

— Set Free Features

Cooling & Heating

air

I- Commercial Information

- 1. Set Free Line-Up**
- 2. New Features**
- 3. Components**
- 4. Standard Functions**
- 5. Optional Functions**

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1. Set Free Line-Up

- **Base Units**
- **Combination of Base Units**
- **CH-Box**
- **Main Changes**
- **New Set Free Identity**
- **Unit Model Names**

Cooling & Heating

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1. Set Free Line-Up Base Units

- Side Flow

RAS-(4-5-6)FS(V)NME



RAS-(8-10-12)FSXNME



1. Set Free Line-Up Base Units

- High Efficiency Type

- RAS-(5/6)FSXNPE

RAS-(8-14)FSXNPE

RAS-(16/18)FSXNPE

- Standard Type

- RAS-(8-12)FSXNSE

RAS-(14-18)FSXNSE

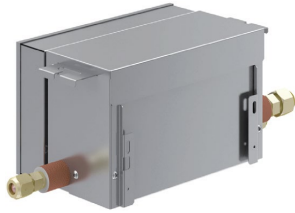
RAS-(20-24)FSXNSE



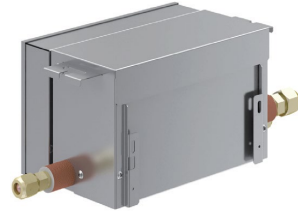
1. Set Free Line-Up Base Units

- New CH-Box & Multi CH-Box

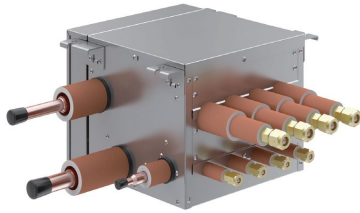
- CH-AP160SSX



- CH-AP280SSX



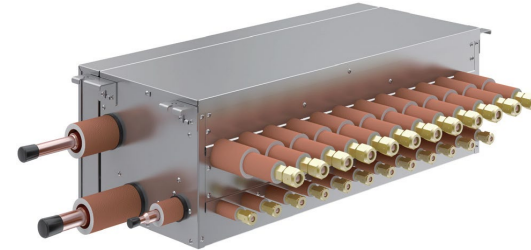
- CH-AP04MSSX



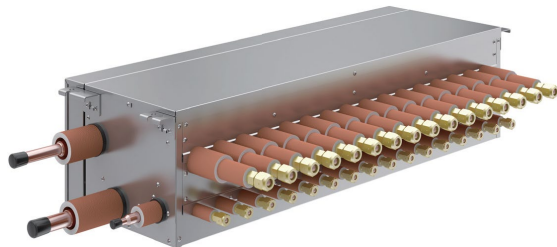
- CH-AP08MSSX



- CH-AP12MSSX



- CH-AP16MSSX



Multi-Kits also available!!!

1. Set Free Line-Up Combinability

- High Efficiency Type
 - Base Unit

HP	5	6	8	10
Model	RAS-5FSXNPE	RAS-6FSXNPE	RAS-8FSXNPE	RAS-10FSXNPE
HP	12	14	16	18
Model	RAS-12FSXNPE	RAS-14FSXNPE	RAS-16FSXNPE	RAS-18FSXNPE



