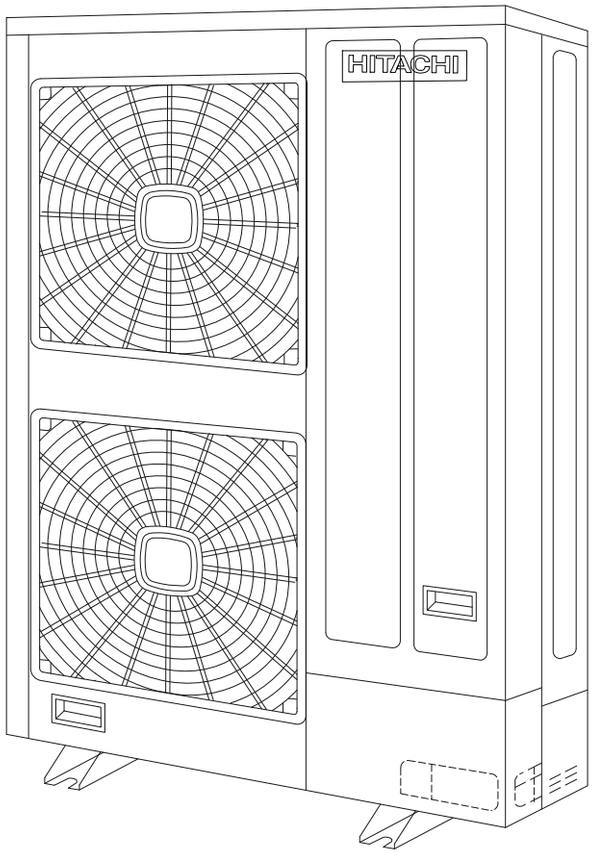
HITACHI

SET FREE FSNM SERIES



Technical Catalogue

RAS-8FSNM
RAS-10FSNM
RAS-12FSNM

Contents

General Index

HITACHI

1. General information

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1.1 General information

1.1.1 General notes

Within the policy of continuous improvement of its products, HITACHI Air Conditioning Products Europe, S.A.U. reserves the right to make changes at any time without prior notification and without being compelled to introducing them into products subsequently sold. This document may therefore have been subject to amendments during the life of the product.

HITACHI makes every effort to offer correct, up-to-date documentation. Despite this, printing errors cannot be controlled by HITACHI and are not its responsibility.

As a result, some of the images or data used to illustrate this document may not refer to specific models. No claims will be accepted based on the data, illustrations and descriptions included in this manual.

No type of modification must be made to the equipment without prior, written authorization from the manufacturer.

1.1.2 Introduction

- The SET FREE air conditioning system is a VRF (Variant Refrigerant Flow) type system that allows multiple indoor units, of different power and model, to be set up with independent control for each of them.
- The Hitachi SET FREE systems offer high efficiency, reliability and comfort, features that make the SET FREE system one of the best on the market.

1.1.3 Environment-friendly units

The new range of HITACHI outdoor units uses environment-friendly R410A gas refrigerant and applies RoHS and Green Dot standards throughout the production and installation process to reflect HITACHI's awareness of environmental respect and commitment.

1.2 Safety

1.2.1 Symbols used

During normal air conditioning system design work or unit installation, greater attention must be paid in certain situations requiring particular care in order to avoid damage to the unit, the installation or the building or property.

Situations that jeopardise the safety of those in the surrounding area or that put the unit itself at risk will be clearly indicated in this manual.

To indicate these situations, a series of special symbols will be used to clearly identify these situations.

Pay close attention to these symbols and to the messages following them, as your safety and that of others depends on it.

DANGER

- ***The text following this symbol contains information and instructions relating directly to your safety and physical wellbeing.***
- ***Not taking these instructions into account could lead to serious, very serious or even fatal injuries to you and others.***

In the texts following the danger symbol you can also find information on safe procedures during unit installation.

CAUTION

- *The text following this symbol contains information and instructions relating directly to your safety and physical wellbeing.*
- *Not taking these instructions into account could lead to minor injuries to you and others.*
- *Not taking these instructions into account could lead to unit damage.*

In the texts following the caution symbol you can also find information on safe procedures during unit installation.

NOTE

- *The text following this symbol contains information or instructions that may be of use or that require a more thorough explanation.*
- *Instructions regarding inspections to be made on unit parts or systems may also be included.*

1.3 Product guide

1.3.1 Classification of outdoor unit models

◆ Outdoor units FSNM series

Unit type (outdoor unit): RAS					
	Position-separating hyphen (fixed)				
		Capacity (HP): 8/10/12 HP			
			FS: SET FREE series		
				N: R410A refrigerant	
					M: Series
XXX	–	XX	FS	N	M

1.3.2 Classification of indoor unit models

Unit type (indoor unit): RCI, RCIM, RCD, RPC, RPI, RPIM, RPK, RPF, RPFI										
	Position-separating hyphen (fixed)									
		Capacity (HP): 0.6, 0.8, 1.0, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 6.0, 8.0, 10.0								
			FS = SYSTEM FREE							
				N = R410A refrigerant						
					H = Hotel (RPK-(0.6-1.5) only)					
						2/3/4 = series				
							P= Pair			
								E = Made in Europe M = Made in Malaysia – = Made in Japan		
									i = Version up (RCI for P-N23NA panel only) k = Version up RCI for P-AP160NA(1/E) panel only	
										(-DU) = Drain Up (RPIM only)
XXX	–	X.X	FS	N	(H)	X	(P)	(X)	(x)	(-DU)

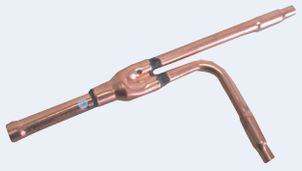
1.3.3 Product guide: Outdoor units

◆ Outdoor units FSNM series

Outdoor Units ❄ ☀	
3N~ 380/415V 50Hz	
RAS-FSNM	
	
Unit	Code
RAS-8FSNM	60288308
RAS-10FSNM	60288309
RAS-12FSNM	60288310

1.3.4 Accessory code list

HITACHI offers a range of different accessories and remote control systems that can be used with the SET FREE outdoor units. Please consult the corresponding Technical Catalogue for controls.

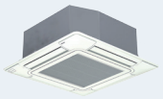
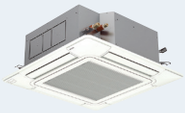
Name	Description	Code	Figure
DBS-26	Drain discharge connection	60299192	
E-102SN4	Line Branch	70524201	
E-162SN4		70524202	
MH-84AN1	Header branch	70522009	
MH-108AN		70522008	

1.3.5 Product line-up: indoor units

NOTE

- *The indoor unit models and codes are the last updated at time of publication; other previous models and coming developments could be available for combination with this outdoor unit series.*
- *Check the exact classification for each unit (model, type, power and series) in "1.3.1 Classification of outdoor unit models".*

◆ RCI and RCIM indoor units

RCI						RCIM	
❄☀							
							
4-way cassette						4-way cassette (compact)	
Unit	Code	Unit	Code	Unit	Code	Unit	Code
						RCIM-0.6FSN4 (*)	60278215
						RCIM-0.8FSN4	60278216
RCI-1.0FSN3Ei	7E403014	RCI-1.0FSN3Ek	7E404001	RCI-1.0FSN3	60278119	RCIM-1.0FSN4	60278217
RCI-1.5FSN3Ei	7E403015	RCI-1.5FSN3Ek	7E404002	RCI-1.5FSN3	60278120	RCIM-1.5FSN4	60278218
RCI-2.0FSN3Ei	7E403016	RCI-2.0FSN3Ek	7E404003	RCI-2.0FSN3	60278121	RCIM-2.0FSN4	60278219
RCI-2.5FSN3Ei	7E403017	RCI-2.5FSN3Ek	7E404004	RCI-2.5FSN3	60278122	RCIM-2.5FSN4	60278220
RCI-3.0FSN3Ei	7E403018	RCI-3.0FSN3Ek	7E404005	RCI-3.0FSN3	60278123		
RCI-4.0FSN3Ei	7E403020	RCI-4.0FSN3Ek	7E404007	RCI-4.0FSN3	60278124		
RCI-5.0FSN3Ei	7E403021	RCI-5.0FSN3Ek	7E404008	RCI-5.0FSN3	60278125		
RCI-6.0FSN3Ei	7E403022	RCI-6.0FSN3Ek	7E404009	RCI-6.0FSN3	60278126		

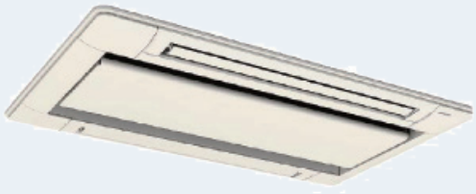
Panels					
RCI				RCIM	
					
P-N23NA	70531000	P-AP160NA1	60297215	P-AP56NAM (without Motion Sensor)	60297297
		P-AP160NAE (With motion sensor)	60297217		

NOTE

- *The RCI and RCIM models must be used in combination with the panels indicated above.*
- *(*): 0.6 HP Indoor Units can only be used in combination with Set Free FSXN1E and FSXNH(E) series.*

◆ RCD and RPC indoor units

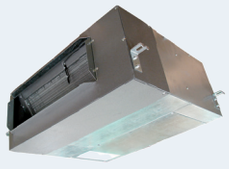
RCD				RPC			
							
2-way cassette				Ceiling type			
Unit	Code	Unit	Code	Unit	Code	Unit	Code
RCD-0.8FSN3	60278242						
RCD-1.0FSN3	60278243						
RCD-1.5FSN3	60278244					RPC-1.5FSN3	60278164
RCD-2.0FSN3	60278245					RPC-2.0FSN3	60278165
RCD-2.5FSN3	60278246					RPC-2.5FSN3	60278166
RCD-3.0FSN3	60278247			RPC-3.0FSN3E	7E443005	RPC-3.0FSN3	60278167
		RCD-4.0FSN3	60278248	RPC-4.0FSN3E	7E443007	RPC-4.0FSN3	60278168
		RCD-5.0FSN3	60278249	RPC-5.0FSN3E	7E443008	RPC-5.0FSN3	60278169
		RCD-6.0FSN3	60278250	RPC-6.0FSN3E	7E443009	RPC-6.0FSN3	60278170

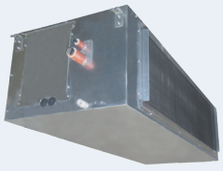
Panels			
RCD			
			
P-AP90DNA	60297300	P-AP160DNA	60297301

NOTE

The RCD models must be used in combination with the panels indicated above.

◆ RPI and RPIM indoor units

RPI				RPIM	
❄ ☀					
					
Indoor ducted unit				Indoor ducted unit (compact)	
Unit	Code	Unit	Code	Unit	Code
RPI-0.6FSN4E (*)	7E424037			RPIM-0.6FSN4E (*)	7E430037
				RPIM-0.6FSN4E-DU (*)	7E431037
RPI-0.8FSN4E	7E424013			RPIM-0.8FSN4E	7E430013
				RPIM-0.8FSN4E -DU	7E431013
RPI-1.0FSN4E	7E424014			RPIM-1.0FSN4E	7E430014
				RPIM-1.0FSN4E -DU	7E431014
RPI-1.5FSN4E	7E424015			RPIM-1.5FSN4E	7E430015
				RPIM-1.5FSN4E -DU	7E431015
		RPI-2.0FSN4E	7E424016		
		RPI-2.5FSN4E	7E424017		
		RPI-3.0FSN4E	7E424018		
		RPI-4.0FSN4E	7E424020		
		RPI-5.0FSN4E	7E424021		
		RPI-6.0FSN4E	7E424022		

RPI							
❄ ☀							
							
Indoor ducted unit							
Unit	Code	Unit	Code	Unit	Code	Unit	Code
RPI-8.0FSN3E	7E424010	RPI-8.0FSN3E-f	7E424410 (**)				
RPI-10.0FSN3E	7E424011	RPI-10.0FSN3E-f	7E424411 (**)				
				RPI-16.0FSN3PE	7E425038 (**)	RPI-16.0FSN3PE-f	7E425438 (**)
				RPI-20.0FSN3PE	7E425039 (**)	RPI-20.0FSN3PE-f	7E425439 (**)

NOTE

- *(*): 0.6 HP Indoor Units can only be used in combination with Set Free FSXN1E and FSXNH(E) series.*
- *(**): RPI-FSN3PE(-f) can only be used in combination with Set Free FSXN1E and FSXNH(E) series.*

◆ RPK, RPF and RPFI indoor units

RPK		RPF		RPFI	
		❄☀			
					
Wall type		Floor type		Floor concealed type	
Unit	Code	Unit	Code	Unit	Code
RPK-0.6FSN3M (*)	60278145				
RPK-0.6FSNH3M (*)	60278153				
RPK-0.8FSN3M	60278146				
RPK-0.8FSNH3M	60278154				
RPK-1.0FSN3M	60278147				
RPK-1.0FSNH3M	60278155	RPF-1.0FSN2E	7E450001	RPFI-1.0FSN2E	7E460001
RPK-1.5FSN3M	60278148				
RPK-1.5FSNH3M	60278156	RPF-1.5FSN2E	7E450002	RPFI-1.5FSN2E	7E460002
RPK-2.0FSN3M	60278149	RPF-2.0FSN2E	7E450003	RPFI-2.0FSN2E	7E460003
RPK-2.5FSN3M	60278150	RPF-2.5FSN2E	7E450004	RPFI-2.5FSN2E	7E460004
RPK-3.0FSN3M	60278151				
RPK-4.0FSN3M	60278152				

Expansion valve kit [1]	
EV-1.5N1[1]	60921791

NOTE

- *(*) 0.6 HP Indoor Units can only be used in combination with Set Free FSXN1E and FSXNH(E) series*
- *[1] For RPK-(0.6-1.5)FSNH3M models only.*

1.3.6 Product line-up: KPI energy / heat recovery unit

KPI			
			
Energy recovery		Active (Energy Recovery+DX section)	
Unit	Code	Unit	Code
KPI-252E4E	70603000		
KPI-502E4E	70603001	KPI-502X4E	70603201
KPI-802E4E	70603002	KPI-802X4E	70603202
KPI-1002E4E	70603003	KPI-1002X4E	70603203
KPI-1502E4E	70603004		
KPI-2002E4E	70603005		

1.3.7 Product line-up: DX-Interface

DX-Interface		
 Control box  Expansion valve box	Unit	Code
	EXV-2.0E2	7E611000
	EXV-2.5E2	7E611001
	EXV-3.0E2	7E611002
	EXV-4.0E2	7E611003
	EXV-5.0E2	7E611004
	EXV-6.0E2	7E611005
	EXV-8.0E2	7E611006
	EXV-10.0E2	7E611007

1.3.8 Product line-up: Econofresh

◆ Econofresh kit

Econofresh	
	
Unit	Code
EF-456NE	7E560000

NOTE

The EF-456NE unit can only be installed in combination with the following units (Sales from April 2014):

- *RPI-4.0FSN4E (7E724020)*
- *RPI-5.0FSN4E (7E724021)*
- *RPI-6.0FSN4E (7E724022)*

2. Features and benefits

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2.1 Benefits of the choice

- The SET FREE air-conditioning system incorporates a set of technical benefits that make it one of the most attractive on the market.
- Right from the selection of the ideal type of equipment in each case, up to its maintenance, and through installation, start up and operation, SET FREE always provides the best solution for every user, and greatly simplifies and eases the user's selection process.

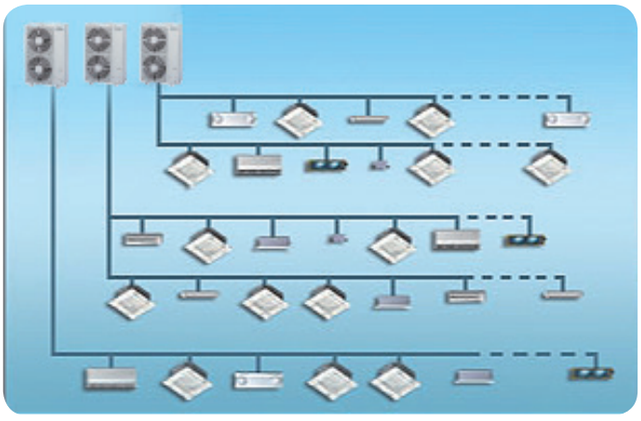


Diagram showing the multiple combinations of a SET FREE FSNM System

- HITACHI offers the same type of indoor unit, the SYSTEM FREE system. Until now each range of outdoor units had its own indoor units. SYSTEM FREE allows users to design a system without having to think what kind of indoor units are needed for it.
- Another benefit of this system is that it allows better stock control and optimizes the number of references. Thanks to this, both installers and distributors obtain a significant reduction in stock and storage costs.
- HITACHI proudly introduces the new SET FREE FSNM series, the highly-efficient and reliable air conditioning system. Recently increased numbers of buildings are requiring "intelligent" facilities communication networks, office automation, including a comfortable environment. Particularly, comfortable space is required all the day through the year in office buildings.
  This multi-split system air conditioner, SET-FREE FSNM can meet these requirements. The proven combination of the scroll compressor and the inverter provides the best air conditioning for small/medium office buildings.
- The SET FREE FSNM series integrates the compactness and lightness of a multi-split air conditioning system (with multiple indoor units) and the user-friendliness of the SET FREE series.

2.1.1 Advantages of SET FREE FSNM Series

- Provided in a compact body, but allows installation conditions comparable with those of a high-performance muti-split air conditioning system.
- The compact and light body facilitates delivery and installation.
- The adoption of a slim body improves flexibility in mounting, enabling installation in a small space or a formerly dead space.
- The new HITACHI Set Free SIDE FLOW RAS-FSNM series line-up is ready for full certification within the framework of the new EUROVENT certification program for VRF-type units..

EUROVENT CERTIFIED PERFORMANCE
www.eurovent-certification.com

EUROVENT certification program for VRF units is based on the certification of the outdoor unit performance, taking into consideration the cooling and heating capacities and efficiencies (EER/COP), as well as the sound power.

2.1.2 Range of accessories

All the outdoor units have a range of accessories that facilitate installation, operation and maintenance.

These accessories are designed to adapt the unit to the type of installation that the air conditioning system requires and improve its performance, always bearing in mind the quality parameters required.

The range of accessories includes:

- Remote controls, for handling and managing the operation of the installation.
- Pipe Connection Kit, for pipe branches connection of outdoor units.
- Multikits and distributors for pipe branches connection of indoor units.
- Drainage pipes, to collect the condensation and then channel it.

2.1.3 Remote control range

HITACHI has a range of remote control systems that are classified according to the type of management and the number of units they manage:

- Individual remote control
- Centralized remote control
- Building air conditioning control (CS-NET WEB / CSNET Manager).
- BMS (Building Management Systems).

◆ Individual remote control

The individual remote control systems, whether they are wireless or connected directly by cable, have a wide range of functions for easier unit management, the programming of specific settings or the identification of incidents. Recommended for managing a small number of units.

◆ Centralized remote control

The centralized remote control systems combine the functions of the remote controls and extend the management and setting possibilities for several air conditioning systems distributed around the entire floor of a building.

◆ Building air conditioning control

Computerized control systems increase management and setting possibilities and allow this to be carried out from any point of the local communication network, by means of a two-core non-polarity cable or even using the Internet.

Recommended when you wish to independently manage more than two plants in one building.

◆ BMS (Building Management System)

Integration into installations with intelligent management. Gateway interface with Lonworks, KNX, MODBUS and BACnet BMS systems.

2.1.4 Flexibility of the system

◆ Large variety of options in the standard commands

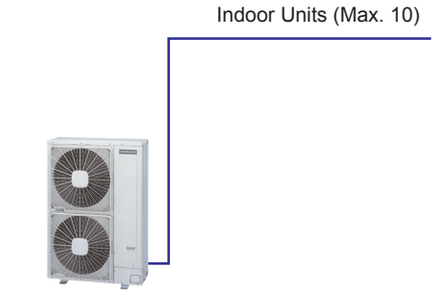
SET FREE units have a great number of standard commands. These options can be easily configured by means of any of the wide variety of HITACHI remote-control switches, or through the PCBs of the indoor and outdoor units. In this way the SET FREE system adapts to each installation.

◆ Able to connect one outdoor unit up to 10 indoor units

Utilizing an inverter control, a wide range of operation capacity control is also available. A maximum total combination horsepower of 130% and a minimum total combination horsepower of 50% can be chosen by combination of the indoor units when compared with the nominal outdoor unit capacity. Therefore, the new system can meet individual air conditioning requirements in most office buildings.

Outdoor unit model	Minimum capacity of connectable indoor unit	Maximum recommended number of connectable indoor units (only for 0.8 and 1.0 indoor units) (*)	Maximum number of connectable indoor units (This number of units is the sum of the installed RPK and all other indoor units)	RPK-FSNH3M restrictions (Maximum number of combinable RPK-FSNH3M indoor unis with expansion valve kit EV-1.5N1)	Capacity range of combination
RAS-8FSNM	0.8 HP (2.2kW)	8	10	8	50% to 130%
RAS-10FSNM					
RAS-12FSNM					

(*) The maximum recommended number is 8 units. If more than 8 units are connected, cold draft may noticed in heating operation.



RAS-(8-12)FSNM

2.1.5 Availability of Hi-Tool Kit selection software

◆ Assistant for air conditioning installation design and Seasonal Efficiency calculation

Current Hi-ToolKit Selection Software for design assistance

The Hi-Tool Kit selection software is a tool for HVAC installations design, generating automatically all necessary information to complete the installation specifications.

Available installation information:

- Product selection from the extensive HITACHI Line-up.
- Cooling and wiring diagram according to the installation design.
- Full list of necessary products to complete the installation.
- Installation start-up management.

◆ New selection software for Seasonal Efficiency calculation

Hi-ToolKit for Business is Hitachi software that has been specifically developed to assist professionals involved in planning the installation of air conditioning systems in non-residential buildings.

In just a few clicks, this new software allows you to quickly and confidently select a Hitachi system from the UTOPIA or SET FREE range. Hi-ToolKit for Business is a genuine consultation tool that can be used to carry out system simulation, aiming to evaluate their efficiency under particular conditions.

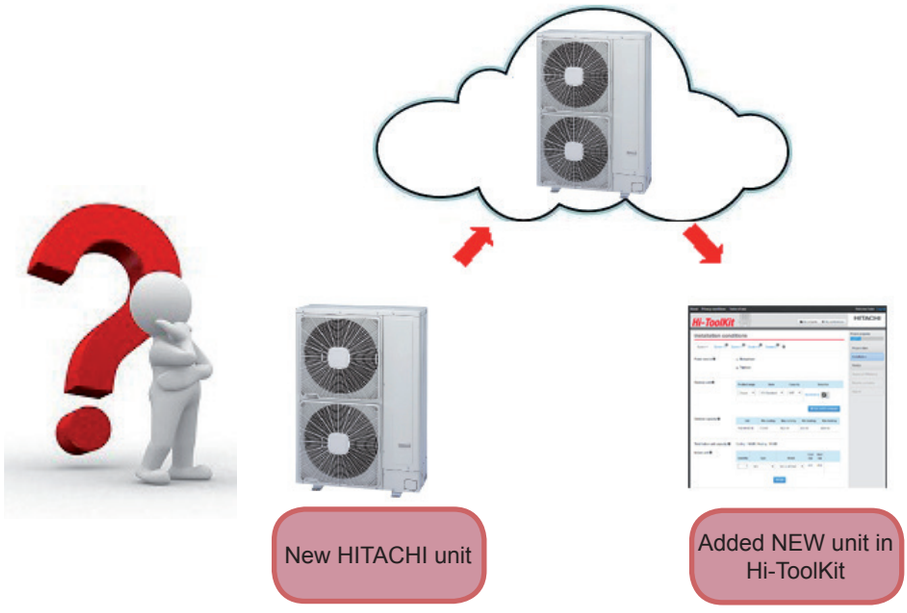
With Hi-ToolKit for Business, you can be safe in the knowledge you will select the correct commercial equipment.

Access to HI-Toolkit for Business

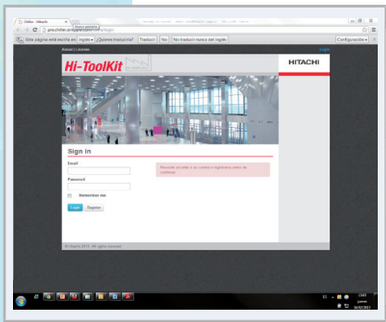
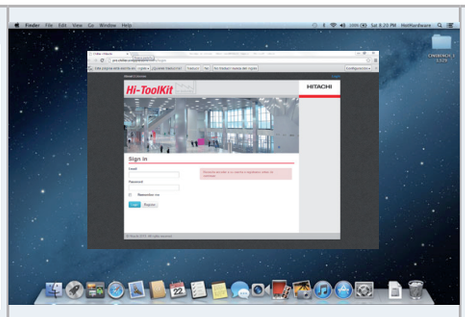
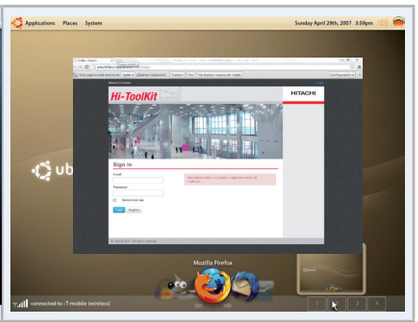
Online web version

Being web-based, the online version web tool provides the user a lot of benefits thanks to its flexible and simple structure:

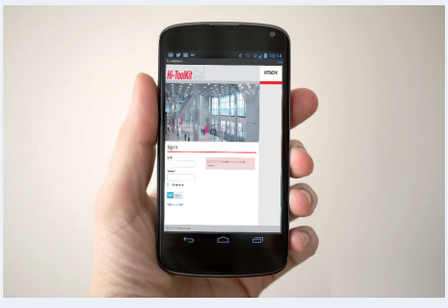
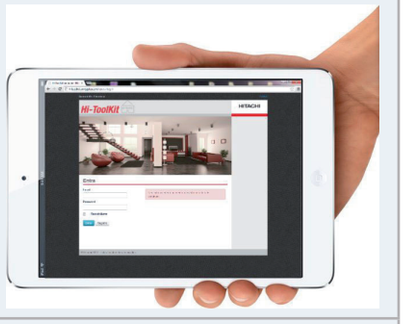
- The user always uses the latest version of selection software



- Accessible from all operating systems (Win, MacOS, Linux) at the beginning.

		
Windows	MacOS	Linux

- Accessible from all hardware platforms (PC, Smartphone, Tablets) at once (*)

		
PC (Windows, MAC, Linux)	Smartphone	Tablets

- All projects from the user are available in the cloud (*)

At the workplace

Anywhere

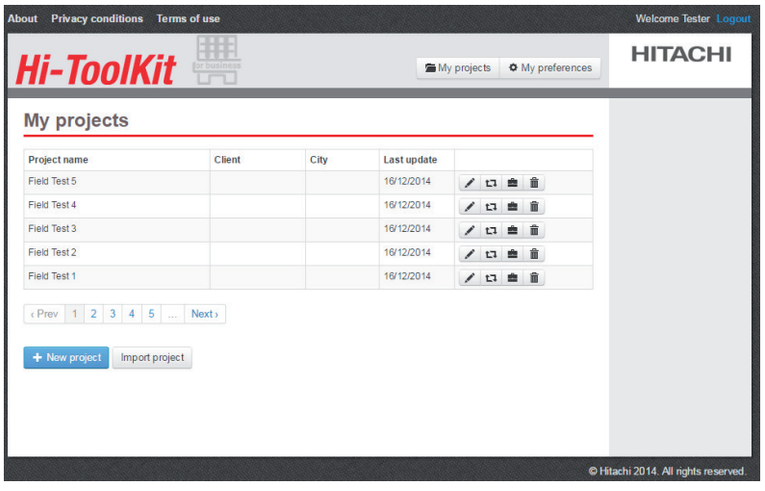
At home

All projects in your user account

With the new Hi-ToolKit for Business, the user has all their projects in their account, accessible from anywhere.

The user has the ability to:

- Create new project
- Edit project
- Copy project
- Export project
- Import project
- Delete project
- See selected units in project
- Print a report of project

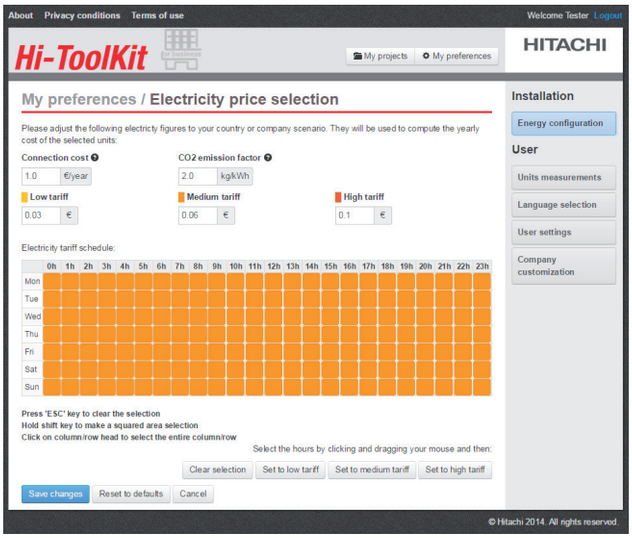


Easy and friendly user configuration

The “My Preferences” screen consists of several options, to define several settings that apply to all Hi-ToolKit for Business projects.

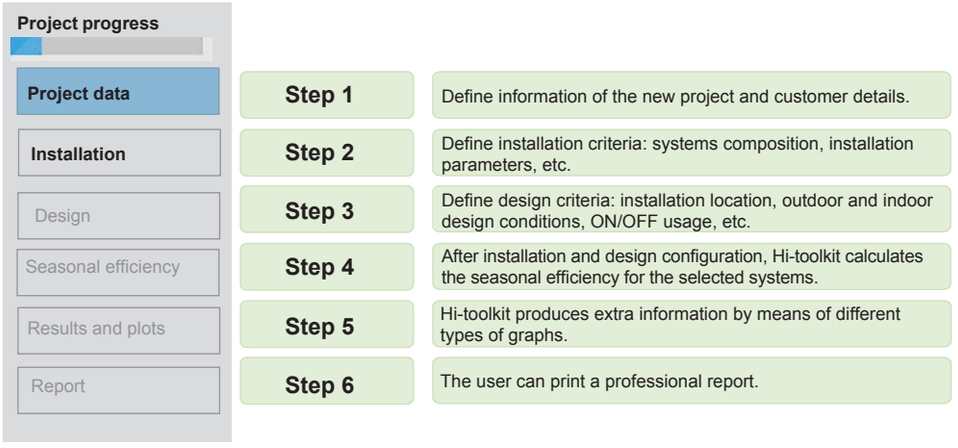
“My Preferences” is divided in two parts:

- Installation Preferences: All options related with installation issues like energy configuration.
- User Preferences: All options related with user settings, such as the change of units of measurement, software language, etc…



Easy, faster and friendly project creation

In only 6 steps, the user can create the report of the selected units for the installation. The user can always see the progress of the project on the menu at the side of the screen.



Exhaustive comparison and selection

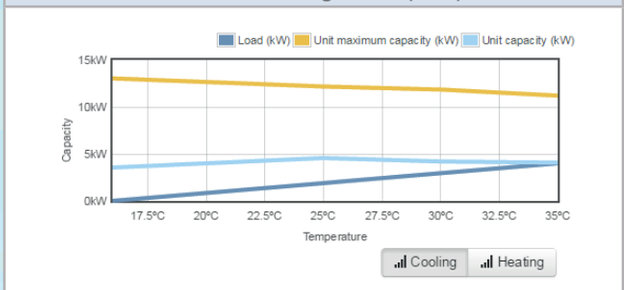
Hi-ToolKit can compare between different outdoors for a specified group of indoors, making great comparison between the outdoors, making easy to select the suitable one.

Hi-ToolKit calculates for each system the seasonal performance for cooling and heating with the related operating costs.

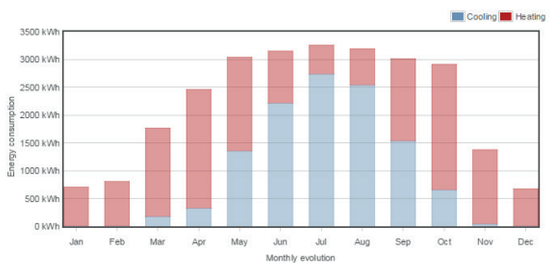
Detailed information with graphs

When the user selects the system, Hi-ToolKit produces extra information with different kinds of graphs and explanations:

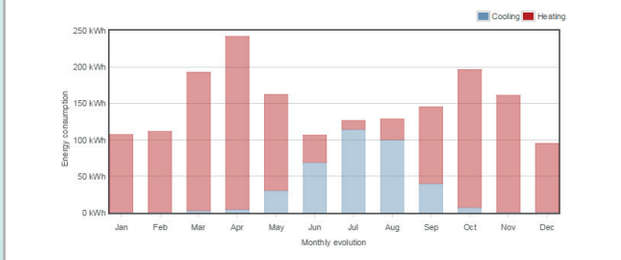
Part load unit regulation (kWh)



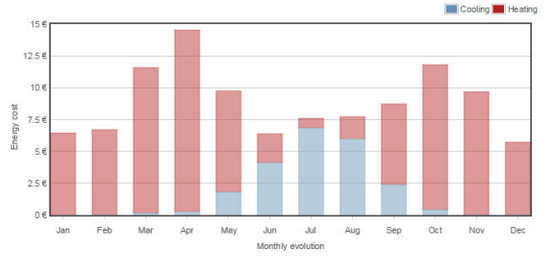
Annual Capacity (kWh)



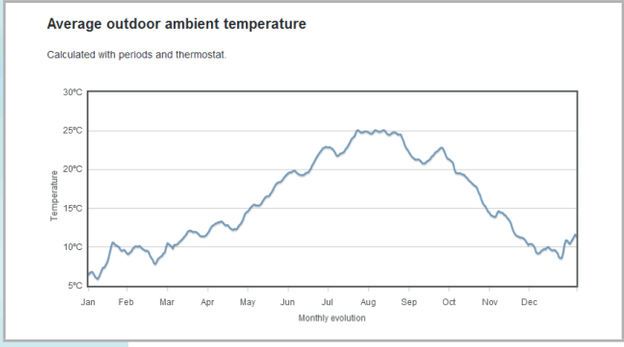
Annual Power consumption (kWh)



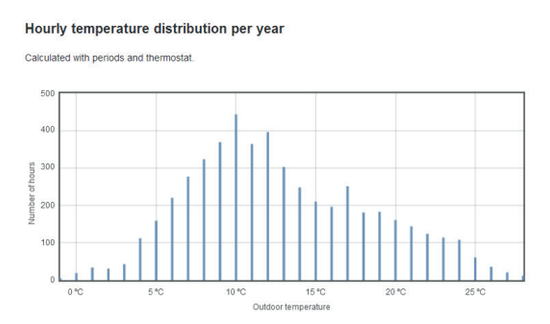
Monthly Energy Cost (€)



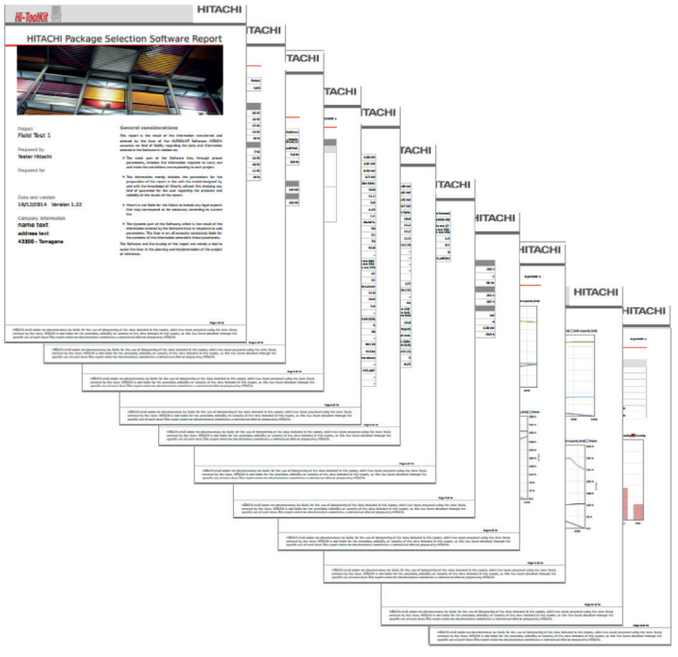
Average outdoor ambient temperature (ºC)



Hourly temperature distribution per year (hours)



Professional report

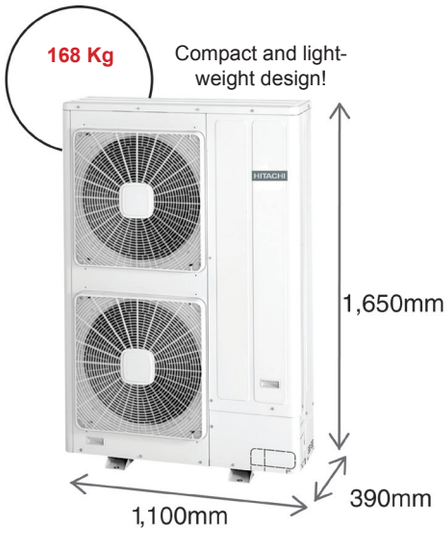


2.2 Installation advantages

2.2.1 Top-class compact and light-weight design

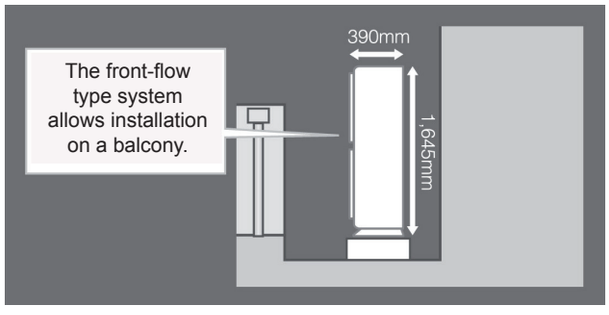
- The compact design greatly improves flexibility in installation.

Facilitation and flexibility at installation are further advanced by adopting light-weight and compact design outdoor units.

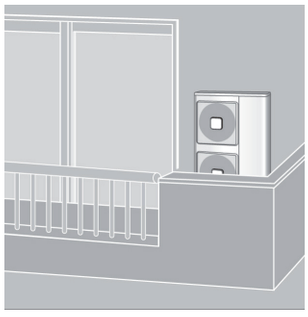


Side Flow type (28.0kW)

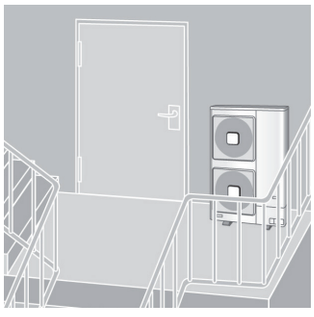
- With a width of only 390 mm, the SET FREE FSNM can be installed on a staircase landing or balcony on each floor.



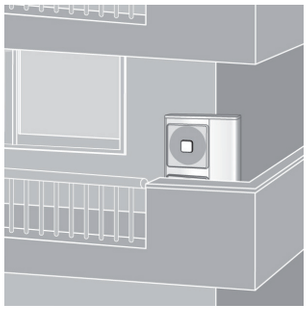
- Space saving installation, the front-flow type system allows installation under the eaves.



Balcony



Landing of outdoor staircase

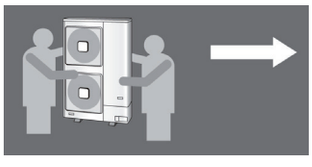


Under balcony eaves

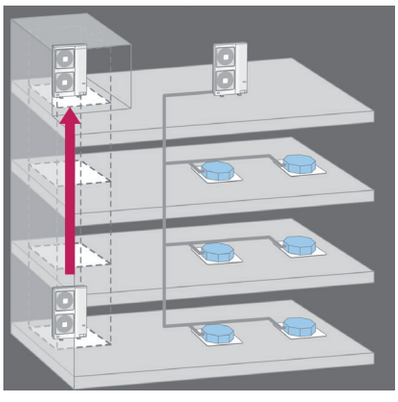
2.2.2 Greater convenience during delivery and installation

- With its light and compact body, the SET FREE FSNM can be easily carried in the elevator even in a small urban site.
- No cranes required for delivery

- The unit can be carried at one time. Elevators can be used for delivery



Light and compact body facilitates renewal



2.2.3 Expanded installation flexibility

◆ Flexible installation

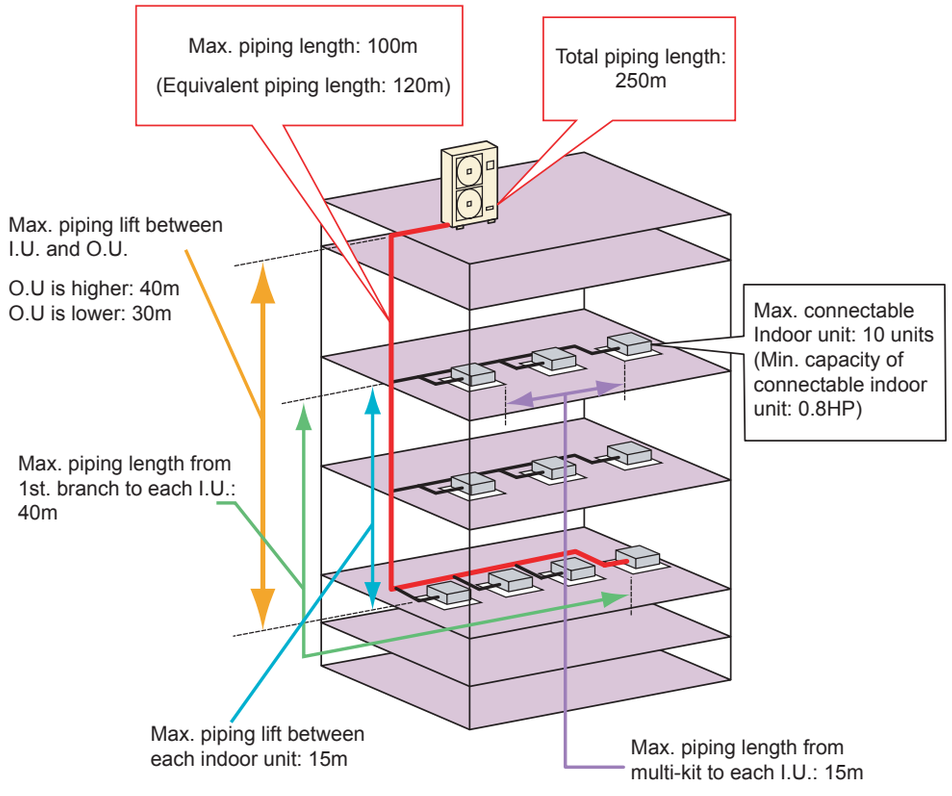
Flexible design and installation is available for this compact type unit.

- Maximum Connectable Number of Indoor Units : 10 Units
- Minimum Capacity of Connectable Indoor Unit: 0.8HP(*1)

(Combined Capacity Ratio: 50-130%

(*1): If only the indoor units 0.8 or 1.0HP are connected, recommended maximum connectable number is 8. If more than 8, perception of cold draft may occur at the heating operation.

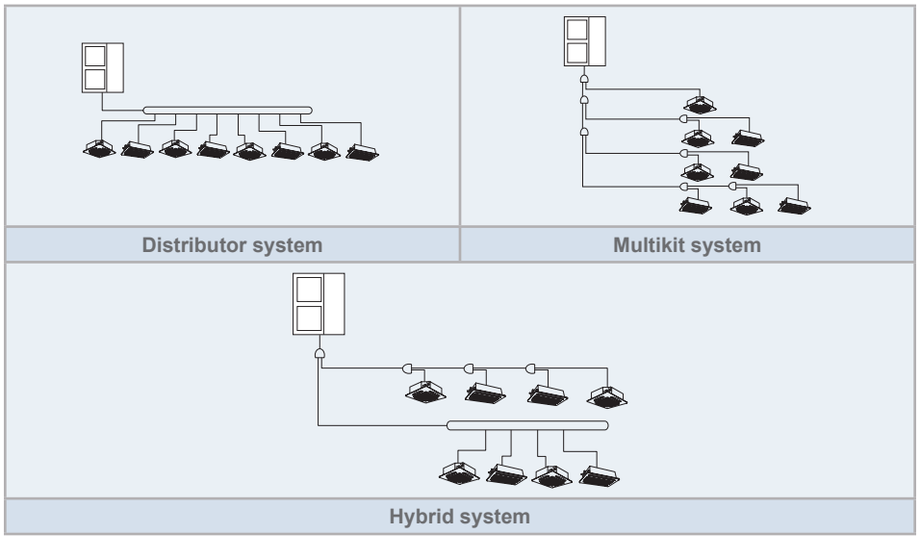
- Total Piping Length: 250m (Maximum Piping Length: 100m)



◆ Flexible installation. Multikits and distributors

Able to establish air conditioning systems for various requirements. In case of outdoor unit is installed higher than indoor units, maximum piping length is 100 meters and maximum lift between outdoor unit and indoor units is 40 meters.
If outdoor unit is installed lower than indoor unit, maximum lift between outdoor unit and indoor unit is 30 meters. A maximum lift between each indoor unit is 15 meters, which is almost equivalent to a 4 floor height.