- Combination of Base Units for Heat Recovery System

HP	20	22	24	26	28	30
Model	RAS-20FSXNPE	RAS-22FSXNPE	RAS-24FSXNPE	RAS-26FSXNPE	RAS-28FSXNPE	RAS-30FSXNPE
Combination	RAS-10FSXNPE	RAS-10FSXNPE	RAS-12FSXNPE	RAS-10FSXNPE	RAS-12FSXNPE	RAS-12FSXNPE
	RAS-10FSXNPE	RAS-12FSXNPE	RAS-12FSXNPE	RAS-16FSXNPE	RAS-16FSXNPE	RAS-18FSXNPE
HP	32	34	36	38	40	42
Model	RAS-32FSXNPE	RAS-34FSXNPE	RAS-36FSXNPE	RAS-38FSXNPE	RAS-40FSXNPE	RAS-42FSXNPE
Combination	RAS-14FSXNPE	RAS-16FSXNPE	RAS-18FSXNPE	RAS-12FSXNPE	RAS-12FSXNPE	RAS-14FSXNPE
	RAS-18FSXNPE	RAS-18FSXNPE	RAS-18FSXNPE	RAS-12FSXNPE	RAS-14FSXNPE	RAS-14FSXNPE
	-	-	-	RAS-14FSXNPE	RAS-14FSXNPE	RAS-14FSXNPE
HP	44	46	48	50	52	54
Model	RAS-44FSXNPE	RAS-46FSXNPE	RAS-48FSXNPE	RAS-50FSXNPE	RAS-52FSXNPE	RAS-54FSXNPE
Combination	RAS-12FSXNPE	RAS-14FSXNPE	RAS-12FSXNPE	RAS-14FSXNPE	RAS-16FSXNPE	RAS-18FSXNPE
	RAS-14FSXNPE	RAS-14FSXNPE	RAS-18FSXNPE	RAS-18FSXNPE	RAS-18FSXNPE	RAS-18FSXNPE
	RAS-18FSXNPE	RAS-18FSXNPE	RAS-18FSXNPE	RAS-18FSXNPE	RAS-18FSXNPE	RAS-18FSXNPE

1. Set Free Line-Up
Combinability

- High Efficiency Type
 - Combination of Base Units for Heat Pump

HP	56	58	60	62	64	66
Model	RAS-56FSXNPE	RAS-58FSXNPE	RAS-60FSXNPE	RAS-62FSXNPE	RAS-64FSXNPE	RAS-66FSXNPE
Combination	RAS-12FSXNPE	RAS-12FSXNPE	RAS-14FSXNPE	RAS-14FSXNPE	RAS-16FSXNPE	RAS-16FSXNPE
	RAS-12FSXNPE	RAS-14FSXNPE	RAS-14FSXNPE	RAS-16FSXNPE	RAS-16FSXNPE	RAS-16FSXNPE
	RAS-14FSXNPE	RAS-14FSXNPE	RAS-16FSXNPE	RAS-16FSXNPE	RAS-16FSXNPE	RAS-16FSXNPE
	RAS-18FSXNPE	RAS-18FSXNPE	RAS-16FSXNPE	RAS-16FSXNPE	RAS-16FSXNPE	RAS-18FSXNPE
HP	68	70	72			
Model	RAS-68FSXNPE	RAS-70FSXNPE	RAS-72FSXNPE			
Combination	RAS-16FSXNPE	RAS-16FSXNPE	RAS-18FSXNPE			
	RAS-16FSXNPE	RAS-18FSXNPE	RAS-18FSXNPE			
	RAS-18FSXNPE	RAS-18FSXNPE	RAS-18FSXNPE			
	RAS-18FSXNPE	RAS-18FSXNPE	RAS-18FSXNPE			



1. Set Free Line-Up Combinability

- Standard Type
 - Base Unit

HP	8	10	12	14	16
Model	RAS-8FSXNSE	RAS-10FSXNSE	RAS-12FSXNSE	RAS-16FSXNSE	RAS-16FSXNSE
HP	18	20	22	24	
Model	RAS-18FSXNSE	RAS-20FSXNSE	RAS-22FSXNSE	RAS-24FSXNSE	



- Combination of Base Units

HP	26	28	30	32	34
Model	RAS-26FSXNSE	RAS-28FSXNSE	RAS-30FSXNSE	RAS-32FSXNSE	RAS-30FSXNSE
Combination	RAS-12FSXNSE	RAS-12FSXNSE	RAS-12FSXNSE	RAS-14FSXNSE	RAS-16FSXNSE
	RAS-14FSXNSE	RAS-16FSXNSE	RAS-18FSXNSE	RAS-18FSXNSE	RAS-18FSXNSE
HP	36	38	40	42	44
Model	RAS-36FSXNSE	RAS-38FSXNSE	RAS-40FSXNSE	RAS-42FSXNSE	RAS-44FSXNSE
Combination	RAS-18FSXNSE	RAS-14FSXNSE	RAS-18FSXNSE	RAS-18FSXNSE	RAS-22FSXNSE
	RAS-18FSXNSE	RAS-24FSXNSE	RAS-22FSXNSE	RAS-24FSXNSE	RAS-22FSXNSE
HP	46	48	50	52	54
Model	RAS-46FSXNSE	RAS-48FSXNSE	RAS-50FSXNSE	RAS-52FSXNSE	RAS-54FSXNSE
Combination	RAS-22FSXNSE	RAS-24FSXNSE	RAS-14FSXNSE	RAS-16FSXNSE	RAS-18FSXNSE
	RAS-24FSXNSE	RAS-24FSXNSE	RAS-18FSXNSE	RAS-18FSXNSE	RAS-18FSXNSE
	-	-	RAS-18FSXNSE	RAS-18FSXNSE	RAS-18FSXNSE

1. Set Free Line-Up Combinability

- Standard Type
 - Combination of Base Units for Heat Pump

HP	56	58	60	62	64	66
Model	RAS-56FSXNSE	RAS-58FSXNSE	RAS-60FSXNSE	RAS-62FSXNSE	RAS-64FSXNSE	RAS-66FSXNSE
Combination	RAS-14FSXNSE	RAS-18FSXNSE	RAS-18FSXNSE	RAS-14FSXNSE	RAS-18FSXNSE	RAS-18FSXNSE
	RAS-18FSXNSE	RAS-18FSXNSE	RAS-18FSXNSE	RAS-24FSXNSE	RAS-22FSXNSE	RAS-24FSXNSE
	RAS-24FSXNSE	RAS-22FSXNSE	RAS-24FSXNSE	RAS-24FSXNSE	RAS-24FSXNSE	RAS-24FSXNSE
HP	68	70	72	74	76	78
Model	RAS-68FSXNSE	RAS-70FSXNSE	RAS-72FSXNSE	RAS-74FSXNSE	RAS-76FSXNSE	RAS-78FSXNSE
Combination	RAS-22FSXNSE	RAS-22FSXNSE	RAS-24FSXNSE	RAS-14FSXNSE	RAS-18FSXNSE	RAS-18FSXNSE
	RAS-22FSXNSE	RAS-24FSXNSE	RAS-24FSXNSE	RAS-18FSXNSE	RAS-18FSXNSE	RAS-18FSXNSE
	RAS-24FSXNSE	RAS-24FSXNSE	RAS-24FSXNSE	RAS-18FSXNSE	RAS-18FSXNSE	RAS-18FSXNSE
	-	-	-	RAS-24FSXNSE	RAS-22FSXNSE	RAS-24FSXNSE
HP	80	82	84	86	88	90
Model	RAS-80FSXNSE	RAS-82FSXNSE	RAS-84FSXNSE	RAS-86FSXNSE	RAS-88FSXNSE	RAS-90FSXNSE
Combination	RAS-14FSXNSE	RAS-16FSXNSE	RAS-18FSXNSE	RAS-14FSXNSE	RAS-16FSXNSE	RAS-18FSXNSE
	RAS-18FSXNSE	RAS-18FSXNSE	RAS-18FSXNSE	RAS-24FSXNSE	RAS-24FSXNSE	RAS-24FSXNSE
	RAS-24FSXNSE	RAS-24FSXNSE	RAS-24FSXNSE	RAS-24FSXNSE	RAS-24FSXNSE	RAS-24FSXNSE
	RAS-24FSXNSE	RAS-24FSXNSE	RAS-24FSXNSE	RAS-24FSXNSE	RAS-24FSXNSE	RAS-24FSXNSE
HP	92	94	96			
Model	RAS-92FSXNSE	RAS-94FSXNSE	RAS-96FSXNSE			
Combination	RAS-22FSXNSE	RAS-22FSXNSE	RAS-24FSXNSE			
	RAS-22FSXNSE	RAS-24FSXNSE	RAS-24FSXNSE			
	RAS-24FSXNSE	RAS-24FSXNSE	RAS-24FSXNSE			
	RAS-24FSXNSE	RAS-24FSXNSE	RAS-24FSXNSE			