Hitachi provides all the accessories required for mounting the piping system, such as multikits and distributors. Hybrid installations can be applied between multikits and distributors, which makes the installation more flexible and greatly simplifies the problems that using a rigid system can create.



NOTE

For additional information concerning the multiple connection kits that Hitachi offers, refer to chapter "9. Piping work and refrigerant charge".

◆ Multiple capacity control

To effectively operate the indoor units, the most appropriate refrigerant flow volume is controlled by the number of operating indoor units.

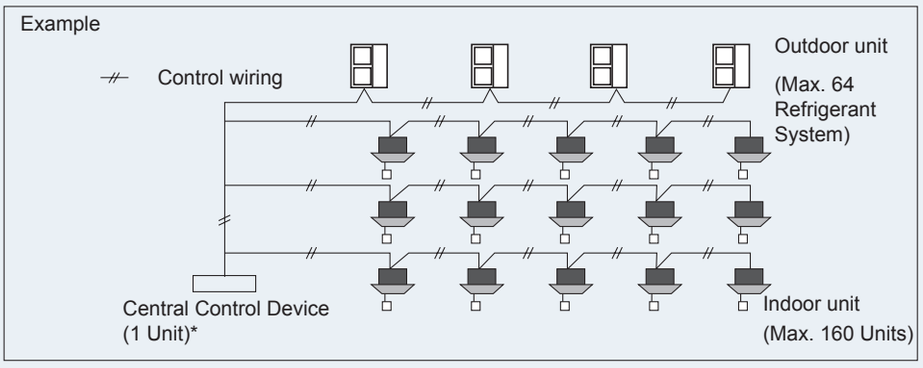
By sensing the air temperature difference between the inlet and outlet of the indoor unit, the electronic expansion opening is controlled to supply the most appropriate refrigerant flow volume. All units can be operated according to their separate operating conditions.

The new control method allows a height difference of up to 15 meters (close o 4-floor height) between indoor units, resulting in improved flexibility of installation.

2.2.4 Easy and Flexible Electrical Installation

◆ Corresponding to H-LINK II System

This SET FREE FSNM series outdoor units corresponds to the new H-LINK II transmission system improved from current H-LINK system. Maximum 64 refrigerant systems and maximum 160 indoor units are available to control by only one central control device when the equipments (central control device, indoor units, remote control switch) in the same transmission system are all corresponding to H-LINK II.



* The above example shows the case that central control device, indoor units and remote control switch are all corresponding to H-LINK II system

NOTE

- *The use of the H-LINK II system requires the setting of DIP switches. If the DIP switches are not set correctly, an alarm may occur due to transmission failure.*
- *Total wiring length for individual and central controllers can be extended up to 500 m. Use the 2P extension cable PRC-(10/15/20/30) E1 when these cables need to be extended up to more than 30 m. If total wiring length is less than 30 m, then normal wires (0.3 mm² section) can be used.*
- *The maximum H-LINK II electrical wiring length can be extended from 1,000 meters up to 5,000 meters by using four PSC-5HR devices as a maximum. Each PSC-5HR device allows an extra H-LINK wiring length of 1,000 meters.*
- *The H-LINK II system provides outstanding flexibility for system design; installation is easy, and total costs are reduced. Furthermore, it can be centrally controlled by connecting Building AC control systems (CSNET WEB or CSNET Manager) which can control installations with a high number of indoor units distributed through several floors which need to be separately controlled:*
  - *CSNET WEB is a good option when there is a computer in the installation with centralised control. In this case, connecting the PSC-A160WEB1 hardware only, it is possible to have access to all the installation parameters from the computer.*
  - *CSNET Manager is a good solution when there is no a computer in the installation with centralised control. In this case, with the use of its H-LINK gateway (HC-A64NET), all the installation parameters can be easily accessible through the touch screen.*
- *The installation can also be controlled via Internet by CSNET WEB or CSNET Manager.*

◆ Compare with H-LINK System

Item	H-LINK	H-LINK II
Number of Max. Refrigerant Group / System	16	64
Address Setting Range of Indoor Units / Refrigerant Group	0 to 15	0 to 63
Number of Max. Indoor Unit / System	128	160
Total Devices Quantity in the same H-LINK	145	200
Max. Wiring Length	Total 1,000m (5,000m*)	

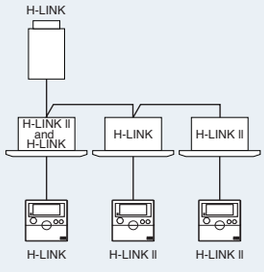
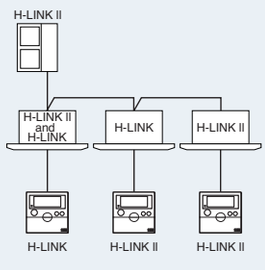
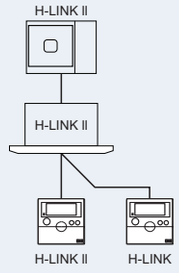
*: In case four units of PSC-5HR is used.

◆ The Mixture of H-LINK and H-LINK II

H-LINK II corresponding models can be mixed with H-LINK corresponding models in the same system without any adaptor.

Control System Device	Outdoor Unit Indoor Unit	One H-LINK II System	
		Outdoor Unit (Number of refrigerant group)	Indoor Unit
H-LINK II	H-LINK II	64	160
	H-LINK II / H-LINK Mixed	64 *1)	128
H-LINK	H-LINK II	16	128
	H-LINK II / H-LINK Mixed	16	128

- **1) The maximum 16 refrigerant groups are available in one H-LINK system under the following conditions.*
- ** The outdoor unit corresponding to H-LINK*
- ** The outdoor unit corresponding to H-LINK II connected with the indoor unit corresponding to H-LINK.*
- *More than 17 indoor units are available to connect with one outdoor unit depending on the outdoor unit capacity. In that case, two refrigerant groups are required for one outdoor unit.*
- **2) Refer to the next page for the control function when usage models are H-LINK II mixed with H-LINK.*

System Configuration	Outdoor Unit: H-LINK Indoor Unit: H-LINK II and H-LINK Remote Control Switch: H-LINK II and H-LINK			Outdoor Unit: H-LINK II Indoor Unit: H-LINK II and H-LINK Remote Control Switch: H-LINK II and H-LINK			Outdoor Unit: H-LINK II Indoor Unit: H-LINK II Remote Control Switch: H-LINK II and H-LINK	
Outdoor Unit Indoor Unit Remote Control Switch								
Setting Range of Refrigerant Group *1)	0 to 15			0 to 15			0 to 15	
Setting Range of Address *1)	0 to 15	0 to 15	0 to 15	0 to 15	0 to 15	0 to 63	0 to 15	0 to 15
Crossoverless of Remote Control Wiring *2)	X	X	X	X	X	X	X	X
Automatic Reset of Setting Temperature *4)	X	●	●	X	●	●	●	X
Operation Lock *4)	X	●	●	X	●	●	●	X
Limitation of Setting Temperature Range *5)	X	●	●	X	●	●	●	X
ON / OFF Timer Setting (72Hr.) *4)	X	●	●	X	●	●	●	X
Elevating Panel Position Setting *4)	X	X	●	X	X	●	X	X
Different Operation Mode Indication *5)	X	X	●	X	X	●	X	X
Indoor Unit Hot-Start Indication *5)	X	X	●	X	X	●	X	X
Change of Indoor Unit Refrigerant Group Number and Address *4)	X	X	●	X	X	●	X	X
Outdoor Unit Comp. Pre-heating Indication / Cancel *4)	X	X	X	X	X	●	X	X
Indoor Temperature Control for Energy Saving *3)	X	X	X	X	X	●	X	X
Emergency Operation from Remote Control Switch *6)	X	X	X	X	X	●	X	X

**1) The range of ref. group setting and address setting is 0 to 15 when H-LINK corresponding central controller is used.*

**2) Only for Inverter UTOPIA type at indoor unit simultaneous operation.*

**3) Only for Inverter UTOPIA type.*

**4) These functions can be set by wired remote control switch (PC-ART / PC-ARF) only.*

**5) These functions can be set by wired remote control switch (PC-ART / PC-ARF) and half size remote control switch (PC-ARH) only.*

**6) This function is not available depending on the outdoor unit type.*

2.2.5 Easy and Flexible Control Connection (Central Station, Interface BMS, CSNET WEB)

◆ No Polarity

Thanks to the absence of polarity, any centralized control can be connected directly to the H-LINK II bus, which means that special lines are not needed.

◆ Auto-Configuration

Aside from the customized configuration, the control systems are also auto-configurable; for example, they have the capacity of interpreting the type of machine they are connected to, and detecting the type of indoor unit or its power.

2.3 Start-up Benefits

2.3.1 Automatic Start-up Test

◆ Test Run

The automatic test run can be activated through outdoor unit DIP switch or indoor unit remote control switch. The outdoor unit 7-segment display gives all the necessary information to verify the correct operation of the system.

- Connected Outdoor Units Identification system: Using a remote control switch, you can confirm what series the operational outdoor units belong to (e.g. single or multiple).
- Automatic identification of each indoor unit. They can also be manually assigned using the unit's DIP rotating switch.

◆ Test Run from the Remote Control Switch

Using the remote control, 3 operations can be run.

- Auto-diagnostic: Quick check of the operating conditions of the indoor units and the outdoor unit.
- Data memory query: If an abnormality occurs, the LCD remote control switch shows an alarm code and save all the operation settings of the unit at the time the fault occurs, so that a quick diagnosis can be made of the installation.
- Optional Function Setting: The remote control switch allows cancellation of the 4-degree offset in the heating mode and an increase in the fan speed setting, among 29 possible options.
  This way, multiple indoor units can be set at the same time. Also, the configuration can easily be changed, even after the installation has been completed.

◆ Test Run Procedure from the Outdoor Unit

The outdoor unit PCB is equipped with a 7-segment screen, which depending on the position of the PSWs shows the following parameters in sequence

- Outdoor air temperature
- Discharge gas temperature
- Evaporation temperature in heating mode
- Condensing temperature
- Discharge pressure
- Compressor run time
- Suction pressure

This allows quick and accurate diagnosis of the installation during normal operation or test run.

2.3.2 Service check

◆ Hitachi Service Tools

Hitachi also has a powerful IT tool, Hitachi Service Tools. This software can be run from any lap-top computer through an interface connected to the H-LINK II bus, and it can collect several parameters that have an influence on the unit's performance. These parameters can also be monitored in different formats, allowing incidents during start-up to be located quickly.

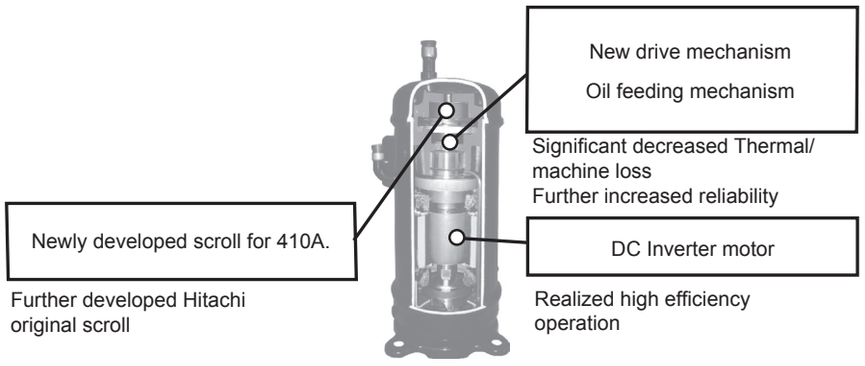
2.4 Functional Benefits

2.4.1 Energy saving

The industry-leading COP is achieved by adopting the following new technologies:

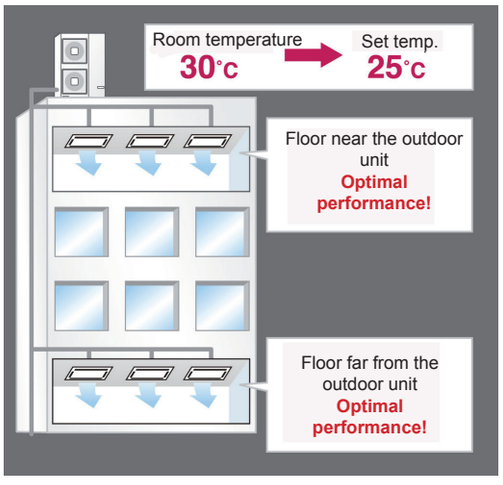
◆ High efficiency DC Inverter compressor

- Energy saving by DC Inverter and new drive mechanism
- 50% weight reduction by compact design



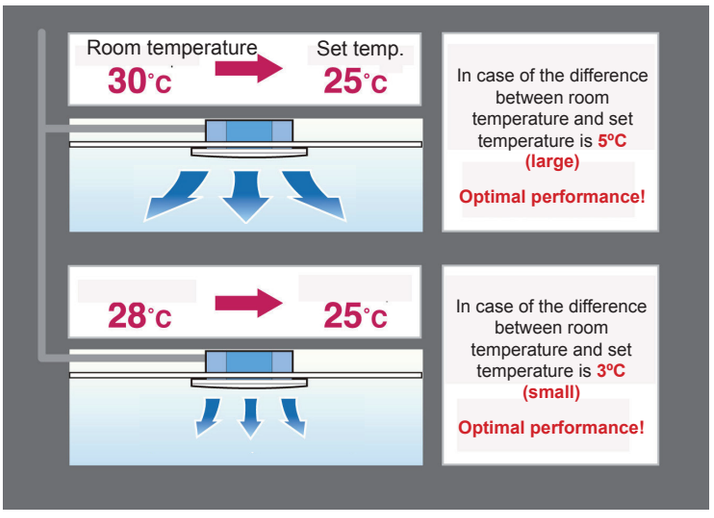
◆ Smart balance control

The performance is the same regardless of the length of the refrigerant pipe.



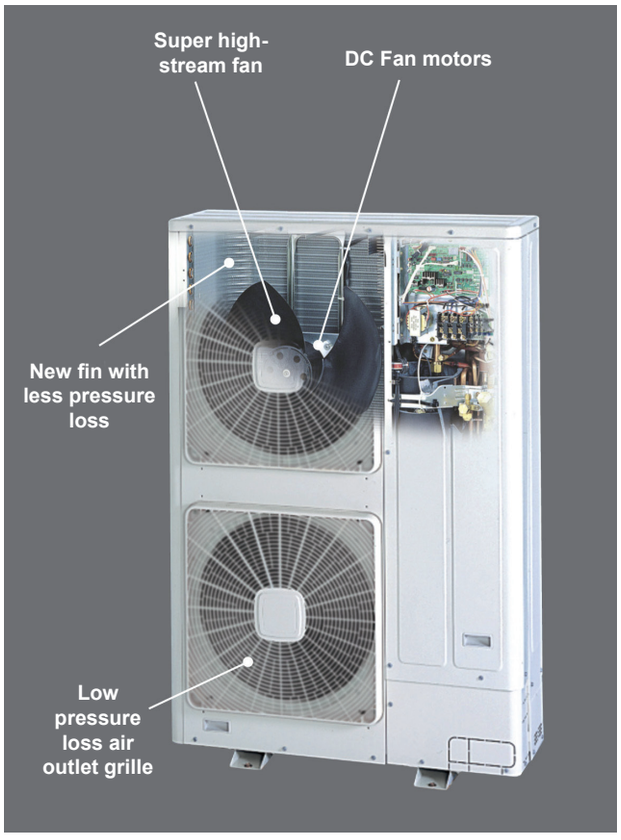
Quickly senses air temperature difference to demonstrate proper performance.

Energy-saving operation without loss realized.



2.4.2 Low noise technologies

DC Fan motor, super high-stream fan, low pressure loss fan guard. The industry-leading low noise outdoor unit is realized by adopting the new model fin with low pressure loss.

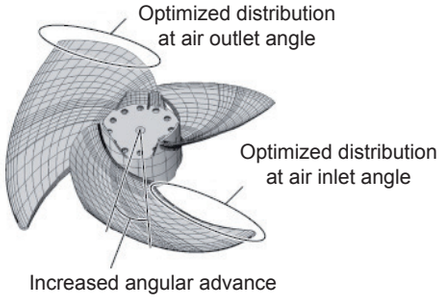


◆ DC fan motor

The smooth rotating fan motor with low vibration reduces the noise generation.

◆ Super high-stream fan

Super high-stream fan of Ø544 mm cuts down the noise.

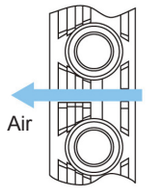


◆ Low pressure loss air outlet grille

The rib structure synchronized with rotation flow from the fan reduces the air resistance at the air outlet grille.

◆ New fin with low pressure loss

The draft resistance is reduced by 20%. Both high-efficiency and low noise operation are simultaneously satisfied.



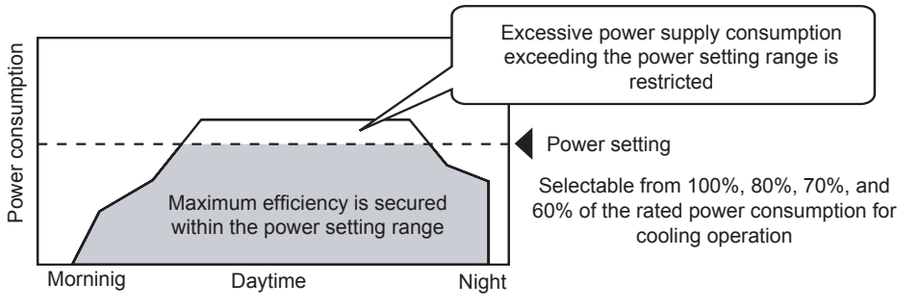
◆ Lower sound operation during night time

Through computer simulation of fluid turbulence which is the main source of unwanted noise, and by visual observation of fluid flow, operation sound has been thoroughly analysed.
By improvement of the cabinet structure and fan shape, and by the adoption of a new material and inverter, operation sound has been reduced.
Friendly to people and the environment alike, a low sound operation design has been obtained.

2.4.3 New functions

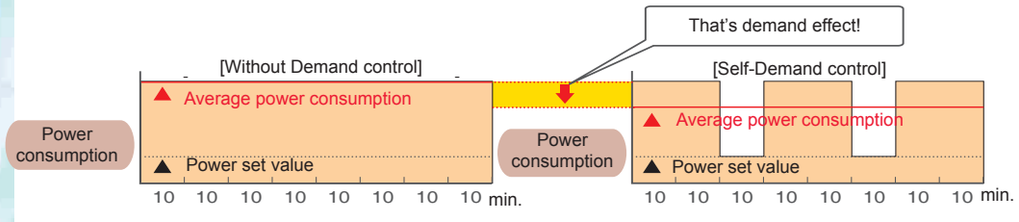
◆ Self-Demand Control

A newly developed self-demand function has largely improved energy-saving effects. Since the current is self-detected and demand control performed automatically, no signal wiring work is required. Conventional demand control using demand signals is also available, and you can select various operations as required.



◆ Wave-mode

Wave mode equipped to turn demand control ON and OFF alternately at intervals of about 20 min. or 10 min. While power is saved without fail, temperature changes are also minimized to maintain a comfortable room temperature.



◆ Protection for cold draft at cooling operation

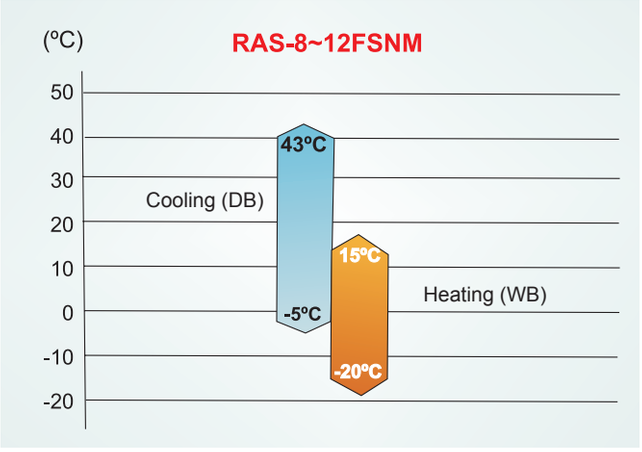
This function is to protect the cold draft while cooling operation at intermediate season or low temperature. This function provides comfortable air conditioning.

2.4.4 Temperature Range

◆ Wide working range

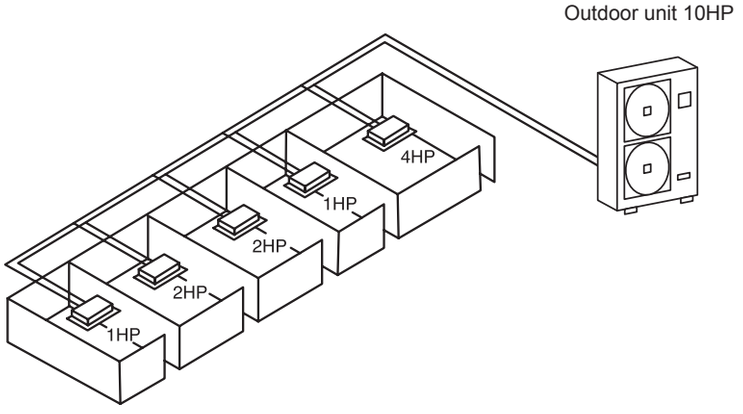
SET FREE FSNM can handle a wide range of outside air conditions, this extending the flexibility of installation space and climatic environment.

The optimized refrigerant cycle makes it possible to work with temperatures of up to -5 ºC in cooling mode.



◆ Precise control with the wide range inverter

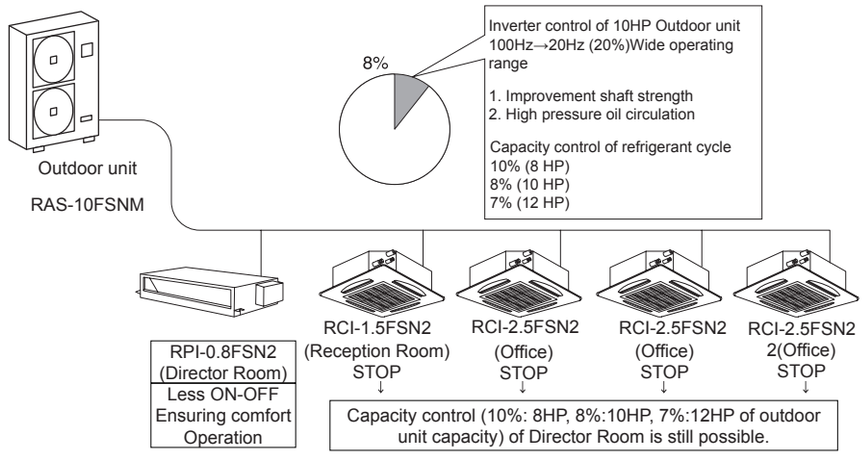
The compressor speed for FSNM series outdoor unit is controlled within a wide range of from 20Hz to 100Hz. Therefore, smooth operation is available without frequently using the ON/OFF control. This new wide range capacity control can meet not only the needs of a wide space but also a small space such as guest rooms and management rooms. Defrosting operation can be quickly performed because of a high compressor speed.



2.4.5 Electronic capacity control

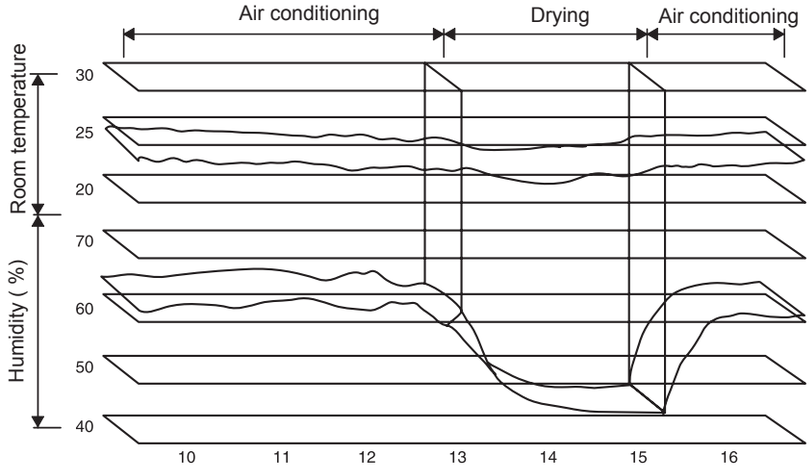
The capacity of the 8 to 12HP outdoor unit is continuously controlled by the inverter from 20% to 100%. This wide working range has been obtained by the improvement of shaft strength and high pressure oil circulation in the scroll compressor. Therefore, an air conditioning system where heat load is greatly changed through the day is easily catered for.

Also, the capacity of each indoor unit is controlled by detecting the inlet and outlet temperatures using an electronic expansion valve. Therefore even a small room down to a 0.8HP indoor unit can be air conditioned without unwanted ON/OFF operation, resulting in comfortable air conditioning.



- Individual operation at minimum 0.8 HP indoor unit:
  The electronic expansion valves installed not only in the outdoor unit, but also in each indoor unit, control the refrigerant flow.

- Drying operation control:
  This system combining the inverter speed control with indoor air volume control performs efficient dehumidification with negligible change in room temperature.



2.5 Maintenance benefits

- Minimum maintenance

  Faithful to Hitachi's usual philosophy, SET FREE units have been designed to guarantee great reliability and robustness in order to reduce maintenance operations to a minimum.

- Easy access

  It is easy to access all components of the SET FREE systems. You can access all the components of the unit to carry out necessary tasks via a simple cover

  The whole system is designed to facilitate and simplify maintenance.

- Alarm information in the remote control switch through the PCB

  Alarm signals can be received through the remote control switches (whether individual or centralized), the CSNET WEB and CSNET Manager software, or via the PCB of the outdoor unit, thus facilitating maintenance work.

- Alarm codes

  The alarms are grouped by elements within the system in order to facilitate maintenance work and optimize the fitter's job.

- SMS Alarm

  The alarm signals can also be received through a simple SMS specifying the cycle affected and the alarm code, allowing incidents to be detected and solved more quickly.

2.5.1 Availability of maintenance tools

All the functions of the Hitachi Service Tools for setup are applicable to unit maintenance, both preventive and corrective, so that any problem can be detected and solved immediately.

CSNET WEB and CSNET Manager is also useful for maintenance tasks.

2.6 Main features of the units

2.6.1 Reduced total outdoor unit capacity

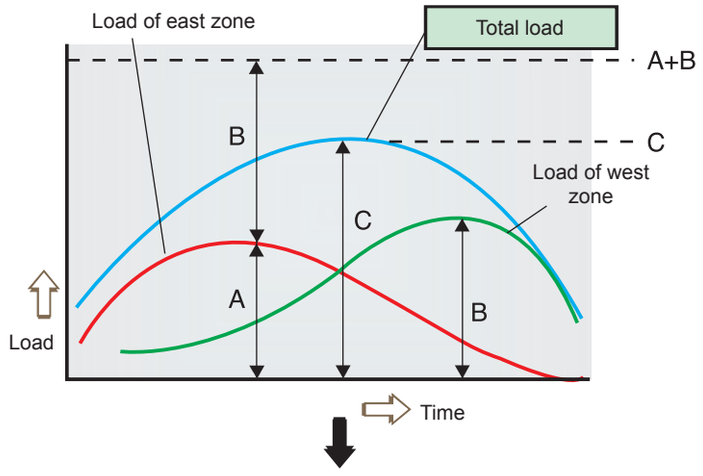
The SET FREE FSNM system enable the outdoor unit to be up to 30% smaller capacity when compared with the current split air conditioning systems. The diagram shows a typical building with a morning peak heat load on the east zone equivalent to a 6HP unit.

In the afternoon a peak occurs on the west zone equivalent to a 7HP unit.

Therefore, a conventional system would require total installed plant of 6HP + 7HP = 13HP. The maximum simultaneous load on the whole building occurs at noon and is equal to 10HP of unit capacity. A SET FREE FSNM system of 10HP can therefore be selected, and this capacity can be directed either to the east or west zone as dictated by the system controls.

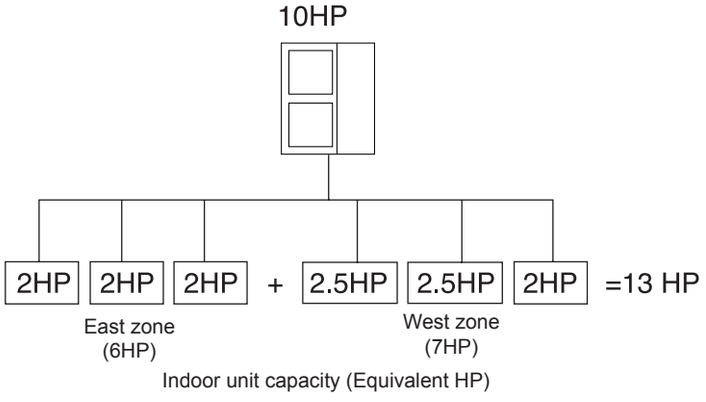
$$\text{Saving in installed plant} = \frac{13-10}{13} \times 100 = \mathbf{23\%}$$

◆ **Exemple of Air conditioning for building**



Since partial operation is obtained due to plural indoor unit, the outdoor unit capacity can be selected according to the total load of a building in a day.

Set Free FSNM series supplies refrigerant according to the load of each room.

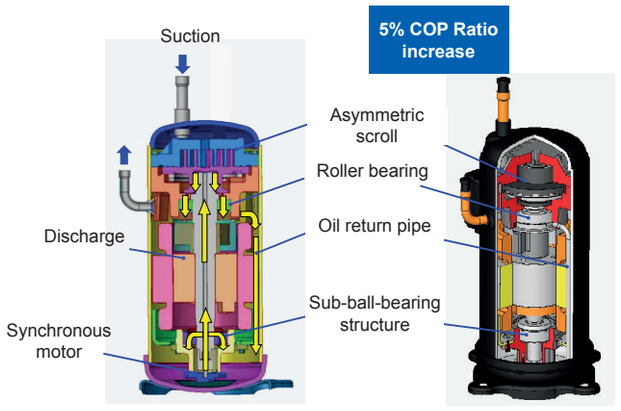


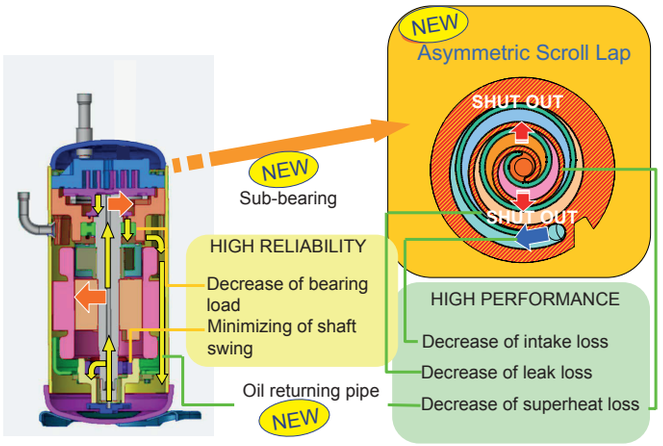
The total combination horsepower is calculated with the following formula:

Total combination horsepower = (Total indoor unit horsepower / outdoor unit horsepower) x 100 = (13HP/10HP) x 100 = 130%

$$\text{Total combination horsepower} = \frac{\text{Total indoor unit horsepower}}{\text{Outdoor unit horsepower}} \times 100 = \frac{13HP}{10HP} \times 100 = \mathbf{130\%}$$

2.6.2 High-efficiency DC Inverter Compressor





◆ Low noise level

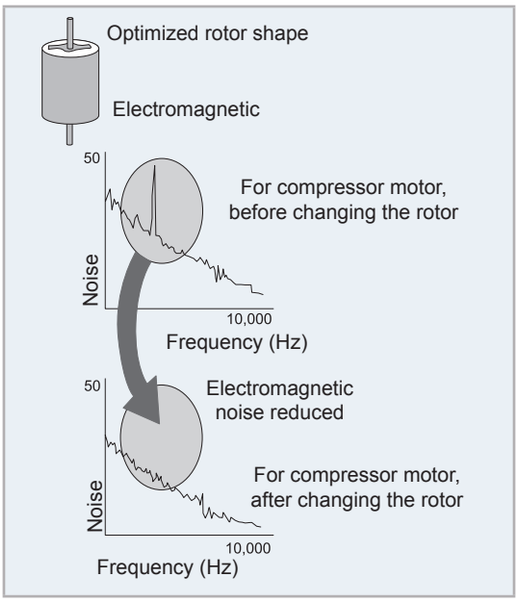
- Noise and vibration

1 The scroll compressor offers low sound and vibration levels because the compression points are spread evenly over the compression stroke, resulting in a very flat torque curve.

2 The minimal number of components used coupled with a high-pressure shell that acts as a silencer further enhances the noise reduction.

3 Because the noise pattern is high-frequency sound it is simple to reduce it to a very low level by using an insulation jacket.

4 Reducing electromagnetic compressor noise.



- Protection against liquid return

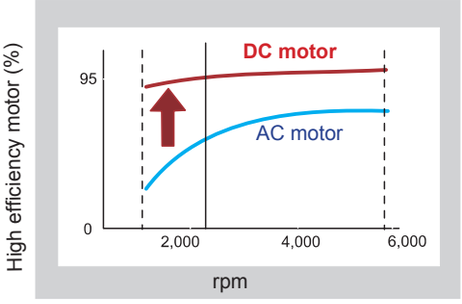
When the compressor is at rest, the moving scroll rests on the casing. When the compressor starts to run, the pressure in the chamber under the scroll builds up through two bleed holes in the medium pressure section of the compression stroke. This pressure then forces the scroll up against the housing and seals the compression chamber. If liquid returns to the compressor, the resulting increase in pressure forces the Scroll downwards breaking the seal which allows the liquid to pass back into the compressor body where it will boil off due to the higher temperature.

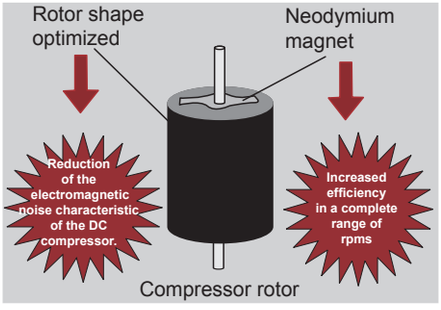
◆ Efficiency

- DC Compressor using Neodymium Magnet.

The use of a DC compressor improves the performance at around the 30 – 40 Hz range where the operation time of the inverter compressor is longest. Additionally, to suppress electromagnetic noise interference and achieve low noise, the rotor has been divided into two parts and the electric pole displaced.

There have been significant improvements in low-speed features, which affect the annual running cost.

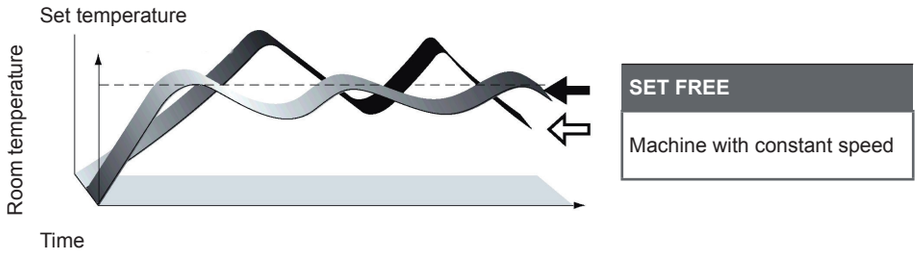




◆ Inverter control

The inverter controls compressor speeds from 30 Hz to 115 Hz, quickly reaching the set temperature and maintaining a stable energy-saving operation, thus reducing the noise since the compressor is not running continuously.

Diagram of operation (in heating mode):

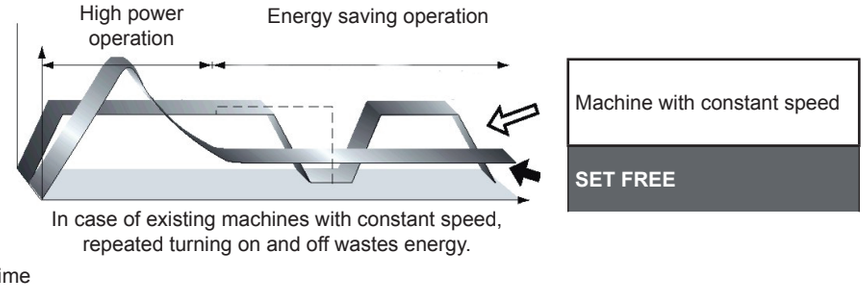


- In the case of Set-Free

Quickly reaches set temperature with high power, then maintains stable energy-saving operation.

- In the case of other constant speed machines:

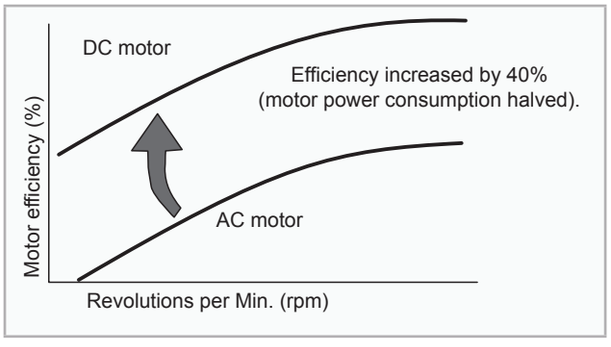
Slowly reaches the set temperature, then turns on and off repeatedly to maintain the temperature, causing uneconomical operation and “power waste”



2.6.3 Enhanced fan motor features for FSNM Series

◆ DC fan motor with outstanding efficiency

The DC fan motor greatly improves efficiency compared to conventional products with AC motors. In addition, air blasts are reduced by controlling the rotation speed of the fan. Stable operation is provided against strong head winds of approximately 10m/s on the front face of the outdoor unit.



- PWM (pulse width modulation) concept of speed control

The switching element (a power MOSFET) switches back and forth at a frequency of several tens of kHz. This controls the ON/OFF duty rate per cycle and changes the voltage applied to the fan motor to control the rotation speed.

- New fan propeller

Hitachi uses high technology to achieve the lowest noise. The new fan has three blades instead of four. It is designed to have a lower body than traditional fans, and achieves surprising results, with a noise reduction of up to 4dB (A).

◆ Large variety of operating possibilities

The use of these machines together with CSNET WEB or CSNET Manager can increase the performance of these installations even more by the following:

- With a program that avoids continuous functioning in rooms without users and allows heating and cooling just before rooms are occupied.
- Limiting the set temperatures, which means that machines do not work at maximum capacity when comfort does not require it.
- Locking functions from the central control, thus avoiding incorrect or ineffective use of the units.
- All these and many more functions mean that the use of the installation as a whole can be optimized.
- And it is worth remembering that because of the wide range of indoor units you can always find the unit with the power and type of installation that best suits your needs.

3. General data

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3.1 General data

3.1.1 General conditions

1 The nominal heating and cooling capacities indicated refer to the outdoor unit operating with the indoor units at 100% of their capacity, and are based on Standard EN14511.

Operating conditions		Cooling	Heating
Indoor air inlet temperature	DB	27.0 °C	20.0 °C
	WB	19.0 °C	—
Outdoor air inlet temperature	DB	35.0 °C	7.0 °C
	WB	—	6.0 °C

DB: dry bulb; WB: wet bulb.
Pipe length: 5 m; pipe height: 0 m

2 The input power of the indoor unit is not considered for the calculation of cooling and heating efficiencies.

3 The sound pressure level was measured under the following conditions:

a. 1 m from the frontal surface of the unit's service cover and 1.5 m from floor level.

b. The provided data corresponds to cooling mode. In the case of heating mode, the sound pressure level increases from 1 to 2 dB(A).

c. The provide data has been measured in an anechoic chamber, so the reflected sound must be taken into account for installation.

d. Voltage of the power source is 400V.

e. The provided data corresponds to cooling mode. In the case of heating mode, the sound pressure level increases from to 2 dB(A).

4 In case of Night Shift mode, the noise level decrease 5 dB(A).

5 Sound power level was measured in a reverberant room, in accordance with the EN12102 standard. Used environment conditions are the same as specified in EN14511 for performance test.

3.1.2 RAS-(8-12)FSNM

RAS MODEL			RAS-8FSNM	RAS-10FSNM	RAS-12FSNM
Electrical power supply			3N~ 380/415V, 50Hz		
Nominal cooling capacity (Min/Nom/Max)		kW	22.4	28.0	33.5
Nominal heating capacity (Min/Nom/Max)		kW	25.0	31.5	37.5
Energy efficiency in cooling mode (EER)			3.56	3.21	2.70
Energy efficiency coefficient in heating mode (COP)			4.24	4.04	3.79
Color (Munsell code)		-	Natural gray (1.0Y 8.5/0.5)		
Sound pressure level Cool/Heat (Night mode)		dB(A)	53/55	56/58	59/61
Sound power level		dB(A)	71	74	77
Outside measurements	Height	mm	1,650	1,650	1,650
	Width	mm	1,100	1,100	1,100
	Depth	mm	390	390	390
Net weight		Kg	170	170	173
Refrigerant		-	R410A		
Flow control		-	Micro-computer control expansion valve		
Compressor		-	Hermetic (scroll)		
Quantity		-	1	1	1
Power		kW	4.80	6.00	7.20
Heat exchanger			Multi-pass cross-finned tube		
Outdoor fan		-	Propeller fan		
Quantity		-	2	2	2
Air flow rate		m³/min	121	150	163
Power (pole)		W	170(8)+101(6)	170(8)+115(6)	170(8)+183(6)
Refrigerant pipe connection			Flare-nut connection (factory supplied)		
Size	Liquid piping	mm (in)	ø9.52 (3/8)	ø12.70 (1/2)	ø12.70 (1/2)
	Gas piping	mm (in)	ø19.05 (3/4)	ø22.20 (7/8)	ø25.40-ø28.60 (1)-(1-1/8)
Refrigerant load		Kg	5.0	5.5	6.5
Maximum electrical power consumption		A	14.0	18.0	23.0
Packaging measurements		m³	0.71	0.71	0.71

3.2 Component data

RAS Model				RAS-8FSNM	RAS-10FSNM	RAS-12FSNM
Heat exchanger	Type		-	Multi-pass cross finned tube		
	Piping	Material	-	Copper tube		
		Outer diameter	Ø mm	7.0	7.0	7.0
		Rows	-	2	2	2
		Number of tubes/coil	-	80	80	80
	Fin	Material	-	Aluminium		
		Pitch	mm	1.9	1.9	1.9
	Maximum operation pressure		MPa	4.15	4.15	4.15
	Total face area		m^2	1.86	1.86	1.86
	Number of coils/unit		-	2	2	2
Fan unit	Fan	Type	-	Propeller fan		
		Number/unit	-	2	2	2
		Outer diameter	mm	544	544	544
		Revolutions	rpm	399+745	630+772	630+871
		Nominal air flow/fan	m^3/min	121	150	163
	Motor	Type	-	Drip-proof type enclosure		
		Starting method	-	PSC (Permanent split capacitor)		
		Fan Motor (output)	W	170+120	170+170	170+200
		Quantity	-	2	2	2
		Insulation class	-	E	E	E
Compressor	Inverter type		-	E656DHD		
	Compressor type		-	Hermetic Scroll Type		
	Pressure resistance	Discharge	MPa	4.20		
		Suction	MPa	2.21		
	Motor	Starting method	-	Inverter-Driven		
		Poles	-	4		
		Insulation class	-	E		
		Oil type		FVC68D		
		Load amount		1.9		

3.3 Electrical data

Model	Main Unit Power			Applicable Voltage		Compressor and fan motors					Max. IPT [kW]	Max. Cur. [A]
	U [V]	PH	f [Hz]	U max. [V]	U min [V]	STC [A]	Cooling Operation		Heating Operation			
							IPT [KW]	RNC [A]	IPT [KW]	RNC [A]		
RAS-8FSNM	380/415	3N~	50	457	342	8/8	6.30	10.3/9.4	5.90	9.6/8.8	8.2	14
RAS-10FSNM						8/8	8.30	13.6/12.4	7.80	12.7/11.7	10.8	18
RAS-12FSNM						8/8	10.70	17.3/15.8	9.90	16.0/14.7	13.9	23

U: Power voltage

PH: Phase (φ)

f: Frequency

STC: Starting current

RNC: Operating current

IPT: Total input power

Cur: Current

NOTE

1. The above performance data is based on 100% capacity combination of the indoor units and rated operating compressor frequency.