1. Set Free Line-Up Main Changes

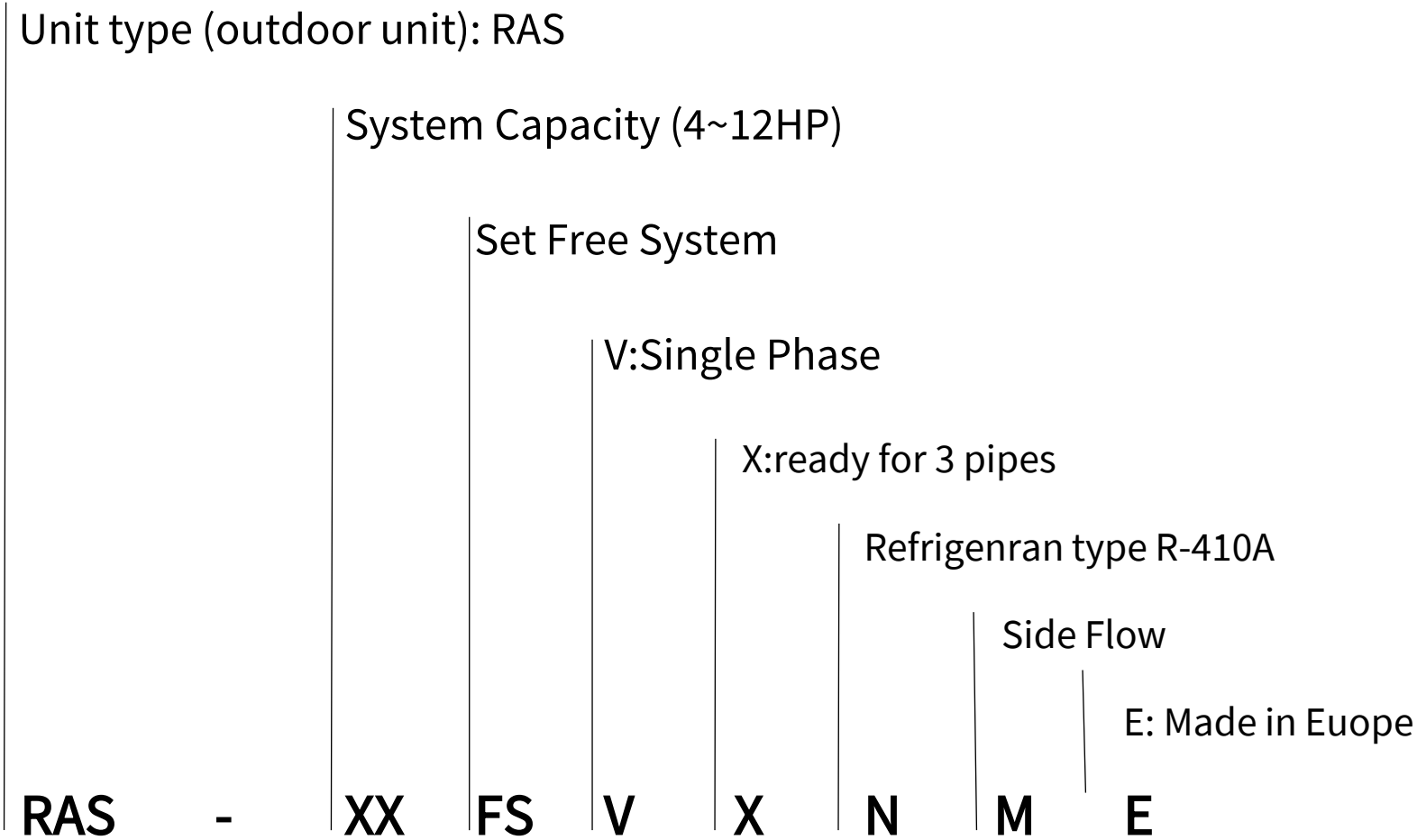
- 3 Phase models from 4 HP to 12 HP
- Bigger Combinability
 - Smaller IU connection from 0,4 HP
 - HydroFree compatibility for 8 to 12 HP OU
 - 4 to 5 HP OU can connect up to 13 IUs
 - 8 to 12 HP OU can connect up to 39 IUs
 - Extended combinability ratio: 50% to 130%
- Others
 - 2 and 3 Pipes System for 8 to 12 HP OU
 - Longer Pipes
 - Improved efficiency

1. Set Free Line-Up

Main Changes

- Total of 17 base modules
 - High Efficiency type
 - Standard type
- Expanded range
 - Expand High efficiency series line-up (from max. 36HP to 72HP)
 - Expand Standard series line-up (from max. 54HP to 96HP)
 - Expand single module range (both for standard and high efficiency)
 - New multi CH-Boxes
 - Extended combinability ratio: 50% to 130% (Standard) or 150% (High efficiency)
 - Combination with new 0.4HP indoor unit (RCIM/RPI/RPK)
- Others
 - Extended cooling working range
 - High Efficiency type: Up to 52°C ambient
 - Standard type: Up to 48°C ambient
 - All Inverter compressors
 - Improved efficiency

1. Set Free Line-Up
Unit Model Names



1. Set Free Line-Up
Unit Model Names

Unit type (outdoor unit): RAS							
Position-separating hyphen (fixed)							
System capacity (HP): (5-96)							
SET FREE System							
X: ready for 3 pipes system installation							
Refrigerant type N: R410A							
P : High efficiency type S : Standard type							
E: Made in Europe							
RAS	-	XX	FS	X	N	(P/S)	E

2. New Features

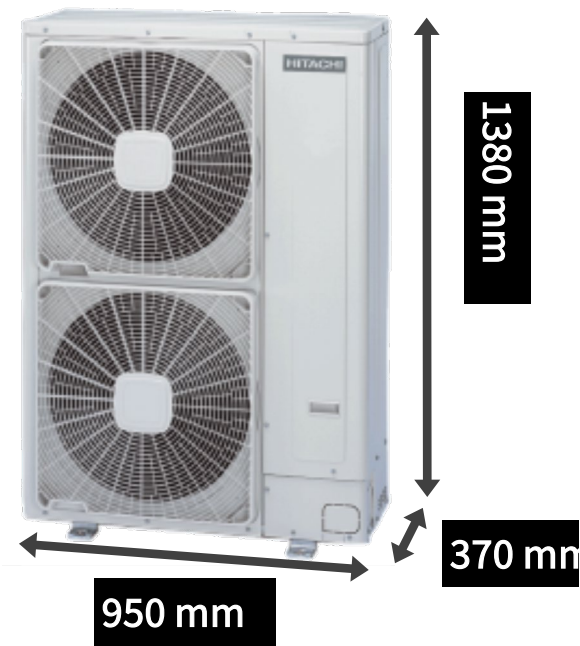
- Outdoor Units
- Compactness
- Soundless
- Accessory List
- Controls

Cooling & Heating

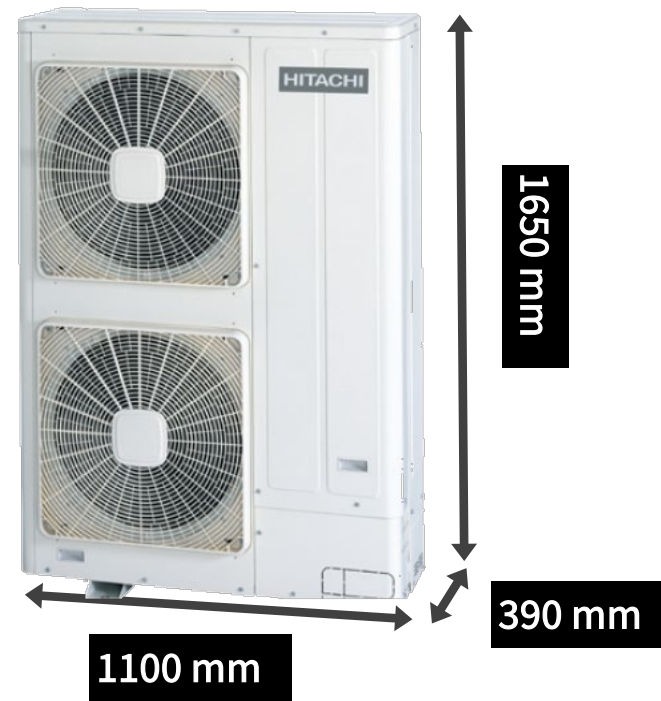
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2. New Features
Outdoor Units