2. The above performance data is based on 5 m equivalent piping length and 0 m piping lift.

3. The compressor is started by an inverter, resulting in extremely low starting current.

4. Capacities and selection data

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4.1 SET-FREE FSNM series system selection procedure

The following procedure is an example of how to select the system units and indicates how to use all the parameters indicated in this chapter.

Considering the layout of the building, the possible position of the indoor units and the air flow distribution, select the unit features that provide the greatest efficiency and comfort. Decide a position for the outdoor unit that facilitates service and maintenance tasks, as well as easy refrigerant pipe installation.

4.1.1 SET-FREE system possibilities

Before selecting the outdoor unit, it's necessary to take into account some important possibilities that offers the SET-FREE system.

◆ Reduced total outdoor unit capacity

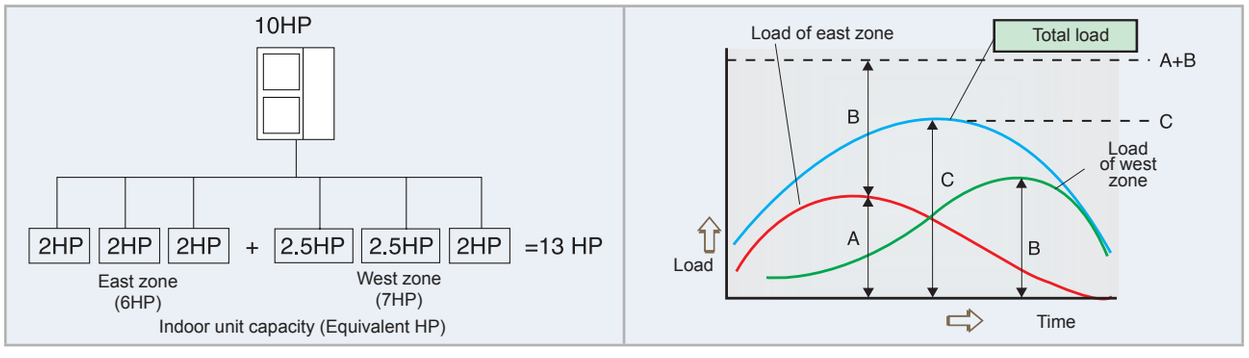
First of all, it will be considered the possibility of the "Reduced total outdoor unit capacity as a result of the wide range of operation capacity control available" in the SET-FREE systems, which enable at the outdoor unit to choose a maximum total combination horsepower of 130% and a minimum total combination horsepower of 50% by combination of the indoor units when compared with the nominal outdoor unit capacity. The possibilities of FSNM series are shown in the following table:

Outdoor unit	Indoor unit					
	Minimum combination capacity (HP)	Maximum combination capacity (HP)	Maximum number of connectable indoor units (This number of units is the sum of the installed RPK and all other indoor units) (*)	RPK-FSNH3M restrictions (Maximum number of combinable RPK-FSNH3M indoor unis with expansion valve kit EV-1.5N1)	Minimum individual operation capacity (HP)	Capacity range of combination
RAS-8FSNM	4.0	10.4	10 (8)	8	0.8	50% to 130%
RAS-10FSNM	5.0	13.0				
RAS-12FSNM	6.0	13.2				

NOTE

(*) In brackets the maximum recommended number of connectable indoor units (only for 0.8 and 1.0 indoor units). If you connect more than 8, the perception cold draft may occur at heating operation.

This concept allows the outdoor unit to be up to 30% smaller capacity when compared with other air conditioning systems, in case of the total combination horsepower of 130%. This possibility is shown in the following example:



The diagram shows a typical building with a morning peak heat load on the east zone equivalent to a 6HP unit. In the afternoon a peak occurs on the west zone equivalent to a 7HP unit.

Therefore, a conventional system would require total installed plant of 6HP + 7HP = 13HP. The maximum simultaneous load on the whole building occurs at noon and is equal to 10HP of unit capacity. A SET FREE FSNM system of 10HP can be selected, and this capacity can be directed either to the east or west zone as dictated by the system controls.

NOTE

The maximum required loads of east and west zone must not be simultaneous.

The total combination horsepower is calculated with the following formula:

$$\text{Total combination horsepower} = \frac{\text{Total indoor unit horsepower}}{\text{Outdoor unit horsepower}} \times 100 = \frac{13\ \text{HP}}{10\ \text{HP}} \times 100 = \mathbf{130\ \%}$$

◆ Capacity adjustment by dip switch setting of the indoor units

In some situations, it should be useful to adjust the capacity of the indoor units in order to adapt the unit to the actual installation requirements. This function is performed by dip switch setting and it's possible in some HP indoor unit models.

Then, are shown two tables with the nominal capacity and the adjusted capacity by dip switch setting of the indoor units.

◆ Nominal capacity of indoor units

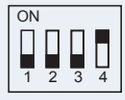
Horsepower (HP) / Capacity		0.8	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0	8.0	10.0
Cooling capacity	kW	2.2	2.8	4.0	5.6	7.1	8.0	11.2	14.0	16.0	22.4	28.0
Heating capacity	kW	2.5	3.2	4.8	6.3	8.5	9.0	12.5	16.0	18.0	25.0	31.5

NOTE

The nominal cooling and heating capacity is the combined capacity of the SET FREE system, and is based on EN14511.

Operation condition		Cooling	Heating
Indoor air inlet temperature	DB	27 °C	20 °C
	WB	19 °C	-
Outdoor air inlet temperature	DB	35 °C	7 °C
	WB	-	6 °C
Piping Length: 5 meters; piping height: 0 meters DB: Dry Bulb; WB: Wet Bulb			

◆ Adjusted capacities of indoor units

Horsepower (HP)		1.3		1.8		2.3	
Variable capacity		1.3◄——1.5		1.8◄——2.0		2.3◄——2.5	
Cooling capacity	kW	3.8		5.2		6.7	
Heating capacity	kW	4.2		5.6		7.5	
Indoor unit dip switch setting (DSW3)		1.3HP  Lowered	1.5HP  Standard	1.8HP  Lowered	2.0HP  Standard	2.3HP  Lowered	2.5HP  Standard

4.1.2 Selection parameters

To select the outdoor units, it will be necessary to consult and/or use a serie of parameters shown in tables and graphics presented in the different chapters of this catalogue. A summarized list is shown below:

For general information: Chapter *"1. General information"*. For operating space options: Chapter *"7. General dimensions"*. For capacities: Sections *"4.2 Cooling capacity tables", "4.3 Heating capacity tables"*	For correction factors: Section *"4.4 Correction factors"* For noise characteristics: Section *"5. Acoustic characteristics curves"* Piping length and lift range: Chapter *"9. Piping work and refrigerant charge"*.

In case of an installation with ducts (outdoor unit with RPI indoor unit) the fan performance for duct calculations should be considered. The RPI units are designed with different static pressure ranges in order to fulfil all installation necessities.

4.1.3 Selection procedure

Once considered the SET-FREE system possibilities, it's the moment to start with the selection procedure. In order to do this, it has been assumed an installation consisting of several rooms with different required cooling loads and temperature conditions, which are shown below:

◆ **Design conditions:**

- Temperature condition

Cooling	Heating
Outdoor air inlet: 30 °C DB	Outdoor air inlet: 5/1 °C (DB/WB)
Indoor air inlet: 28/19 °C (DB/WB)	Indoor air inlet: 18 °C DB

- Installation required loads (*)

Item			East zone			West zone
			Room 1	Room 2	Room 3	Room 4
Estimated cooling load	Total	kW	3.40	4.50	4.90	5.40
	Sensible		2.40	3.20	3.50	3.80
Estimated heating load	Total	kW	3.80	5.10	5.50	6.10

NOTE

- *(*) In this example, the maximum required loads will not be simultaneous.*
- *The maximum required loads of rooms 1, 2 and 3 (east zone) occurs at the morning*
- *The maximum required load of room 4 (west zone) occurs at the afternoon.*

- Installation characteristics:

Equivalent piping length (L)	50 m
Height difference between outdoor unit and indoor units (H)	+20 m

It has been considered that the outdoor unit is located in a higher position than the indoor units. Therefore, when necessary refer to the section *"4.4.1 Piping length correction factor"*, it will be used the correction factor value at positive height difference between indoor and outdoor units (+H).

Step 1:

Initial pre-selection

Taking into account the SET-FREE system possibilities mentioned above, it has been adjusted the indoor unit capacities by dip-switch (DSW3).

Item		Room 1	Room 2	Room 3	Room 4	1+2+3+4	Outdoor Unit
Selected Model		RPK-2.0 (Adjusted to 1.8)	RCD-2.5 (Adjusted to 2.3)	RCI-2.5	RPI-3.0	9.6 HP	RAS-8FSNM (120%)
Nominal cooling capacity	kW	5.2	6.7	7.1	8.0	27.0	22.40
Nominal heating capacity		5.6	7.5	8.5	9.0	30.6	24.72

The pre-selected capacity of the different indoor units has not been the immediately higher in order to apply a safety factor considering the different correction factors existing, which will reduce the capacity.

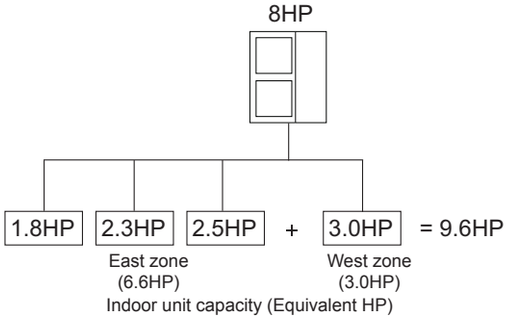
To determinate the nominal cooling and heating capacity, it's necessary refer to section *"4.2.2 Nominal cooling capacity tables"* and *"4.3.2 Nominal heating capacity tables"* respectively, taking into account the temperature condition and the total horsepower combination (120%).

4

NOTE

- *If the air inlet temperature for the indoor unit or outdoor unit is not contained in the capacity tables, an interpolation should be carried out using the values above and below those of the air inlet temperature.*
- *If the total combination horsepower is not shown in the capacity tables (for example, 114%), an interpolation should be carried out using the values above and below (120% and 110%)those of the total combination horsepower.*

Then, it's shown a diagram of the installation resulting:



For this example it has been assumed four different indoor units (RPK-2.0FSN3M, RCD-2.5FSN2, RCI-2.5FSN3Ei and RPI-3.0FSN3Ei) in order to show how the choice of indoor unit can affect the different factors presented in this chapter.

The resulting total indoor unit horsepower is 9.6 HP. The outdoor unit with the horsepower immediately higher is the 10 HP model, but the possibility "Reduced total outdoor unit capacity" allows the 8 HP model selection. Thus, it's allowed at the outdoor unit to be up to 20% smaller capacity when compared with other air conditioning systems.

The total combination horsepower is the following:

$$\text{Total combination horsepower} = \frac{\text{Total indoor unit horsepower}}{\text{Outdoor unit horsepower}} \times 100 = \frac{9.6\ \text{HP}}{8.0\ \text{HP}} \times 100 = \mathbf{120\ \%}$$

Next step will be the capacity correction using the different correction factors shown in this chapter.

This procedure is divided in two parts: cooling and heating.

☛ **Step 2:**

◆ Cooling mode

Cooling capacity correction

The actual cooling capacity of the pre-selected outdoor unit must be calculated applying the necessary correction factors:

$$Q_C = Q_{MC} \times f_{LC}$$

Q_C: Corrected cooling capacity of the outdoor unit by piping length (kW)

Q_{MC}: Maximum cooling capacity of the outdoor unit (kW)

f_{LC}: Cooling piping length correction factor

The maximum cooling capacity (Q_{MC}) of the RAS-8FSNM unit is 22.4 kW.

◆ Calculation of f_{LC}:

Both length of the refrigerant piping used and height difference between the outdoor unit and the indoor units directly affect the performance of the unit. This concept is quantified in the piping length correction factor.

To determine this value it is necessary refer to section *"4.4.1 Piping length correction factor"*, where it can be seen that for the characteristics of our example (piping length of 50 metres and a height difference between the outdoor unit and the indoor units of 20 metres) the piping length correction factor for cooling mode is **0.86** approximately.

◆ Calculation of Q_C:

Once the correction factors to be applied have been determined, the formula for the corrected cooling capacity by piping length of the unit RAS-8FSNM can be applied:

$$Q_C = 22.4\ kW \times 0.86 = \mathbf{19.26\ kW}$$

◆ Actual cooling capacity of the outdoor unit (Q_{AC}):

The cooling capacity data for the RAS-8FSNM unit taken from the table in section *"4.2.2 Nominal cooling capacity tables"* is calculated on the basis of a relative humidity of 50% which means that an indoor air inlet temperature of 19 ºC WB corresponds to a temperature of 27 ºC DB.

However, the difference between the indoor air inlet dry bulb temperature required by the system (28 ºC) and the indoor air inlet dry bulb temperature recorded in the cooling capacity data (27 ºC) requires an adjustment of the capacity.

The following formula is used to apply this adjustment.

$$Q_{AC} = Q_C + (CR \times (DB_R - DB))$$

Q_{AC}: Actual cooling capacity of the outdoor unit (kW)

Q_C: Corrected cooling capacity of the outdoor unit by piping length (kW)

CR: Correction ratio due to humidity

DB_R: Real Dry Bulb evaporator temperature (ºC)

DB: Dry Bulb evaporator temperature (ºC) for each wet bulb temperature from the table (HR = 50 %)

◆ Calculation of CR:

The correction ratio due to humidity is shown in a table contained in section *"4.2.2 Nominal cooling capacity tables"*.

This coefficient corrects the sensible heat capacity of a unit according to the relative humidity of the air entering the indoor unit. The greater the relative humidity the lower will be the sensible heat capacity and vice versa.

The correction ratio CR for the RAS-8FSNM unit is **0.74.**

◆ Calculation of Q_{AC}:

Once the CR has been identified for the RAS-8FSNM unit, the actual cooling capacity of the unit RAS-8FSNM can be calculated:

$$Q_{AC} = 19.26\ kW + (0.74 \times (28 - 27)) = 20.00\ kW$$

☛ Step 3:

Cooling capacity of each indoor unit

Once it's known the actual cooling capacity of the outdoor unit, it must be calculated the actual cooling capacity of each indoor unit, according to the following formula:

$$Q_{CI} = Q_{AC} \times \frac{Q_{NCI}}{Q_{NCC}}$$

Q_{CI}: Actual cooling capacity of the indoor unit (kW)

Q_{AC}: Actual cooling capacity of the outdoor unit (kW)

Q_{NCI}: Nominal cooling capacity of the indoor unit (kW).

Q_{NCC}: Nominal cooling capacity of the combination (kW).

Applying this we obtain:

nº 1	RPK-2.0 (Adjusted to 1.8)	Cooling capacity = 20.00 x (5.20 / 27.00) = 3.85 kW
nº 2	RCD-2.5 (Adjusted to 2.3)	Cooling capacity = 20.00 x (6.70 / 27.00) = 4.96 kW
nº 3	RCI-2.5	Cooling capacity = 20.00 x (7.10 / 27.00) = 5.26 kW
nº 4	RPI-3.0	Cooling capacity = 20.00 x (8.00 / 27.00) = 5.93 kW

☛ Step 4:

Sensible heat capacity (SHC)

The system requirements specify a sensible heat load for each indoor unit (see the indoor unit technical catalogue).

Once the calculation of the indoor units cooling capacity has been completed, the sensible heat capacity can be calculated using the following formula:

$$SHC = Q_{CI} \times SHF$$

SHC: Sensible heat capacity (kW)

Q_{CI}: Actual cooling capacity of the indoor unit (kW)

SHF: Sensible heat factor

◆ Calculation of SHF:

To determine the sensible heat factor (ratio of sensible heat relative to the total) the table in section “Sensible heat factor (SHF)” has to be seen, in which the different SHF values are shown for the different indoor units for each of the three possible fan speeds (High, Medium, Low). The value used is that relating to the high fan speed. Doing this we obtain:

$$SHF_{RPK\text{-}2.0} = 0.72$$

$$SHF_{RCD\text{-}2.5} = 0.74$$

$$SHF_{RCI\text{-}2.5} = 0.73$$

$$SHF_{RPI\text{-}3.0} = 0.75$$

◆ Calculation of SHC:

Initially, once the sensible heat factors have been obtained, the sensible heat capacity of each indoor unit can be calculated by applying the previous formula.

$$SHC_{RPK\text{-}2.0} = 3.85\ kW \times 0.72 = \mathbf{2.77\ kW}$$

$$SHC_{RCD\text{-}2.5} = 4.96\ kW \times 0.74 = \mathbf{3.67\ kW}$$

$$SHC_{RCI\text{-}2.5} = 5.26\ kW \times 0.73 = \mathbf{3.84\ kW}$$

$$SHC_{RPI\text{-}3.0} = 5.93\ kW \times 0.75 = \mathbf{4.45\ kW}$$

The results of cooling mode are the following:

Item			Room 1	Room 2	Room 3	Room 4	1+2+3+4	Outdoor Unit
Selected model			RPK-2.0 (Adjusted to 1.8)	RCD-2.5 (Adjusted to 2.3)	RCI-2.5	RPI-3.0	9.6 HP	RAS-8FSNM (120%)
Estimated cooling load	Total	kW	3.40	4.50	4.90	5.40	18.20	
	Sensible		2.40	3.20	3.50	3.80	12.90	
Corrected cooling capacity	Total	kW	3.85	4.96	5.26	5.93	20.00	
	Sensible		2.77	3.67	3.84	4.45	14.73	

As can be seen, the total and sensible corrected cooling capacity are greater than the estimated cooling load by the different rooms to be conditioned. Therefore, it can be said that the RAS-8FSNM unit meets the minimum cooling requirements set for the system.

In order to validate the pre-selection of the RAS-8FSNM unit, its compliance with the minimum heating requirements must be checked as well.

NOTE

If the actual cooling capacity (total or sensible) calculated is less than that provided by the pre-selected unit, the calculation must be done again with the unit immediately higher.

◆ Heating mode

Refering to the step 1 (Initial pre-selection), it can be seen the nominal heating capacities selected for each room and the outdoor unit capacity at the 120% total combination horsepower, resulting total indoor unit horsepower is 9.6 HP.

Item		Room 1	Room 2	Room 3	Room 4	1+2+3+4	Outdoor Unit
Selected Model		RPK-2.0 (Adjusted to 1.8)	RCD-2.5 (Adjusted to 2.3)	RCI-2.5	RPI-3.0	9.6 HP	RAS-8FSNM (120%)
Nominal heating capacity	kW	5.6	7.5	8.5	9.0	30.6	24.72

☛ **Step 5:**

Heating capacity correction

The actual heating capacity of the pre-selected outdoor unit must be calculated applying the necessary correction factors:

$$Q_{AH} = Q_{MH} \times f_{LH} \times f_{D}$$

Q_{AH}: Actual heating capacity of the outdoor unit (kW)

Q_{MH}: Maximum heating capacity of the outdoor unit (kW)

f_{LC}: Heating piping length correction factor

f_{D}: Defrosting correction factor

The maximum heating capacity (Q_{MH}) of the RAS-8FSNM unit is 24.72 kW.

◆ Calculation of f_{LH}:

Referring to the section *"4.4.1 Piping length correction factor"*, it can be seen that for the characteristics of our example (piping length of 50 metres and a height difference between the outdoor unit and the indoor units of +20 metres) the piping length correction factor for heating mode is **0.963** approximately.

◆ Calculation of f_{D}:

In situations where the ambient temperature is lower than 7 ºC DB, frost may build up on the heat exchanger. In that case, the heating capacity for the unit may be reduced because of the time spent by the unit in removing the build-up.

The defrosting correction factor takes this time into account and applies the heating capacity correction.

To calculate the correction factor, please see section *"4.4.2 Defrost correction factor"* which shows a table with different values of f_{D} depending on the ambient temperature (ºC DB). If the correction factor at an ambient temperature of 5 ºC DB does not appear on the table, an interpolation will be needed.

Finally, the resulting defrosting correction factor is **0.90**.

◆ Calculation of Q_{AH}:

Once the correction factors to be applied have been determined, the formula for actual heating capacity of the unit RAS-8FSNM can be applied:

$$Q_{AH} = 24.72\ kW \times 0.963 \times 0.90 = \mathbf{21.42\ kW}$$

☛ **Step 6:**

Heating capacity of each indoor unit

Once it's known the actual heating capacity of the outdoor unit, it must be calculated the actual heating capacity of each indoor unit, according to the following formula:

$$Q_{HI} = Q_{AH} \times \frac{Q_{NHI}}{Q_{NHC}}$$

Q_{HI}: Actual heating capacity of the indoor unit (kW)

Q_{AH}: Actual heating capacity of the outdoor unit (kW)

Q_{NHI}: Nominal heating capacity of the indoor unit (kW).

Q_{NHC}: Nominal heating capacity of the combination (kW).

Applying this we obtain:

nº 1	**RPK-2.0 (Adjusted to 1.8)**	Heating capacity = 21.42 x (5.60 / 30.60) = 3.92 kW
nº 2	**RCD-2.5 (Adjusted to 2.3)**	Heating capacity = 21.42 x (7.50 / 30.60) = 5.25 kW
nº 3	**RCI-2.5**	Heating capacity = 21.42 x (8.50 / 30.60) = 5.95 kW
nº 4	**RPI-3.0**	Heating capacity = 21.42 x (9.00 / 30.60) = 6.30 kW

The results of heating mode are the following:

Item		**Room 1**	**Room 2**	**Room 3**	**Room 4**	**1+2+3+4**	**Outdoor Unit**
Selected model		**RPK-2.0 (Adjusted to 1.8)**	**RCD-2.5 (Adjusted to 2.3)**	**RCI-2.5**	**RPI-3.0**	**9.6 HP**	**RAS-8FSNM (120%)**
Estimated heating load	kW	3.80	5.10	5.50	6.10	20.50	
Corrected heating capacity		3.92	5.25	5.95	6.30	21.42	

As can be seen, the corrected heating capacity is greater than the estimated heating load by the different rooms to be conditioned. Therefore, it can be said that the RAS-8FSNM unit is valid for both heating and cooling.

NOTE

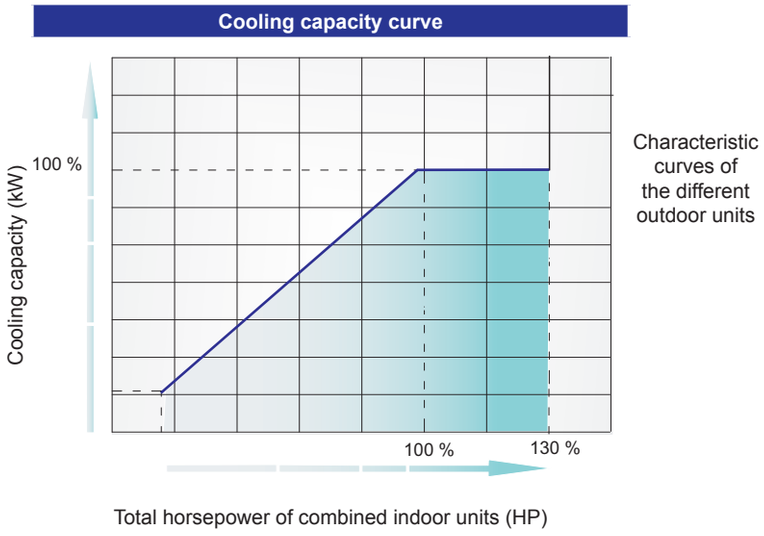
If the actual heating capacity calculated is less than that provided by the pre-selected unit, the calculation must be done again with the unit immediately higher.

4.2 Cooling capacity tables

The following diagram shows the behaviour of the cooling capacity of the outdoor unit with the total power of the combined indoor units up to 130%.

See the examples of the actual combinations.

4.2.1 Cooling capacity curve



4.2.2 Nominal cooling capacity tables

Nominal capacity at 19°C (Wet Bulb) and 35°C (Dry Bulb)

(kW)

Total horsepower of combined indoor units (%)	Outdoor units HP					
	8		10		12	
	Maximum capacity	Electrical power consumed	Maximum capacity	Electrical power consumed	Maximum capacity	Electrical power consumed
130	22.40	6.26	28.00	8.24	33.50	10.59
120	22.40	6.62	28.00	8.78	33.50	11.24
110	22.40	6.63	28.00	8.80	33.50	11.27
100	22.40	6.30	28.00	8.30	33.50	10.70
90	20.16	5.93	25.20	7.75	30.16	10.02
80	17.92	5.44	22.40	7.02	26.82	9.09
70	15.68	4.83	19.60	6.10	23.48	7.90
60	13.44	4.09	16.80	5.00	20.14	6.47
50	11.20	3.22	14.00	3.71	16.80	4.78

4.2.3 Cooling capacity tables according to total power of combined indoor units

NOTE

- *CAP: Capacity at compressor maximum frequency (kW)*
- *IPT: Input power (kW)*
- *TEMP: Outdoor air inlet temperature (DB (ºC))*

◆ RAS-8FSNM

TEMP	Total Power of Combined Indoor Units: 50%														Total Power of Combined Indoor Units: 60%											
	Indoor Air Inlet Temperature (WB (ºC))														Indoor Air Inlet Temperature (WB (ºC))											
	14		16		18		19		20		22		24		14		16		18		19		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
10	9.30	2.90	10.05	2.93	10.80	2.96	11.20	3.00	11.60	3.00	12.45	3.00	12.85	3.03	11.16	3.11	12.06	3.31	12.96	3.47	13.44	3.56	13.92	3.51	14.94	3.47	15.42	3.43
12	9.30	2.93	10.05	2.96	10.80	3.00	11.20	3.03	11.60	3.03	12.45	3.03	12.85	3.03	11.16	3.15	12.06	3.31	12.96	3.47	13.44	3.56	13.92	3.51	14.94	3.47	15.42	3.43
14	9.30	2.93	10.05	2.96	10.80	3.03	11.20	3.03	11.60	3.03	12.45	3.06	12.85	3.06	11.16	3.15	12.06	3.31	12.96	3.47	13.44	3.56	13.92	3.56	14.94	3.51	15.42	3.43
16	9.30	2.96	10.05	3.00	10.80	3.03	11.20	3.06	11.60	3.06	12.45	3.06	12.85	3.09	11.16	3.15	12.06	3.31	12.96	3.51	13.44	3.56	13.92	3.56	14.94	3.51	15.42	3.47
18	9.30	2.96	10.05	3.03	10.80	3.06	11.20	3.09	11.60	3.09	12.45	3.09	12.85	3.09	11.16	3.19	12.06	3.35	12.96	3.51	13.44	3.60	13.92	3.60	14.94	3.56	15.42	3.51
20	9.30	3.00	10.05	3.03	10.80	3.09	11.20	3.13	11.60	3.13	12.45	3.13	12.85	3.13	11.16	3.23	12.06	3.39	12.96	3.56	13.44	3.64	13.92	3.64	14.94	3.56	15.42	3.51
22	9.30	3.03	10.05	3.06	10.80	3.09	11.20	3.13	11.60	3.13	12.45	3.13	12.85	3.13	11.16	3.23	12.06	3.43	12.96	3.60	13.44	3.68	13.92	3.64	14.94	3.60	15.42	3.56
24	9.30	3.03	10.05	3.09	10.80	3.13	11.20	3.13	11.60	3.16	12.45	3.16	12.85	3.16	11.16	3.31	12.06	3.47	12.96	3.64	13.44	3.72	13.92	3.68	14.94	3.64	15.42	3.64
26	9.30	3.06	10.05	3.09	10.80	3.13	11.20	3.16	11.60	3.16	12.45	3.16	12.85	3.19	11.16	3.31	12.06	3.51	12.96	3.68	13.44	3.76	13.92	3.76	14.94	3.72	15.42	3.68
28	9.30	3.06	10.05	3.13	10.80	3.16	11.20	3.19	11.60	3.19	12.45	3.19	12.85	3.19	11.16	3.39	12.06	3.56	12.96	3.76	13.44	3.84	13.92	3.80	14.94	3.76	15.42	3.72
30	9.30	3.09	10.05	3.13	10.80	3.16	11.20	3.19	11.60	3.19	12.45	3.19	12.85	3.22	11.16	3.43	12.06	3.64	12.96	3.80	13.44	3.88	13.92	3.88	14.94	3.84	15.42	3.80
32	9.30	3.09	10.05	3.13	10.80	3.19	11.20	3.22	11.60	3.22	12.45	3.22	12.85	3.22	11.16	3.51	12.06	3.68	12.96	3.88	13.44	3.96	13.92	3.96	14.94	3.88	15.42	3.84
34	9.30	3.13	10.05	3.16	10.80	3.19	11.20	3.22	11.60	3.22	12.45	3.22	12.85	3.22	11.16	3.56	12.06	3.76	12.96	3.96	13.44	4.05	13.92	4.01	14.94	3.96	15.42	3.92
35	9.30	3.13	10.05	3.16	10.80	3.19	11.20	3.22	11.60	3.22	12.45	3.22	12.85	3.22	11.16	3.60	12.06	3.80	12.96	4.01	13.44	4.09	13.92	4.09	14.94	4.01	15.42	3.96
36	9.16	3.13	9.91	3.16	10.66	3.22	11.05	3.25	11.44	3.22	12.24	3.22	12.58	3.25	10.99	3.64	11.89	3.84	12.79	4.05	13.26	4.01	13.73	4.13	14.69	4.09	15.10	4.01
38	8.88	3.13	9.63	3.16	10.38	3.22	10.75	3.25	11.12	3.25	11.82	3.25	12.04	3.25	10.66	3.72	11.56	3.92	12.46	4.13	12.90	4.09	13.34	4.21	14.18	4.17	14.45	4.09
40	8.60	3.13	9.35	3.19	10.10	3.22	10.45	3.25	10.80	3.25	11.40	3.25	11.50	3.25	10.32	3.84	11.22	4.01	12.12	4.21	12.54	4.21	12.96	4.29	13.68	4.25	13.80	4.21

TEMP	Total Power of Combined Indoor Units: 70%														Total Power of Combined Indoor Units: 80%											
	Indoor Air Inlet Temperature (WB (ºC))														Indoor Air Inlet Temperature (WB (ºC))											
	14		16		18		19		20		22		24		14		16		18		19		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
10	13.02	3.81	14.07	3.96	15.12	4.05	15.68	4.15	16.24	4.15	17.43	4.15	17.99	4.20	14.88	4.52	16.08	4.57	17.28	4.63	17.92	4.68	18.56	4.74	19.92	4.79	20.56	4.90
12	13.02	3.86	14.07	3.96	15.12	4.10	15.68	4.15	16.24	4.15	17.43	4.15	17.99	4.20	14.88	4.52	16.08	4.57	17.28	4.68	17.92	4.68	18.56	4.74	19.92	4.79	20.56	4.90
14	13.02	3.86	14.07	4.01	15.12	4.10	15.68	4.15	16.24	4.15	17.43	4.20	17.99	4.20	14.88	4.57	16.08	4.63	17.28	4.68	17.92	4.74	18.56	4.74	19.92	4.84	20.56	4.90
16	13.02	3.86	14.07	4.01	15.12	4.10	15.68	4.20	16.24	4.20	17.43	4.20	17.99	4.25	14.88	4.57	16.08	4.63	17.28	4.68	17.92	4.74	18.56	4.79	19.92	4.84	20.56	4.95
18	13.02	3.91	14.07	4.01	15.12	4.15	15.68	4.20	16.24	4.25	17.43	4.25	17.99	4.30	14.88	4.57	16.08	4.68	17.28	4.74	17.92	4.79	18.56	4.84	19.92	4.90	20.56	5.01
20	13.02	3.96	14.07	4.05	15.12	4.20	15.68	4.25	16.24	4.25	17.43	4.30	17.99	4.30	14.88	4.63	16.08	4.74	17.28	4.79	17.92	4.84	18.56	4.84	19.92	4.95	20.56	5.06
22	13.02	4.01	14.07	4.10	15.12	4.25	15.68	4.30	16.24	4.30	17.43	4.34	17.99	4.34	14.88	4.68	16.08	4.79	17.28	4.84	17.92	4.84	18.56	4.90	19.92	5.01	20.56	5.12
24	13.02	4.05	14.07	4.15	15.12	4.30	15.68	4.34	16.24	4.39	17.43	4.39	17.99	4.44	14.88	4.79	16.08	4.84	17.28	4.90	17.92	4.95	18.56	4.95	19.92	5.06	20.56	5.17
26	13.02	4.10	14.07	4.25	15.12	4.34	15.68	4.44	16.24	4.44	17.43	4.44	17.99	4.49	14.88	4.84	16.08	4.90	17.28	4.95	17.92	5.01	18.56	5.06	19.92	5.17	20.56	5.22
28	13.02	4.15	14.07	4.30	15.12	4.44	15.68	4.49	16.24	4.54	17.43	4.54	17.99	4.54	14.88	4.90	16.08	4.95	17.28	5.06	17.92	5.06	18.56	5.12	19.92	5.22	20.56	5.33
30	13.02	4.25	14.07	4.39	15.12	4.49	15.68	4.59	16.24	4.59	17.43	4.59	17.99	4.63	14.88	5.01	16.08	5.06	17.28	5.17	17.92	5.17	18.56	5.22	19.92	5.33	20.56	5.44
32	13.02	4.30	14.07	4.44	15.12	4.59	15.68	4.63	16.24	4.68	17.43	4.68	17.99	4.73	14.88	5.06	16.08	5.17	17.28	5.22	17.92	5.28	18.56	5.33	19.92	5.44	20.56	5.50
34	13.02	4.39	14.07	4.54	15.12	4.68	15.68	4.73	16.24	4.78	17.43	4.78	17.99	4.83	14.88	5.17	16.08	5.28	17.28	5.33	17.92	5.39	18.56	5.44	19.92	5.55	20.56	5.61
35	13.02	4.49	14.07	4.59	15.12	4.73	15.68	4.83	16.24	4.83	17.43	4.88	17.99	4.88	14.88	5.22	16.08	5.33	17.28	5.39	17.92	5.44	18.56	5.50	19.92	5.61	20.56	5.71
36	12.82	4.49	13.87	4.63	14.92	4.78	15.47	4.88	16.02	4.88	17.14	4.88	17.61	4.92	14.66	5.28	15.86	5.39	17.06	5.44	17.68	5.55	18.30	5.55	19.58	5.66	20.13	5.77
38	12.43	4.59	13.48	4.73	14.53	4.88	15.05	4.92	15.57	4.97	16.55	5.02	16.86	5.02	14.21	5.44	15.41	5.50	16.61	5.61	17.20	5.77	17.79	5.66	18.91	5.77	19.26	5.88
40	12.04	4.73	13.09	4.88	14.14	5.02	14.63	4.97	15.12	5.12	15.96	5.12	16.10	5.17	13.76	5.55	14.96	5.66	16.16	5.71	16.72	5.88	17.28	5.82	18.24	5.93	18.40	6.04

TEMP	Total Power of Combined Indoor Units: 90%														Total Power of Combined Indoor Units: 100%											
	Indoor Air Inlet Temperature (WB (ºC))														Indoor Air Inlet Temperature (WB (ºC))											
	14		16		18		19		20		22		24		14		16		18		19		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
10	16.74	4.87	18.09	4.92	19.44	5.04	20.16	5.04	20.88	5.04	22.41	5.04	23.13	5.04	18.60	5.17	20.10	5.23	21.60	5.36	22.40	5.36	23.20	5.36	24.90	5.23	25.70	5.10
12	16.74	4.87	18.09	4.98	19.44	5.04	20.16	5.10	20.88	5.10	22.41	5.04	23.13	5.04	18.60	5.17	20.10	5.23	21.60	5.36	22.40	5.42	23.20	5.36	24.90	5.23	25.70	5.10
14	16.74	4.87	18.09	4.98	19.44	5.04	20.16	5.10	20.88	5.10	22.41	5.04	23.13	5.04	18.60	5.17	20.10	5.23	21.60	5.36	22.40	5.42	23.20	5.36	24.90	5.23	25.70	5.10
16	16.74	4.92	18.09	4.98	19.44	5.10	20.16	5.10	20.88	5.10	22.41	5.10	23.13	5.10	18.60	5.23	20.10	5.29	21.60	5.42	22.40	5.42	23.20	5.36	24.90	5.23	25.70	5.17
18	16.74	4.98	18.09	5.04	19.44	5.10	20.16	5.16	20.88	5.16	22.41	5.16	23.13	5.10	18.60	5.23	20.10	5.36	21.60	5.42	22.40	5.48	23.20	5.42	24.90	5.29	25.70	5.17
20	16.74	4.98	18.09	5.10	19.44	5.16	20.16	5.22	20.88	5.22	22.41	5.16	23.13	5.16	18.60	5.29	20.10	5.36	21.60	5.48	22.40	5.54	23.20	5.48	24.90	5.36	25.70	5.23
22	16.74	5.04	18.09	5.16	19.44	5.22	20.16	5.28	20.88	5.28	22.41	5.28	23.13	5.22	18.60	5.36	20.10	5.42	21.60	5.54	22.40	5.61	23.20	5.54	24.90	5.42	25.70	5.29
24	16.74	5.16	18.09	5.22	19.44	5.28	20.16	5.34	20.88	5.34	22.41	5.28	23.13	5.28	18.60	5.42	20.10	5.54	21.60	5.61	22.40	5.67	23.20	5.61	24.90	5.48	25.70	5.36
26	16.74	5.22	18.09	5.28	19.44	5.40	20.16	5.40	20.88	5.40	22.41	5.40	23.13	5.34	18.60	5.48	20.10	5.61	21.60	5.73	22.40	5.73	23.20	5.67	24.90	5.61	25.70	5.48
28	16.74	5.28	18.09	5.40	19.44	5.46	20.16	5.52	20.88	5.52	22.41	5.46	23.13	5.46	18.60	5.61	20.10	5.73	21.60	5.80	22.40	5.86	23.20	5.80	24.90	5.67	25.70	5.54
30	16.74	5.40	18.09	5.46	19.44	5.58	20.16	5.64	20.88	5.64	22.41	5.58	23.13	5.58	18.60	5.73	20.10	5.80	21.60	5.92	22.40	5.99	23.20	5.92	24.90	5.80	25.70	5.67
32	16.74	5.52	18.09	5.58	19.44	5.70	20.16	5.76	20.88	5.76	22.41	5.70	23.13	5.70	18.60	5.80	20.10	5.92	21.60	6.05	22.40	6.11	23.20	6.05	24.90	5.92	25.70	5.80
34	16.74	5.64	18.09	5.70	19.44	5.81	20.16	5.87	20.88	5.87	22.41	5.81	23.13	5.81	18.60	5.92	20.10	6.05	21.60	6.17	22.40	6.24	23.20	6.17	24.90	6.05	25.70	5.92
35	16.74	5.70	18.09	5.81	19.44	5.87	20.16	5.93	20.88	5.93	22.41	5.87	23.13	5.87	18.60	6.05	20.10	6.11	21.60	6.24	22.40	6.30	23.20	6.24	24.90	6.11	25.70	5.99
36	16.49	5.76	17.84	5.87	19.19	5.93	19.89	5.93	20.59	5.99	22.03	5.93	22.64	5.93	18.32	6.11	19.82	6.17	21.32	6.30	22.10	6.43	22.88	6.30	24.48	6.17	25.16	6.05
38	15.98	5.87	17.33	5.99	18.68	6.11	19.35	6.05	20.02	6.11	21.28	6.11	21.67	6.05	17.76	6.24	19.26	6.36	20.76	6.49	21.50	6.62	22.24	6.49	23.64	6.30	24.08	6.17
40	15.48	6.05	16.83	6.11	18.18	6.23	18.81	6.23	19.44	6.29	20.52	6.23	20.70	6.23	17.20	6.43	18.70	6.55	20.20	6.68	20.90	6.62	21.60	6.62	22.80	6.49	23.00	6.36

TEMP	Total Power of Combined Indoor Units: 110%														Total Power of Combined Indoor Units: 120%													
	Indoor Air Inlet Temperature (WB (ºC))														Indoor Air Inlet Temperature (WB (ºC))													
	14		16		18		19		20		22		24		14		16		18		19		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
10	18.60	5.04	20.10	5.11	21.60	5.17	22.40	5.24	23.20	5.31	24.90	5.44	25.70	5.51	18.60	5.03	20.10	5.16	21.60	5.30	22.40	5.30	23.20	5.36	24.90	5.56	25.70	5.69
12	18.60	5.04	20.10	5.17	21.60	5.24	22.40	5.31	23.20	5.37	24.90	5.44	25.70	5.57	18.60	5.10	20.10	5.23	21.60	5.30	22.40	5.36	23.20	5.43	24.90	5.56	25.70	5.69
14	18.60	5.11	20.10	5.17	21.60	5.31	22.40	5.31	23.20	5.37	24.90	5.51	25.70	5.57	18.60	5.10	20.10	5.23	21.60	5.36	22.40	5.36	23.20	5.50	24.90	5.63	25.70	5.76
16	18.60	5.17	20.10	5.24	21.60	5.37	22.40	5.37	23.20	5.44	24.90	5.57	25.70	5.64	18.60	5.16	20.10	5.30	21.60	5.36	22.40	5.43	23.20	5.50	24.90	5.63	25.70	5.83
18	18.60	5.17	20.10	5.31	21.60	5.44	22.40	5.44	23.20	5.51	24.90	5.64	25.70	5.77	18.60	5.23	20.10	5.36	21.60	5.43	22.40	5.50	23.20	5.56	24.90	5.76	25.70	5.89
20	18.60	5.31	20.10	5.37	21.60	5.51	22.40	5.57	23.20	5.57	24.90	5.70	25.70	5.84	18.60	5.30	20.10	5.43	21.60	5.56	22.40	5.56	23.20	5.63	24.90	5.83	25.70	5.96
22	18.60	5.37	20.10	5.51	21.60	5.57	22.40	5.64	23.20	5.70	24.90	5.84	25.70	5.90	18.60	5.43	20.10	5.50	21.60	5.63	22.40	5.69	23.20	5.76	24.90	5.89	25.70	6.09
24	18.60	5.51	20.10	5.57	21.60	5.70	22.40	5.77	23.20	5.84	24.90	5.97	25.70	6.04	18.60	5.50	20.10	5.63	21.60	5.76	22.40	5.76	23.20	5.89	24.90	6.03	25.70	6.16
26	18.60	5.64	20.10	5.70	21.60	5.84	22.40	5.90	23.20	5.97	24.90	6.04	25.70	6.17	18.60	5.63	20.10	5.76	21.60	5.83	22.40	5.89	23.20	5.96	24.90	6.16	25.70	6.29
28	18.60	5.77	20.10	5.84	21.60	5.97	22.40	6.04	23.20	6.10	24.90	6.24	25.70	6.30	18.60	5.76	20.10	5.89	21.60	5.96	22.40	6.03	23.20	6.16	24.90	6.29	25.70	6.42
30	18.60	5.90	20.10	6.04	21.60	6.10	22.40	6.17	23.20	6.24	24.90	6.37	25.70	6.50	18.60	5.89	20.10	6.03	21.60	6.16	22.40	6.22	23.20	6.29	24.90	6.42	25.70	6.62
32	18.60	6.04	20.10	6.17	21.60	6.30	22.40	6.37	23.20	6.43	24.90	6.57	25.70	6.70	18.60	6.03	20.10	6.16	21.60	6.29	22.40	6.36	23.20	6.42	24.90	6.62	25.70	6.75
34	18.60	6.24	20.10	6.37	21.60	6.50	22.40	6.50	23.20	6.63	24.90	6.77	25.70	6.83	18.60	6.22	20.10	6.36	21.60	6.49	22.40	6.56	23.20	6.62	24.90	6.82	25.70	6.95
35	18.60	6.30	20.10	6.43	21.60	6.57	22.40	6.63	23.20	6.70	24.90	6.83	25.70	6.97	18.60	6.29	20.10	6.42	21.60	6.56	22.40	6.62	23.20	6.69	24.90	6.89	25.70	7.08
36	18.32	6.43	19.82	6.50	21.32	6.63	22.10	6.77	22.88	6.77	24.48	6.97	25.16	7.10	18.32	6.42	19.82	6.56	21.32	6.69	22.10	6.75	22.88	6.82	24.48	7.02	25.16	7.15
38	17.76	6.63	19.26	6.77	20.76	6.90	21.50	7.03	22.24	7.03	23.64	7.10	24.08	7.30	17.76	6.62	19.26	6.69	20.76	6.89	21.50	6.95	22.24	7.02	23.64	7.22	24.08	7.42
40	17.20	6.83	18.70	6.97	20.20	7.10	20.90	7.16	21.60	7.23	22.80	7.36	23.00	7.50	17.20	6.82	18.70	6.95	20.20	7.08	20.90	7.15	21.60	7.22	22.80	7.42	23.00	7.61