■ RAS-(4~6)FS(V)NME



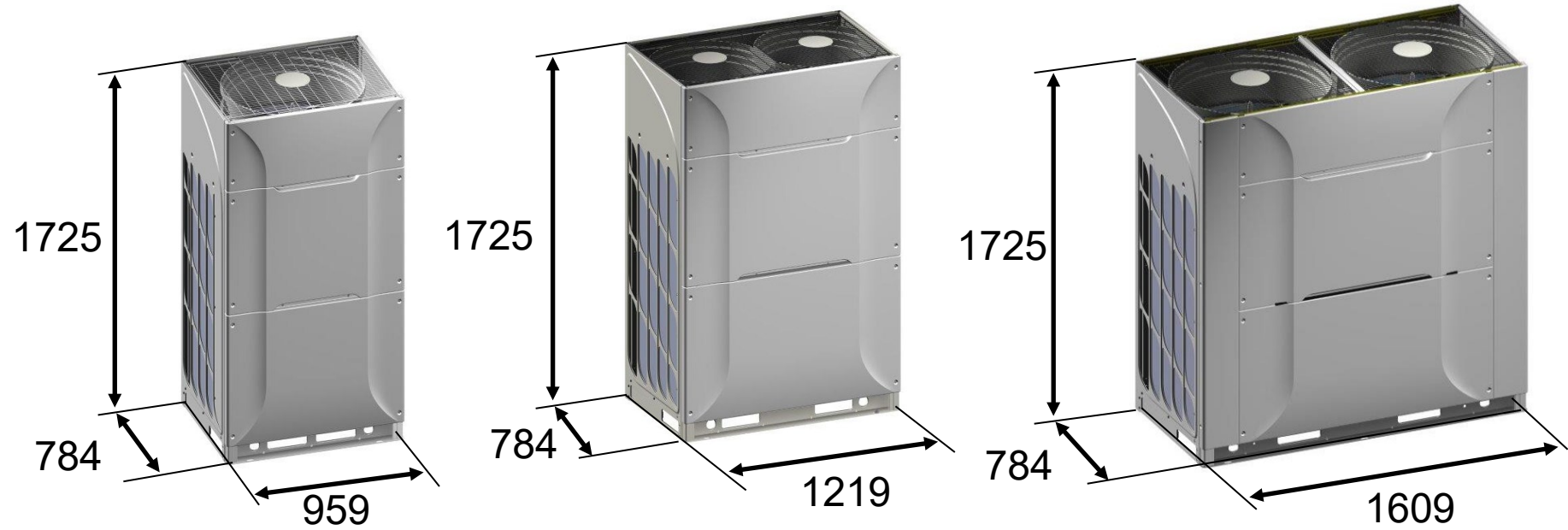
■ RAS-(8~12)FSXNME



Item	RAS-4FS(V)NME	RAS-5FS(V)NME	RAS-6FS(V)NME	RAS-8FSXNME	RAS-10FSXNME	RAS-12FSXNME
Weight (Kg)	124	124	128	168	187	187
Sound Pressure (dB)	54(45)	54 (48)	55 (48)	56 (53)	59 (56)	60 (56)

2. New Features
Outdoor Units

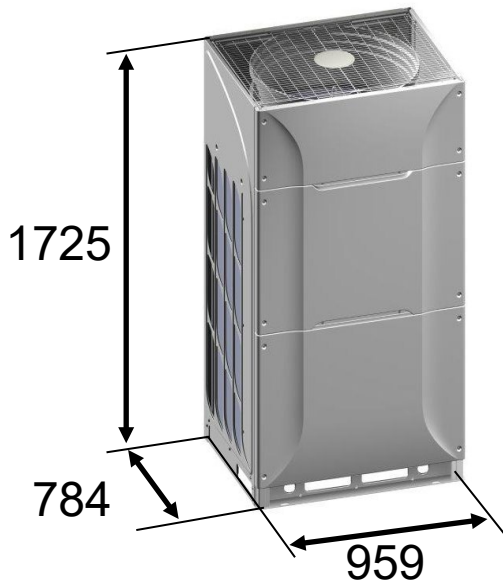
- RAS-(8~12)FSXNSE ■ RAS-(14~18)FSXNSE ■ RAS-(20~24)FSXNSE



Item	RAS-8FSXNSE	RAS-10FSXNSE	RAS-12FSXNSE	RAS-14FSXNSE	RAS-16FSXNSE	RAS-18FSXNSE	RAS-20FSXNSE	RAS-22FSXNSE	RAS-24FSXNSE
Weight (Kg)	195	195	215	271	314	315	355	369	370
Sound Pressure (dB)	58	60	59	63	63	65	65	64	66