TEMP	Total Power of Combined Indoor Units: 130%													
	Indoor Air Inlet Temperature (WB (ºC))													
	14		16		18		19		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
10	18.60	4.51	20.10	4.63	21.60	4.70	22.40	4.76	23.20	4.82	24.90	4.95	25.70	5.07
12	18.60	4.51	20.10	4.63	21.60	4.70	22.40	4.76	23.20	4.82	24.90	4.95	25.70	5.07
14	18.60	4.57	20.10	4.70	21.60	4.76	22.40	4.82	23.20	4.88	24.90	4.95	25.70	5.14
16	18.60	4.57	20.10	4.70	21.60	4.82	22.40	4.82	23.20	4.88	24.90	5.01	25.70	5.14
18	18.60	4.63	20.10	4.76	21.60	4.88	22.40	4.88	23.20	4.95	24.90	5.14	25.70	5.26
20	18.60	4.76	20.10	4.88	21.60	4.95	22.40	5.01	23.20	5.07	24.90	5.20	25.70	5.32
22	18.60	4.82	20.10	4.95	21.60	5.01	22.40	5.07	23.20	5.14	24.90	5.32	25.70	5.45
24	18.60	4.95	20.10	5.07	21.60	5.14	22.40	5.20	23.20	5.26	24.90	5.45	25.70	5.57
26	18.60	5.07	20.10	5.26	21.60	5.32	22.40	5.39	23.20	5.45	24.90	5.57	25.70	5.70
28	18.60	5.26	20.10	5.39	21.60	5.45	22.40	5.51	23.20	5.57	24.90	5.76	25.70	5.89
30	18.60	5.45	20.10	5.57	21.60	5.64	22.40	5.70	23.20	5.76	24.90	5.95	25.70	6.07
32	18.60	5.64	20.10	5.76	21.60	5.89	22.40	5.89	23.20	6.01	24.90	6.14	25.70	6.33
34	18.60	5.82	20.10	5.95	21.60	6.07	22.40	6.14	23.20	6.20	24.90	6.39	25.70	6.51
35	18.60	5.95	20.10	6.07	21.60	6.20	22.40	6.26	23.20	6.33	24.90	6.51	25.70	6.70
36	18.32	6.07	19.82	6.20	21.32	6.33	22.10	6.83	22.88	6.45	24.48	6.64	25.16	6.83
38	17.76	6.33	19.26	6.45	20.76	6.58	21.50	7.08	22.24	6.70	23.64	6.89	24.08	7.08
40	17.20	6.58	18.70	6.76	20.20	6.83	20.90	7.39	21.60	7.01	22.80	7.20	23.00	7.39

◆ RAS-10FSNM

TEMP	Total Power of Combined Indoor Units: 50% — Indoor Air Inlet Temperature (WB (ºC))														Total Power of Combined Indoor Units: 60% — Indoor Air Inlet Temperature (WB (ºC))											
	14		16		18		19		20		22		24		14		16		18		19		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
10	11.50	3.34	12.50	3.37	13.50	3.41	14.00	3.45	14.55	3.45	15.50	3.45	16.05	3.48	13.80	3.80	15.00	4.05	16.20	4.25	16.80	4.35	17.46	4.30	18.60	4.25	19.26	4.20
12	11.50	3.37	12.50	3.41	13.50	3.45	14.00	3.48	14.55	3.48	15.50	3.48	16.05	3.48	13.80	3.85	15.00	4.05	16.20	4.25	16.80	4.35	17.46	4.30	18.60	4.25	19.26	4.20
14	11.50	3.37	12.50	3.41	13.50	3.48	14.00	3.48	14.55	3.48	15.50	3.52	16.05	3.52	13.80	3.85	15.00	4.05	16.20	4.25	16.80	4.35	17.46	4.35	18.60	4.30	19.26	4.20
16	11.50	3.41	12.50	3.45	13.50	3.48	14.00	3.52	14.55	3.52	15.50	3.52	16.05	3.56	13.80	3.85	15.00	4.05	16.20	4.30	16.80	4.35	17.46	4.35	18.60	4.30	19.26	4.25
18	11.50	3.41	12.50	3.48	13.50	3.52	14.00	3.56	14.55	3.56	15.50	3.56	16.05	3.56	13.80	3.90	15.00	4.10	16.20	4.30	16.80	4.40	17.46	4.40	18.60	4.35	19.26	4.30
20	11.50	3.45	12.50	3.48	13.50	3.56	14.00	3.59	14.55	3.59	15.50	3.59	16.05	3.59	13.80	3.95	15.00	4.15	16.20	4.35	16.80	4.45	17.46	4.45	18.60	4.35	19.26	4.30
22	11.50	3.48	12.50	3.52	13.50	3.56	14.00	3.59	14.55	3.59	15.50	3.59	16.05	3.59	13.80	3.95	15.00	4.20	16.20	4.40	16.80	4.50	17.46	4.45	18.60	4.40	19.26	4.35
24	11.50	3.48	12.50	3.56	13.50	3.59	14.00	3.59	14.55	3.63	15.50	3.63	16.05	3.63	13.80	4.05	15.00	4.25	16.20	4.45	16.80	4.55	17.46	4.50	18.60	4.45	19.26	4.45
26	11.50	3.52	12.50	3.56	13.50	3.59	14.00	3.63	14.55	3.63	15.50	3.63	16.05	3.67	13.80	4.05	15.00	4.30	16.20	4.50	16.80	4.60	17.46	4.60	18.60	4.55	19.26	4.50
28	11.50	3.52	12.50	3.59	13.50	3.63	14.00	3.67	14.55	3.67	15.50	3.67	16.05	3.67	13.80	4.15	15.00	4.35	16.20	4.60	16.80	4.70	17.46	4.65	18.60	4.60	19.26	4.55
30	11.50	3.56	12.50	3.59	13.50	3.63	14.00	3.67	14.55	3.67	15.50	3.67	16.05	3.71	13.80	4.20	15.00	4.45	16.20	4.65	16.80	4.75	17.46	4.75	18.60	4.70	19.26	4.65
32	11.50	3.56	12.50	3.59	13.50	3.67	14.00	3.71	14.55	3.71	15.50	3.71	16.05	3.71	13.80	4.30	15.00	4.50	16.20	4.75	16.80	4.85	17.46	4.85	18.60	4.75	19.26	4.70
34	11.50	3.59	12.50	3.63	13.50	3.67	14.00	3.71	14.55	3.71	15.50	3.71	16.05	3.71	13.80	4.35	15.00	4.60	16.20	4.85	16.80	4.95	17.46	4.90	18.60	4.85	19.26	4.80
35	11.50	3.59	12.50	3.63	13.50	3.67	14.00	3.71	14.55	3.71	15.50	3.71	16.05	3.71	13.80	4.40	15.00	4.65	16.20	4.90	16.80	5.00	17.46	5.00	18.60	4.90	19.26	4.85
36	11.29	3.59	12.30	3.63	13.31	3.71	13.81	3.74	14.32	3.71	15.21	3.71	15.67	3.74	13.55	4.45	14.76	4.70	15.97	4.95	16.57	4.90	17.18	5.05	18.25	5.00	18.80	4.90
38	10.87	3.59	11.90	3.63	12.93	3.71	13.43	3.74	13.86	3.74	14.63	3.74	14.91	3.74	13.04	4.55	14.28	4.80	15.52	5.05	16.12	5.00	16.63	5.15	17.56	5.10	17.89	5.00
40	10.45	3.59	11.50	3.67	12.55	3.71	13.05	3.74	13.40	3.74	14.05	3.74	14.15	3.74	12.54	4.70	13.80	4.90	15.06	5.15	15.66	5.15	16.08	5.25	16.86	5.20	16.98	5.15

TEMP	Total Power of Combined Indoor Units: 70% — Indoor Air Inlet Temperature (WB (ºC))														Total Power of Combined Indoor Units: 80% — Indoor Air Inlet Temperature (WB (ºC))											
	14		16		18		19		20		22		24		14		16		18		19		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
10	16.10	4.82	17.50	5.00	18.90	5.13	19.60	5.25	20.37	5.25	21.70	5.25	22.47	5.31	18.40	5.83	20.00	5.90	21.60	5.97	22.40	6.04	23.28	6.11	24.80	6.18	25.68	6.32
12	16.10	4.88	17.50	5.00	18.90	5.19	19.60	5.25	20.37	5.25	21.70	5.25	22.47	5.31	18.40	5.83	20.00	5.90	21.60	6.04	22.40	6.04	23.28	6.11	24.80	6.18	25.68	6.32
14	16.10	4.88	17.50	5.07	18.90	5.19	19.60	5.25	20.37	5.25	21.70	5.31	22.47	5.31	18.40	5.90	20.00	5.97	21.60	6.04	22.40	6.11	23.28	6.11	24.80	6.25	25.68	6.32
16	16.10	4.88	17.50	5.07	18.90	5.19	19.60	5.31	20.37	5.31	21.70	5.31	22.47	5.37	18.40	5.90	20.00	5.97	21.60	6.04	22.40	6.11	23.28	6.18	24.80	6.25	25.68	6.39
18	16.10	4.94	17.50	5.07	18.90	5.25	19.60	5.31	20.37	5.37	21.70	5.37	22.47	5.43	18.40	5.90	20.00	6.04	21.60	6.11	22.40	6.18	23.28	6.25	24.80	6.32	25.68	6.46
20	16.10	5.00	17.50	5.13	18.90	5.31	19.60	5.37	20.37	5.37	21.70	5.43	22.47	5.43	18.40	5.97	20.00	6.11	21.60	6.18	22.40	6.25	23.28	6.25	24.80	6.39	25.68	6.53
22	16.10	5.07	17.50	5.19	18.90	5.37	19.60	5.43	20.37	5.43	21.70	5.49	22.47	5.49	18.40	6.04	20.00	6.18	21.60	6.25	22.40	6.25	23.28	6.32	24.80	6.46	25.68	6.60
24	16.10	5.13	17.50	5.25	18.90	5.43	19.60	5.49	20.37	5.55	21.70	5.55	22.47	5.61	18.40	6.18	20.00	6.25	21.60	6.32	22.40	6.39	23.28	6.39	24.80	6.53	25.68	6.67
26	16.10	5.19	17.50	5.37	18.90	5.49	19.60	5.61	20.37	5.61	21.70	5.61	22.47	5.68	18.40	6.25	20.00	6.32	21.60	6.39	22.40	6.46	23.28	6.53	24.80	6.67	25.68	6.74
28	16.10	5.25	17.50	5.43	18.90	5.61	19.60	5.68	20.37	5.74	21.70	5.74	22.47	5.74	18.40	6.32	20.00	6.39	21.60	6.53	22.40	6.53	23.28	6.60	24.80	6.74	25.68	6.88
30	16.10	5.37	17.50	5.55	18.90	5.68	19.60	5.80	20.37	5.80	21.70	5.80	22.47	5.86	18.40	6.46	20.00	6.53	21.60	6.67	22.40	6.67	23.28	6.74	24.80	6.88	25.68	7.02
32	16.10	5.43	17.50	5.61	18.90	5.80	19.60	5.86	20.37	5.92	21.70	5.92	22.47	5.98	18.40	6.53	20.00	6.67	21.60	6.74	22.40	6.81	23.28	6.88	24.80	7.02	25.68	7.09
34	16.10	5.55	17.50	5.74	18.90	5.92	19.60	5.98	20.37	6.04	21.70	6.04	22.47	6.10	18.40	6.67	20.00	6.81	21.60	6.88	22.40	6.95	23.28	7.02	24.80	7.16	25.68	7.23
35	16.10	5.68	17.50	5.80	18.90	5.98	19.60	6.10	20.37	6.10	21.70	6.16	22.47	6.16	18.40	6.74	20.00	6.88	21.60	6.95	22.40	7.02	23.28	7.09	24.80	7.23	25.68	7.37
36	15.81	5.68	17.22	5.86	18.63	6.04	19.33	6.16	20.05	6.16	21.29	6.16	21.94	6.23	18.06	6.81	19.68	6.95	21.30	7.02	22.10	7.16	22.91	7.16	24.34	7.30	25.07	7.44
38	15.22	5.80	16.66	5.98	18.10	6.16	18.80	6.23	19.40	6.29	20.48	6.35	20.87	6.35	17.39	7.02	19.04	7.09	20.69	7.23	21.49	7.44	22.18	7.30	23.41	7.44	23.86	7.58
40	14.63	5.98	16.10	6.16	17.57	6.35	18.27	6.29	18.76	6.47	19.67	6.47	19.81	6.53	16.72	7.16	18.40	7.30	20.08	7.37	20.88	7.58	21.44	7.51	22.48	7.65	22.64	7.79

TEMP	Total Power of Combined Indoor Units: 90% — Indoor Air Inlet Temperature (WB (ºC))														Total Power of Combined Indoor Units: 100% — Indoor Air Inlet Temperature (WB (ºC))											
	14		16		18		19		20		22		24		14		16		18		19		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
10	20.70	6.36	22.50	6.44	24.30	6.59	25.20	6.59	26.19	6.59	27.90	6.59	28.89	6.59	23.00	6.81	25.00	6.89	27.00	7.06	28.00	7.06	29.10	7.06	31.00	6.89	32.10	6.72
12	20.70	6.36	22.50	6.51	24.30	6.59	25.20	6.67	26.19	6.67	27.90	6.59	28.89	6.59	23.00	6.81	25.00	6.89	27.00	7.06	28.00	7.14	29.10	7.06	31.00	6.89	32.10	6.72
14	20.70	6.36	22.50	6.51	24.30	6.59	25.20	6.67	26.19	6.67	27.90	6.59	28.89	6.59	23.00	6.81	25.00	6.89	27.00	7.06	28.00	7.14	29.10	7.06	31.00	6.89	32.10	6.72
16	20.70	6.44	22.50	6.51	24.30	6.67	25.20	6.67	26.19	6.67	27.90	6.67	28.89	6.67	23.00	6.89	25.00	6.97	27.00	7.14	28.00	7.14	29.10	7.06	31.00	6.89	32.10	6.81
18	20.70	6.51	22.50	6.59	24.30	6.67	25.20	6.75	26.19	6.75	27.90	6.75	28.89	6.67	23.00	6.89	25.00	7.06	27.00	7.14	28.00	7.22	29.10	7.14	31.00	6.97	32.10	6.81
20	20.70	6.51	22.50	6.67	24.30	6.75	25.20	6.82	26.19	6.82	27.90	6.75	28.89	6.75	23.00	6.97	25.00	7.06	27.00	7.22	28.00	7.30	29.10	7.22	31.00	7.06	32.10	6.89
22	20.70	6.59	22.50	6.75	24.30	6.82	25.20	6.90	26.19	6.90	27.90	6.90	28.89	6.82	23.00	7.06	25.00	7.14	27.00	7.30	28.00	7.39	29.10	7.30	31.00	7.14	32.10	6.97
24	20.70	6.75	22.50	6.82	24.30	6.90	25.20	6.98	26.19	6.98	27.90	6.90	28.89	6.90	23.00	7.14	25.00	7.30	27.00	7.39	28.00	7.47	29.10	7.39	31.00	7.22	32.10	7.06
26	20.70	6.82	22.50	6.90	24.30	7.06	25.20	7.06	26.19	7.06	27.90	7.06	28.89	6.98	23.00	7.22	25.00	7.39	27.00	7.55	28.00	7.55	29.10	7.47	31.00	7.39	32.10	7.22
28	20.70	6.90	22.50	7.06	24.30	7.13	25.20	7.21	26.19	7.21	27.90	7.13	28.89	7.13	23.00	7.39	25.00	7.55	27.00	7.64	28.00	7.72	29.10	7.64	31.00	7.47	32.10	7.30
30	20.70	7.06	22.50	7.13	24.30	7.29	25.20	7.37	26.19	7.37	27.90	7.29	28.89	7.29	23.00	7.55	25.00	7.64	27.00	7.80	28.00	7.89	29.10	7.80	31.00	7.64	32.10	7.47
32	20.70	7.21	22.50	7.29	24.30	7.44	25.20	7.52	26.19	7.52	27.90	7.44	28.89	7.44	23.00	7.64	25.00	7.80	27.00	7.97	28.00	8.05	29.10	7.97	31.00	7.80	32.10	7.64
34	20.70	7.37	22.50	7.44	24.30	7.60	25.20	7.68	26.19	7.68	27.90	7.60	28.89	7.60	23.00	7.80	25.00	7.97	27.00	8.13	28.00	8.22	29.10	8.13	31.00	7.97	32.10	7.80
35	20.70	7.44	22.50	7.60	24.30	7.68	25.20	7.75	26.19	7.75	27.90	7.68	28.89	7.68	23.00	7.97	25.00	8.05	27.00	8.22	28.00	8.30	29.10	8.22	31.00	8.05	32.10	7.89
36	20.32	7.52	22.14	7.68	23.96	7.75	24.86	7.75	25.78	7.83	27.38	7.75	28.21	7.75	22.58	8.05	24.60	8.13	26.62	8.30	27.62	8.47	28.64	8.30	30.42	8.13	31.34	7.97
38	19.57	7.68	21.42	7.83	23.27	7.99	24.17	7.91	24.95	7.99	26.33	7.99	26.84	7.91	21.74	8.22	23.80	8.38	25.86	8.55	26.86	8.72	27.72	8.55	29.26	8.30	29.82	8.13
40	18.81	7.91	20.70	7.99	22.59	8.14	23.49	8.14	24.12	8.22	25.29	8.14	25.47	8.14	20.90	8.47	23.00	8.63	25.10	8.80	26.10	8.72	26.80	8.72	28.10	8.55	28.30	8.38

TEMP	Total Power of Combined Indoor Units: 110% — Indoor Air Inlet Temperature (WB (ºC))														Total Power of Combined Indoor Units: 120% — Indoor Air Inlet Temperature (WB (ºC))											
	14		16		18		19		20		22		24		14		16		18		19		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
10	23.00	6.69	25.00	6.77	27.00	6.86	28.00	6.95	29.10	7.04	31.00	7.21	32.10	7.30	23.00	6.67	25.00	6.85	27.00	7.02	28.00	7.02	29.10	7.11	31.00	7.37	32.10	7.55
12	23.00	6.69	25.00	6.86	27.00	6.95	28.00	7.04	29.10	7.13	31.00	7.21	32.10	7.39	23.00	6.76	25.00	6.93	27.00	7.02	28.00	7.11	29.10	7.20	31.00	7.37	32.10	7.55
14	23.00	6.77	25.00	6.86	27.00	7.04	28.00	7.04	29.10	7.13	31.00	7.30	32.10	7.39	23.00	6.76	25.00	6.93	27.00	7.11	28.00	7.11	29.10	7.28	31.00	7.46	32.10	7.64
16	23.00	6.86	25.00	6.95	27.00	7.13	28.00	7.13	29.10	7.21	31.00	7.39	32.10	7.48	23.00	6.85	25.00	7.02	27.00	7.11	28.00	7.20	29.10	7.28	31.00	7.46	32.10	7.72
18	23.00	6.86	25.00	7.04	27.00	7.21	28.00	7.21	29.10	7.30	31.00	7.48	32.10	7.65	23.00	6.93	25.00	7.11	27.00	7.20	28.00	7.28	29.10	7.37	31.00	7.64	32.10	7.81
20	23.00	7.04	25.00	7.13	27.00	7.30	28.00	7.39	29.10	7.39	31.00	7.57	32.10	7.74	23.00	7.02	25.00	7.20	27.00	7.37	28.00	7.37	29.10	7.46	31.00	7.72	32.10	7.90
22	23.00	7.13	25.00	7.30	27.00	7.39	28.00	7.48	29.10	7.57	31.00	7.74	32.10	7.83	23.00	7.20	25.00	7.28	27.00	7.46	28.00	7.55	29.10	7.64	31.00	7.81	32.10	8.07
24	23.00	7.30	25.00	7.39	27.00	7.57	28.00	7.65	29.10	7.74	31.00	7.92	32.10	8.01	23.00	7.28	25.00	7.46	27.00	7.64	28.00	7.64	29.10	7.81	31.00	7.99	32.10	8.16
26	23.00	7.48	25.00	7.57	27.00	7.74	28.00	7.83	29.10	7.92	31.00	8.01	32.10	8.18	23.00	7.46	25.00	7.64	27.00	7.72	28.00	7.81	29.10	7.90	31.00	8.16	32.10	8.34
28	23.00	7.65	25.00	7.74	27.00	7.92	28.00	8.01	29.10	8.09	31.00	8.27	32.10	8.36	23.00	7.64	25.00	7.81	27.00	7.90	28.00	7.99	29.10	8.16	31.00	8.34	32.10	8.51
30	23.00	7.83	25.00	8.01	27.00	8.09	28.00	8.18	29.10	8.27	31.00	8.45	32.10	8.62	23.00	7.81	25.00	7.99	27.00	8.16	28.00	8.25	29.10	8.34	31.00	8.51	32.10	8.78
32	23.00	8.01	25.00	8.18	27.00	8.36	28.00	8.45	29.10	8.53	31.00	8.71	32.10	8.89	23.00	7.99	25.00	8.16	27.00	8.34	28.00	8.43	29.10	8.51	31.00	8.78	32.10	8.95
34	23.00	8.27	25.00	8.45	27.00	8.62	28.00	8.62	29.10	8.80	31.00	8.97	32.10	9.06	23.00	8.25	25.00	8.43	27.00	8.60	28.00	8.69	29.10	8.78	31.00	9.04	32.10	9.22
35	23.00	8.36	25.00	8.53	27.00	8.71	28.00	8.80	29.10	8.89	31.00	9.06	32.10	9.24	23.00	8.34	25.00	8.51	27.00	8.69	28.00	8.78	29.10	8.86	31.00	9.13	32.10	9.39
36	22.58	8.53	24.60	8.62	26.62	8.80	27.62	8.97	28.64	8.97	30.42	9.24	31.34	9.41	22.58	8.51	24.60	8.69	26.62	8.86	27.62	8.95	28.64	9.04	30.42	9.30	31.34	9.48
38	21.74	8.80	23.80	8.97	25.86	9.15	26.86	9.33	27.72	9.33	29.26	9.41	29.82	9.68	21.74	8.78	23.80	8.86	25.86	9.13	26.86	9.22	27.72	9.30	29.26	9.57	29.82	9.83
40	20.90	9.06	23.00	9.24	25.10	9.41	26.10	9.50	26.80	9.59	28.10	9.77	28.30	9.94	20.90	9.04	23.00	9.22	25.10	9.39	26.10	9.48	26.80	9.57	28.10	9.83	28.30	10.09

TEMP	Total Power of Combined Indoor Units: 130%													
	Indoor Air Inlet Temperature (WB (ºC))													
	14		16		18		19		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
10	23.00	5.93	25.00	6.09	27.00	6.18	28.00	6.26	29.10	6.34	31.00	6.51	32.10	6.67
12	23.00	5.93	25.00	6.09	27.00	6.18	28.00	6.26	29.10	6.34	31.00	6.51	32.10	6.67
14	23.00	6.01	25.00	6.18	27.00	6.26	28.00	6.34	29.10	6.42	31.00	6.51	32.10	6.75
16	23.00	6.01	25.00	6.18	27.00	6.34	28.00	6.34	29.10	6.42	31.00	6.59	32.10	6.75
18	23.00	6.09	25.00	6.26	27.00	6.42	28.00	6.42	29.10	6.51	31.00	6.75	32.10	6.92
20	23.00	6.26	25.00	6.42	27.00	6.51	28.00	6.59	29.10	6.67	31.00	6.84	32.10	7.00
22	23.00	6.34	25.00	6.51	27.00	6.59	28.00	6.67	29.10	6.75	31.00	7.00	32.10	7.17
24	23.00	6.51	25.00	6.67	27.00	6.75	28.00	6.84	29.10	6.92	31.00	7.17	32.10	7.33
26	23.00	6.67	25.00	6.92	27.00	7.00	28.00	7.08	29.10	7.17	31.00	7.33	32.10	7.49
28	23.00	6.92	25.00	7.08	27.00	7.17	28.00	7.25	29.10	7.33	31.00	7.58	32.10	7.74
30	23.00	7.17	25.00	7.33	27.00	7.41	28.00	7.49	29.10	7.58	31.00	7.82	32.10	7.99
32	23.00	7.41	25.00	7.58	27.00	7.74	28.00	7.74	29.10	7.91	31.00	8.07	32.10	8.32
34	23.00	7.66	25.00	7.82	27.00	7.99	28.00	8.07	29.10	8.15	31.00	8.40	32.10	8.57
35	23.00	7.82	25.00	7.99	27.00	8.15	28.00	8.24	29.10	8.32	31.00	8.57	32.10	8.81
36	22.58	7.99	24.60	8.15	26.62	8.32	27.62	8.98	28.64	8.48	30.42	8.73	31.34	8.98
38	21.74	8.32	23.80	8.48	25.86	8.65	26.86	9.31	27.72	8.81	29.26	9.06	29.82	9.31
40	20.90	8.65	23.00	8.90	25.10	8.98	26.10	9.72	26.80	9.22	28.10	9.47	28.30	9.72

◆ RAS-12FSNM

TEMP	Total Power of Combined Indoor Units: 50%														Total Power of Combined Indoor Units: 60%											
	Indoor Air Inlet Temperature (WB (ºC))														Indoor Air Inlet Temperature (WB (ºC))											
	14		16		18		19		20		22		24		14		16		18		19		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
10	13.79	4.30	14.99	4.35	16.20	4.39	16.80	4.44	17.35	4.44	18.25	4.44	18.76	4.49	16.53	4.91	17.98	5.24	19.42	5.50	20.14	5.63	20.80	5.56	21.88	5.50	22.48	5.43
12	13.79	4.35	14.99	4.39	16.20	4.44	16.80	4.49	17.35	4.49	18.25	4.49	18.76	4.49	16.53	4.98	17.98	5.24	19.42	5.50	20.14	5.63	20.80	5.56	21.88	5.50	22.48	5.43
14	13.79	4.35	14.99	4.39	16.20	4.49	16.80	4.49	17.35	4.49	18.25	4.54	18.76	4.54	16.53	4.98	17.98	5.24	19.42	5.50	20.14	5.63	20.80	5.63	21.88	5.56	22.48	5.43
16	13.79	4.39	14.99	4.44	16.20	4.49	16.80	4.54	17.35	4.54	18.25	4.54	18.76	4.58	16.53	4.98	17.98	5.24	19.42	5.56	20.14	5.63	20.80	5.63	21.88	5.56	22.48	5.50
18	13.79	4.39	14.99	4.49	16.20	4.54	16.80	4.58	17.35	4.58	18.25	4.58	18.76	4.58	16.53	5.04	17.98	5.30	19.42	5.56	20.14	5.69	20.80	5.69	21.88	5.63	22.48	5.56
20	13.79	4.44	14.99	4.49	16.20	4.58	16.80	4.63	17.35	4.63	18.25	4.63	18.76	4.63	16.53	5.11	17.98	5.37	19.42	5.63	20.14	5.75	20.80	5.75	21.88	5.63	22.48	5.56
22	13.79	4.49	14.99	4.54	16.20	4.58	16.80	4.63	17.35	4.63	18.25	4.63	18.76	4.63	16.53	5.11	17.98	5.43	19.42	5.69	20.14	5.82	20.80	5.75	21.88	5.69	22.48	5.63
24	13.79	4.49	14.99	4.58	16.20	4.63	16.80	4.63	17.35	4.68	18.25	4.68	18.76	4.68	16.53	5.24	17.98	5.50	19.42	5.75	20.14	5.88	20.80	5.82	21.88	5.75	22.48	5.75
26	13.79	4.54	14.99	4.58	16.20	4.63	16.80	4.68	17.35	4.68	18.25	4.68	18.76	4.73	16.53	5.24	17.98	5.56	19.42	5.82	20.14	5.95	20.80	5.95	21.88	5.88	22.48	5.82
28	13.79	4.54	14.99	4.63	16.20	4.68	16.80	4.73	17.35	4.73	18.25	4.73	18.76	4.73	16.53	5.37	17.98	5.63	19.42	5.95	20.14	6.08	20.80	6.01	21.88	5.95	22.48	5.88
30	13.79	4.58	14.99	4.63	16.20	4.68	16.80	4.73	17.35	4.73	18.25	4.73	18.76	4.78	16.53	5.43	17.98	5.75	19.42	6.01	20.14	6.14	20.80	6.14	21.88	6.08	22.48	6.01
32	13.79	4.58	14.99	4.63	16.20	4.73	16.80	4.78	17.35	4.78	18.25	4.78	18.76	4.78	16.53	5.56	17.98	5.82	19.42	6.14	20.14	6.27	20.80	6.27	21.88	6.14	22.48	6.08
34	13.79	4.63	14.99	4.68	16.20	4.73	16.80	4.78	17.35	4.78	18.25	4.78	18.76	4.78	16.53	5.63	17.98	5.95	19.42	6.27	20.14	6.40	20.80	6.34	21.88	6.27	22.48	6.21
35	13.79	4.63	14.99	4.68	16.20	4.73	16.80	4.78	17.35	4.78	18.25	4.78	18.76	4.78	16.53	5.69	17.98	6.01	19.42	6.34	20.14	6.47	20.80	6.47	21.88	6.34	22.48	6.27
36	13.62	4.63	14.69	4.68	15.77	4.78	16.31	4.82	16.77	4.78	17.54	4.78	17.96	4.82	16.33	5.75	17.61	6.08	18.90	6.40	19.55	6.34	20.10	6.53	21.03	6.47	21.53	6.34
38	13.28	4.63	14.09	4.68	14.90	4.78	15.33	4.82	15.61	4.82	16.12	4.82	16.38	4.82	15.92	5.88	16.89	6.21	17.87	6.53	18.37	6.47	18.71	6.66	19.32	6.60	19.63	6.47
40	12.94	4.63	13.49	4.73	14.04	4.78	14.34	4.82	14.44	4.82	14.69	4.82	14.79	4.82	15.51	6.08	16.17	6.34	16.83	6.66	17.19	6.66	17.31	6.79	17.61	6.72	17.74	6.66

TEMP	Total Power of Combined Indoor Units: 70%														Total Power of Combined Indoor Units: 80%											
	Indoor Air Inlet Temperature (WB (ºC))														Indoor Air Inlet Temperature (WB (ºC))											
	14		16		18		19		20		22		24		14		16		18		19		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
10	19.27	6.24	20.96	6.48	22.64	6.64	23.48	6.80	24.25	6.80	25.51	6.80	26.21	6.88	22.02	7.54	23.94	7.63	25.86	7.73	26.82	7.82	27.70	7.91	29.14	8.00	29.94	8.18
12	19.27	6.32	20.96	6.48	22.64	6.72	23.48	6.80	24.25	6.80	25.51	6.80	26.21	6.88	22.02	7.54	23.94	7.63	25.86	7.82	26.82	7.82	27.70	7.91	29.14	8.00	29.94	8.18
14	19.27	6.32	20.96	6.56	22.64	6.72	23.48	6.80	24.25	6.80	25.51	6.88	26.21	6.88	22.02	7.63	23.94	7.73	25.86	7.82	26.82	7.91	27.70	7.91	29.14	8.09	29.94	8.18
16	19.27	6.32	20.96	6.56	22.64	6.72	23.48	6.88	24.25	6.88	25.51	6.88	26.21	6.95	22.02	7.63	23.94	7.73	25.86	7.82	26.82	7.91	27.70	8.00	29.14	8.09	29.94	8.27
18	19.27	6.40	20.96	6.56	22.64	6.80	23.48	6.88	24.25	6.95	25.51	6.95	26.21	7.03	22.02	7.63	23.94	7.82	25.86	7.91	26.82	8.00	27.70	8.09	29.14	8.18	29.94	8.36
20	19.27	6.48	20.96	6.64	22.64	6.88	23.48	6.95	24.25	6.95	25.51	7.03	26.21	7.03	22.02	7.73	23.94	7.91	25.86	8.00	26.82	8.09	27.70	8.09	29.14	8.27	29.94	8.45
22	19.27	6.56	20.96	6.72	22.64	6.95	23.48	7.03	24.25	7.03	25.51	7.11	26.21	7.11	22.02	7.82	23.94	8.00	25.86	8.09	26.82	8.09	27.70	8.18	29.14	8.36	29.94	8.54
24	19.27	6.64	20.96	6.80	22.64	7.03	23.48	7.11	24.25	7.19	25.51	7.19	26.21	7.27	22.02	8.00	23.94	8.09	25.86	8.18	26.82	8.27	27.70	8.27	29.14	8.45	29.94	8.63
26	19.27	6.72	20.96	6.95	22.64	7.11	23.48	7.27	24.25	7.27	25.51	7.27	26.21	7.35	22.02	8.09	23.94	8.18	25.86	8.27	26.82	8.36	27.70	8.45	29.14	8.63	29.94	8.72
28	19.27	6.80	20.96	7.03	22.64	7.27	23.48	7.35	24.25	7.43	25.51	7.43	26.21	7.43	22.02	8.18	23.94	8.27	25.86	8.45	26.82	8.45	27.70	8.54	29.14	8.72	29.94	8.91
30	19.27	6.95	20.96	7.19	22.64	7.35	23.48	7.51	24.25	7.51	25.51	7.51	26.21	7.59	22.02	8.36	23.94	8.45	25.86	8.63	26.82	8.63	27.70	8.72	29.14	8.91	29.94	9.09
32	19.27	7.03	20.96	7.27	22.64	7.51	23.48	7.59	24.25	7.67	25.51	7.67	26.21	7.75	22.02	8.45	23.94	8.63	25.86	8.72	26.82	8.82	27.70	8.91	29.14	9.09	29.94	9.18
34	19.27	7.19	20.96	7.43	22.64	7.67	23.48	7.75	24.25	7.82	25.51	7.82	26.21	7.90	22.02	8.63	23.94	8.82	25.86	8.91	26.82	9.00	27.70	9.09	29.14	9.27	29.94	9.36
35	19.27	7.35	20.96	7.51	22.64	7.75	23.48	7.90	24.25	7.90	25.51	7.98	26.21	7.98	22.02	8.72	23.94	8.91	25.86	9.00	26.82	9.09	27.70	9.18	29.14	9.36	29.94	9.54
36	19.04	7.35	20.54	7.59	22.04	7.82	22.79	7.98	23.44	7.98	24.52	7.98	25.11	8.06	21.74	8.82	23.46	9.00	25.17	9.09	26.04	9.27	26.77	9.27	28.00	9.45	28.68	9.63
38	18.56	7.51	19.70	7.75	20.83	7.98	21.42	8.06	21.81	8.14	22.53	8.22	22.89	8.22	21.20	9.09	22.50	9.18	23.79	9.36	24.47	9.63	24.91	9.45	25.73	9.63	26.15	9.82
40	18.08	7.75	18.85	7.98	19.63	8.22	20.05	8.14	20.19	8.38	20.54	8.38	20.68	8.46	20.66	9.27	21.54	9.45	22.42	9.54	22.90	9.82	23.06	9.72	23.46	9.91	23.62	10.09

TEMP	Total Power of Combined Indoor Units: 90%														Total Power of Combined Indoor Units: 100%											
	Indoor Air Inlet Temperature (WB (ºC))														Indoor Air Inlet Temperature (WB (ºC))											
	14		16		18		19		20		22		24		14		16		18		19		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
10	24.76	8.22	26.92	8.32	29.08	8.52	30.16	8.52	31.15	8.52	32.77	8.52	33.67	8.52	27.50	8.77	29.90	8.88	32.30	9.10	33.50	9.10	34.60	9.10	36.40	8.88	37.40	8.67
12	24.76	8.22	26.92	8.42	29.08	8.52	30.16	8.62	31.15	8.62	32.77	8.52	33.67	8.52	27.50	8.77	29.90	8.88	32.30	9.10	33.50	9.20	34.60	9.10	36.40	8.88	37.40	8.67
14	24.76	8.22	26.92	8.42	29.08	8.52	30.16	8.62	31.15	8.62	32.77	8.52	33.67	8.52	27.50	8.77	29.90	8.88	32.30	9.10	33.50	9.20	34.60	9.10	36.40	8.88	37.40	8.67
16	24.76	8.32	26.92	8.42	29.08	8.62	30.16	8.62	31.15	8.62	32.77	8.62	33.67	8.62	27.50	8.88	29.90	8.99	32.30	9.20	33.50	9.20	34.60	9.10	36.40	8.88	37.40	8.77
18	24.76	8.42	26.92	8.52	29.08	8.62	30.16	8.72	31.15	8.72	32.77	8.72	33.67	8.62	27.50	8.88	29.90	9.10	32.30	9.20	33.50	9.31	34.60	9.20	36.40	8.99	37.40	8.77
20	24.76	8.42	26.92	8.62	29.08	8.72	30.16	8.82	31.15	8.82	32.77	8.72	33.67	8.72	27.50	8.99	29.90	9.10	32.30	9.31	33.50	9.42	34.60	9.31	36.40	9.10	37.40	8.88
22	24.76	8.52	26.92	8.72	29.08	8.82	30.16	8.92	31.15	8.92	32.77	8.92	33.67	8.82	27.50	9.10	29.90	9.20	32.30	9.42	33.50	9.52	34.60	9.42	36.40	9.20	37.40	8.99
24	24.76	8.72	26.92	8.82	29.08	8.92	30.16	9.02	31.15	9.02	32.77	8.92	33.67	8.92	27.50	9.20	29.90	9.42	32.30	9.52	33.50	9.63	34.60	9.52	36.40	9.31	37.40	9.10
26	24.76	8.82	26.92	8.92	29.08	9.12	30.16	9.12	31.15	9.12	32.77	9.12	33.67	9.02	27.50	9.31	29.90	9.52	32.30	9.74	33.50	9.74	34.60	9.63	36.40	9.52	37.40	9.31
28	24.76	8.92	26.92	9.12	29.08	9.22	30.16	9.32	31.15	9.32	32.77	9.22	33.67	9.22	27.50	9.52	29.90	9.74	32.30	9.84	33.50	9.95	34.60	9.84	36.40	9.63	37.40	9.42
30	24.76	9.12	26.92	9.22	29.08	9.42	30.16	9.52	31.15	9.52	32.77	9.42	33.67	9.42	27.50	9.74	29.90	9.84	32.30	10.06	33.50	10.17	34.60	10.06	36.40	9.84	37.40	9.63
32	24.76	9.32	26.92	9.42	29.08	9.62	30.16	9.72	31.15	9.72	32.77	9.62	33.67	9.62	27.50	9.84	29.90	10.06	32.30	10.27	33.50	10.38	34.60	10.27	36.40	10.06	37.40	9.84
34	24.76	9.52	26.92	9.62	29.08	9.82	30.16	9.92	31.15	9.92	32.77	9.82	33.67	9.82	27.50	10.06	29.90	10.27	32.30	10.49	33.50	10.59	34.60	10.49	36.40	10.27	37.40	10.06
35	24.76	9.62	26.92	9.82	29.08	9.92	30.16	10.02	31.15	10.02	32.77	9.92	33.67	9.92	27.50	10.27	29.90	10.38	32.30	10.59	33.50	10.70	34.60	10.59	36.40	10.38	37.40	10.17
36	24.45	9.72	26.38	9.92	28.31	10.02	29.28	10.02	30.11	10.12	31.49	10.02	32.25	10.02	27.16	10.38	29.30	10.49	31.44	10.70	32.52	10.91	33.44	10.70	34.98	10.49	35.82	10.27
38	23.84	9.92	25.30	10.12	26.76	10.32	27.51	10.22	28.02	10.32	28.94	10.32	29.40	10.22	26.48	10.59	28.10	10.81	29.72	11.02	30.56	11.24	31.12	11.02	32.14	10.70	32.66	10.49
40	23.23	10.22	24.22	10.32	25.21	10.52	25.75	10.52	25.93	10.62	26.38	10.52	26.56	10.52	25.80	10.91	26.90	11.13	28.00	11.34	28.60	11.24	28.80	11.24	29.30	11.02	29.50	10.81

TEMP	Total Power of Combined Indoor Units: 110%														Total Power of Combined Indoor Units: 120%											
	Indoor Air Inlet Temperature (WB (ºC))														Indoor Air Inlet Temperature (WB (ºC))											
	14		16		18		19		20		22		24		14		16		18		19		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
10	27.50	8.57	29.90	8.68	32.30	8.79	33.50	8.91	34.60	9.02	36.40	9.24	37.40	9.36	27.50	8.54	29.90	8.76	32.30	9.00	33.50	9.00	34.60	9.10	36.40	9.44	37.40	9.66
12	27.50	8.57	29.90	8.79	32.30	8.91	33.50	9.02	34.60	9.13	36.40	9.24	37.40	9.47	27.50	8.66	29.90	8.88	32.30	9.00	33.50	9.10	34.60	9.22	36.40	9.44	37.40	9.66
14	27.50	8.68	29.90	8.79	32.30	9.02	33.50	9.02	34.60	9.13	36.40	9.36	37.40	9.47	27.50	8.66	29.90	8.88	32.30	9.10	33.50	9.10	34.60	9.34	36.40	9.56	37.40	9.78
16	27.50	8.79	29.90	8.91	32.30	9.13	33.50	9.13	34.60	9.24	36.40	9.47	37.40	9.58	27.50	8.76	29.90	9.00	32.30	9.10	33.50	9.22	34.60	9.34	36.40	9.56	37.40	9.90
18	27.50	8.79	29.90	9.02	32.30	9.24	33.50	9.24	34.60	9.36	36.40	9.58	37.40	9.81	27.50	8.88	29.90	9.10	32.30	9.22	33.50	9.34	34.60	9.44	36.40	9.78	37.40	10.00
20	27.50	9.02	29.90	9.13	32.30	9.36	33.50	9.47	34.60	9.47	36.40	9.70	37.40	9.92	27.50	9.00	29.90	9.22	32.30	9.44	33.50	9.44	34.60	9.56	36.40	9.90	37.40	10.12
22	27.50	9.13	29.90	9.36	32.30	9.47	33.50	9.58	34.60	9.70	36.40	9.92	37.40	10.03	27.50	9.22	29.90	9.34	32.30	9.56	33.50	9.66	34.60	9.78	36.40	10.00	37.40	10.34
24	27.50	9.36	29.90	9.47	32.30	9.70	33.50	9.81	34.60	9.92	36.40	10.15	37.40	10.26	27.50	9.34	29.90	9.56	32.30	9.78	33.50	9.78	34.60	10.00	36.40	10.24	37.40	10.46
26	27.50	9.58	29.90	9.70	32.30	9.92	33.50	10.03	34.60	10.15	36.40	10.26	37.40	10.48	27.50	9.56	29.90	9.78	32.30	9.90	33.50	10.00	34.60	10.12	36.40	10.46	37.40	10.68
28	27.50	9.81	29.90	9.92	32.30	10.15	33.50	10.26	34.60	10.37	36.40	10.60	37.40	10.71	27.50	9.78	29.90	10.00	32.30	10.12	33.50	10.24	34.60	10.46	36.40	10.68	37.40	10.90
30	27.50	10.03	29.90	10.26	32.30	10.37	33.50	10.48	34.60	10.60	36.40	10.82	37.40	11.05	27.50	10.00	29.90	10.24	32.30	10.46	33.50	10.56	34.60	10.68	36.40	10.90	37.40	11.24
32	27.50	10.26	29.90	10.48	32.30	10.71	33.50	10.82	34.60	10.94	36.40	11.16	37.40	11.39	27.50	10.24	29.90	10.46	32.30	10.68	33.50	10.80	34.60	10.90	36.40	11.24	37.40	11.46
34	27.50	10.60	29.90	10.82	32.30	11.05	33.50	11.05	34.60	11.27	36.40	11.50	37.40	11.61	27.50	10.56	29.90	10.80	32.30	11.02	33.50	11.14	34.60	11.24	36.40	11.58	37.40	11.80
35	27.50	10.71	29.90	10.94	32.30	11.16	33.50	11.27	34.60	11.39	36.40	11.61	37.40	11.84	27.50	10.68	29.90	10.90	32.30	11.14	33.50	11.24	34.60	11.36	36.40	11.70	37.40	12.02
36	27.16	10.94	29.30	11.05	31.44	11.27	32.52	11.50	33.44	11.50	34.98	11.84	35.82	12.06	27.16	10.90	29.30	11.14	31.44	11.36	32.52	11.46	33.44	11.58	34.98	11.92	35.82	12.14
38	26.48	11.27	28.10	11.50	29.72	11.72	30.56	11.95	31.12	11.95	32.14	12.06	32.66	12.40	26.48	11.24	28.10	11.36	29.72	11.70	30.56	11.80	31.12	11.92	32.14	12.26	32.66	12.60
40	25.80	11.61	26.90	11.84	28.00	12.06	28.60	12.18	28.80	12.29	29.30	12.51	29.50	12.74	25.80	11.58	26.90	11.80	28.00	12.02	28.60	12.14	28.80	12.26	29.30	12.60	29.50	12.92

TEMP	Total Power of Combined Indoor Units: 110%												
	Indoor Air Inlet Temperature (WB (ºC))												
	14		16		18		19		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
10	27,50	7,63	29,90	7,83	32,30	7,95	33,50	8,05	34,60	8,15	36,40	8,37	37,40	8,58
12	27,50	7,63	29,90	7,83	32,30	7,95	33,50	8,05	34,60	8,15	36,40	8,37	37,40	8,58
14	27,50	7,73	29,90	7,95	32,30	8,05	33,50	8,15	34,60	8,26	36,40	8,37	37,40	8,70
16	27,50	7,73	29,90	7,95	32,30	8,15	33,50	8,15	34,60	8,26	36,40	8,48	37,40	8,70
18	27,50	7,83	29,90	8,05	32,30	8,26	33,50	8,26	34,60	8,37	36,40	8,70	37,40	8,90
20	27,50	8,05	29,90	8,26	32,30	8,37	33,50	8,48	34,60	8,58	36,40	8,80	37,40	9,00
22	27,50	8,15	29,90	8,37	32,30	8,48	33,50	8,58	34,60	8,70	36,40	9,00	37,40	9,22
24	27,50	8,37	29,90	8,58	32,30	8,70	33,50	8,80	34,60	8,90	36,40	9,22	37,40	9,42
26	27,50	8,58	29,90	8,90	32,30	9,00	33,50	9,12	34,60	9,22	36,40	9,42	37,40	9,64
28	27,50	8,90	29,90	9,12	32,30	9,22	33,50	9,32	34,60	9,42	36,40	9,74	37,40	9,96
30	27,50	9,22	29,90	9,42	32,30	9,54	33,50	9,64	34,60	9,74	36,40	10,07	37,40	10,27
32	27,50	9,54	29,90	9,74	32,30	9,96	33,50	9,96	34,60	10,17	36,40	10,39	37,40	10,71
34	27,50	9,85	29,90	10,07	32,30	10,27	33,50	10,39	34,60	10,49	36,40	10,81	37,40	11,01
35	27,50	10,07	29,90	10,27	32,30	10,49	33,50	10,59	34,60	10,71	36,40	11,01	37,40	11,33
36	27,16	10,27	29,30	10,49	31,44	10,71	32,52	11,55	33,44	10,91	34,98	11,23	35,82	11,55
38	26,48	10,71	28,10	10,91	29,72	11,13	30,56	11,98	31,12	11,33	32,14	11,66	32,66	11,98
40	25,80	11,13	26,90	11,44	28,00	11,55	28,60	12,50	28,80	11,86	29,30	12,18	29,50	12,50

◆ Correction ratio due to humidity (CR)

The cooling capacity data for the outdoor units is taken from the table in section *"4.2.2 Nominal cooling capacity tables"*, and it's calculated on the basis of a relative humidity of 50%.