2. New Features
Outdoor Units

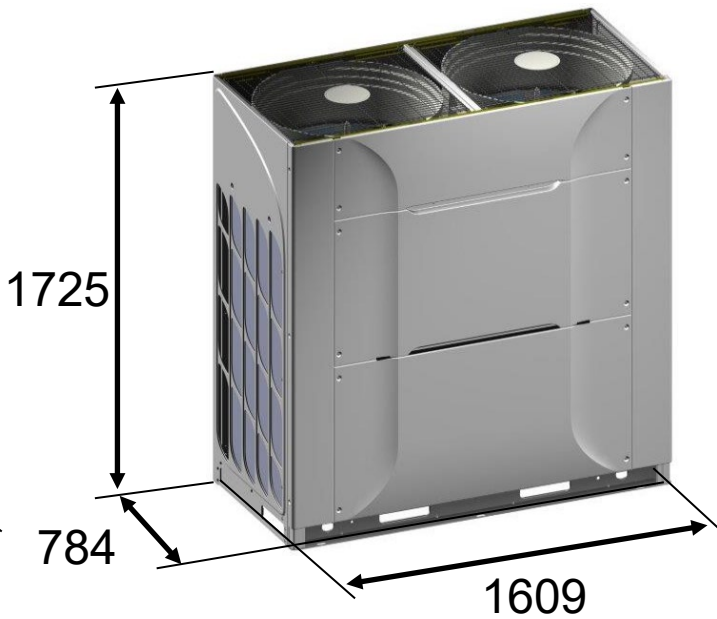
■ RAS-(5/6)FSXNPE



■ RAS-(8~14)FSXNPE



■ RAS-(16/18)FSXNPE

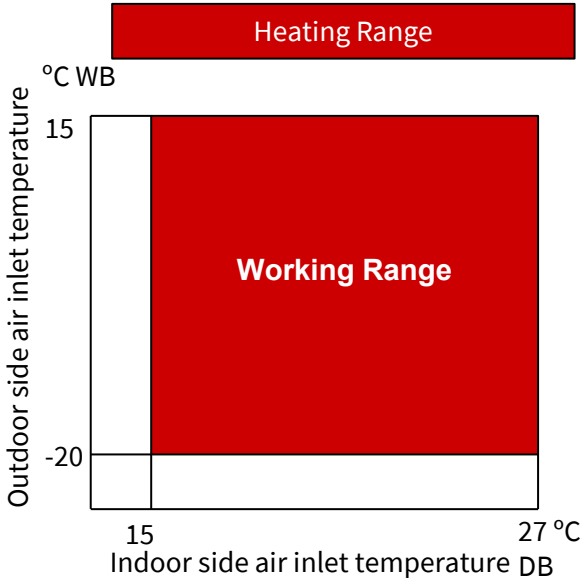
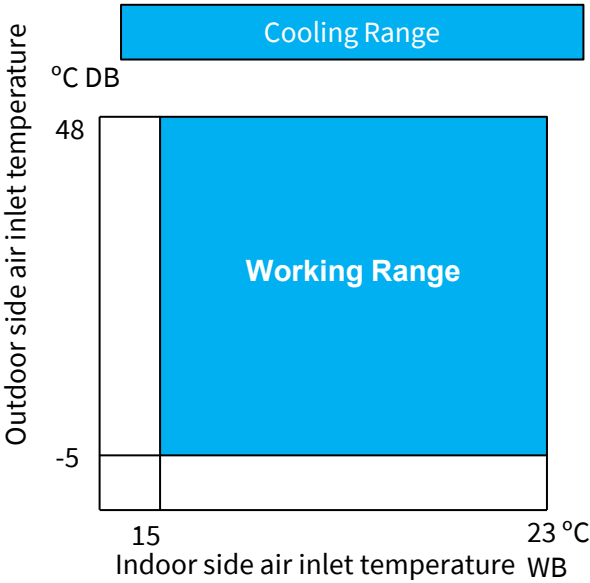


Item	RAS-5FSXNPE	RAS-6FSXNPE	RAS-8FSXNPE	RAS-10FSXNPE	RAS-12FSXNPE	RAS-14FSXNPE	RAS-16FSXNPE	RAS-18FSXNPE
Weight (Kg)	195	195	258	262	263	273	350	365
Sound Pressure (dB)	54	56	55	59	60	62	65	65