In some situations, it's possible that the temperature condition of the ambient to be conditionated, specifies other different relative humidity, which affect at the Dry Bulb temperature. In this cases, it's necessary to calculate the difference between the indoor air inlet dry bulb temperature required by the system and the indoor air inlet dry bulb temperature shown in the cooling capacity data.

This temperature difference requires an adjustment of the sensible heat capacity for the indoor units.

This coefficient corrects the sensible heat capacity of a unit according to the relative humidity of the air entering the indoor unit. The greater the relative humidity the lower will be the sensible heat capacity and vice versa.

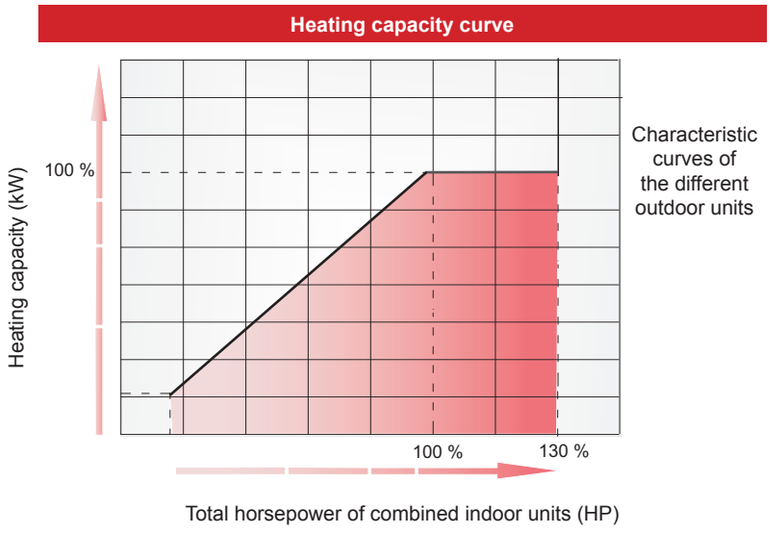
Outdoor unit	CR
RAS-8FSNM	0.74
RAS-10FSNM	0.88
RAS-12FSNM	1.01

4.3 Heating capacity tables

The following diagram shows the behavior of the heating capacity of the outdoor unit with the total power of the combined indoor units up to 130%.

See the examples of the actual combinations.

4.3.1 Heating capacity curve



4.3.2 Nominal heating capacity tables

Nominal capacity at 20 °C (Dry Bulb) and 6 °C (Wet Bulb)

(kW)

Total horsepower of combined indoor units (%)	Outdoor units HP					
	8		10		12	
	Maximum capacity	Electrical power consumed	Maximum capacity	Electrical power consumed	Maximum capacity	Electrical power consumed
130	25.00	6.18	31.50	7.74	37.50	10.10
120	25.00	6.39	31.50	8.22	37.50	10.40
110	25.00	6.30	31.50	8.24	37.50	10.34
100	25.00	5.90	31.50	7.80	37.50	9.90
90	22.50	5.52	28.36	7.32	33.76	9.36
80	20.00	5.03	25.22	6.67	30.02	8.62
70	17.50	4.43	22.08	5.86	26.28	7.67
60	15.00	3.72	18.94	4.88	22.54	6.51
50	12.50	2.90	15.80	3.74	18.80	5.15

4.3.3 Heating capacity tables according to total power of combined indoor units

◆ RAS-8FSNM

NOTE

- *CAP: Capacity at compressor maximum frequency (kW)*
- *IPT: Input power (kW)*
- *TEMP: Outdoor air inlet temperature (WB (ºC))*

TEMP	Total Power of Combined Indoor Units: 50%										Total Power of Combined Indoor Units: 60%									
	Indoor Air Inlet Temperature (DB (ºC))										Indoor Air Inlet Temperature (DB (ºC))									
	16		18		20		22		24		16		18		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
-20	7.95	2.67	7.75	2.78	7.70	2.90	7.60	3.07	7.50	3.25	9.54	3.42	9.30	3.57	9.24	3.72	9.12	3.94	9.00	4.16
-17	8.40	2.64	8.23	2.76	8.18	2.87	8.08	3.05	7.98	3.19	10.08	3.38	9.88	3.53	9.82	3.68	9.70	3.90	9.58	4.09
-15	8.70	5.22	8.55	5.25	8.50	5.31	8.40	5.54	8.30	5.77	10.44	6.51	10.26	6.65	10.20	6.77	10.08	7.10	9.96	7.47
-13	9.00	4.82	8.87	4.84	8.82	4.87	8.72	5.11	8.62	5.31	10.80	6.02	10.64	6.13	10.58	6.25	10.46	6.58	10.34	6.88
-11	9.30	4.41	9.19	4.44	9.14	4.47	9.04	4.67	8.94	4.87	11.16	5.50	11.03	5.65	10.97	5.73	10.85	6.02	10.73	6.32
-10	9.45	4.21	9.35	4.23	9.30	4.26	9.20	4.45	9.10	4.64	11.34	5.26	11.22	5.39	11.16	5.47	11.04	5.76	10.92	6.04
-9	9.60	4.00	9.51	4.03	9.46	4.06	9.36	4.23	9.26	4.41	11.52	5.02	11.41	5.13	11.35	5.20	11.23	5.50	11.11	5.76
-7	9.90	3.60	9.83	3.63	9.78	3.63	9.68	3.80	9.58	3.94	11.88	4.54	11.80	4.61	11.74	4.68	11.62	4.94	11.50	5.20
-6	10.05	3.36	9.99	3.39	9.94	3.42	9.84	3.57	9.74	3.71	12.06	4.28	11.99	4.35	11.93	4.42	11.81	4.68	11.69	4.91
-5	10.20	3.31	10.15	3.31	10.10	3.34	10.00	3.51	9.90	3.65	12.24	4.16	12.18	4.24	12.12	4.31	12.00	4.54	11.88	4.76
-3	10.78	3.13	10.71	3.16	10.64	3.16	10.54	3.34	10.40	3.45	12.94	3.90	12.85	3.98	12.77	4.05	12.65	4.28	12.48	4.50
-1	11.36	2.96	11.27	2.99	11.18	3.02	11.08	3.13	10.90	3.28	13.63	3.68	13.52	3.76	13.42	3.79	13.30	4.02	13.08	4.20
0	11.65	2.89	11.55	2.92	11.45	2.93	11.35	3.06	11.15	3.19	13.98	3.55	13.86	3.62	13.74	3.66	13.62	3.89	13.38	4.07
1	12.61	2.81	12.36	2.84	12.08	2.84	11.71	2.99	11.15	3.10	15.13	3.42	14.83	3.49	14.50	3.53	14.05	3.76	13.38	3.94
3	13.25	2.70	12.90	2.73	12.50	2.73	11.95	2.84	11.15	2.99	15.90	3.49	15.48	3.57	15.00	3.61	14.34	3.79	13.38	4.02
5	13.25	2.78	12.90	2.81	12.50	2.84	11.95	2.96	11.15	3.07	15.90	3.57	15.48	3.61	15.00	3.68	14.34	3.87	13.38	4.09
6	13.35	2.84	13.00	2.87	12.50	2.90	11.95	3.02	11.15	3.16	16.02	3.57	15.60	3.64	15.00	3.72	14.34	3.90	13.38	4.09
7	13.55	2.93	13.16	2.96	12.60	2.96	11.96	3.10	11.15	3.22	16.26	3.68	15.80	3.76	15.12	3.83	14.36	4.02	13.38	4.24
9	13.95	3.07	13.49	3.07	12.80	3.10	11.99	3.25	11.15	3.39	16.74	3.90	16.19	3.98	15.36	4.05	14.39	4.28	13.38	4.46
10	14.15	3.13	13.65	3.15	12.90	3.18	12.00	3.32	11.15	3.47	16.98	4.02	16.38	4.09	15.48	4.16	14.40	4.39	13.38	4.59
11	14.15	3.19	13.65	3.22	12.90	3.25	12.00	3.39	11.15	3.54	16.98	4.13	16.38	4.20	15.48	4.28	14.40	4.50	13.38	4.72
14	14.15	3.36	13.65	3.39	12.90	3.39	12.00	3.57	11.15	3.71	16.98	4.39	16.38	4.46	15.48	4.54	14.40	4.80	13.38	5.02
15	14.15	3.45	13.65	3.51	12.90	3.51	12.00	3.65	11.15	3.83	16.98	4.57	16.38	4.65	15.48	4.72	14.40	4.98	13.38	5.20

TEMP	Total Power of Combined Indoor Units: 70%										Total Power of Combined Indoor Units: 80%									
	Indoor Air Inlet Temperature (DB (ºC))										Indoor Air Inlet Temperature (DB (ºC))									
	16		18		20		22		24		16		18		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
-20	11.13	4.07	10.85	4.25	10.78	4.43	10.64	4.69	10.50	4.96	12.72	4.62	12.40	4.83	12.32	5.03	12.16	5.33	12.00	5.63
-17	11.76	4.03	11.52	4.21	11.45	4.38	11.31	4.65	11.17	4.87	13.44	4.57	13.17	4.77	13.09	4.98	12.93	5.28	12.77	5.53
-15	12.18	7.08	11.97	7.13	11.90	7.13	11.76	7.52	11.62	7.88	13.92	6.89	13.68	6.99	13.60	7.09	13.44	7.49	13.28	7.84
-13	12.60	6.82	12.42	6.82	12.35	6.86	12.21	7.21	12.07	7.57	14.40	6.89	14.19	6.99	14.11	7.09	13.95	7.44	13.79	7.84
-11	13.02	6.51	12.87	6.55	12.80	6.55	12.66	6.91	12.52	7.26	14.88	6.84	14.70	6.94	14.62	7.04	14.46	7.44	14.30	7.79
-10	13.23	6.37	13.09	6.40	13.02	6.42	12.88	6.75	12.74	7.10	15.12	6.84	14.96	6.91	14.88	7.01	14.72	7.41	14.56	7.77
-9	13.44	6.24	13.31	6.24	13.24	6.29	13.10	6.60	12.96	6.95	15.36	6.84	15.22	6.89	15.14	6.99	14.98	7.39	14.82	7.74
-7	13.86	5.98	13.76	5.98	13.69	5.98	13.55	6.29	13.41	6.64	15.84	6.79	15.73	6.89	15.65	6.99	15.49	7.34	15.33	7.76
-6	14.07	5.80	13.99	5.84	13.92	5.84	13.78	6.15	13.64	6.46	16.08	6.79	15.98	6.89	15.90	6.94	15.74	7.34	15.58	7.69
-5	14.28	5.62	14.21	5.62	14.14	5.67	14.00	5.93	13.86	6.24	16.32	6.53	16.24	6.63	16.16	6.74	16.00	7.09	15.84	7.44
-3	15.09	5.22	14.99	5.22	14.90	5.27	14.76	5.53	14.56	5.80	17.25	6.03	17.14	6.13	17.02	6.18	16.86	6.53	16.64	6.84
-1	15.90	4.82	15.78	4.82	15.65	4.87	15.51	5.13	15.26	5.40	18.18	5.53	18.03	5.58	17.89	5.68	17.73	5.98	17.44	6.28
0	16.31	4.65	16.17	4.65	16.03	4.67	15.89	4.94	15.61	5.18	18.64	5.28	18.48	5.33	18.32	5.43	18.16	5.73	17.84	6.01
1	17.65	4.47	17.30	4.47	16.91	4.47	16.39	4.74	15.61	4.96	20.18	5.03	19.78	5.08	19.33	5.18	18.74	5.48	17.84	5.73
3	18.55	4.38	18.06	4.38	17.50	4.43	16.73	4.65	15.61	4.87	21.20	4.83	20.64	4.93	20.00	4.98	19.12	5.28	17.84	5.53
5	18.55	4.34	18.06	4.34	17.50	4.38	16.73	4.60	15.61	4.82	21.20	4.67	20.64	4.72	20.00	4.83	19.12	5.08	17.84	5.33
6	18.69	4.38	18.20	4.43	17.50	4.43	16.73	4.65	15.61	4.87	21.36	4.88	20.80	4.93	20.00	5.03	19.12	5.28	17.84	5.58
7	18.97	4.51	18.43	4.51	17.64	4.56	16.75	4.78	15.61	5.05	21.68	4.88	21.06	4.93	20.16	5.03	19.14	5.28	17.84	5.58
9	19.52	4.78	18.88	4.78	17.92	4.78	16.78	5.05	15.61	5.31	22.32	5.13	21.58	5.23	20.48	5.28	19.18	5.58	17.84	5.83
10	19.81	4.89	19.11	4.89	18.06	4.91	16.80	5.18	15.61	5.44	22.64	5.25	21.84	5.35	20.64	5.40	19.20	5.70	17.84	5.98
11	19.81	5.00	19.11	5.00	18.06	5.05	16.80	5.31	15.61	5.58	22.64	5.38	21.84	5.48	20.64	5.53	19.20	5.83	17.84	6.13
14	19.81	5.31	19.11	5.31	18.06	5.36	16.80	5.62	15.61	5.93	22.64	5.68	21.84	5.78	20.64	5.83	19.20	6.18	17.84	6.48
15	19.81	5.49	19.11	5.53	18.06	5.53	16.80	5.80	15.61	6.11	22.64	5.88	21.84	5.93	20.64	6.03	19.20	6.38	17.84	6.68

TEMP	Total Power of Combined Indoor Units: 90%										Total Power of Combined Indoor Units: 100%									
	Indoor Air Inlet Temperature (DB (ºC))										Indoor Air Inlet Temperature (DB (ºC))									
	16		18		20		22		24		16		18		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
-20	14.31	5.08	13.95	5.30	13.86	5.52	13.68	5.85	13.50	6.18	15.90	5.43	15.50	5.66	15.40	5.90	15.20	6.25	15.00	6.61
-17	15.12	5.02	14.81	5.24	14.72	5.46	14.54	5.79	14.36	6.07	16.80	5.37	16.46	5.61	16.36	5.84	16.16	6.20	15.96	6.49
-15	15.66	7.56	15.39	7.23	15.30	6.95	15.12	7.28	14.94	7.67	17.40	7.43	17.10	6.96	17.00	6.43	16.80	6.79	16.60	7.08
-13	16.20	7.50	15.97	7.17	15.88	6.90	15.70	7.23	15.52	7.56	18.00	7.32	17.74	6.84	17.64	6.37	17.44	6.67	17.24	6.96
-11	16.74	7.45	16.54	7.12	16.45	6.79	16.27	7.17	16.09	7.50	18.60	7.20	18.38	6.73	18.28	6.25	18.08	6.55	17.88	6.90
-10	17.01	7.39	16.83	7.09	16.74	6.76	16.56	7.15	16.38	7.48	18.90	7.14	18.70	6.70	18.60	6.22	18.40	6.52	18.20	6.84
-9	17.28	7.34	17.12	7.06	17.03	6.73	16.85	7.12	16.67	7.45	19.20	7.08	19.02	6.67	18.92	6.20	18.72	6.49	18.52	6.79
-7	17.82	7.28	17.69	7.01	17.60	6.68	17.42	7.01	17.24	7.34	19.80	7.02	19.66	6.55	19.56	6.08	19.36	6.37	19.16	6.67
-6	18.09	7.28	17.98	6.95	17.89	6.68	17.71	7.01	17.53	7.34	20.10	6.96	19.98	6.49	19.88	6.02	19.68	6.31	19.48	6.61
-5	18.36	7.17	18.27	6.84	18.18	6.57	18.00	6.90	17.82	7.23	20.40	7.08	20.30	6.61	20.20	6.14	20.00	6.43	19.80	6.73
-3	19.40	7.01	19.28	6.68	19.15	6.40	18.97	6.73	18.72	7.06	21.56	7.32	21.42	6.84	21.28	6.31	21.08	6.67	20.80	6.96
-1	20.45	6.84	20.29	6.57	20.12	6.23	19.94	6.57	19.62	6.90	22.72	7.49	22.54	7.02	22.36	6.55	22.16	6.84	21.80	7.20
0	20.97	6.73	20.79	6.46	20.61	6.15	20.43	6.48	20.07	6.79	23.30	7.64	23.10	7.14	22.90	6.64	22.70	6.96	22.30	7.29
1	22.70	6.62	22.25	6.35	21.74	6.07	21.08	6.40	20.07	6.68	25.22	7.79	24.72	7.26	24.16	6.73	23.42	7.08	22.30	7.38
3	23.85	6.35	23.22	6.07	22.50	5.79	21.51	6.12	20.07	6.40	26.50	7.38	25.80	6.90	25.00	6.43	23.90	6.73	22.30	7.02
5	23.85	6.07	23.22	5.79	22.50	5.57	21.51	5.85	20.07	6.12	26.50	6.96	25.80	6.55	25.00	6.08	23.90	6.37	22.30	6.67
6	24.03	6.01	23.40	5.52	22.50	5.52	21.51	5.79	20.07	6.07	26.70	6.79	26.00	6.37	25.00	5.90	23.90	6.20	22.30	6.49
7	24.39	6.18	23.69	5.74	22.68	5.63	21.53	5.96	20.07	6.23	27.10	6.96	26.33	6.49	25.20	6.02	23.93	6.31	22.30	6.61
9	25.11	6.46	24.28	5.90	23.04	5.90	21.58	6.23	20.07	6.51	27.90	7.26	26.98	6.79	25.60	6.31	23.98	6.61	22.30	6.90
10	25.47	6.59	24.57	6.04	23.22	6.04	21.60	6.37	20.07	6.65	28.30	7.40	27.30	6.93	25.80	6.43	24.00	6.73	22.30	7.05
11	25.47	6.73	24.57	6.18	23.22	6.18	21.60	6.51	20.07	6.79	28.30	7.55	27.30	7.08	25.80	6.55	24.00	6.84	22.30	7.20
14	25.47	7.12	24.57	6.79	23.22	6.51	21.60	6.84	20.07	7.17	28.30	7.91	27.30	7.43	25.80	6.90	24.00	7.26	22.30	7.55
15	25.47	7.34	24.57	7.01	23.22	6.73	21.60	7.06	20.07	7.39	28.30	8.14	27.30	7.85	25.80	7.08	24.00	7.43	22.30	7.79

TEMP	Total Power of Combined Indoor Units: 110%										Total Power of Combined Indoor Units: 120%									
	Indoor Air Inlet Temperature (DB (ºC))										Indoor Air Inlet Temperature (DB (ºC))									
	16		18		20		22		24		16		18		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
-20	15.90	5.79	15.50	6.04	15.40	6.30	15.20	6.67	15.00	7.05	15.90	5.88	15.50	6.13	15.40	6.39	15.20	6.77	15.00	7.16
-17	16.80	5.73	16.46	5.98	16.36	6.23	16.16	6.61	15.96	6.93	16.80	5.82	16.46	6.07	16.36	6.33	16.16	6.71	15.96	7.03
-15	17.40	6.74	17.10	6.61	17.00	6.48	16.80	6.86	16.60	7.24	17.40	5.82	17.10	6.07	17.00	6.20	16.80	6.65	16.60	7.09
-13	18.00	6.61	17.74	6.48	17.64	6.36	17.44	6.74	17.24	7.11	18.00	5.69	17.74	5.88	17.64	6.07	17.44	6.52	17.24	6.90
-11	18.60	6.48	18.38	6.36	18.28	6.23	18.08	6.61	17.88	6.99	18.60	5.56	18.38	5.75	18.28	5.94	18.08	6.39	17.88	6.71
-10	18.90	6.42	18.70	6.30	18.60	6.17	18.40	6.55	18.20	6.93	18.90	5.46	18.70	5.69	18.60	5.88	18.40	6.29	18.20	6.65
-9	19.20	6.36	19.02	6.23	18.92	6.11	18.72	6.48	18.52	6.86	19.20	5.37	19.02	5.62	18.92	5.82	18.72	6.20	18.52	6.58
-7	19.80	6.23	19.66	6.11	19.56	5.98	19.36	6.36	19.16	6.74	19.80	5.24	19.66	5.50	19.56	5.62	19.36	6.07	19.16	6.39
-6	20.10	6.17	19.98	6.04	19.88	5.98	19.68	6.30	19.48	6.67	20.10	5.18	19.98	5.43	19.88	5.56	19.68	6.01	19.48	6.33
-5	20.40	6.30	20.30	6.17	20.20	6.04	20.00	6.42	19.80	6.74	20.40	5.24	20.30	5.50	20.20	5.62	20.00	6.07	19.80	6.39
-3	21.56	6.48	21.42	6.36	21.28	6.23	21.08	6.61	20.80	6.93	21.56	5.37	21.42	5.62	21.28	5.82	21.08	6.20	20.80	6.58
-1	22.72	6.61	22.54	6.48	22.36	6.42	22.16	6.80	21.80	7.11	22.72	5.56	22.54	5.75	22.36	5.94	22.16	6.39	21.80	6.77
0	23.30	6.71	23.10	6.58	22.90	6.52	22.70	6.89	22.30	7.24	23.30	5.62	23.10	5.82	22.90	6.01	22.70	6.45	22.30	6.84
1	25.22	6.80	24.72	6.67	24.16	6.61	23.42	6.99	22.30	7.37	25.22	5.69	24.72	5.88	24.16	6.07	23.42	6.52	22.30	6.90
3	26.50	6.74	25.80	6.61	25.00	6.48	23.90	6.86	22.30	7.24	26.50	5.82	25.80	6.01	25.00	6.20	23.90	6.65	22.30	7.03
5	26.50	6.61	25.80	6.48	25.00	6.36	23.90	6.74	22.30	7.11	26.50	5.88	25.80	6.13	25.00	6.33	23.90	6.77	22.30	7.22
6	26.70	6.55	26.00	6.42	25.00	6.30	23.90	6.67	22.30	7.05	26.70	5.94	26.00	6.20	25.00	6.39	23.90	6.84	22.30	7.29
7	27.10	6.67	26.33	6.55	25.20	6.42	23.93	6.80	22.30	7.24	27.10	6.13	26.33	6.39	25.20	6.58	23.93	7.03	22.30	7.48
9	27.90	6.99	26.98	6.86	25.60	6.74	23.98	7.18	22.30	7.56	27.90	6.39	26.98	6.71	25.60	6.90	23.98	7.41	22.30	7.80
10	28.30	7.18	27.30	7.02	25.80	6.89	24.00	7.33	22.30	7.71	28.30	6.55	27.30	6.87	25.80	7.06	24.00	7.57	22.30	7.99
11	28.30	7.37	27.30	7.18	25.80	7.05	24.00	7.49	22.30	7.87	28.30	6.71	27.30	7.03	25.80	7.22	24.00	7.73	22.30	8.18
14	28.30	7.74	27.30	7.56	25.80	7.43	24.00	7.87	22.30	8.31	28.30	7.09	27.30	7.41	25.80	7.60	24.00	8.18	22.30	8.69
15	28.30	7.93	27.30	7.81	25.80	7.68	24.00	8.12	22.30	8.56	28.30	7.35	27.30	7.67	25.80	7.86	24.00	8.44	22.30	8.95

TEMP	Total Power of Combined Indoor Units: 130%									
	Indoor Air Inlet Temperature (DB (ºC))									
	16		18		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
-20	15.90	5.69	15.50	5.94	15.40	6.18	15.20	6.55	15.00	6.92
-17	16.80	5.63	16.46	5.87	16.36	6.12	16.16	6.49	15.96	6.80
-15	17.40	5.50	17.10	5.81	17.00	6.06	16.80	6.43	16.60	6.74
-13	18.00	5.38	17.74	5.63	17.64	5.94	17.44	6.24	17.24	6.55
-11	18.60	5.26	18.38	5.50	18.28	5.75	18.08	6.06	17.88	6.37
-10	18.90	5.19	18.70	5.44	18.60	5.69	18.40	6.00	18.20	6.31
-9	19.20	5.13	19.02	5.38	18.92	5.63	18.72	5.94	18.52	6.24
-7	19.80	4.95	19.66	5.19	19.56	5.44	19.36	5.75	19.16	6.06
-6	20.10	4.88	19.98	5.13	19.88	5.38	19.68	5.69	19.48	5.94
-5	20.40	4.95	20.30	5.19	20.20	5.44	20.00	5.75	19.80	6.00
-3	21.56	5.07	21.42	5.32	21.28	5.56	21.08	5.87	20.80	6.18
-1	22.72	5.19	22.54	5.44	22.36	5.69	22.16	6.00	21.80	6.31
0	23.30	5.26	23.10	5.50	22.90	5.75	22.70	6.06	22.30	6.37
1	25.22	5.32	24.72	5.56	24.16	5.81	23.42	6.12	22.30	6.43
3	26.50	5.44	25.80	5.69	25.00	5.94	23.90	6.31	22.30	6.62
5	26.50	5.56	25.80	5.81	25.00	6.12	23.90	6.43	22.30	6.74
6	26.70	5.63	26.00	5.94	25.00	6.18	23.90	6.49	22.30	6.86
7	27.10	5.75	26.33	6.00	25.20	6.31	23.93	6.62	22.30	6.99
9	27.90	5.94	26.98	6.24	25.60	6.49	23.98	6.86	22.30	7.23
10	28.30	6.03	27.30	6.34	25.80	6.62	24.00	6.99	22.30	7.36
11	28.30	6.12	27.30	6.43	25.80	6.74	24.00	7.11	22.30	7.48
14	28.30	6.43	27.30	6.68	25.80	6.99	24.00	7.42	22.30	7.73
15	28.30	6.55	27.30	6.86	25.80	7.17	24.00	7.54	22.30	7.98

◆ RAS-10FSNM

TEMP	Total Power of Combined Indoor Units: 50%										Total Power of Combined Indoor Units: 60%									
	Indoor Air Inlet Temperature (DB (ºC))										Indoor Air Inlet Temperature (DB (ºC))									
	16		18		20		22		24		16		18		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
-20	8.33	3.44	8.23	3.59	8.18	3.74	8.08	3.96	7.98	4.19	9.98	4.49	9.86	4.68	9.80	4.88	9.68	5.17	9.56	5.47
-17	9.29	3.40	9.19	3.55	9.14	3.70	9.04	3.93	8.94	4.11	11.14	4.44	11.02	4.64	10.96	4.83	10.83	5.12	10.71	5.37
-15	9.93	6.73	9.83	6.77	9.78	6.84	9.68	7.14	9.58	7.44	11.91	8.54	11.78	8.73	11.72	8.88	11.60	9.32	11.48	9.81
-13	10.57	6.21	10.47	6.24	10.42	6.28	10.32	6.58	10.22	6.84	12.67	7.90	12.55	8.05	12.49	8.20	12.37	8.64	12.25	9.03
-11	11.22	5.68	11.12	5.72	11.07	5.76	10.96	6.02	10.86	6.28	13.44	7.22	13.32	7.42	13.26	7.51	13.14	7.90	13.02	8.30
-10	11.54	5.42	11.44	5.46	11.39	5.50	11.29	5.74	11.19	5.98	13.83	6.90	13.71	7.08	13.65	7.17	13.53	7.56	13.41	7.93
-9	11.86	5.16	11.76	5.20	11.71	5.23	11.61	5.46	11.51	5.68	14.21	6.59	14.09	6.73	14.03	6.83	13.91	7.22	13.79	7.56
-7	12.50	4.64	12.40	4.67	12.35	4.67	12.25	4.90	12.15	5.08	14.98	5.95	14.86	6.05	14.80	6.15	14.68	6.49	14.56	6.83
-6	12.82	4.34	12.72	4.37	12.67	4.41	12.57	4.60	12.47	4.78	15.37	5.61	15.25	5.71	15.19	5.81	15.07	6.15	14.95	6.44
-5	13.14	4.26	13.04	4.26	12.99	4.30	12.89	4.52	12.79	4.71	15.75	5.47	15.63	5.56	15.57	5.66	15.45	5.95	15.33	6.25
-3	13.74	4.04	13.64	4.07	13.59	4.07	13.47	4.30	13.29	4.45	16.47	5.12	16.35	5.22	16.29	5.32	16.15	5.61	15.93	5.90
-1	14.35	3.81	14.25	3.85	14.19	3.89	14.05	4.04	13.79	4.22	17.20	4.83	17.08	4.93	17.02	4.98	16.85	5.27	16.53	5.51
0	14.65	3.72	14.55	3.76	14.50	3.78	14.35	3.94	14.04	4.11	17.56	4.66	17.44	4.76	17.38	4.81	17.20	5.10	16.84	5.34
1	15.61	3.63	15.45	3.66	15.28	3.66	14.83	3.85	14.04	4.00	18.71	4.49	18.52	4.59	18.31	4.64	17.77	4.93	16.84	5.17
3	16.25	3.48	16.05	3.51	15.80	3.51	15.15	3.66	14.04	3.85	19.48	4.59	19.24	4.68	18.94	4.73	18.16	4.98	16.84	5.27
5	16.25	3.59	16.05	3.63	15.80	3.66	15.15	3.81	14.04	3.96	19.48	4.68	19.24	4.73	18.94	4.83	18.16	5.07	16.84	5.37
6	16.65	3.66	16.30	3.70	15.80	3.74	15.15	3.89	14.04	4.07	19.96	4.68	19.54	4.78	18.94	4.88	18.16	5.12	16.84	5.37
7	16.95	3.78	16.53	3.81	15.91	3.81	15.15	4.00	14.04	4.15	20.32	4.83	19.81	4.93	19.08	5.03	18.16	5.27	16.84	5.56
9	17.56	3.96	16.98	3.96	16.14	4.00	15.15	4.19	14.04	4.37	21.04	5.12	20.35	5.22	19.35	5.32	18.16	5.61	16.84	5.86
10	17.86	4.04	17.20	4.06	16.25	4.09	15.15	4.28	14.04	4.47	21.41	5.27	20.62	5.37	19.48	5.47	18.16	5.76	16.84	6.03
11	17.86	4.11	17.20	4.15	16.25	4.19	15.15	4.37	14.04	4.56	21.41	5.42	20.62	5.51	19.48	5.61	18.16	5.90	16.84	6.20
14	17.86	4.34	17.20	4.37	16.25	4.37	15.15	4.60	14.04	4.78	21.41	5.76	20.62	5.86	19.48	5.95	18.16	6.29	16.84	6.59
15	17.86	4.45	17.20	4.52	16.25	4.52	15.15	4.71	14.04	4.93	21.41	6.00	20.62	6.10	19.48	6.20	18.16	6.54	16.84	6.83

TEMP	Total Power of Combined Indoor Units: 70%										Total Power of Combined Indoor Units: 80%									
	Indoor Air Inlet Temperature (DB (ºC))										Indoor Air Inlet Temperature (DB (ºC))									
	16		18		20		22		24		16		18		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
-20	11.64	5.39	11.50	5.62	11.43	5.86	11.29	6.21	11.15	6.56	13.29	6.14	13.13	6.40	13.05	6.67	12.89	7.07	12.73	7.47
-17	12.98	5.33	12.84	5.56	12.77	5.80	12.63	6.15	12.49	6.44	14.83	6.07	14.67	6.34	14.59	6.60	14.43	7.00	14.27	7.34
-15	13.88	9.37	13.74	9.43	13.67	9.43	13.53	9.96	13.39	10.42	15.85	9.14	15.69	9.27	15.61	9.40	15.45	9.94	15.29	10.40
-13	14.78	9.02	14.64	9.02	14.57	9.08	14.43	9.55	14.29	10.01	16.88	9.14	16.72	9.27	16.64	9.40	16.48	9.87	16.32	10.40
-11	15.67	8.61	15.53	8.67	15.46	8.67	15.32	9.14	15.18	9.60	17.90	9.07	17.74	9.20	17.66	9.34	17.50	9.87	17.34	10.34
-10	16.12	8.43	15.98	8.46	15.91	8.49	15.77	8.93	15.63	9.40	18.41	9.07	18.25	9.17	18.17	9.30	18.01	9.84	17.85	10.30
-9	16.57	8.26	16.43	8.26	16.36	8.32	16.22	8.73	16.08	9.19	18.93	9.07	18.77	9.14	18.69	9.27	18.53	9.80	18.37	10.27
-7	17.47	7.91	17.33	7.91	17.26	7.91	17.12	8.32	16.98	8.78	19.95	9.00	19.79	9.14	19.71	9.27	19.55	9.74	19.39	10.29
-6	17.92	7.67	17.78	7.73	17.71	7.73	17.57	8.14	17.43	8.55	20.46	9.00	20.30	9.14	20.22	9.20	20.06	9.74	19.90	10.20
-5	18.36	7.44	18.22	7.44	18.15	7.50	18.01	7.85	17.87	8.26	20.98	8.67	20.82	8.80	20.74	8.94	20.58	9.40	20.42	9.87
-3	19.21	6.91	19.07	6.91	19.00	6.97	18.83	7.32	18.58	7.67	21.94	8.00	21.78	8.14	21.70	8.20	21.51	8.67	21.22	9.07
-1	20.05	6.38	19.91	6.38	19.84	6.44	19.64	6.79	19.28	7.14	22.90	7.34	22.74	7.40	22.66	7.54	22.43	7.94	22.02	8.34
0	20.47	6.15	20.33	6.15	20.26	6.18	20.05	6.53	19.63	6.85	23.38	7.00	23.22	7.07	23.14	7.20	22.90	7.60	22.42	7.97
1	21.81	5.92	21.59	5.92	21.35	5.92	20.72	6.27	19.63	6.56	24.92	6.67	24.66	6.74	24.39	6.87	23.67	7.27	22.42	7.60
3	22.71	5.80	22.43	5.80	22.08	5.86	21.17	6.15	19.63	6.44	25.94	6.40	25.62	6.54	25.22	6.60	24.18	7.00	22.42	7.34
5	22.71	5.74	22.43	5.74	22.08	5.80	21.17	6.09	19.63	6.38	25.94	6.20	25.62	6.27	25.22	6.40	24.18	6.74	22.42	7.07
6	23.27	5.80	22.78	5.86	22.08	5.86	21.17	6.15	19.63	6.44	26.58	6.47	26.02	6.54	25.22	6.67	24.18	7.00	22.42	7.40
7	23.69	5.97	23.10	5.97	22.24	6.03	21.17	6.33	19.63	6.68	27.06	6.47	26.38	6.54	25.40	6.67	24.18	7.00	22.42	7.40
9	24.53	6.33	23.73	6.33	22.55	6.33	21.17	6.68	19.63	7.03	28.02	6.80	27.10	6.94	25.76	7.00	24.18	7.40	22.42	7.74
10	24.95	6.47	24.04	6.47	22.71	6.50	21.17	6.85	19.63	7.20	28.50	6.97	27.46	7.10	25.94	7.17	24.18	7.57	22.42	7.94
11	24.95	6.62	24.04	6.62	22.71	6.68	21.17	7.03	19.63	7.38	28.50	7.14	27.46	7.27	25.94	7.34	24.18	7.74	22.42	8.14
14	24.95	7.03	24.04	7.03	22.71	7.09	21.17	7.44	19.63	7.85	28.50	7.54	27.46	7.67	25.94	7.74	24.18	8.20	22.42	8.60
15	24.95	7.26	24.04	7.32	22.71	7.32	21.17	7.67	19.63	8.08	28.50	7.80	27.46	7.87	25.94	8.00	24.18	8.47	22.42	8.87

TEMP	Total Power of Combined Indoor Units: 90%										Total Power of Combined Indoor Units: 100%									
	Indoor Air Inlet Temperature (DB (ºC))										Indoor Air Inlet Temperature (DB (ºC))									
	16		18		20		22		24		16		18		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
-20	14.95	6.73	14.77	7.02	14.68	7.32	14.50	7.76	14.32	8.19	16.60	7.18	16.40	7.49	16.30	7.80	16.10	8.27	15.90	8.74
-17	16.67	6.66	16.49	6.95	16.40	7.24	16.22	7.68	16.04	8.05	18.52	7.10	18.32	7.41	18.22	7.72	18.02	8.19	17.82	8.58
-15	17.83	10.02	17.65	9.58	17.56	9.22	17.38	9.66	17.20	10.17	19.80	9.83	19.60	9.20	19.50	8.50	19.30	8.97	19.10	9.36
-13	18.98	9.95	18.80	9.51	18.71	9.15	18.53	9.58	18.35	10.02	21.08	9.67	20.88	9.05	20.78	8.42	20.58	8.81	20.38	9.20
-11	20.13	9.88	19.95	9.44	19.86	9.00	19.68	9.51	19.50	9.95	22.36	9.52	22.16	8.89	22.06	8.27	21.86	8.66	21.66	9.13
-10	20.71	9.80	20.53	9.40	20.44	8.96	20.26	9.47	20.08	9.91	23.00	9.44	22.80	8.85	22.70	8.23	22.50	8.62	22.30	9.05
-9	21.28	9.73	21.10	9.36	21.01	8.93	20.83	9.44	20.65	9.88	23.64	9.36	23.44	8.81	23.34	8.19	23.14	8.58	22.94	8.97
-7	22.44	9.66	22.26	9.29	22.17	8.85	21.99	9.29	21.81	9.73	24.92	9.28	24.72	8.66	24.62	8.03	24.42	8.42	24.22	8.81
-6	23.01	9.66	22.83	9.22	22.74	8.85	22.56	9.29	22.38	9.73	25.56	9.20	25.36	8.58	25.26	7.96	25.06	8.35	24.86	8.74
-5	23.59	9.51	23.41	9.07	23.32	8.71	23.14	9.15	22.96	9.58	26.20	9.36	26.00	8.74	25.90	8.11	25.70	8.50	25.50	8.89
-3	24.67	9.29	24.49	8.85	24.40	8.49	24.18	8.93	23.86	9.36	27.40	9.67	27.20	9.05	27.10	8.35	26.86	8.81	26.50	9.20
-1	25.75	9.07	25.57	8.71	25.48	8.27	25.23	8.71	24.76	9.15	28.60	9.91	28.40	9.28	28.30	8.66	28.02	9.05	27.50	9.52
0	26.29	8.93	26.11	8.56	26.02	8.16	25.75	8.60	25.21	9.00	29.20	10.10	29.00	9.44	28.90	8.78	28.60	9.20	28.00	9.63
1	28.02	8.78	27.73	8.41	27.42	8.05	26.61	8.49	25.21	8.85	31.12	10.30	30.80	9.59	30.46	8.89	29.56	9.36	28.00	9.75
3	29.17	8.41	28.81	8.05	28.36	7.68	27.19	8.12	25.21	8.49	32.40	9.75	32.00	9.13	31.50	8.50	30.20	8.89	28.00	9.28
5	29.17	8.05	28.81	7.68	28.36	7.39	27.19	7.76	25.21	8.12	32.40	9.20	32.00	8.66	31.50	8.03	30.20	8.42	28.00	8.81
6	29.89	7.97	29.26	7.32	28.36	7.32	27.19	7.68	25.21	8.05	33.20	8.97	32.50	8.42	31.50	7.80	30.20	8.19	28.00	8.58
7	30.43	8.19	29.67	7.61	28.56	7.46	27.19	7.90	25.21	8.27	33.80	9.20	32.95	8.58	31.73	7.96	30.20	8.35	28.00	8.74
9	31.51	8.56	30.48	7.83	28.97	7.83	27.19	8.27	25.21	8.63	35.00	9.59	33.85	8.97	32.18	8.35	30.20	8.74	28.00	9.13
10	32.05	8.74	30.88	8.01	29.17	8.01	27.19	8.45	25.21	8.82	35.60	9.79	34.30	9.17	32.40	8.50	30.20	8.89	28.00	9.32
11	32.05	8.93	30.88	8.19	29.17	8.19	27.19	8.63	25.21	9.00	35.60	9.98	34.30	9.36	32.40	8.66	30.20	9.05	28.00	9.52
14	32.05	9.44	30.88	9.00	29.17	8.63	27.19	9.07	25.21	9.51	35.60	10.45	34.30	9.83	32.40	9.13	30.20	9.59	28.00	9.98
15	32.05	9.73	30.88	9.29	29.17	8.93	27.19	9.36	25.21	9.80	35.60	10.76	34.30	10.37	32.40	9.36	30.20	9.83	28.00	10.30

TEMP	Total Power of Combined Indoor Units: 110%										Total Power of Combined Indoor Units: 120%									
	Indoor Air Inlet Temperature (DB (ºC))										Indoor Air Inlet Temperature (DB (ºC))									
	16		18		20		22		24		16		18		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
-20	16.60	7.58	16.40	7.91	16.30	8.24	16.10	8.73	15.90	9.23	16.60	7.56	16.40	7.89	16.30	8.22	16.10	8.71	15.90	9.20
-17	18.52	7.50	18.32	7.83	18.22	8.15	18.02	8.65	17.82	9.06	18.52	7.48	18.32	7.81	18.22	8.14	18.02	8.63	17.82	9.04
-15	19.80	8.81	19.60	8.65	19.50	8.48	19.30	8.98	19.10	9.47	19.80	7.48	19.60	7.81	19.50	7.97	19.30	8.55	19.10	9.12
-13	21.08	8.65	20.88	8.48	20.78	8.32	20.58	8.81	20.38	9.31	21.08	7.31	20.88	7.56	20.78	7.81	20.58	8.38	20.38	8.88
-11	22.36	8.48	22.16	8.32	22.06	8.15	21.86	8.65	21.66	9.14	22.36	7.15	22.16	7.40	22.06	7.64	21.86	8.22	21.66	8.63
-10	23.00	8.40	22.80	8.24	22.70	8.07	22.50	8.57	22.30	9.06	23.00	7.03	22.80	7.31	22.70	7.56	22.50	8.09	22.30	8.55
-9	23.64	8.32	23.44	8.15	23.34	7.99	23.14	8.48	22.94	8.98	23.64	6.90	23.44	7.23	23.34	7.48	23.14	7.97	22.94	8.46
-7	24.92	8.15	24.72	7.99	24.62	7.83	24.42	8.32	24.22	8.81	24.92	6.74	24.72	7.07	24.62	7.23	24.42	7.81	24.22	8.22
-6	25.56	8.07	25.36	7.91	25.26	7.83	25.06	8.24	24.86	8.73	25.56	6.66	25.36	6.99	25.26	7.15	25.06	7.72	24.86	8.14
-5	26.20	8.24	26.00	8.07	25.90	7.91	25.70	8.40	25.50	8.81	26.20	6.74	26.00	7.07	25.90	7.23	25.70	7.81	25.50	8.22
-3	27.40	8.48	27.20	8.32	27.10	8.15	26.86	8.65	26.50	9.06	27.40	6.90	27.20	7.23	27.10	7.48	26.86	7.97	26.50	8.46
-1	28.60	8.65	28.40	8.48	28.30	8.40	28.02	8.90	27.50	9.31	28.60	7.15	28.40	7.40	28.30	7.64	28.02	8.22	27.50	8.71
0	29.20	8.77	29.00	8.61	28.90	8.53	28.60	9.02	28.00	9.47	29.20	7.23	29.00	7.48	28.90	7.72	28.60	8.30	28.00	8.79
1	31.12	8.90	30.80	8.73	30.46	8.65	29.56	9.14	28.00	9.64	31.12	7.31	30.80	7.56	30.46	7.81	29.56	8.38	28.00	8.88
3	32.40	8.81	32.00	8.65	31.50	8.48	30.20	8.98	28.00	9.47	32.40	7.48	32.00	7.72	31.50	7.97	30.20	8.55	28.00	9.04
5	32.40	8.65	32.00	8.48	31.50	8.32	30.20	8.81	28.00	9.31	32.40	7.56	32.00	7.89	31.50	8.14	30.20	8.71	28.00	9.29
6	33.20	8.57	32.50	8.40	31.50	8.24	30.20	8.73	28.00	9.23	33.20	7.64	32.50	7.97	31.50	8.22	30.20	8.79	28.00	9.37
7	33.80	8.73	32.95	8.57	31.73	8.40	30.20	8.90	28.00	9.47	33.80	7.89	32.95	8.22	31.73	8.46	30.20	9.04	28.00	9.61
9	35.00	9.14	33.85	8.98	32.18	8.81	30.20	9.39	28.00	9.88	35.00	8.22	33.85	8.63	32.18	8.88	30.20	9.52	28.00	10.03
10	35.60	9.39	34.30	9.18	32.40	9.02	30.20	9.60	28.00	10.09	35.60	8.42	34.30	8.83	32.40	9.08	30.20	9.74	28.00	10.27
11	35.60	9.64	34.30	9.39	32.40	9.23	30.20	9.80	28.00	10.30	35.60	8.63	34.30	9.04	32.40	9.29	30.20	9.94	28.00	10.52
14	35.60	10.13	34.30	9.88	32.40	9.72	30.20	10.30	28.00	10.87	35.60	9.12	34.30	9.52	32.40	9.78	30.20	10.52	28.00	11.18
15	35.60	10.38	34.30	10.21	32.40	10.05	30.20	10.63	28.00	11.20	35.60	9.45	34.30	9.86	32.40	10.11	30.20	10.85	28.00	11.50

TEMP	Total Power of Combined Indoor Units: 130%									
	Indoor Air Inlet Temperature (DB (ºC))									
	16		18		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
-20	16.60	7.12	16.40	7.43	16.30	7.74	16.10	8.21	15.90	8.67
-17	18.52	7.05	18.32	7.35	18.22	7.66	18.02	8.13	17.82	8.52
-15	19.80	6.89	19.60	7.28	19.50	7.59	19.30	8.05	19.10	8.44
-13	21.08	6.74	20.88	7.05	20.78	7.43	20.58	7.82	20.38	8.21
-11	22.36	6.58	22.16	6.89	22.06	7.20	21.86	7.59	21.66	7.97
-10	23.00	6.50	22.80	6.81	22.70	7.12	22.50	7.51	22.30	7.90
-9	23.64	6.43	23.44	6.74	23.34	7.05	23.14	7.43	22.94	7.82
-7	24.92	6.19	24.72	6.50	24.62	6.81	24.42	7.20	24.22	7.59
-6	25.56	6.12	25.36	6.43	25.26	6.74	25.06	7.12	24.86	7.43
-5	26.20	6.19	26.00	6.50	25.90	6.81	25.70	7.20	25.50	7.51
-3	27.40	6.35	27.20	6.66	27.10	6.97	26.86	7.35	26.50	7.74
-1	28.60	6.50	28.40	6.81	28.30	7.12	28.02	7.51	27.50	7.90
0	29.20	6.58	29.00	6.89	28.90	7.20	28.60	7.59	28.00	7.97
1	31.12	6.66	30.80	6.97	30.46	7.28	29.56	7.66	28.00	8.05
3	32.40	6.81	32.00	7.12	31.50	7.43	30.20	7.90	28.00	8.28
5	32.40	6.97	32.00	7.28	31.50	7.66	30.20	8.05	28.00	8.44
6	33.20	7.05	32.50	7.43	31.50	7.74	30.20	8.13	28.00	8.59
7	33.80	7.20	32.95	7.51	31.73	7.90	30.20	8.28	28.00	8.75
9	35.00	7.43	33.85	7.82	32.18	8.13	30.20	8.59	28.00	9.06
10	35.60	7.55	34.30	7.94	32.40	8.28	30.20	8.75	28.00	9.21
11	35.60	7.66	34.30	8.05	32.40	8.44	30.20	8.90	28.00	9.37
14	35.60	8.05	34.30	8.36	32.40	8.75	30.20	9.29	28.00	9.68
15	35.60	8.21	34.30	8.59	32.40	8.98	30.20	9.45	28.00	9.99

◆ RAS-12FSNM

TEMP	Total Power of Combined Indoor Units: 50%										Total Power of Combined Indoor Units: 60%									
	Indoor Air Inlet Temperature (DB (ºC))										Indoor Air Inlet Temperature (DB (ºC))									
	16		18		20		22		24		16		18		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
-20	9.58	4.73	9.48	4.94	9.43	5.15	9.32	5.45	9.22	5.76	11.48	5.99	11.36	6.25	11.30	6.51	11.18	6.90	11.06	7.29
-17	10.75	4.68	10.65	4.89	10.60	5.09	10.50	5.40	10.40	5.66	12.89	5.92	12.77	6.19	12.71	6.45	12.59	6.84	12.47	7.16
-15	11.53	9.26	11.43	9.31	11.38	9.42	11.28	9.83	11.18	10.24	13.82	11.39	13.70	11.65	13.64	11.85	13.52	12.44	13.40	13.09
-13	12.31	8.54	12.21	8.59	12.16	8.64	12.06	9.06	11.96	9.42	14.76	10.55	14.64	10.74	14.58	10.94	14.46	11.52	14.34	12.05
-11	13.09	7.82	12.99	7.87	12.94	7.92	12.84	8.28	12.74	8.64	15.70	9.64	15.58	9.90	15.52	10.03	15.40	10.55	15.28	11.07
-10	13.49	7.46	13.39	7.51	13.34	7.56	13.24	7.90	13.13	8.23	16.17	9.21	16.05	9.44	15.99	9.57	15.87	10.09	15.75	10.58
-9	13.88	7.10	13.78	7.15	13.73	7.20	13.63	7.51	13.53	7.82	16.64	8.79	16.52	8.98	16.46	9.12	16.34	9.64	16.22	10.09
-7	14.66	6.38	14.56	6.43	14.51	6.43	14.41	6.74	14.31	7.00	17.58	7.94	17.45	8.07	17.39	8.20	17.27	8.66	17.15	9.12
-6	15.05	5.97	14.95	6.02	14.90	6.07	14.80	6.33	14.70	6.59	18.04	7.49	17.92	7.62	17.86	7.75	17.74	8.20	17.62	8.59
-5	15.44	5.87	15.34	5.87	15.29	5.92	15.19	6.23	15.09	6.48	18.51	7.29	18.39	7.42	18.33	7.55	18.21	7.94	18.09	8.33
-3	16.22	5.56	16.12	5.61	16.07	5.61	15.97	5.92	15.75	6.12	19.45	6.84	19.33	6.97	19.27	7.10	19.15	7.49	18.89	7.88
-1	17.01	5.25	16.90	5.30	16.85	5.35	16.75	5.56	16.41	5.81	20.39	6.45	20.27	6.58	20.21	6.64	20.09	7.03	19.68	7.36
0	17.40	5.12	17.30	5.17	17.25	5.20	17.15	5.43	16.74	5.66	20.86	6.22	20.74	6.35	20.68	6.41	20.56	6.80	20.08	7.13
1	18.06	4.99	17.96	5.04	17.91	5.04	17.69	5.30	16.74	5.51	21.65	5.99	21.53	6.12	21.47	6.19	21.21	6.58	20.08	6.90
3	18.50	4.79	18.40	4.84	18.35	4.84	18.05	5.04	16.74	5.30	22.18	6.12	22.06	6.25	22.00	6.32	21.64	6.64	20.08	7.03
5	18.50	4.94	18.40	4.99	18.35	5.04	18.05	5.25	16.74	5.45	22.18	6.25	22.06	6.32	22.00	6.45	21.64	6.77	20.08	7.16
6	19.05	5.04	18.95	5.09	18.80	5.15	18.05	5.35	16.74	5.61	22.84	6.25	22.72	6.38	22.54	6.51	21.64	6.84	20.08	7.16
7	19.33	5.20	19.20	5.25	18.94	5.25	18.05	5.51	16.74	5.71	23.17	6.45	23.02	6.58	22.71	6.71	21.64	7.03	20.08	7.42
9	19.88	5.45	19.70	5.45	19.21	5.51	18.05	5.76	16.74	6.02	23.83	6.84	23.62	6.97	23.04	7.10	21.64	7.49	20.08	7.81
10	20.15	5.56	19.95	5.58	19.35	5.63	18.05	5.89	16.74	6.15	24.16	7.03	23.92	7.16	23.20	7.29	21.64	7.68	20.08	8.04
11	21.04	5.66	20.39	5.71	19.35	5.76	18.05	6.02	16.74	6.28	25.22	7.23	24.45	7.36	23.20	7.49	21.64	7.88	20.08	8.27
14	21.26	5.97	20.50	6.02	19.35	6.02	18.05	6.33	16.74	6.59	25.49	7.68	24.58	7.81	23.20	7.94	21.64	8.40	20.08	8.79
15	21.26	6.12	20.50	6.23	19.35	6.23	18.05	6.48	16.74	6.79	25.49	8.01	24.58	8.14	23.20	8.27	21.64	8.72	20.08	9.12

TEMP	Total Power of Combined Indoor Units: 70%										Total Power of Combined Indoor Units: 80%									
	Indoor Air Inlet Temperature (DB (ºC))										Indoor Air Inlet Temperature (DB (ºC))									
	16		18		20		22		24		16		18		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
-20	13.39	7.06	13.25	7.36	13.18	7.67	13.03	8.13	12.89	8.59	15.29	7.93	15.13	8.27	15.05	8.62	14.89	9.14	14.73	9.65
-17	15.03	6.98	14.88	7.29	14.81	7.59	14.67	8.05	14.53	8.44	17.16	7.84	17.00	8.19	16.92	8.53	16.76	9.05	16.60	9.48
-15	16.12	12.27	15.98	12.35	15.91	12.35	15.77	13.04	15.63	13.65	18.41	11.81	18.25	11.98	18.17	12.15	18.01	12.84	17.85	13.45
-13	17.21	11.81	17.07	11.81	17.00	11.89	16.86	12.50	16.72	13.11	19.66	11.81	19.50	11.98	19.42	12.15	19.26	12.76	19.10	13.45
-11	18.30	11.27	18.16	11.35	18.09	11.35	17.95	11.96	17.81	12.58	20.91	11.72	20.75	11.90	20.67	12.07	20.51	12.76	20.35	13.36
-10	18.85	11.04	18.71	11.08	18.64	11.12	18.50	11.69	18.36	12.31	21.53	11.72	21.37	11.85	21.29	12.02	21.13	12.71	20.97	13.32
-9	19.40	10.81	19.26	10.81	19.19	10.89	19.05	11.43	18.91	12.04	22.16	11.72	22.00	11.81	21.92	11.98	21.76	12.67	21.60	13.27
-7	20.49	10.35	20.35	10.35	20.28	10.35	20.14	10.89	20.00	11.50	23.41	11.64	23.25	11.81	23.17	11.98	23.01	12.58	22.85	13.30
-6	21.04	10.05	20.90	10.12	20.83	10.12	20.69	10.66	20.55	11.20	24.03	11.64	23.87	11.81	23.79	11.90	23.63	12.58	23.47	13.19
-5	21.58	9.74	21.44	9.74	21.37	9.82	21.23	10.28	21.09	10.81	24.66	11.21	24.50	11.38	24.42	11.55	24.26	12.15	24.10	12.76
-3	22.68	9.05	22.54	9.05	22.47	9.13	22.33	9.59	22.02	10.05	25.91	10.34	25.75	10.52	25.67	10.60	25.50	11.21	25.15	11.72
-1	23.77	8.36	23.63	8.36	23.56	8.44	23.42	8.90	22.94	9.36	27.15	9.48	26.99	9.57	26.91	9.74	26.75	10.26	26.21	10.77
0	24.32	8.05	24.18	8.05	24.11	8.09	23.97	8.55	23.41	8.97	27.78	9.05	27.62	9.14	27.54	9.31	27.38	9.83	26.74	10.30
1	25.24	7.75	25.10	7.75	25.03	7.75	24.72	8.21	23.41	8.59	28.84	8.62	28.68	8.71	28.60	8.88	28.24	9.40	26.74	9.83
3	25.86	7.59	25.72	7.59	25.65	7.67	25.23	8.05	23.41	8.44	29.54	8.27	29.38	8.45	29.30	8.53	28.82	9.05	26.74	9.48
5	25.86	7.52	25.72	7.52	25.65	7.59	25.23	7.98	23.41	8.36	29.54	8.02	29.38	8.10	29.30	8.27	28.82	8.71	26.74	9.14
6	26.63	7.59	26.49	7.67	26.28	7.67	25.23	8.05	23.41	8.44	30.42	8.36	30.26	8.45	30.02	8.62	28.82	9.05	26.74	9.57
7	27.02	7.82	26.84	7.82	26.47	7.90	25.23	8.28	23.41	8.74	30.86	8.36	30.66	8.45	30.24	8.62	28.82	9.05	26.74	9.57
9	27.79	8.28	27.54	8.28	26.86	8.28	25.23	8.74	23.41	9.20	31.74	8.79	31.46	8.96	30.68	9.05	28.82	9.57	26.74	10.00
10	28.17	8.47	27.89	8.47	27.05	8.51	25.23	8.97	23.41	9.43	32.18	9.01	31.86	9.18	30.90	9.27	28.82	9.78	26.74	10.26
11	29.41	8.67	28.51	8.67	27.05	8.74	25.23	9.20	23.41	9.66	33.59	9.22	32.57	9.40	30.90	9.48	28.82	10.00	26.74	10.52
14	29.71	9.20	28.66	9.20	27.05	9.28	25.23	9.74	23.41	10.28	33.94	9.74	32.74	9.91	30.90	10.00	28.82	10.60	26.74	11.12
15	29.71	9.51	28.66	9.59	27.05	9.59	25.23	10.05	23.41	10.58	33.94	10.09	32.74	10.17	30.90	10.34	28.82	10.95	26.74	11.46

TEMP	Total Power of Combined Indoor Units: 90%										Total Power of Combined Indoor Units: 100%									
	Indoor Air Inlet Temperature (DB (ºC))										Indoor Air Inlet Temperature (DB (ºC))									
	16		18		20		22		24		16		18		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
-20	17.20	8.61	17.02	8.99	16.93	9.36	16.74	9.93	16.56	10.49	19.10	9.11	18.90	9.50	18.80	9.90	18.60	10.49	18.40	11.09
-17	19.30	8.52	19.12	8.90	19.03	9.27	18.85	9.83	18.67	10.30	21.44	9.01	21.24	9.41	21.14	9.80	20.94	10.40	20.74	10.89
-15	20.71	12.83	20.53	12.27	20.44	11.80	20.26	12.36	20.08	13.02	23.00	12.47	22.80	11.68	22.70	10.79	22.50	11.39	22.30	11.88
-13	22.11	12.73	21.93	12.17	21.84	11.70	21.66	12.27	21.48	12.83	24.56	12.28	24.36	11.48	24.26	10.69	24.06	11.19	23.86	11.68
-11	23.51	12.64	23.33	12.08	23.24	11.52	23.06	12.17	22.88	12.73	26.12	12.08	25.92	11.29	25.82	10.49	25.62	10.99	25.42	11.58
-10	24.22	12.55	24.04	12.03	23.95	11.47	23.77	12.13	23.59	12.69	26.90	11.98	26.70	11.24	26.60	10.44	26.40	10.94	26.20	11.48
-9	24.92	12.45	24.74	11.99	24.65	11.42	24.47	12.08	24.29	12.64	27.68	11.88	27.48	11.19	27.38	10.40	27.18	10.89	26.98	11.39
-7	26.32	12.36	26.14	11.89	26.05	11.33	25.87	11.89	25.69	12.45	29.24	11.78	29.04	10.99	28.94	10.20	28.74	10.69	28.54	11.19
-6	27.03	12.36	26.85	11.80	26.76	11.33	26.58	11.89	26.40	12.45	30.02	11.68	29.82	10.89	29.72	10.10	29.52	10.59	29.32	11.09
-5	27.73	12.17	27.55	11.61	27.46	11.14	27.28	11.70	27.10	12.27	30.80	11.88	30.60	11.09	30.50	10.30	30.30	10.79	30.10	11.29
-3	29.13	11.89	28.95	11.33	28.86	10.86	28.68	11.42	28.29	11.99	32.36	12.28	32.16	11.48	32.06	10.59	31.86	11.19	31.42	11.68
-1	30.54	11.61	30.36	11.14	30.27	10.58	30.09	11.14	29.47	11.70	33.92	12.57	33.72	11.78	33.62	10.99	33.42	11.48	32.74	12.08
0	31.24	11.42	31.06	10.96	30.97	10.44	30.79	11.00	30.07	11.52	34.70	12.82	34.50	11.98	34.40	11.14	34.20	11.68	33.40	12.23
1	32.43	11.24	32.25	10.77	32.16	10.30	31.76	10.86	30.07	11.33	36.02	13.07	35.82	12.18	35.72	11.29	35.28	11.88	33.40	12.38
3	33.22	10.77	33.04	10.30	32.95	9.83	32.41	10.39	30.07	10.86	36.90	12.38	36.70	11.58	36.60	10.79	36.00	11.29	33.40	11.78
5	33.22	10.30	33.04	9.83	32.95	9.46	32.41	9.93	30.07	10.39	36.90	11.68	36.70	10.99	36.60	10.20	36.00	10.69	33.40	11.19
6	34.21	10.21	34.03	9.36	33.76	9.36	32.41	9.83	30.07	10.30	38.00	11.39	37.80	10.69	37.50	9.90	36.00	10.40	33.40	10.89
7	34.71	10.49	34.48	9.74	34.01	9.55	32.41	10.11	30.07	10.58	38.55	11.68	38.30	10.89	37.78	10.10	36.00	10.59	33.40	11.09
9	35.70	10.96	35.38	10.02	34.50	10.02	32.41	10.58	30.07	11.05	39.65	12.18	39.30	11.39	38.33	10.59	36.00	11.09	33.40	11.58
10	36.19	11.19	35.83	10.25	34.75	10.25	32.41	10.82	30.07	11.28	40.20	12.42	39.80	11.63	38.60	10.79	36.00	11.29	33.40	11.83
11	37.78	11.42	36.62	10.49	34.75	10.49	32.41	11.05	30.07	11.52	41.96	12.67	40.68	11.88	38.60	10.99	36.00	11.48	33.40	12.08
14	38.17	12.08	36.82	11.52	34.75	11.05	32.41	11.61	30.07	12.17	42.40	13.27	40.90	12.47	38.60	11.58	36.00	12.18	33.40	12.67
15	38.17	12.45	36.82	11.89	34.75	11.42	32.41	11.99	30.07	12.55	42.40	13.66	40.90	13.17	38.60	11.88	36.00	12.47	33.40	13.07

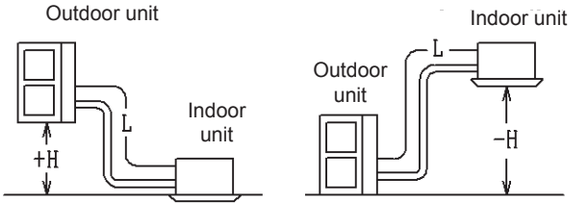
TEMP	Total Power of Combined Indoor Units: 110%										Total Power of Combined Indoor Units: 120%									
	Indoor Air Inlet Temperature (DB (ºC))										Indoor Air Inlet Temperature (DB (ºC))									
	16		18		20		22		24		16		18		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
-20	19.10	9.51	18.90	9.92	18.80	10.34	18.60	10.96	18.40	11.58	19.10	9.57	18.90	9.98	18.80	10.40	18.60	11.02	18.40	11.65
-17	21.44	9.41	21.24	9.82	21.14	10.23	20.94	10.85	20.74	11.37	21.44	9.47	21.24	9.88	21.14	10.30	20.94	10.92	20.74	11.44
-15	23.00	11.06	22.80	10.85	22.70	10.65	22.50	11.27	22.30	11.89	23.00	9.47	22.80	9.88	22.70	10.09	22.50	10.82	22.30	11.54
-13	24.56	10.85	24.36	10.65	24.26	10.44	24.06	11.06	23.86	11.68	24.56	9.26	24.36	9.57	24.26	9.88	24.06	10.61	23.86	11.23
-11	26.12	10.65	25.92	10.44	25.82	10.23	25.62	10.85	25.42	11.47	26.12	9.05	25.92	9.36	25.82	9.67	25.62	10.40	25.42	10.92
-10	26.90	10.54	26.70	10.34	26.60	10.13	26.40	10.75	26.20	11.37	26.90	8.89	26.70	9.26	26.60	9.57	26.40	10.24	26.20	10.82
-9	27.68	10.44	27.48	10.23	27.38	10.03	27.18	10.65	26.98	11.27	27.68	8.74	27.48	9.15	27.38	9.47	27.18	10.09	26.98	10.71
-7	29.24	10.23	29.04	10.03	28.94	9.82	28.74	10.44	28.54	11.06	29.24	8.53	29.04	8.95	28.94	9.15	28.74	9.88	28.54	10.40
-6	30.02	10.13	29.82	9.92	29.72	9.82	29.52	10.34	29.32	10.96	30.02	8.43	29.82	8.84	29.72	9.05	29.52	9.78	29.32	10.30
-5	30.80	10.34	30.60	10.13	30.50	9.92	30.30	10.54	30.10	11.06	30.80	8.53	30.60	8.95	30.50	9.15	30.30	9.88	30.10	10.40
-3	32.36	10.65	32.16	10.44	32.06	10.23	31.86	10.85	31.42	11.37	32.36	8.74	32.16	9.15	32.06	9.47	31.86	10.09	31.42	10.71
-1	33.92	10.85	33.72	10.65	33.62	10.54	33.42	11.16	32.74	11.68	33.92	9.05	33.72	9.36	33.62	9.67	33.42	10.40	32.74	11.02
0	34.70	11.01	34.50	10.80	34.40	10.70	34.20	11.32	33.40	11.89	34.70	9.15	34.50	9.47	34.40	9.78	34.20	10.50	33.40	11.13
1	36.02	11.16	35.82	10.96	35.72	10.85	35.28	11.47	33.40	12.09	36.02	9.26	35.82	9.57	35.72	9.88	35.28	10.61	33.40	11.23
3	36.90	11.06	36.70	10.85	36.60	10.65	36.00	11.27	33.40	11.89	36.90	9.47	36.70	9.78	36.60	10.09	36.00	10.82	33.40	11.44
5	36.90	10.85	36.70	10.65	36.60	10.44	36.00	11.06	33.40	11.68	36.90	9.57	36.70	9.98	36.60	10.30	36.00	11.02	33.40	11.75
6	38.00	10.75	37.80	10.54	37.50	10.34	36.00	10.96	33.40	11.58	38.00	9.67	37.80	10.09	37.50	10.40	36.00	11.13	33.40	11.86
7	38.55	10.96	38.30	10.75	37.78	10.54	36.00	11.16	33.40	11.89	38.55	9.98	38.30	10.40	37.78	10.71	36.00	11.44	33.40	12.17
9	39.65	11.47	39.30	11.27	38.33	11.06	36.00	11.78	33.40	12.40	39.65	10.40	39.30	10.92	38.33	11.23	36.00	12.06	33.40	12.69
10	40.20	11.78	39.80	11.53	38.60	11.32	36.00	12.04	33.40	12.66	40.20	10.66	39.80	11.18	38.60	11.49	36.00	12.32	33.40	13.00
11	41.96	12.09	40.68	11.78	38.60	11.58	36.00	12.30	33.40	12.92	41.96	10.92	40.68	11.44	38.60	11.75	36.00	12.58	33.40	13.31
14	42.40	12.71	40.90	12.40	38.60	12.20	36.00	12.92	33.40	13.64	42.40	11.54	40.90	12.06	38.60	12.37	36.00	13.31	33.40	14.14
15	42.40	13.02	40.90	12.82	38.60	12.61	36.00	13.33	33.40	14.06	42.40	11.96	40.90	12.48	38.60	12.79	36.00	13.74	33.40	14.57

TEMP	Total Power of Combined Indoor Units: 130%									
	Indoor Air Inlet Temperature (DB (ºC))									
	16		18		20		22		24	
	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT	CAP	IPT
-20	19.10	9.30	18.90	9.71	18.80	10.10	18.60	10.70	18.40	11.31
-17	21.44	9.20	21.24	9.59	21.14	10.00	20.94	10.61	20.74	11.11
-15	23.00	8.99	22.80	9.50	22.70	9.90	22.50	10.51	22.30	11.02
-13	24.56	8.79	24.36	9.20	24.26	9.71	24.06	10.20	23.86	10.70
-11	26.12	8.60	25.92	8.99	25.82	9.40	25.62	9.90	25.42	10.41
-10	26.90	8.48	26.70	8.89	26.60	9.30	26.40	9.81	26.20	10.31
-9	27.68	8.38	27.48	8.79	27.38	9.20	27.18	9.71	26.98	10.20
-7	29.24	8.09	29.04	8.48	28.94	8.89	28.74	9.40	28.54	9.90
-6	30.02	7.98	29.82	8.38	29.72	8.79	29.52	9.30	29.32	9.71
-5	30.80	8.09	30.60	8.48	30.50	8.89	30.30	9.40	30.10	9.81
-3	32.36	8.29	32.16	8.69	32.06	9.09	31.86	9.59	31.42	10.10
-1	33.92	8.48	33.72	8.89	33.62	9.30	33.42	9.81	32.74	10.31
0	34.70	8.60	34.50	8.99	34.40	9.40	34.20	9.90	33.40	10.41
1	36.02	8.69	35.82	9.09	35.72	9.50	35.28	10.00	33.40	10.51
3	36.90	8.89	36.70	9.30	36.60	9.71	36.00	10.31	33.40	10.82
5	36.90	9.09	36.70	9.50	36.60	10.00	36.00	10.51	33.40	11.02
6	38.00	9.20	37.80	9.71	37.50	10.10	36.00	10.61	33.40	11.21
7	38.55	9.40	38.30	9.81	37.78	10.31	36.00	10.82	33.40	11.42
9	39.65	9.71	39.30	10.20	38.33	10.61	36.00	11.21	33.40	11.82
10	40.20	9.85	39.80	10.36	38.60	10.82	36.00	11.42	33.40	12.03
11	41.96	10.00	40.68	10.51	38.60	11.02	36.00	11.62	33.40	12.22
14	42.40	10.51	40.90	10.92	38.60	11.42	36.00	12.13	33.40	12.63
15	42.40	10.70	40.90	11.21	38.60	11.72	36.00	12.32	33.40	13.04

4.4 Correction factors

4.4.1 Piping length correction factor

The correction factor is based on the equivalent piping length in meters (EL) and the height between outdoor and indoor units in meters (H).



H:
Height between indoor unit and outdoor unit (m).

- H>0: Position of outdoor unit is higher than position of indoor unit (m).
- H<0: Position of outdoor unit is lower than position of indoor unit (m).

L:
Actual one-way piping length between indoor unit and outdoor unit (m).

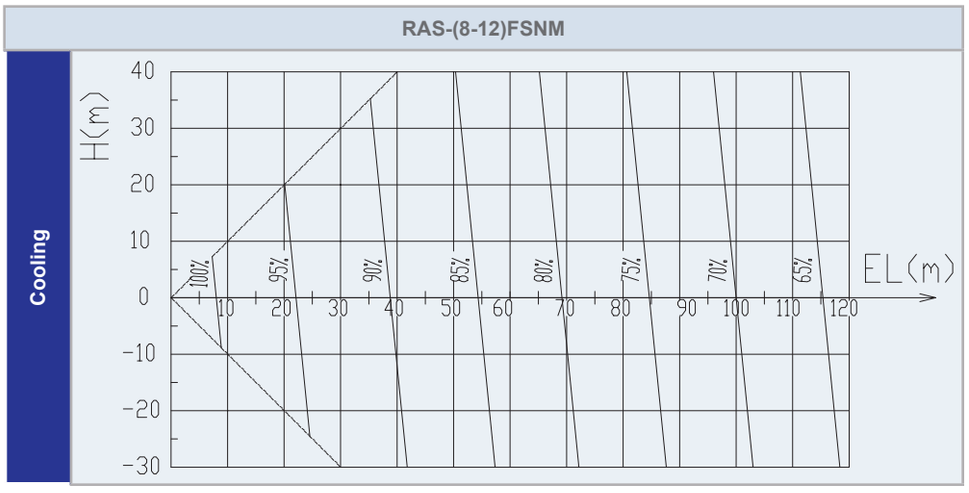
EL:
Equivalent one-way piping length between indoor unit and outdoor unit (m).

- One 90º elbow is 0.5 m.
- One 180º bend is 1.5 m.
- One Multi-kit is 0.5 m.

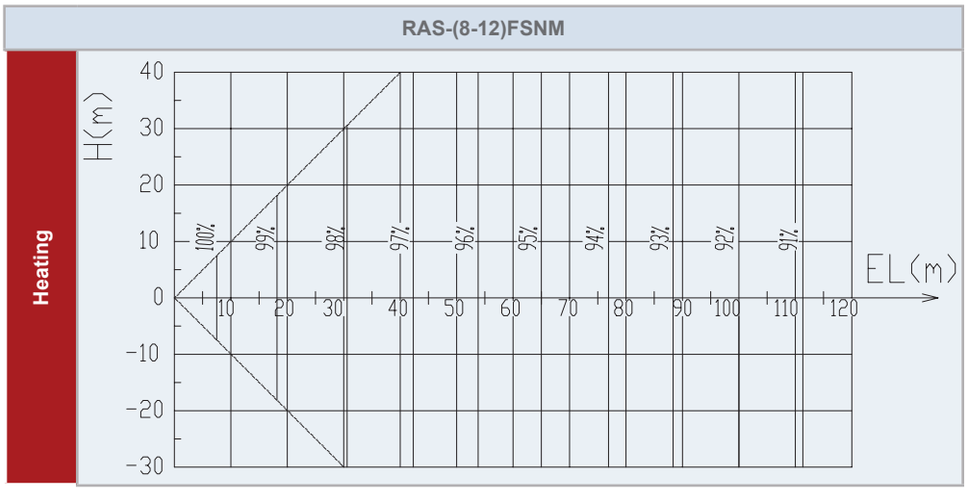
NOTE

- *In order to ensure a right outdoor unit selection, consider the farthest indoor unit in general situations*
- *In case of an installation with indoor units at heights both higher and lower the outdoor unit, it have to be studied all the situations with their respective values of height and equivalent piping length and it has to be considered the most unfavourable case referring to the charts shown in this section.*
- *If the equivalent piping lenght of the indoor units located in a higher and lower position at the outdoor unit is the same, the height which have to be considered is the corresponding at the indoor unit located in a higher position than the outdoor unit, because of it's the most unfavourable case.*

◆ Cooling



◆ Heating



4.4.2 Defrost correction factor

The heating capacity does not include operation during frost or defrosting.

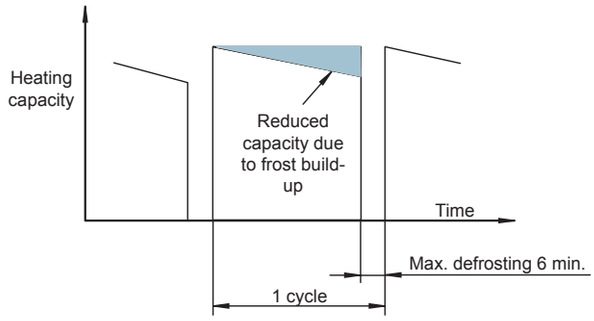
When this type of operation is taken in account, the heating capacity must be corrected according to the following equation:

Corrected heating capacity = correction factor x heating capacity

Outdoor inlet air temp. (ºC DB) (HR = 85%)	-7	-5	-3	0	3	5	7
Defrosting correction factor f_D	0.95	0.93	0.88	0.85	0.87	0.90	1.00

NOTE

The correction factor is not valid for special conditions such as during snow or operation in a transitional period.



5. Acoustic characteristics curves

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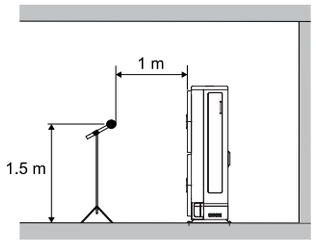
5.1 Overall sound level

The overall sound level has been measured in an anechoic chamber so reflected sound should be taken into consideration when installing the unit.

Test Conditions:

1 Distance of the unit from the measuring point: 1 meter from the unit's front surface; 1.5 meter from floor level:

Overall sound level measuring position



2 Power supply:

Three phase units: 3N~ 380/415V 50Hz.

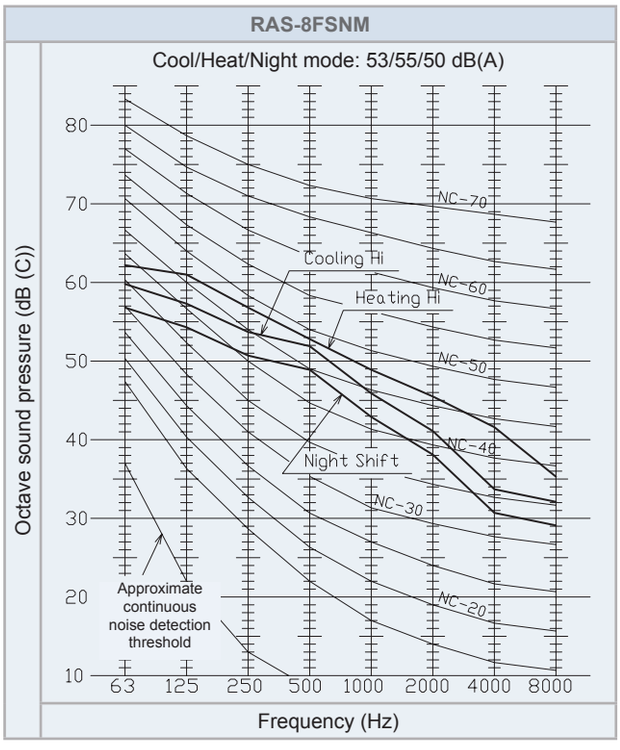
NOTE

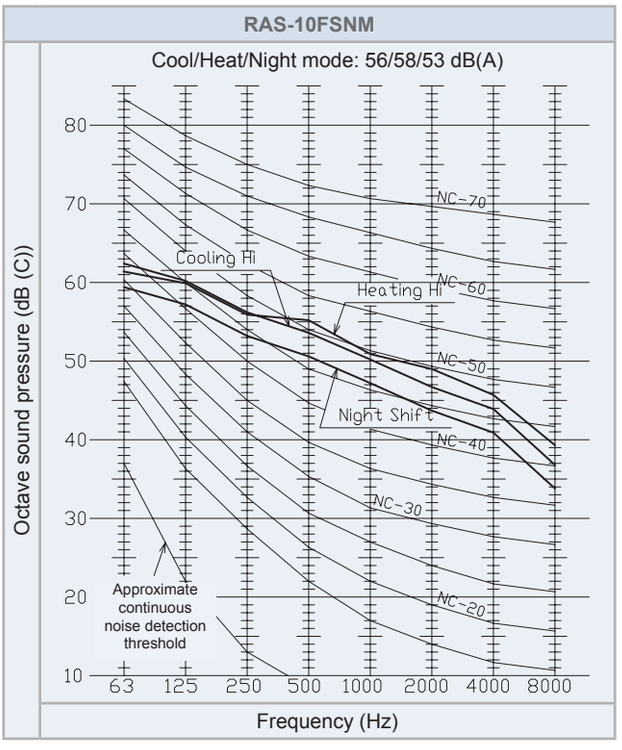
The sound data is measured in an anechoic chamber, so reflected sound should be taken into consideration when installing the unit.

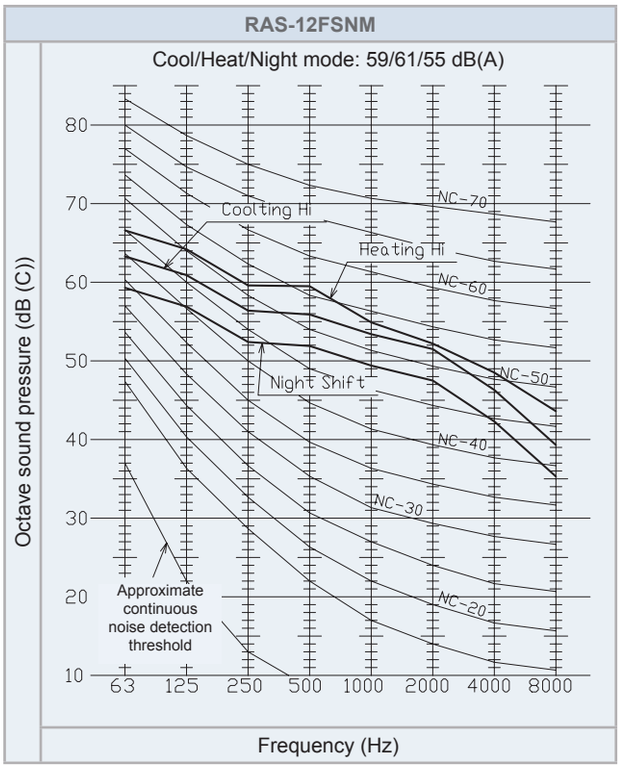
3 The provided data corresponds to cooling mode. In case of heating mode, te sound pressure level increases from 1 to 2 dB(A).

4 Sound power level were measured in a reverberant room, in accordance with the EN12102 standard. Used environment conditions are the same as specified in EN14511 for performance test.

5.2 Sound pressure curves



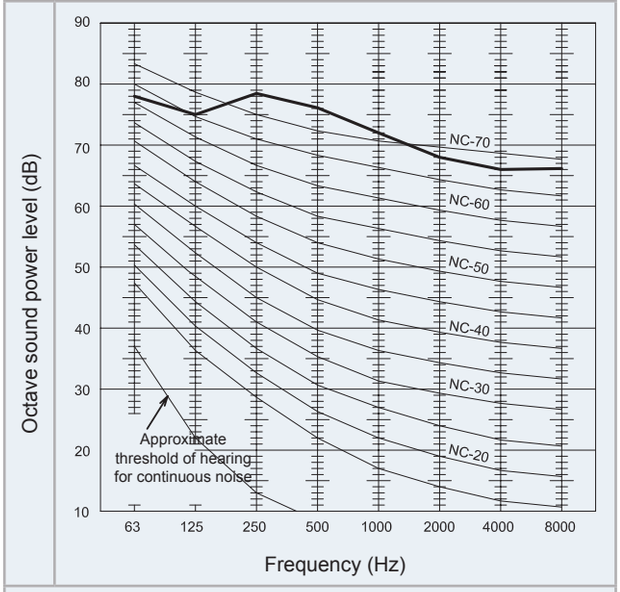




5

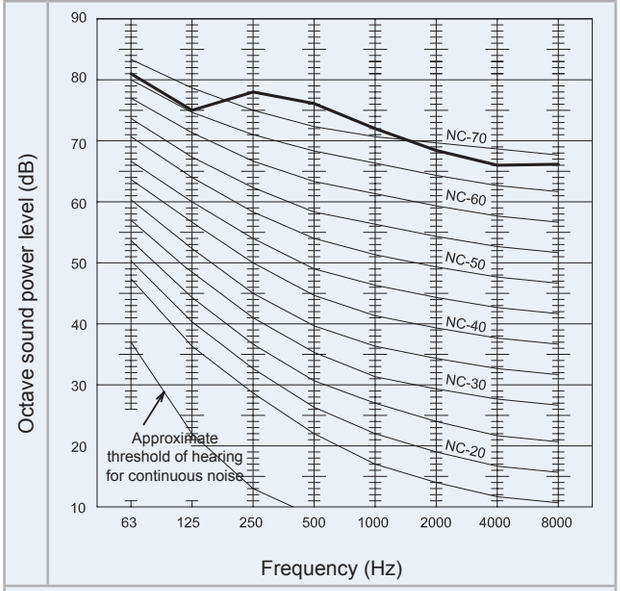
5.3 Sound Power curves

RAS-8FSNM



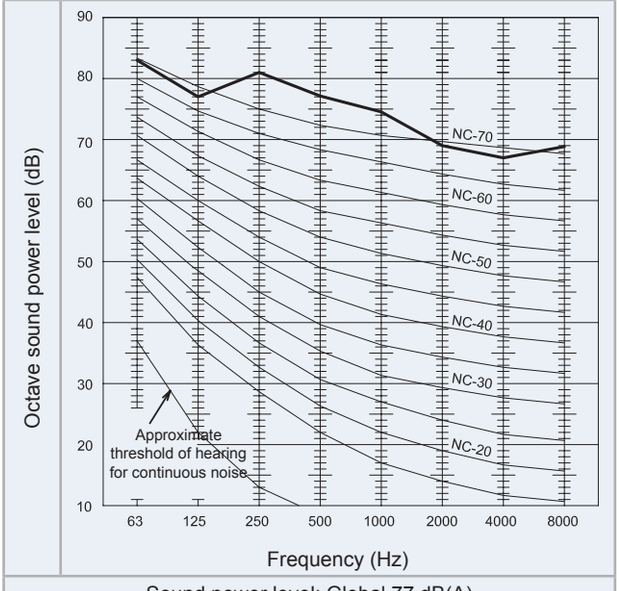
Sound power level: Global 71 dB(A)

RAS-10FSNM



Sound power level: Global 74 dB(A)

RAS-12FSNM



Sound power level: Global 77 dB(A)

6. Working range

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6.1 Power Supply

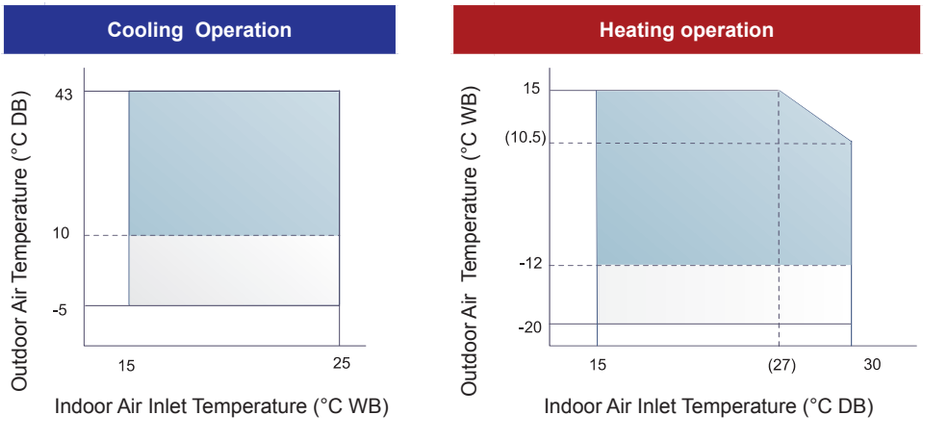
Operating voltage	90% to 110% of the nominal voltage
Voltage imbalance	Within a 3% deviation from each voltage at the main terminal of the outdoor unit
Starting voltage	Higher than 85% of the nominal voltage

6.2 Temperature range

The temperature range is indicated in the following table:

		Cooling Operation	Heating operation
Indoor temperature	Minimum	21 °C DB/15 °C WB	15 °C DB
	Maximum	32 °C DB/25 °C WB	27 °C DB
Outdoor temperature	Minimum	–5 °C DB (*)	–20 °C WB (**)
	Maximum	43°C DB	15 °C WB

Temperature Range Diagram:



NOTE

- *(*) 10°C DB ~ -5°C DB, Operation Control Range*
- *(**)-12°C WB ~ -20°C WB, Operation Control Range*
- *DB: dry bulb; WB: wet bulb*
- *Operation control range*

7. General dimensions

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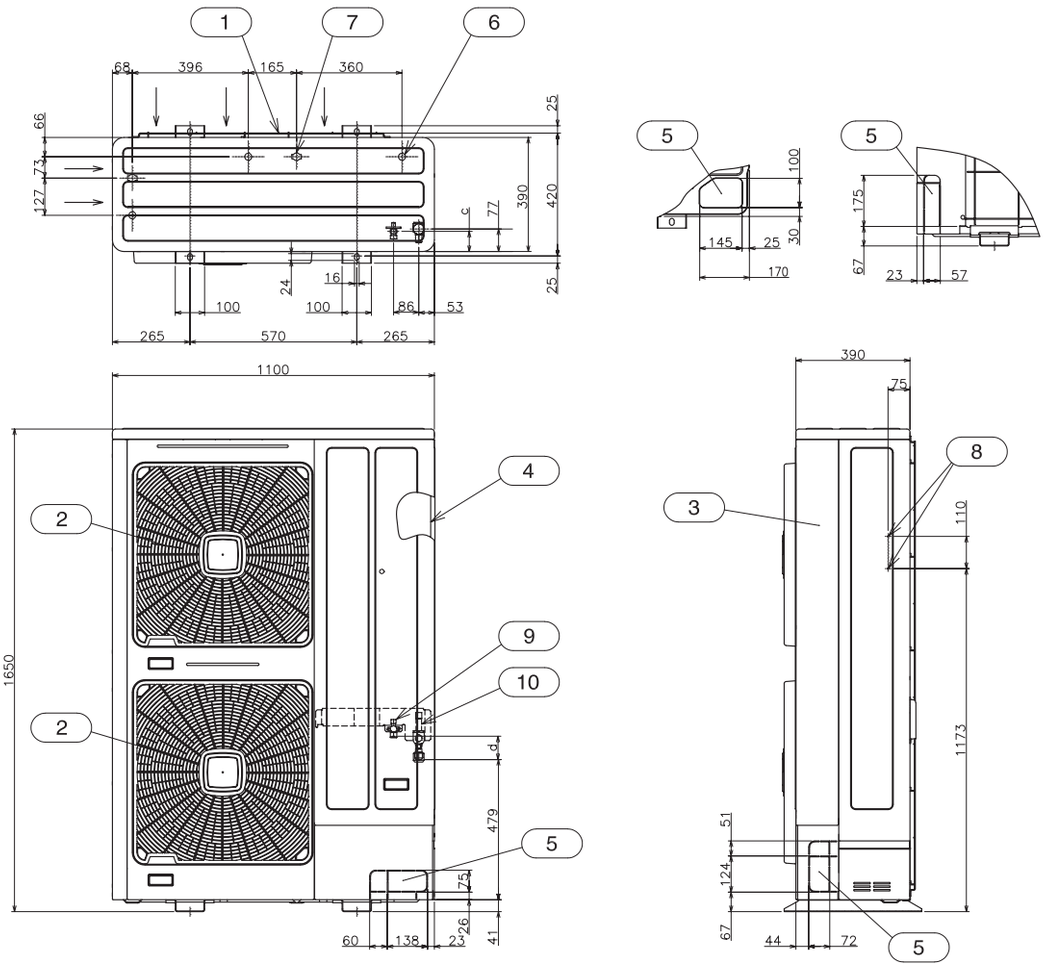
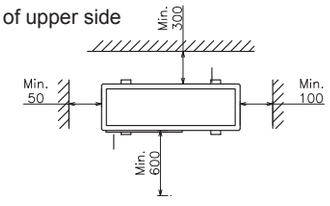
7.1 Dimensional drawing

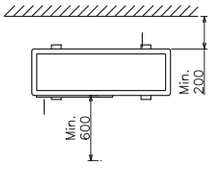


Service space

In case of obstacles on both sides and no obstacles of upper side



In case of no obstacles on both sides, and upper side



Units: mm

No.	Item	Remarks
1	Air intake	
2	Air outlet	
3	Service cover	
4	Electrical switch box	
5	Holes for Refrigerant Piping and electrical wiring piping	
6	Drain holes	3-Ø24
7	Drain holes	2-Ø26
8	Holes for fixing machine to wall	4-(M5)
9	Refrigerant liquid pipe	Flare nut: Øa
10	Refrigerant gas pipe	Flare nut: Øb

8. Refrigerant cycle

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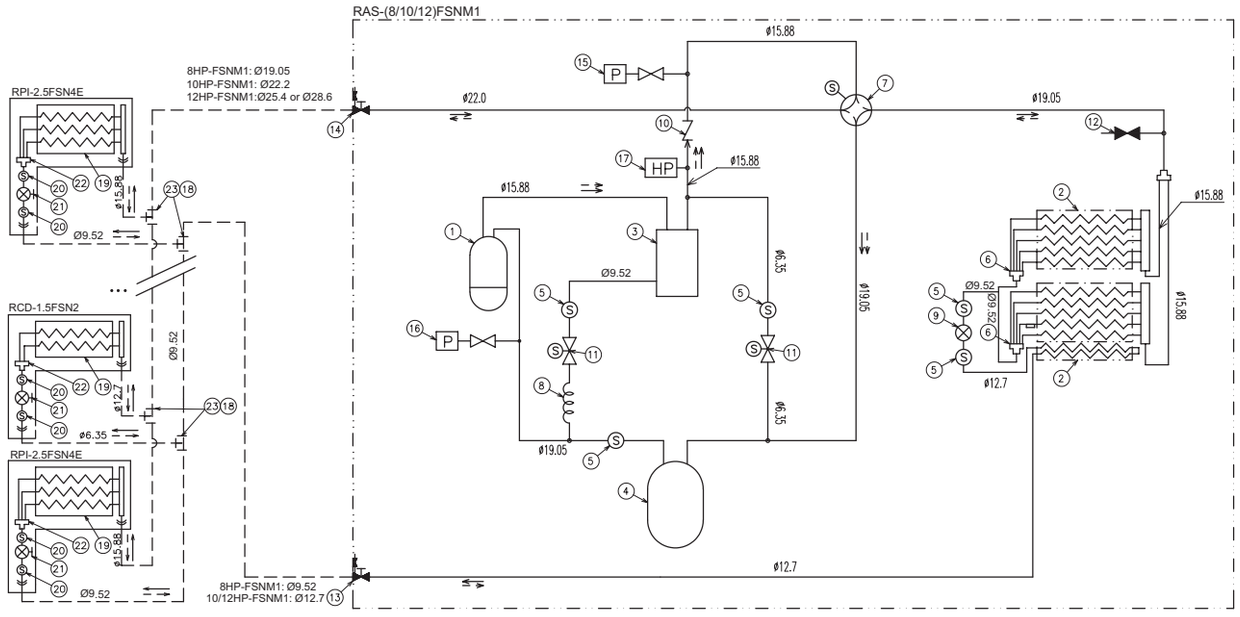
8.1 Refrigerant cycle for RAS-(8-12)FSNM



→	-⇐--	___				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

No	Item
1	Compressor
2	Heat exchanger
3	Oil separator
4	Accumulator
5	Strainer
6	Distributor
7	Reversing valve
8	Capillary tube

No	Item
9	Micro-computer control expansion valve
10	Check valve
11	Solenoid valve
12	Check joint
13	Stop Valve for liquid line
14	Stop Valve for gas line
14	Stop Valve for gas line
15	Sensor for Refrigerant Pressure (High pressure sensor)

No	Item
16	Sensor for Refrigerant Pressure (Low pressure sensor)
17	High pressure switch for protection
18	Multi-Kit E-162SN4
19	Heat exchanger indoor
20	Strainer indoor
21	Expansion valve indoor
22	Distributor indoor
23	Multi-Kit E-102SN4

9. Piping work and refrigerant charge

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9.1 Refrigerant piping selection

The Set Free FSNM 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.

9.1.1 Minimum and maximum number of indoor units per outdoor unit

With Set Free FSNM system it's able to connect one outdoor unit with up to 10 indoor units.

Utilizing an inverter control, a wide range of operation capacity control is also available. A maximum total combination horsepower of 130% and a minimum total combination horsepower of 50% can be chosen by combination of the indoor units when compared with the nominal outdoor unit capacity. Therefore, the new system can meet individual air conditioning requirements in most office buildings.

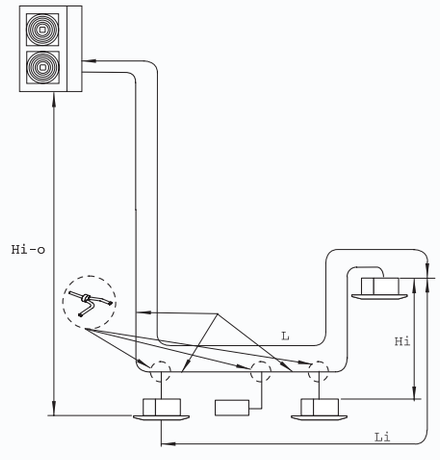
Outdoor unit	Indoor unit					
	Minimum combination capacity (HP)	Maximum combination capacity (HP)	Maximum number of connectable indoor units (This number of units is the sum of the installed RPK and all other indoor units) (*)	RPK-FSNH3M restrictions (Maximum number of combinable RPK-FSNH3M indoor unis with expansion valve kit EV-1.5N1)	Minimum individual operation capacity (HP)	Capacity range of combination
RAS-8FSNM	4.0	10.4	10 (8)	8	0.8	50% to 130%
RAS-10FSNM	5.0	13.0				
RAS-12FSNM	6.0	13.2				

NOTE

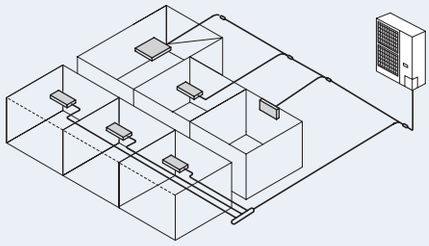
(*) In brackets the maximum recommended number of connectable indoor units (only for 0.8 and 1.0 indoor units). If you connect more than 8, the perception cold draft may occur at heating operation.

9.1.2 Refrigerant piping range

The piping selection and the distribution must be designed according to the following specifications:



Item		Applicable range
Length between OU and the farthest IU: L (m)	Actual	100
	Equivalent	120
Total piping length (m)		250
Piping length from 1st branch to the farthest IU: Li (m)		40
Piping length from each IU (m)		40
Lift between IU and OU: Hi-o (m)	OU is higher	40
	OU is lower	30
Lift between IU: Hi (m)		15



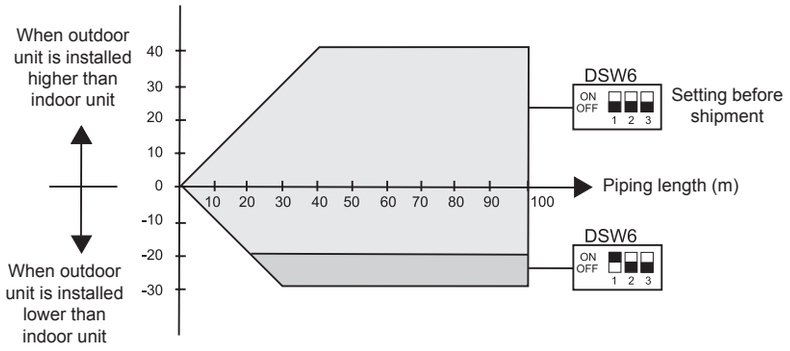
NOTE

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

9.1.3 Refrigerant piping length by dip switch setting

The refrigerant piping length between indoor units 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 the piping length.

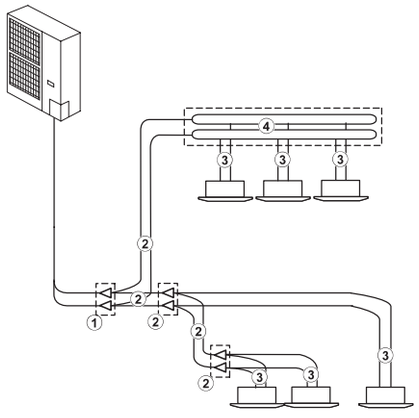


9.1.4 Piping size and multiple connections kit

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 available for 8 HP units.

Unit	Piping systems	
	Uni-piping	Down-size
RAS-(8-12)FSNM	●	●



NOTE

- *In case of Uni-piping system, the pipe size and the multi-kit from the 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 outdoor unit and the 1st kit, use the pipe of the same size as the 1st kit.*
- *If you want to use “Uni-piping” system for other configurations that are not shown in the table, consult with your distributor.*

☛ **Table 1:**

Outdoor unit to first multi-kit

Unit	Pipe size (Ømm)		Multi-kit
	Gas	Liquid	
RAS-8FSNM	19.05	9.52 (*)	E-102SN4
RAS-10FSNM	22.2	12.7	E-162SN4
RAS-12FSNM	25.4~28.6	12.7	E-162SN4

NOTE

- *(*): When the equivalent refrigerant pipe length is over 70m, use Ø12.7 liquid pipe.*
- *(In this case, use E-162SN4).*

☛ **Table 2:**

First multi-kit to last multi-kit

Unit	Pipe size (Ømm)		Multi-kit
	Gas	Liquid	
12≤HP	25.4-28.6	12.7	E-162SN4
9≤HP<12	22.2	9.52	E-102SN4
6≤HP<9	19.05	9.52	E-102SN4
HP<6	15.88	9.52	E-102SN4

NOTE

- *If the multi-kit size is larger than the first branch, adjust the multi-kit size to the first branch.*
- *In case that the selected pipe size after the first branch is larger than the pipe size before the first branch, use the same pipe size as before the branch.*

☛ **Table 3:**

Multi-kit to indoor unit

Total indoor unit capacity (HP)	Pipe size (Ømm)		Maximum length of liquid pipe (m)
	Gas	Liquid	
0.8 to 2	12.7	6.35	15
2.5 to 6	15.88	9.52	15
8	19.05	9.52	15
10	22.2	9.52	15

NOTE

The multi-kit pipe size should be the same that indoor unit pipe.

☛ **Table 4:**

Distributor system

Total indoor unit capacity (HP)	Number of branches	Pipe size (Ømm)		Distributor
		Gas	Liquid	
5~8	4	15.88/19.05	9.52	MH-84AN1
5~10	8	15.88/19.05/22.2	9.52	MH-108AN

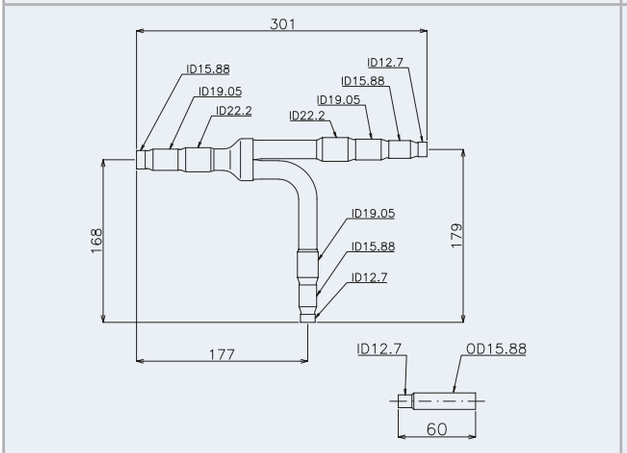
9.2 Multi-kits and distributors

9.2.1 Size data

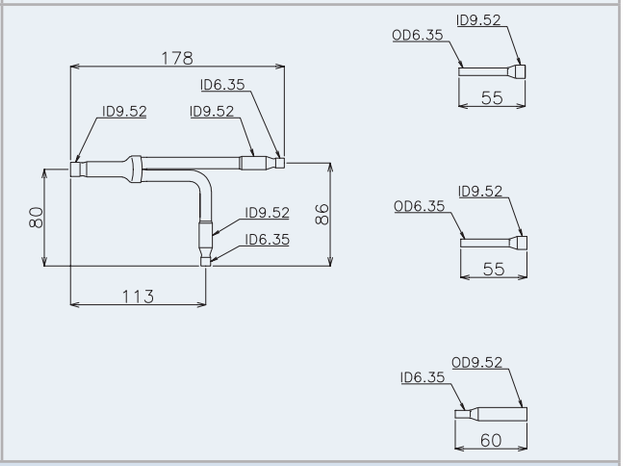
◆ Multi-kits - line branch

E-102SN4

Gas line

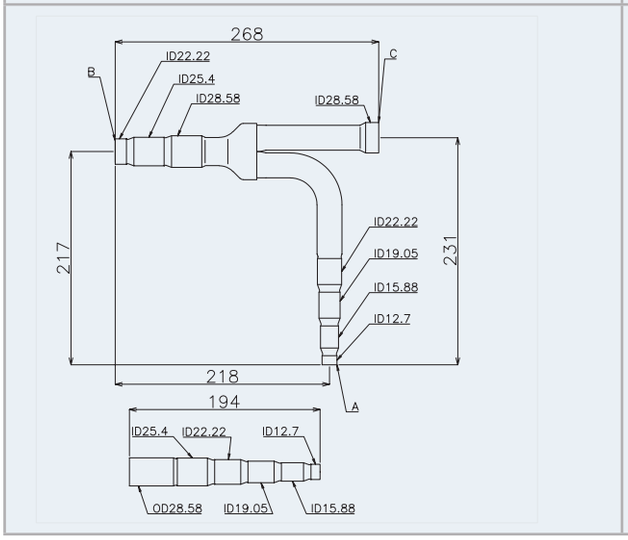


Liquid line

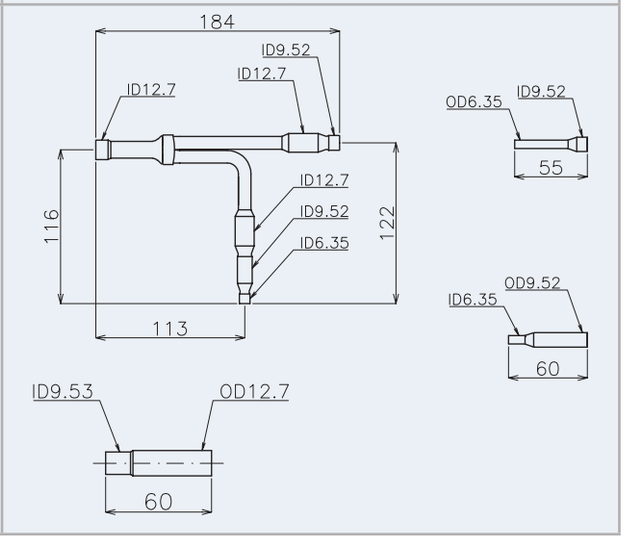


E-162SN4

Gas line

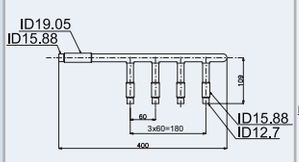
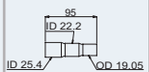
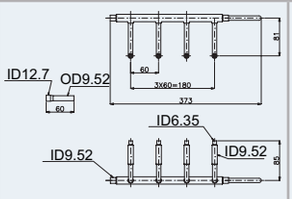
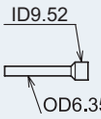
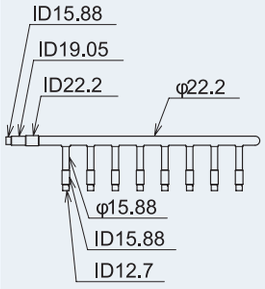
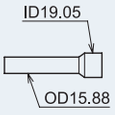
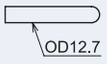
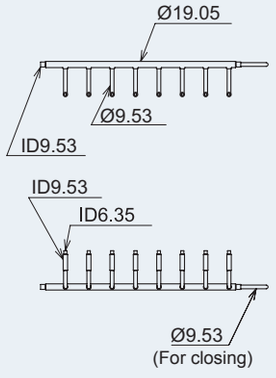
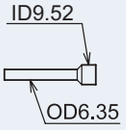


Liquid line



A	To indoor unit
B	To outdoor unit
C	To main piping

◆ Distributors

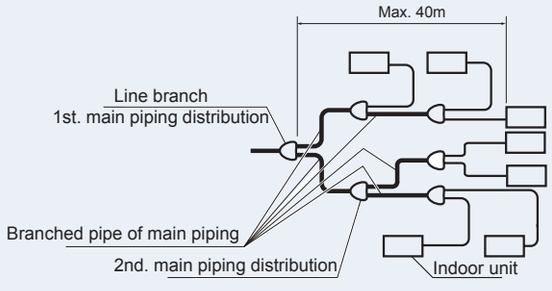
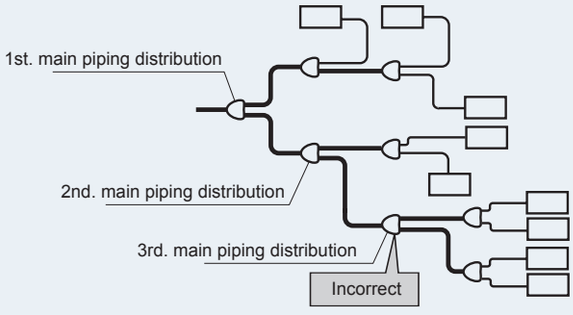
	Gas line	Expander for gas line	Closing pipe for gas line	Liquid line	Expander for liquid line	Closing pipe for liquid line
MH-84AN1			 Q'ty: 2		 Q'ty: 4	 Q'ty: 2
MH-108AN		 Q'ty: 2	 Q'ty: 6		 Q'ty: 8	 Q'ty: 6

9.2.2 Distribution method

◆ Line distribution

The use of line branches is allowed for the first and second levels of branching from the main distribution piping. Installation of line branches at a third and further levels of branching from the main distribution piping is not allowed. See the examples of correct and wrong branching method below.

Branch method

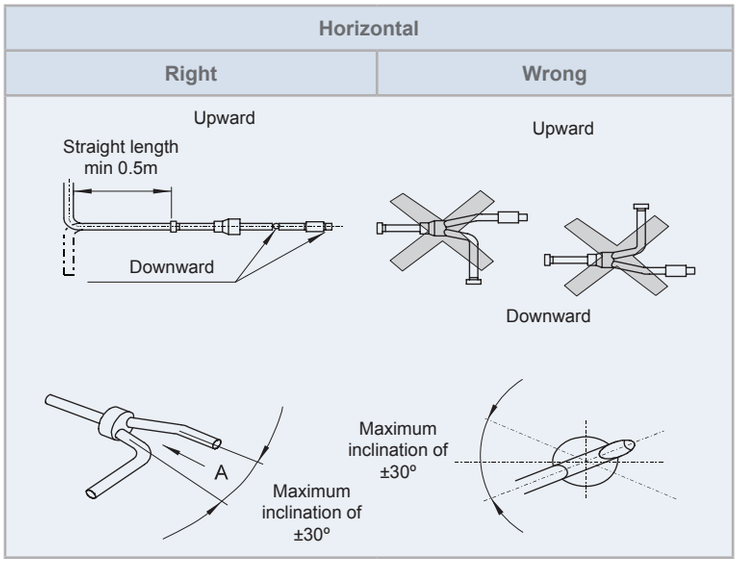
Correct	Wrong
	

Installation position

- Horizontal installation

Locate the branch pipes on the same horizontal plane. (Inclination within 30º)

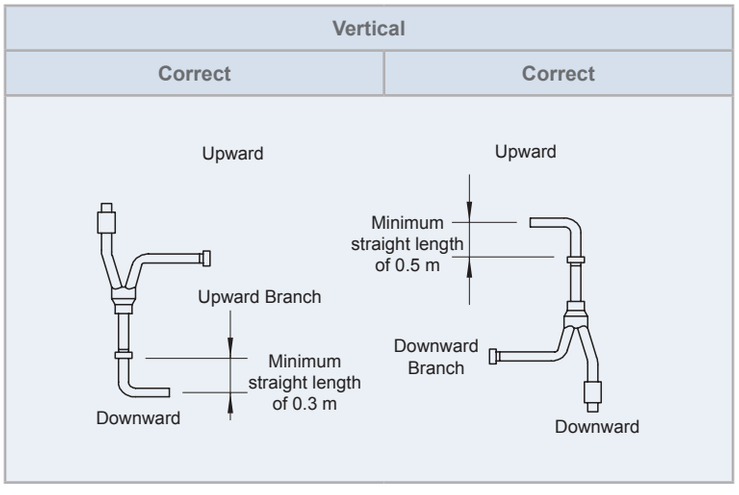
Make the straight length a minimum of 0.5m after the vertical bend.



- Vertical installation

Straight length of the pipe connection on the outdoor unit side is made as follows:

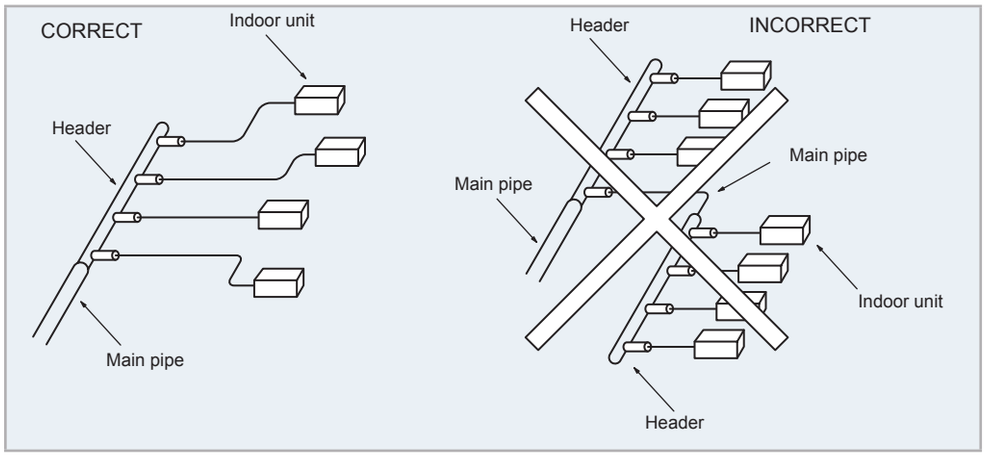
- The collective pipe connection part is installed upward, the straight length must be minimum 0.5m.
- The collective pipe connection part is installed downward, the straight length must be minimum 0.3m.



◆ Header distribution

Branch method

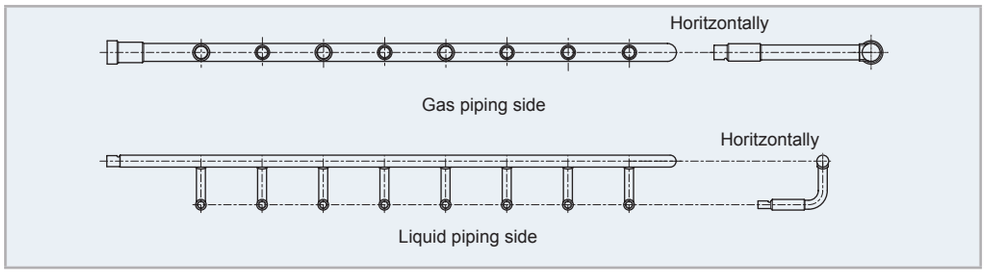
Do not connect two header branches consecutively.



Installation position

Perform to install horizontally always.

(Ex.: In case of model MH-108AN)

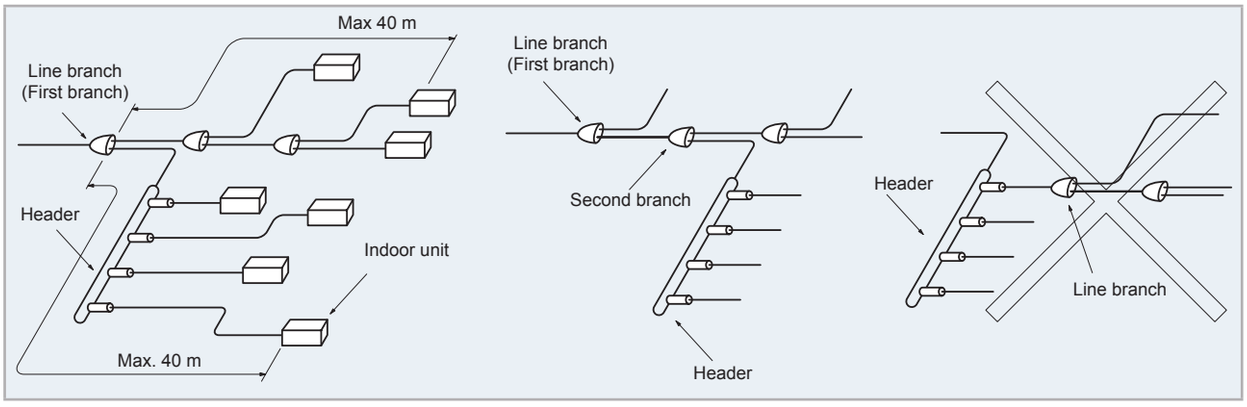


⚠ CAUTION

Seal the end of branch pipes which are not connected, by brazing factory supplied closing pipes.

Combination branch

- It is possible to conect the header to the second branch, when the first branch is also the line branch.
- Do not connect a line branch to a header branch.



9.2.3 Copper pipes and sizes

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.

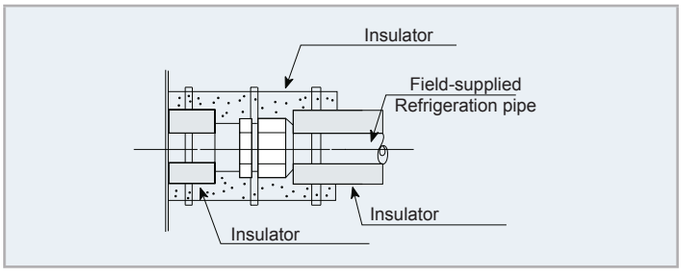
Nominal diameter		Thickness (mm)	Copper type
(mm)	(in.)		
6.35	1/4	0.80	Coil
9.52	3/8	0.80	Coil
12.70	1/2	0.80	Coil
15.88	5/8	1.00	Coil
19.05	3/4	1.00	Straight lengths
22.23	7/8	1.00	Straight lengths
25.40	1	1.00	Straight lengths
28.60	1-1/8	1.00	Straight lengths

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:

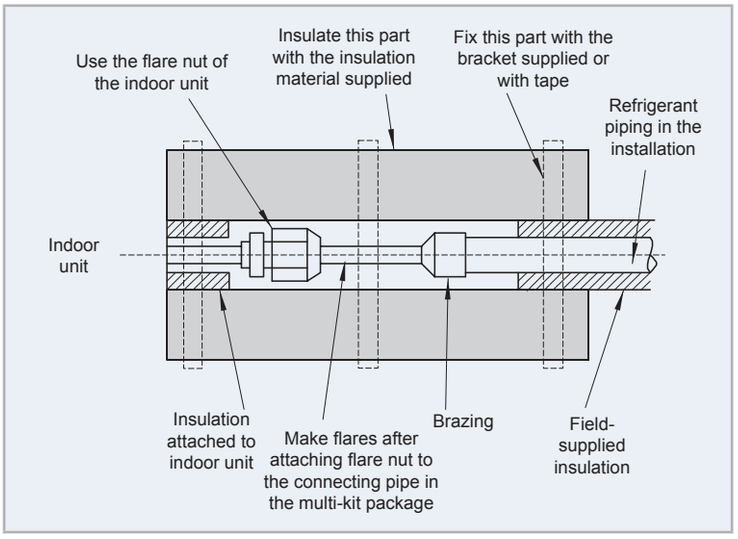


CAUTION

- *Do not use saws. grindstones or other tools which might create copper dust.*
- *When cutting pipes, secure the part for brazing in accordance to national and local regulations.*
- *Use security glasses and gloves for cutting or welding works.*

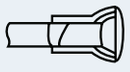
◆ Piping connections

When connecting liquid piping for the unit where the piping is longer than 15 meters. apply a piping size of Ø9.52. 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. Take particular care to ensure that all copper piping is clean and dry internally.*
- *To ensure this, blow oxygen-free nitrogen through the pipes.*

Right	Wrong
	

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, as it's shown in the figures.*
- *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.*

◆ Insulation

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.

NOTE

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

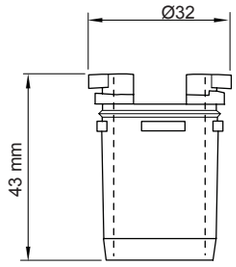
CAUTION

- *Do not use insulation material that contents NH3 because can damage cooper pipe material and can be a source of future leakage.*
- *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.*

◆ Outdoor unit drain kit (DBS-26) (Optional accessory)

In the case that drain water from the heat exchanger of the outdoor unit is required to be collected, use the drain kit. However, it is not recommended to use it in a snow fall area.

If the drain water is required to be collected completely, provide a field-supplied drain pan under the outdoor unit.



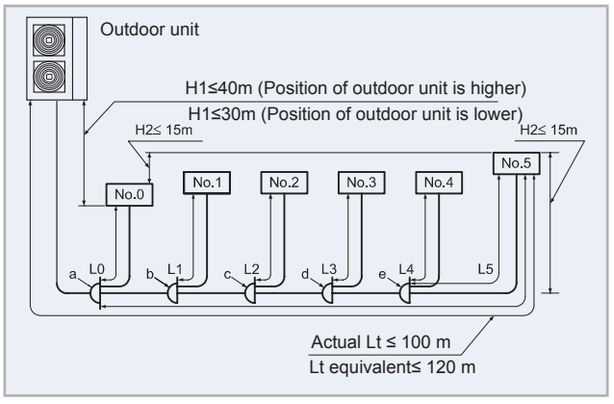
Outdoor unit HP	Drain kit quantity (units)
8 to 12 HP	DBS-26 x 4

9.3 Amount refrigerant charge

9.3.1 Additional refrigerant charge calculation (R410A)

Although refrigerant has been charged into this unit, additional refrigerant charge is required according to piping length.

- The additional refrigerant quantity should be determined and charged into the system according to the following procedure.
- Record the additional refrigerant quantity in order to facilitate maintenance and servicing activities.



◆ Calculating method of additional refrigerant charge (W kg)

Calculate the additional refrigerant charge amount according to the following steps:

☛ **Step 1:**

Additional refrigerant charge calculation for liquid piping (W_1 (kg))

(Fill in the following table)

Pipe diameter (mm)	Total piping length (m)	Additional charge (kg/m)	Subtotal (kg)
Ø12.7		x 0.12	
Ø9.52		x 0.07	
Ø6.35		x 0.03	

☛ **Step 2:**

Additional refrigerant charge calculation for indoor unit (W_2 (kg))

When the outdoor unit is combined with indoor units RPI-8/10FSN3E, it´s necessary an additional refrigerant charge (W_2) = 1 kg/unit.

For indoor units lower than 8 HP, the additional refrigerant charge it's not needed.

Step 3:

Calculation of total additional refrigerant charge (W (kg))

Put weight W_1 and W_2 calculated in step 1 and step 2 into the following formula:

Total additional refrigerant charge: W= W_1 + W_2

The following table shows the maximum additional refrigerant quantity allowed by unit.

Outdoor unit	Maximum additional refrigerant charge quantity (kg)
RAS-(8-12)FSNM	13.5

NOTE

- *The total additional refrigerant charge quantity calculated, should not exceed the maximum additional refrigerant charge quantity allowed.*
- *When the additional refrigerant charge is over the maximum additional refrigerant charge allowed by the unit, it's necessary to adjust the piping length of the installation.*

- Charging work

  Charge refrigerant (R410A) into the system according to the instructions described in "SMGB0059_rev0".
- Record of additional charge

  The total refrigerant charge of this system is calculated with the following formula:

Total refrigerant charge: W_{TOT}= W + W_0

This system = ☐ + ☐ = ☐ kg

W_0 is the outdoor unit refrigerant charge before shipment, and it's shown in the following table:

Outdoor unit	W_0 outdoor unit refrigerant charge (kg)
RAS-8FSNM	5.0
RAS-10FSNM	5.5
RAS-12FSNM	6.5

Record the refrigerant charge quantity in order to facilitate maintenance and servicing activities.

Total additional charge W ☐ kg

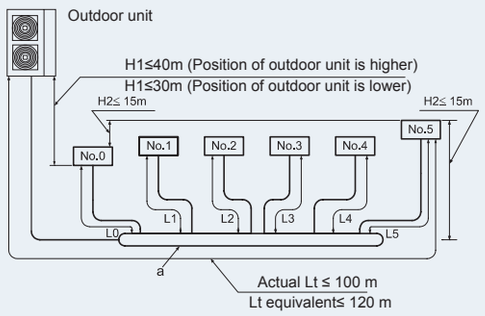
Total Ref. charge ☐ kg

Date of ref. charge work

☐ / ☐ / ☐

9.3.2 Examples of calculation

<table>
<tr><th colspan="3">ITEM</th><th>DISTRIBUTOR SYSTEM</th></tr>
<tr><td colspan="3">Example of systems
1: Simple installation with distributor

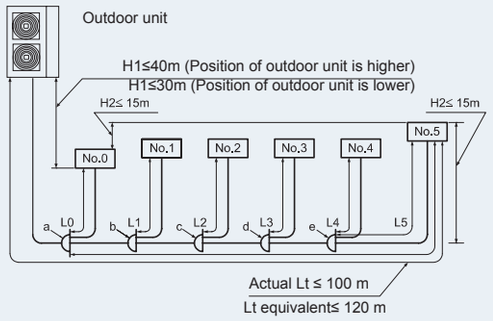
This figure shows examples of 6 indoor units combined with one outdoor unit.
The refrigerant pipes are shown as single line in the diagrams.
However, liquid line piping and gas line piping are required in the field.</td><td> 
</td></tr>
<tr><td colspan="3">Total piping length</td><td>≤ 250 m</td></tr>
<tr><td rowspan="2">Maximum piping length</td><td colspan="2">Actual length</td><td>Lt ≤ 100 m</td></tr>
<tr><td colspan="2">Equivalent length</td><td>Lt ≤ 120 m</td></tr>
<tr><td rowspan="2">Maximum lift between outdoor and indoor unit</td><td colspan="2">In the case that the position of outdoor unit is higher than that of indoor unit.</td><td>H1 ≤ 40 m</td></tr>
<tr><td colspan="2">In the case that the position of outdoor unit is lower than that of indoor unit.</td><td>H1 ≤ 30 m</td></tr>
<tr><td colspan="3">Maximum lift between each indoor unit or multi-kit and indoor unit</td><td>H2 ≤ 15 m</td></tr>
<tr><td rowspan="2">Maximum piping length between multi-kit and indoor unit</td><td colspan="2">Between the “a” kit and the farthest indoor unit</td><td>L ≤ 40 m</td></tr>
<tr><td colspan="2">Between each multi-kit and each indoor unit</td><td>L0. L1. L2. L3. L4. L5 ≤ 15 m</td></tr>
<tr><td colspan="4">Example: Outdoor unit: RAS-8FSNM</td></tr>
<tr><td colspan="3">Selecting the distributor.</td><td>Use MH-108AN (8 branches)</td></tr>
<tr><td rowspan="3">1) 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_{16}+W_2

1.1)W_{11} (kg): (Total length (m) of Ø22.2 Liquid piping) x 0.39
W_{12} (kg): (Total length (m) of Ø19.05 Liquid piping) x 0.28
W_{13} (kg): (Total length (m) of Ø15.88 Liquid piping) x 0.19
W_{14} (kg): (Total length (m) of Ø12.7 Liquid piping) x 0.12
W_{15} (kg): (Total length (m) of Ø9.52 Liquid piping) x 0.07
W_{16} (kg): (Total length (m) of Ø6.35 Liquid piping) x 0.030
1.2)W_2 (kg): Total quantity of additional refrigerant of each indoor unit (kg)</td><td>1.1) Liquid piping</td><td>Example:
<table><tr><th>Mark</th><th>Lt-L5</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>Ø9.52</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>61</td><td>5</td><td>3</td><td>5</td><td>3</td><td>3</td><td>5</td></tr></table>W_{15} = 61 x 0.07 = 4.27 kg
W_{16} = (5+3+5+3+5+3) x 0.03 = 0.72 kg</td></tr>
<tr><td>1.2) Indoor unit</td><td>Example:
<table><tr><th>Indoor Unit Number</th><th>0</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr><tr><td>Corresponding power (HP)</td><td>1.5</td><td>1.5</td><td>1</td><td>1</td><td>1.5</td><td>1.5</td></tr><tr><td>Additional refrigerant quantity</td><td colspan="6">Indoor units that do not require refrigerant charge</td></tr></table>W_2 = 0 kg</td></tr>
<tr><td>Total</td><td>W (kg) = W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_{16}+W_2
= 0 + 0 + 0 + 0 + 4.27 + 0.72 + 0 = 4.99 kg</td></tr>
<tr><td colspan="3">2) Checking the maximum quantity of additional refrigerant charge: (W < W_{MAX})</td><td>4.99 kg < 13.5 kg (CORRECT)</td></tr>
<tr><td colspan="3">3) Total refrigerant charge: W_{TOT} (kg)= W_0 + W
W_0 : Outdoor unit refrigerant charge before shipment (kg)</td><td>W_{TOT} = 5.0 + 4.99 = 9.99 kg</td></tr>
</table>

NOTE

- *Refer to “9.3 Amount refrigerant charge” to know all the information necessary for the calculation of the addtional refrigerant charge.*
- *Refer to “9.3.1 Additional refrigerant charge calculation (R410A)” in this chapter to know the maximum quantity of additional refrigerant charge (W_{MAX}) and the outdoor unit refrigerant charge before shipment (W_0).*

<table>
<tr><th colspan="3">ITEM</th><th>MULTI-KITS UNI-PIPING SYSTEM</th></tr>
<tr><td colspan="3">Example of systems
2: Simple installation with multi-kits (Uni-piping)

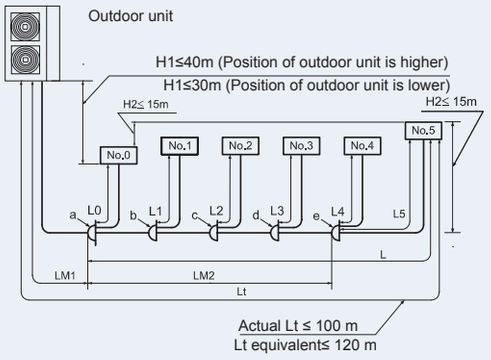
This figure shows examples of 6 indoor units combined with one outdoor unit.
The refrigerant pipes are shown as a single line in the diagrams.
However, liquid line piping and gas line piping are required in the field.</td><td> 
</td></tr>
<tr><td colspan="2">Total piping length</td><td>≤ 250 m</td></tr>
<tr><td rowspan="2">Maximum piping length</td><td>Actual length</td><td>Lt ≤ 100 m</td></tr>
<tr><td>Equivalent length</td><td>Lt ≤ 120 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>H1 ≤ 40 m</td></tr>
<tr><td>In the case that the position of outdoor unit is lower than that of indoor unit.</td><td>H1 ≤ 30 m</td></tr>
<tr><td colspan="2">Maximum lift between each indoor unit or multi-kit and indoor unit</td><td>H2 ≤ 15 m</td></tr>
<tr><td rowspan="2">Maximum piping length between multi-kit and indoor unit</td><td>Between the “a” kit and the farthest indoor unit</td><td>L ≤ 40 m</td></tr>
<tr><td>Between each multi-kit and each indoor unit</td><td>L0. L1. L2. L3. L4. L5 ≤ 15 m</td></tr>
<tr><td colspan="4">Example: Outdoor unit: RAS-8FSNM</td></tr>
<tr><td colspan="3">Choice of each multi-kit</td><td><table><tr><th>Mark</th><th>a,b,c,d,e</th></tr><tr><td>Multi-kit</td><td>E-102SN4</td></tr></table></td></tr>
<tr><td rowspan="3">1) Quantity of additional refrigerant charge.
The quantity is calculated by the following equation:
W (kg) = $W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_{16}+W_2$

1.1)W_{11} (kg): (Total length (m) of Ø22.2 Liquid piping) x 0.39
W_{12} (kg): (Total length (m) of Ø19.05 Liquid piping) x 0.28
W_{13} (kg): (Total length (m) of Ø15.88 Liquid piping) x 0.19
W_{14} (kg): (Total length (m) of Ø12.7 Liquid piping) x 0.12
W_{15} (kg): (Total length (m) of Ø9.52 Liquid piping) x 0.07
W_{16} (kg): (Total length (m) of Ø6.35 Liquid piping) x 0.030
1.2)W_2 (kg): Total quantity of additional refrigerant of each indoor unit (kg)</td><td>1.1) Liquid piping</td><td>Example:<table><tr><th>Mark</th><th>Lt-L5</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>Ø9.52</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>60</td><td>5</td><td>3</td><td>5</td><td>3</td><td>5</td><td>3</td></tr></table>W_{15} = 60 x 0.07 = 4.2 kg
W_{16} = (5+3+5+3+5+3) x 0.03 = 0.72 kg</td></tr>
<tr><td>1.2) Indoor unit</td><td>Example:<table><tr><th>Indoor Unit Number</th><th>0</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr><tr><td>Corresponding power (HP)</td><td>1</td><td>1</td><td>1.5</td><td>1.5</td><td>1.5</td><td>1.5</td></tr><tr><td>Additional refrigerant quantity</td><td colspan="6">Indoor units that do not require refrigerant charge</td></tr></table>W_2 = 0 kg</td></tr>
<tr><td>Total</td><td>W (kg) = $W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_{16}+W_2$
= 0 + 0 + 0 + 0 + 4.2 + 0.72 + 0 = 4.92 kg</td></tr>
<tr><td colspan="3">2) Checking the maximum quantity of additional refrigerant charge: ($W < W_{MAX}$)</td><td>4.92 kg < 13.5 kg (CORRECT)</td></tr>
<tr><td colspan="3">3) Total refrigerant charge: W_{TOT} (kg)= W_0 + W
W_0 : Outdoor unit refrigerant charge before shipment (kg)</td><td>W_{TOT} = 5.0 + 4.92 = 9.92 kg</td></tr>
</table>

NOTE

- *Refer to “9.3 Amount refrigerant charge” to know all the information necessary for the calculation of the addtional refrigerant charge.*
- *Refer to “9.3.1 Additional refrigerant charge calculation (R410A)” in this chapter to know the maximum quantity of additional refrigerant charge (W_{MAX}) and the outdoor unit refrigerant charge before shipment (W_0).*

<table>
<tr><th colspan="3">ITEM</th><th>MULTI-KITS DOWN-SIZE SYSTEM</th></tr>
<tr><td colspan="3">Example of systems
3: Simple installation with multi-kits (Down-size)

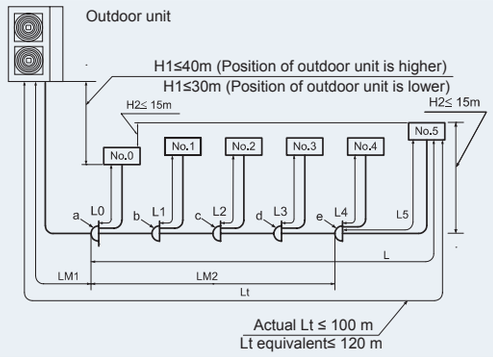
This figure shows examples of 6 indoor units combined with one outdoor unit.
The refrigerant pipes are shown as a single line in the diagrams.
However, liquid line piping and gas line piping are required in the field.</td><td> 
</td></tr>
<tr><td colspan="3">Total piping length</td><td>≤ 250 m</td></tr>
<tr><td rowspan="2">Maximum piping length</td><td colspan="2">Actual length</td><td>Lt ≤ 100 m</td></tr>
<tr><td colspan="2">Equivalent length</td><td>Lt ≤ 120 m</td></tr>
<tr><td rowspan="2">Maximum lift between outdoor and indoor unit</td><td colspan="2">In the case that the position of outdoor unit is higher than that of indoor unit.</td><td>H1 ≤ 40 m</td></tr>
<tr><td colspan="2">In the case that the position of outdoor unit is lower than that of indoor unit.</td><td>H1 ≤ 30 m</td></tr>
<tr><td colspan="3">Maximum lift between each indoor unit or multi-kit and indoor unit</td><td>H2 ≤ 15 m</td></tr>
<tr><td rowspan="2">Maximum piping length between multi-kit and indoor unit</td><td colspan="2">Between the “a” kit and the farthest indoor unit</td><td>L ≤ 40 m</td></tr>
<tr><td colspan="2">Between each multi-kit and each indoor unit</td><td>L0. L1. L2. L3. L4. L5 ≤ 15 m</td></tr>
<tr><td colspan="4">Example: Outdoor unit: RAS-10FSNM</td></tr>
<tr><td colspan="3">Choice of each multi-kit</td><td><table><tr><th>Mark</th><th>a</th><th>b,c,d,e</th></tr><tr><td>Multi-kit</td><td>E-162SN4</td><td>E-102SN4</td></tr></table></td></tr>
<tr><td rowspan="3">1) 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_{16}+W_2

1.1)W_{11} (kg): (Total length (m) of Ø22.2 Liquid piping) x 0.39
W_{12} (kg): (Total length (m) of Ø19.05 Liquid piping) x 0.28
W_{13} (kg): (Total length (m) of Ø15.88 Liquid piping) x 0.19
W_{14} (kg): (Total length (m) of Ø12.7 Liquid piping) x 0.12
W_{15} (kg): (Total length (m) of Ø9.52 Liquid piping) x 0.07
W_{16} (kg): (Total length (m) of Ø6.35 Liquid piping) x 0.030
1.2)W_2 (kg): Total quantity of additional refrigerant of each indoor unit (kg)</td><td>1.1) Liquid piping</td><td>Example:<table><tr><th>Mark</th><th>LM1</th><th>LM2</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>Ø12.7</td><td>Ø9.52</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>45</td><td>20</td><td>5</td><td>3</td><td>5</td><td>3</td><td>5</td><td>3</td></tr></table>W_{14} = 45 x 0.12 = 5.4 kg
W_{15} = 20 x 0.07 = 1.4 kg
W_{16} = (5+3+5+3+5+3) x 0.03 = 0.72 kg</td></tr>
<tr><td>1.2) Indoor unit</td><td>Example:<table><tr><th>Indoor Unit Number</th><th>0</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr><tr><td>Corresponding power (HP)</td><td>2</td><td>2</td><td>1</td><td>1</td><td>2</td><td>2</td></tr><tr><td>Additional refrigerant quantity</td><td colspan="6">Indoor units that do not require refrigerant charge</td></tr></table>W_2 = 0 kg</td></tr>
<tr><td>Total</td><td>W (kg) = W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_{16}+W_2
= 0 + 0 + 0 + 5.4+ 1.4 + 0.72 + 0 = 7.52 kg</td></tr>
<tr><td colspan="3">2) Checking the maximum quantity of additional refrigerant charge: (W < W_{MAX})</td><td>7.52 kg < 13.5 kg (CORRECT)</td></tr>
<tr><td colspan="3">3) Total refrigerant charge: W_{TOT} (kg)= W_0 + W
W_0 : Outdoor unit refrigerant charge before shipment (kg)</td><td>W_{TOT} = 5.5 + 7.52 = 13.02 kg</td></tr>
</table>

NOTE

- *Refer to “9.3 Amount refrigerant charge” to know all the information necessary for the calculation of the additional refrigerant charge.*
- *Refer to “9.3.1 Additional refrigerant charge calculation (R410A)” in this chapter to know the maximum quantity of additional refrigerant charge (W_{MAX}) and the outdoor unit refrigerant charge before shipment (W_0).*

<table>
<tr><th colspan="2">ITEM</th><th>MULTI-KITS DOWN-SIZE SYSTEM</th></tr>
<tr><td colspan="2">Example of systems
4: Simple installation where the length from the outdoor unit (RAS-8FSNM) to the first branch is over 70 m (Down-size)

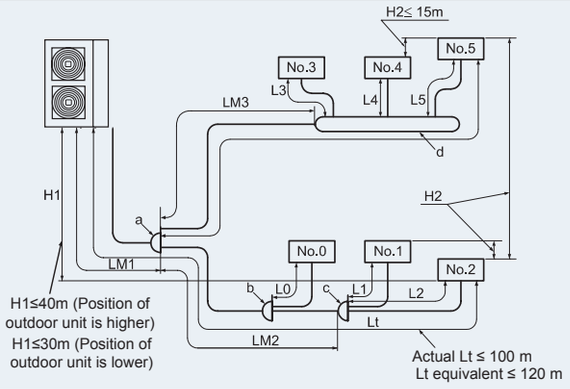
This figure shows examples of 6 indoor units combined with one outdoor unit.
The refrigerant pipes are shown as a single line in the diagrams.
However, liquid line piping and gas line piping are required in the field.</td><td> 
</td></tr>
<tr><td colspan="2">Total piping length</td><td>≤ 250 m</td></tr>
<tr><td rowspan="2">Maximum piping length</td><td>Actual length</td><td>Lt ≤ 100 m</td></tr>
<tr><td>Equivalent length</td><td>Lt ≤ 120 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>H1 ≤ 40 m</td></tr>
<tr><td>In the case that the position of outdoor unit is lower than that of indoor unit.</td><td>H1 ≤ 30 m</td></tr>
<tr><td colspan="2">Maximum lift between each indoor unit or multi-kit and indoor unit</td><td>H2 ≤ 15 m</td></tr>
<tr><td rowspan="2">Maximum piping length between multi-kit and indoor unit</td><td>Between the “a” kit and the farthest indoor unit</td><td>L ≤ 40 m</td></tr>
<tr><td>Between each multi-kit and each indoor unit</td><td>L0. L1. L2. L3. L4. L5 ≤ 15 m</td></tr>
<tr><td colspan="3">Example: Outdoor unit: RAS-8FSNM</td></tr>
<tr><td colspan="2">Choice of each multi-kit</td><td><table><tr><th>Mark</th><th>a</th><th>b,c,d,e</th></tr><tr><td>Multi-kit</td><td>E-162SN4</td><td>E-102SN4</td></tr></table></td></tr>
<tr><td rowspan="3">1) 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_{16}+W_2

1.1)W_{11} (kg): (Total length (m) of Ø22.2 Liquid piping) x 0.39
W_{12} (kg): (Total length (m) of Ø19.05 Liquid piping) x 0.28
W_{13} (kg): (Total length (m) of Ø15.88 Liquid piping) x 0.19
W_{14} (kg): (Total length (m) of Ø12.7 Liquid piping) x 0.12
W_{15} (kg): (Total length (m) of Ø9.52 Liquid piping) x 0.07
W_{16} (kg): (Total length (m) of Ø6.35 Liquid piping) x 0.030
1.2)W_2 (kg): Total quantity of additional refrigerant of each indoor unit (kg)</td><td>1.1) Liquid piping</td><td>Example:<table><tr><th>Mark</th><th>LM1</th><th>LM2</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>Ø12.7 (*1)</td><td>Ø9.52</td><td>Ø6.35</td><td>Ø9.52</td><td>Ø9.52</td><td>Ø6.35</td><td>Ø9.52</td><td>Ø9.52</td></tr><tr><td>Length</td><td>76</td><td>15</td><td>5</td><td>3</td><td>5</td><td>3</td><td>5</td><td>3</td></tr></table>W_{14} = 76 x 0.12 = 9.12 kg
W_{15} = 15 x 0.07 = 1.05 kg
W_{16} = (5+3+5+3+5+3) x 0.03 = 0.72 kg</td></tr>
<tr><td>1.2) Indoor unit</td><td>Example:<table><tr><th>Indoor Unit Number</th><th>0</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr><tr><td>Corresponding power (HP)</td><td>1.5</td><td>1.5</td><td>1</td><td>1</td><td>1.5</td><td>1.5</td></tr><tr><td>Additional refrigerant quantity</td><td colspan="6">Indoor units that do not require refrigerant charge</td></tr></table>W_2 = 0 kg</td></tr>
<tr><td>Total</td><td>W (kg) = W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_{16}+W_2
= 0 + 0 +0 + 9.12+ 1.05 + 0.72 + 0 = 10.89 kg</td></tr>
<tr><td colspan="2">2) Checking the maximum quantity of additional refrigerant charge: (W < W_{MAX})</td><td>10.89 kg < 13.5 kg (CORRECT)</td></tr>
<tr><td colspan="2">3) Total refrigerant charge: W_{TOT} (kg)= W_0 + W
W_0 : Outdoor unit refrigerant charge before shipment (kg)</td><td>W_{TOT} = 5.0 + 10.89 = 15.89 kg</td></tr>
</table>

NOTE

- *Refer to “9.3 Amount refrigerant charge” to know all the information necessary for the calculation of the additional refrigerant charge.*
- *Refer to “9.3.1 Additional refrigerant charge calculation (R410A)” in this chapter to know the maximum quantity of additional refrigerant charge (W_{MAX}) and the outdoor unit refrigerant charge before shipment (W_0).*
- *(*1): When the equivalent refrigerant piping length is over 70 m in RAS-8FSNM units (76 m in this example), the pipe size of the line from the outdoor unit to the first branch should be increased with the reducer (field supplied) from Ø9.52 to Ø12.7. In this case, use E-162SN4*

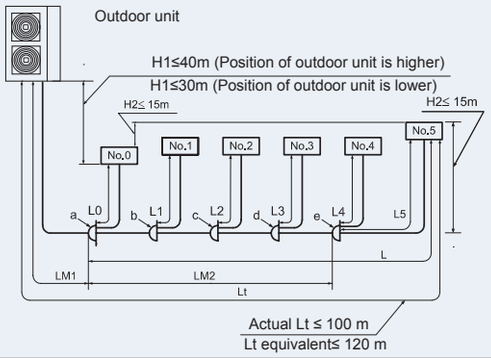
<table>
<tr><th colspan="3">ITEM</th><th>DOWN-SIZE DISTRIBUTOR AND
MULTI-KITS SYSTEM WITH REDUCTION</th></tr>
<tr><td colspan="3">Example of systems
5: Line distribution method where is needed an additional refrigerant charge for indoor unit. (Down-size)

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.</td><td> 
</td></tr>
<tr><td colspan="3">Total piping length</td><td>≤ 250 m</td></tr>
<tr><td rowspan="2">Maximum piping length</td><td colspan="2">Actual length</td><td>Lt ≤ 100 m</td></tr>
<tr><td colspan="2">Equivalent length</td><td>Lt ≤ 120 m</td></tr>
<tr><td rowspan="2">Maximum lift between outdoor and indoor unit</td><td colspan="2">In the case that the position of outdoor unit is higher than that of indoor unit.</td><td>H1 ≤ 40 m</td></tr>
<tr><td colspan="2">In the case that the position of outdoor unit is lower than that of indoor unit.</td><td>H1 ≤ 30 m</td></tr>
<tr><td colspan="3">Maximum lift between each indoor unit or multi-kit and indoor unit</td><td>H2 ≤ 15 m</td></tr>
<tr><td rowspan="2">Maximum piping length between multi-kit and indoor unit</td><td colspan="2">Between the “a” kit and the farthest indoor unit</td><td>L ≤ 40 m</td></tr>
<tr><td colspan="2">Between each multi-kit and each indoor unit</td><td>L0. L1. L2. L3. L4. L5 ≤ 15 m</td></tr>
<tr><td colspan="4">Example: Outdoor unit: RAS-12FSNM</td></tr>
<tr><td colspan="3">Choice of each multi-kit</td><td><table><tr><th>Mark</th><th>a</th><th>b,c</th><th>d</th></tr><tr><td>Multi-kit</td><td>E-162SN4</td><td>E-102SN4</td><td>MH-84HAN</td></tr></table></td></tr>
<tr><td colspan="2" rowspan="4">1) 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_{16}+W_2
1.1)W_{11} (kg): (Total length (m) of Ø22.2 Liquid piping) x 0.39
W_{12} (kg): (Total length (m) of Ø19.05 Liquid piping) x 0.28
W_{13} (kg): (Total length (m) of Ø15.88 Liquid piping) x 0.19
W_{14} (kg): (Total length (m) of Ø12.7 Liquid piping) x 0.12
W_{15} (kg): (Total length (m) of Ø9.52 Liquid piping) x 0.07
W_{16} (kg): (Total length (m) of Ø6.35 Liquid piping) x 0.030
1.2)W_2 (kg): Total quantity of additional refrigerant of each indoor unit (kg)</td><td>1.1) Liquid piping</td><td>Example:<table><tr><th>Mark</th><th>LM1</th><th>LM2</th><th>LM3</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>Ø12.7</td><td>Ø9.52</td><td>Ø9.52</td><td>Ø9.52</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>50</td><td>15</td><td>10</td><td>8</td><td>5</td><td>3</td><td>5</td><td>3</td><td>3</td></tr></table>W_{14} = 50 x 0.12 = 6 kg;
W_{15} = (15+10+8) x 0.07 = 2.31 kg
W_{16} = (5+3+5+3+3) x 0.03 = 0.57 kg</td></tr>
<tr><td>1.2) Indoor unit</td><td>Example:<table><tr><th>Indoor Unit Number</th><th>0</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr><tr><td>Corresponding power (HP)</td><td>8 (*1)</td><td>0.8</td><td>0.8</td><td>0.8</td><td>0.8</td><td>0.8</td></tr><tr><td>Additional refrigerant quantity</td><td colspan="6">Indoor unit Number 0: 1 kg</td></tr></table>W_2 = 1 kg</td></tr>
<tr><td>Total</td><td>W (kg) = W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_{16}+W_2
= 0 + 0 + 0 + 6 + 2.31 + 0.57 + 1 = 9.88 kg</td></tr>
<tr><td colspan="2">2) Checking the maximum quantity of additional refrigerant charge: (W < W_{MAX})</td><td colspan="2">9.88 kg < 13.5 kg (CORRECT)</td></tr>
<tr><td colspan="2">3) Total refrigerant charge: W_{TOT} (kg)= W_0 + W
W_0 : Outdoor unit refrigerant charge before shipment (kg)</td><td colspan="2">W_{TOT} = 6.5 + 9.88 = 16.38 kg</td></tr>
</table>

NOTE

- *Refer to “9.3 Amount refrigerant charge” to know all the information necessary for the calculation of the additional refrigerant charge.*
- *Refer to “9.3.1 Additional refrigerant charge calculation (R410A)” in this chapter to know the maximum quantity of additional refrigerant charge (W_{MAX}) and the outdoor unit refrigerant charge before shipment (W_0).*
- *(*1): When the outdoor unit is combined with indoor units RPI-(8.0/10.0)FSN3E, it´s necessary an additional refrigerant charge (W_2) = 1 kg/unit.*

<table>
<tr><th colspan="3">ITEM</th><th>MULTI-KITS DOWN-SIZE SYSTEM</th></tr>
<tr><td colspan="3">Example of systems
6: Simple installation where the additional refrigerant charge is over the maximum additional refrigerant charge allowed by the unit. (Down-size)

This figure shows examples of 10 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> 
</td></tr>
<tr><td colspan="2">Total piping length</td><td>≤ 250 m</td></tr>
<tr><td rowspan="2">Maximum piping length</td><td>Actual length</td><td>Lt ≤ 100 m</td></tr>
<tr><td>Equivalent length</td><td>Lt ≤ 120 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>H1 ≤ 40 m</td></tr>
<tr><td>In the case that the position of outdoor unit is lower than that of indoor unit.</td><td>H1 ≤ 30 m</td></tr>
<tr><td colspan="2">Maximum lift between each indoor unit or multi-kit and indoor unit</td><td>H2 ≤ 15 m</td></tr>
<tr><td rowspan="2">Maximum piping length between multi-kit and indoor unit</td><td>Between the “a” kit and the farthest indoor unit</td><td>L ≤ 40 m</td></tr>
<tr><td>Between each multi-kit and each indoor unit</td><td>L0. L1. L2. L3. L4. L5 ≤ 15 m</td></tr>
<tr><td colspan="4">Example: Outdoor unit: RAS-12FSNM</td></tr>
<tr><td colspan="3">Choice of each multi-kit</td><td><table><tr><th>Mark</th><th>a</th><th>b,c,d,e</th></tr><tr><td>Multi-kit</td><td>E-162SN4</td><td>E-102SN4</td></tr></table></td></tr>
<tr><td colspan="2" rowspan="4">1) 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_{16}+W_2

1.1) W_{11} (kg): (Total length (m) of Ø22.2 Liquid piping) x 0.39
W_{12} (kg): (Total length (m) of Ø19.05 Liquid piping) x 0.28
W_{13} (kg): (Total length (m) of Ø15.88 Liquid piping) x 0.19
W_{14} (kg): (Total length (m) of Ø12.7 Liquid piping) x 0.12
W_{15} (kg): (Total length (m) of Ø9.52 Liquid piping) x 0.07
W_{16} (kg): (Total length (m) of Ø6.35 Liquid piping) x 0.030
1.2) W_2 (kg): Total quantity of additional refrigerant of each indoor unit (kg)</td><td>1.1) Liquid piping</td><td>Example:<table><tr><th>Mark</th><th>LM1</th><th>LM2</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>Ø12.7</td><td>Ø9.52</td><td>Ø6.35</td><td>Ø6.35</td><td>Ø9.52</td><td>Ø9.52</td><td>Ø9.52</td><td>Ø9.52</td></tr><tr><td>Length</td><td>72</td><td>15</td><td>11</td><td>11</td><td>13</td><td>13</td><td>10</td><td>12</td></tr></table>W_{13} = 72 x 0.12 = 8.64 kg;
W_{14} = (15+13+13+10+12) x 0.07 = 4.41 kg
W_{15} = (10+12) x 0.03 = 0.66 kg</td></tr>
<tr><td>1.2) Indoor unit</td><td>Example:<table><tr><th>Indoor Unit Number</th><th>0</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr><tr><td>Corresponding power (HP)</td><td>1</td><td>1</td><td>2.5</td><td>2.5</td><td>2.5</td><td>2.5</td></tr><tr><td>Additional refrigerant quantity</td><td colspan="6">Indoor units that do not require refrigerant charge</td></tr></table>W_2 = 0 kg</td></tr>
<tr><td>Total</td><td>W (kg) = W_{11}+W_{12}+W_{13}+W_{14}+W_{15}+W_{16}+W_2
= 0 + 0 + 0 + 8.64 + 4.41 + 0.66 + 0 = 13.71 kg</td></tr>
<tr><td colspan="2">2) Checking the maximum quantity of additional refrigerant charge: (W < W_{MAX})</td><td>13.71 kg > 13.5 kg (INCORRECT) *(1)</td></tr>
<tr><td colspan="2">3) Total refrigerant charge: W_{TOT} (kg)= W_0 + W
W_0 : Outdoor unit refrigerant charge before shipment (kg)</td><td>W_{TOT} = 6.5 + 13.71 = 20.21 kg</td></tr>
</table>

NOTE

- *Refer to “9.3 Amount refrigerant charge” to know all the information necessary for the calculation of the additional refrigerant charge.*
- *Refer to “9.3.1 Additional refrigerant charge calculation (R410A)” in this chapter to know the maximum quantity of additional refrigerant charge (W_{MAX}) and the outdoor unit refrigerant charge before shipment (W_0).*
- *(*1): When the additional refrigerant charge is over the maximum additional refrigerant charge allowed by the unit, it’s necessary to adjust the piping length of the installation.*

9.4 Caution on refrigerant leakage

9.4.1 Maximum permissible concentration of HCFC/HFC gas

The refrigerant R410A, charged in the Set Free FSNM system, is an incombustible and non-toxic gas. However, if leakage occurs and gas fills a room, it may cause suffocation.

The maximum permissible concentration of HCFC/HFC gas, R410A in air is 0.44 kg/m³, according to EN378-1

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

9.4.2 Calculation of refrigerant concentration

1 Calculate the total quantity of refrigerant R (kg) charged in the system connecting all the indoor units of rooms to be air-conditioned.

2 Calculate the room volume V (m^3) of each room.

3 Calculate the refrigerant concentration C (kg/m^3) of the room according to the following equation.

R	≤C	R: Total quantity of charged refrigerant (kg)
V		V: Room volume (m^3)
		C: Refrigerant concentration 0.44 kg/m³ for R410A

9.4.3 Countermeasure for refrigerant leakage

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

1 Provide a shutterless opening which will allow fresh air to circulate into the room.

2 Provide a doorless opening of 0.15% or more size to the floor area.

3 Provide a ventilator, linked with a gas leak detector, of 0.4 m^3/min. or more ventilating capacity per Japanese Refrigeration Ton (= compressor displacement 5.7 m^3/h) of the air conditioning system utilizing refrigerant R410A.

Model	Tonnes
RAS-(8-12)FSNM	4.11

4 Pay a special attention to the place, such as a basement, etc., where refrigerant can stay, since refrigerant is heavier than air.

10. Electrical wiring

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10.1 General Check

CAUTION

- *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 fan and the outdoor fan have stopped before electrical wiring work or a periodical check is performed.*
- *Protect wires, drainpipe, electrical parts, etc. from rats or other small animals. If all these parts are not protected, rats or other small animals may gnaw at them 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.*
- *Secure the wires firmly with the clamp to the inside of the indoor unit.*

NOTE

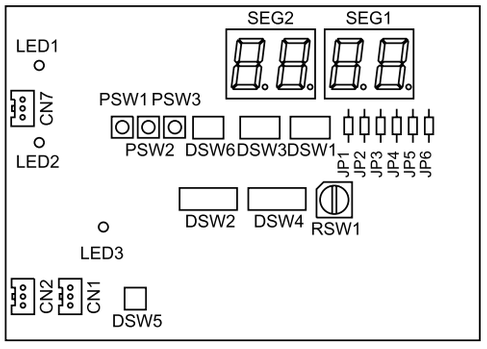
Fix the rubber bushes with adhesive when the outdoor unit ducts are not used.

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 in this technical catalogue. 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 wiring. If the power source capacity is too low, the system cannot be started due to voltage drop.*
4. *Check to ensure that the earth wire is connected.*
5. *Main power source switch. Install a multi-pole main switch with a space of 3.5mm or more between each phase.*

10.2 Setting and Function of DIP Switches

Quantity and position of DIP Switches. The PCB in the outdoor unit is operated with 6 types of dip switches and 3 types of push switch.

PCB1



NOTE

- *The mark "■" indicates position of dips switches. Figures show setting before shipment or after selection.*
- *By using DSW4, the unit is started or stopped after 10 to 20 seconds after the switch is operated.*
- *Number this outdoor unit to distinguish from other outdoor units for service and maintenance. And write the number in the space right.*

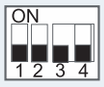
CAUTION

Before setting dips switches, firstly turn off power source and set the position of the dips switches. If the switches are set without turning off the power source, the contents of the setting are invalid.

10.2.1 DSW1: Test operation and service setting

Setting is required, for test operation and operating the compressor.

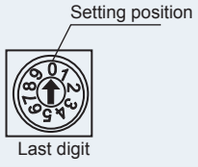
◆ **DSW1**

Setting before shipment	
Test cooling operation	
Test heating operation	
Compressor forced stop	

◆ **RSW1: Ref. cycle Nº setting**

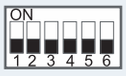
Setting is required.

Set by inserting slotted screwdriver into the groove.

Setting before shipment	

◆ **DSW2: Optional function setting**

Setting is required, when optional functions are required.

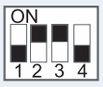
Setting before shipment	

Set the designated pin ON for the setting items in the table.

Setting Item	Pin number
-	1
-	2
-	3
-	4
Function setting	5
External Input/Output selection	6

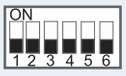
◆ DSW3: Capacity setting

No setting is required.

Model	Setting Position
RAS-8FSNM	
RAS-10FSNM	
RAS-12FSNM	

◆ DSW4: Ref. Cycle Nº setting

Setting is required

Setting before shipment	 (Setting for the tens digit)

◆ DSW5: End terminal resistance

No setting is required

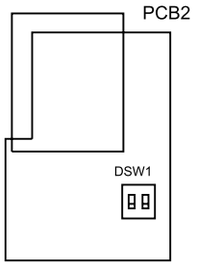
Setting before shipment	

◆ DSW6: Height difference

Setting is required

Setting before shipment	
The indoor unit is located higher than outdoor unit (20 to 30 m)	
Fine-tuning of heating capacity	

PCB2



◆ DSW1: (On PCB2)

No setting is required

When set N°1 pin to ON, the electric current detection is cancelled. N° 1 pin should be set back to OFF after electrical work.	

◆ JP1~6: Jumper cable

N°	380/415V 50 Hz	N°	380/415V 50 Hz
JP1	●	JP4	×
JP2	●	JP5	●
JP3	×	JP6	●

Jumper cable setting is different depending on the power supply voltage. Make sure to check the jumper cable setting before exchanging PCB1.

Pay attention not to damage other electric parts when cutting jumper cables.

⚠ CAUTION

If the power source is open phase, "05" will be displayed at 7-segment on the outdoor PCB, and the compressor will not be operated. In this case check for the connection of power source terminal.

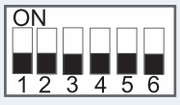
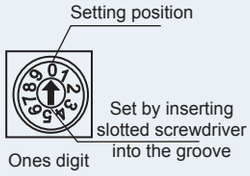
◆ Setting for transmitting

It is required to set the refrigerant cycle number and end terminal resistance for this H-LINK or H-LINK II system.

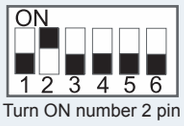
◆ Setting of Refrigerant Cycle Number

In the same refrigerant cycle, set the same refrigerant cycle N° for the outdoor unit and the indoor units as shown below.

As for setting indoor unit refrigerant cycle number, set the RSW2 and DSW5 on the indoor unit PCB.

	Setting Switch	
	 Tens digit	
Outdoor unit	DSW4	RSW1
Indoor unit (H-LINK II)	DSW5	RSW2

Ex.: In case of setting refrigerant cycle number 25

 Turn ON number 2 pin	 Set dial N° 5

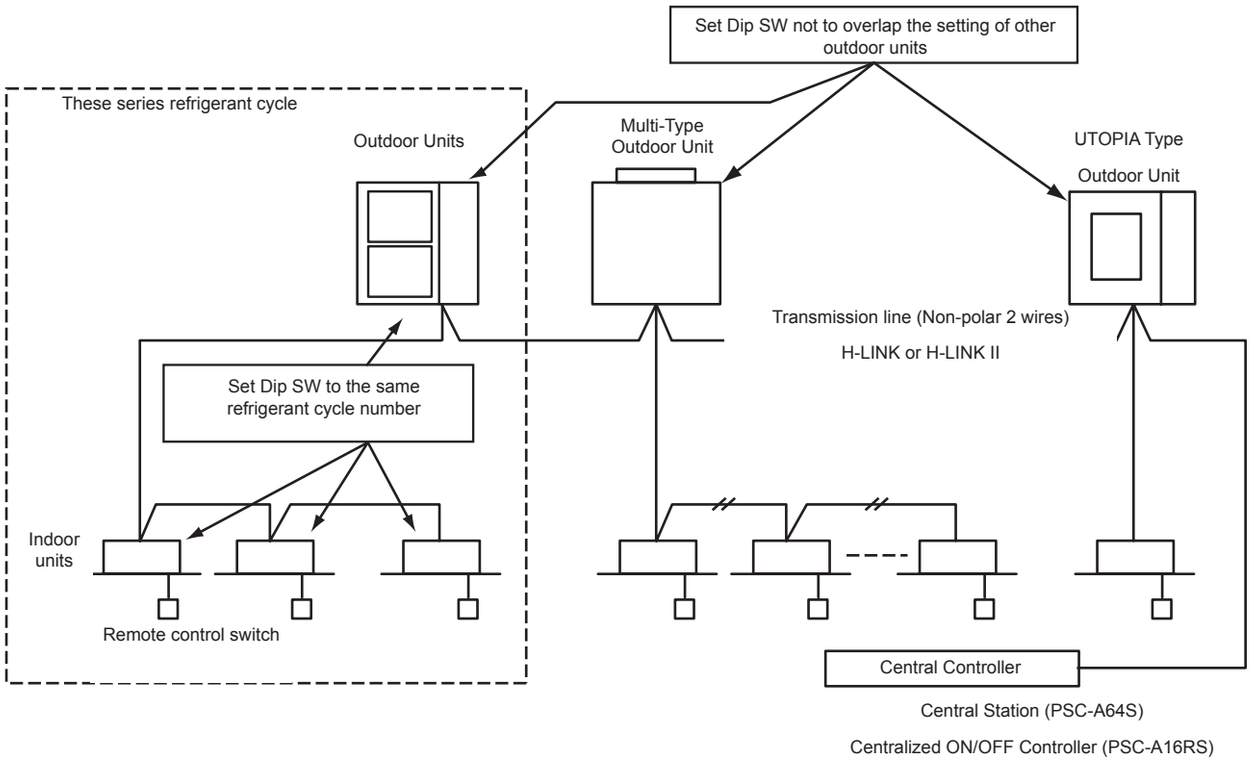
DSW and RSW setting before shipment is 0.

Maximum in setting refrigerant cycle Number is 63.

◆ Setting of end terminal resistance

Before shipment, number 1 pin of DSW5 is set at the “ON” side. In the case that the outdoor units quantity in the same H-LINK or H-LINK II is 2 or more, set number 1 pin of DSW5 at the “OFF” side from the 2nd unit. If only one outdoor unit is used, no setting is required.

Setting of end terminal resistance	
DSW5	
Before shipment	Cancellation
	



Maximum Units per Refrigerant System

(In Case of H-LINK II)

Outdoor Unit	64 units
Indoor Unit	160 units

NOTE

If H-LINK II adaptive and non-adaptive indoor and outdoor unit are connected together, the maximum indoor units to be connected are 128 units.

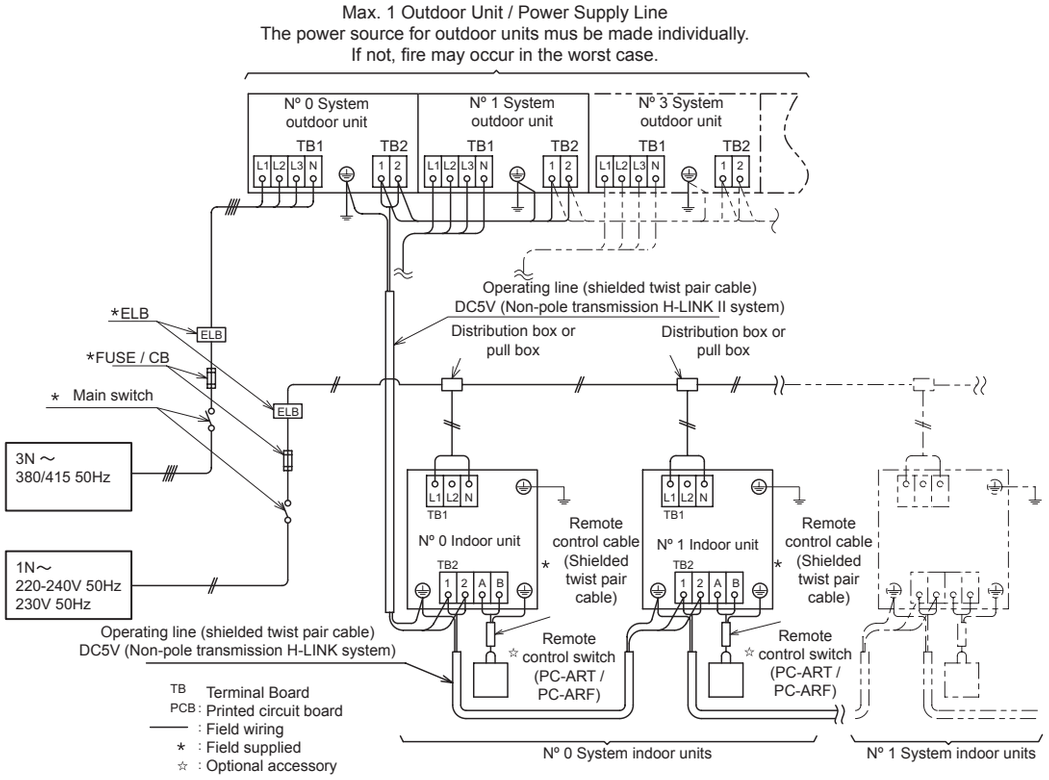
10.3 Common Wiring

10.3.1 Electrical Wiring between Indoor and Outdoor Units

- 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 twist pair wire (more than 0.75mm2) for operation wiring between the outdoor unit and indoor unit, and operation wiring between indoor unit and indoor unit.
- 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 interference at lengths of less than 300m. The size must comply with local code.
- 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 circuit-breaker sizes are shown in the table of electrical data and recommended wiring and breaker sizes / 1 O.U.
- If a duct for field-supplied wiring is not used, fix rubber bushes with adhesive on the panel.
- All field wiring and equipment must comply with local and international codes.

⚠ CAUTION

Take care with the connection of the operating line. Incorrect connection may cause a failure of the PCB.



10.4 Wiring Size

◆ Connection Wiring

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

Indoor units

Model	Power Supply	Maximum Current (A)	Size of Power Supply Cable	Size of Transmission Cable
			EN60 335-1 ❶	EN60 335-1 ❶
All indoor units (*)	230V/1 phase/50Hz	5.0	0.75mm²	0.75mm²
RPI-8/10		10.0	1.5mm²	

(*) Except RPI-8/10

Outdoor units

Model	Power Supply	Maximum Current	Power Source Cable Size	Transmitting Cable Size
			EN60 335-1 *1	Shielded Twist Pair Cable
RAS-8FSNM	380/415V 50Hz	14	2.5mm²	0.75mm²
RAS-10FSNM		18	4.0mm²	
RAS-12FSNM		23	4.0mm²	

* Refer to the notes for selection of the power source cable size.

NOTE

- *Follow local codes and regulations when selecting field wires.*
- *The wire sizes marked with *1 in the table of this page are selected at the maximum current of the unit according to the European Standard, EN60 335-1. Use the wires which are not lighter than the ordinary tough rubber sheathed flexible cord (code designation H05RN-F) or ordinary polychloroprene sheathed flexible cord (code designation H05RN-F).*
- *The wire sizes marked with *2 in the table of this page are selected at the maximum current of the unit according to the wire, MLFC (Flame Retardant Polyflex Wire) manufactured by Hitachi Cable Ltd., Japan.*
- *Use a shielded cable for the transmitting circuit and connect it to ground.*
- *In the case that power cables are connected in series, add each unit maximum current and select wires below.*

Selection According to EN60 335-1	
Current i (A)	Wire size
I ≤ 6	0.75mm²
6 < i ≤ 10	1.0mm²
10 < i ≤ 16	1.5mm²
16 < i ≤ 25	2.5mm²
25 < i ≤ 32	4.0mm²
32 < i ≤ 40	6.0mm²
40 < i ≤ 63	10.0mm²
63 < i	❷

◆ Main Switch Protection

Select the main switches according to the following table.

Indoor units

Model	Power Source	Maximum Running Current (A)	CB(A)	ELB no. poles/A/mA
All indoor units (*)	1~230V/50Hz	5.0	6	2/40/30
RPI-(8.0/10.0)FSN3E		10.0	16	

(*) Except RPI-8/10

Outdoor units

Model	Power Source	Maximum Running Current (A)	CB(A)	ELB no. poles/A/mA
RAS-8FSNM	3N~ 380/415V 50Hz	14.0	20	4/20/30
RAS-10FSNM		18.0	30	4/30/30
RAS-12FSNM		23.0	30	4/30/30

NOTE

- *ELB: Differential switch.*
- *CB: Magnetothermic switch.*

11. Optional functions

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11.1 Optional Functions Available for Outdoor Units

Optional functions	
Optional function	**Explanation**
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 unpleasant 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.
Priority Cooling Capacity Mode	
Priority Heating Capacity Mode	
Cold Draft (1/2)	IU discharge air temperature is to low the OU is changing the working conditions in order to avoid this low temperature air discharge
Signal Capture	This function provides information on the units operation, (Operation, Alarm, Compressor ON, Defrosting Signals) so the necessary devices can be activated
Signal capture	This function provides information on the unit’s operations so the necessary devices can be activated.

12. Troubleshooting

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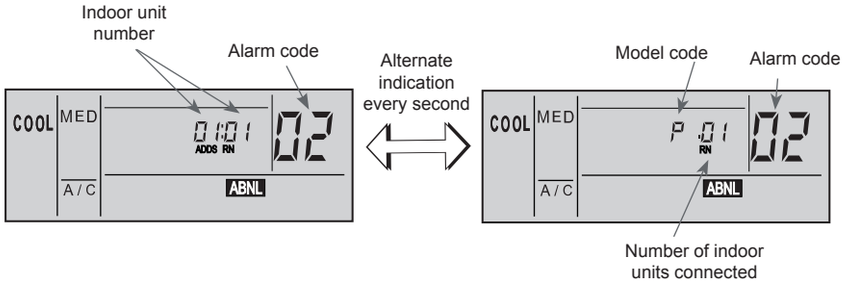
12.1 Alarm display

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 all cases, contact your service provider.

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



12.2 Alarm Codes for FSNM Series

Code	Category	Content of Abnormality	Leading Cause
01	Indoor Unit	Activation of Protection Device	Activation of Float Switch, High Level in Drain Pan
02	Outdoor Unit	Activation of Protection Device	Activation of PSH, Pipe Clogging, Excessive Refrigerant, Inert Gas Mixing
03	Transmission	Abnormality between Indoor and Outdoor (or Outdoor and Outdoor)	Incorrect Wiring, Loose Terminals, Disconnect Wire, Tripping of Fuse
04		Abnormality between Inverter PCB and Outdoor PCB	Transmission Failure (Loose Connector)
05	Supply Phase	Abnormality Power Source Phases	Incorrect Power Source, Connection to Reversed-Phase, Open Phase
06	Voltage	Abnormal Inverter Voltage	Outdoor Voltage Drop, Insufficient Power Capacity
07	Cycle	Decrease in Discharge Gas Superheat	Excessive Refrigerant Charge, Failure of Thermistor, Incorrect Wiring
08		Increase in Discharge Gas Temperature	Insufficient Refrigerant Charge, Pipe Clogging, Failure of Thermistor, Incorrect Wiring
11	Sensor on Indoor Unit	Inlet Air Thermistor	Incorrect Wiring, Disconnecting Wiring
12		Outlet Air Thermistor	
13		Freeze Protection Thermistor	
14		Gas Piping Thermistor	
19	Fan Motor	Activation of Protection Device for Indoor Fan	Fan Motor Overheat, Locking
21	Sensor on Outdoor Unit	High Pressure Sensor	Incorrect Wiring, Disconnecting Wiring
22		Outdoor Air Thermistor	
23		Discharge Gas Thermistor	
24		Evaporating Piping Thermistor	
29		Low Pressure Sensor	
31	System	Incorrect Capacity of Outdoor Unit and Indoor Unit	Incorrect Setting of Capacity Combination
35		Incorrect Setting of Indoor Unit Number	Duplication of Indoor Unit Number
38		Abnormality of Protective Circuit in Outdoor Unit	Failure of Protection Detecting Circuit (Failure of Protection Detecting Device, Abnormality of Outdoor PCB, Incorrect Wiring of PCB)

Code	Category	Content of Abnormality	Leading Cause
43	Protection Device	Activation of Low Pressure Decrease Protection Device	Defective Compression (Failure of Compressor of Inverter, Loose Power Supply Connection)
44		Activation of Low Pressure Increase Protection Device	Overload at Cooling, High Temperature at Heating, Locking (Loose Connector)
45		Activation of High Pressure Increase Protection Device	Overload Operation (Clogging, Short-Pass), Pipe Clogging, Insufficient Refrigerant, Inert Gas Mixing
47		Activation of Low Pressure Decrease Protection Device (Vacuum Operation)	Insufficient Refrigerant, Refrigerant Piping Clogging, Locking (Loose Connector)
48		Activation of Inverter Overcurrent Protection Device	Overload Operation, Compressor Failure
51	Sensor	Abnormal current sensor	Current sensor failure
53	Inverter	Inverter error signal detection	Driver IC Error Signal Detection (Protection for Overcurrent, Low Voltage, Short-Circuit)
54		Increase of inverter fin temperature	Abnormal inverter fin thermistor, heat exchanger clogging, abnormal fan
55		Inverter failure	Inverter PCB failure
57	Outdoor fan motor	Abnormality of fan motor	Disconnecting wiring or incorrect wiring between control PCB (PCB1) and Fan Relay PCB (PCB3, PCB5), Failure of Fan Motor
EE	Compressor	Compressor protection alarm	Failure of compressor
b1	Outdoor unit number setting	Incorrect outdoor unit number setting	Over 64 number is set for address or refrigerant cycle.
b5	Indoor unit number setting	Incorrect indoor unit number Setting	More than 17 non-corresponding to H-LINKII Units are Connected to One System.

HITACHI

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Hitachi certifies that our products have met EU consumer safety, health and environmental requirements.

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