2. New Features
Outdoor Units

- Extended temperature range MiniSetFree

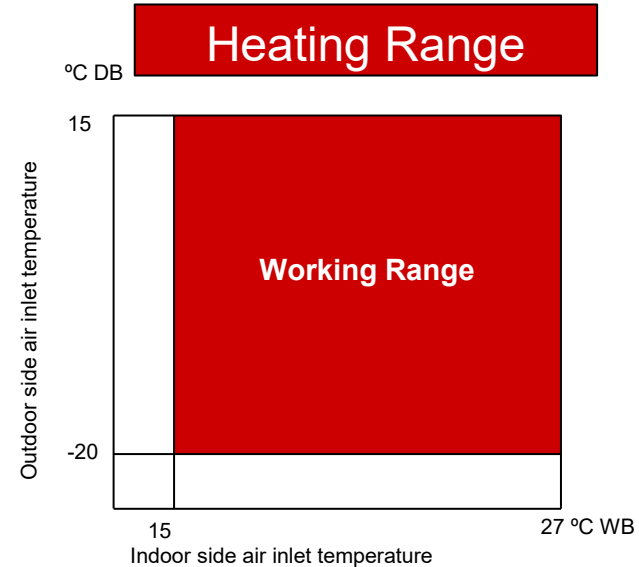
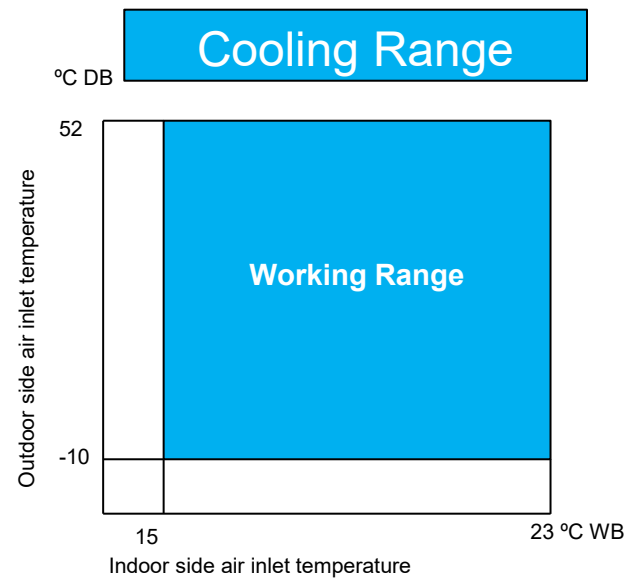
Operation		Cooling	Heating
Indoor Temperature	Min.	21°C DB / 15°C WB	15°C DB
	Max.	32°C DB / 23°C WB	27°C DB
Outdoor Temperature	Min.	-5°C DB	-20°C WB
	Max.	48°C DB	15°C WB



2. New Features Outdoor Units

- Extended temperature range Sigma

Operation		Cooling	Heating
Indoor Temperature	Min.	21°C DB / 15°C WB	15°C DB
	Max.	32°C DB / 23°C WB	27°C DB
Outdoor Temperature	Min.	-10°C DB (*)	-20°C WB
	Max.	Standard Type: 48°C DB High Eff. Type: 52°C DB	15°C WB



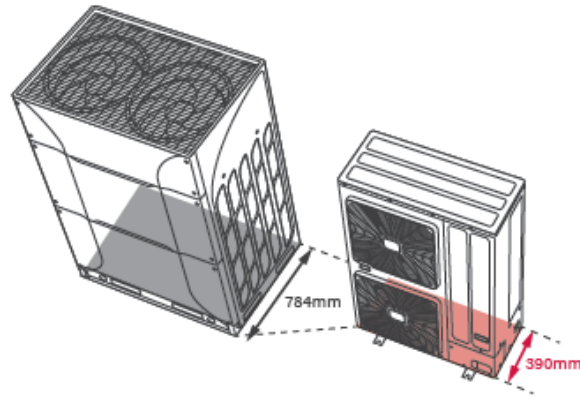
(*) Air inlet temperature -10°C DB at cooling operation mode and for combination of outdoor unit of 54 HP or less (special installation considerations and setting are required).

2. New Features Compactness

- SET FREE mini outdoor units can be placed discreetly out of sight or configured to optimize space usage.

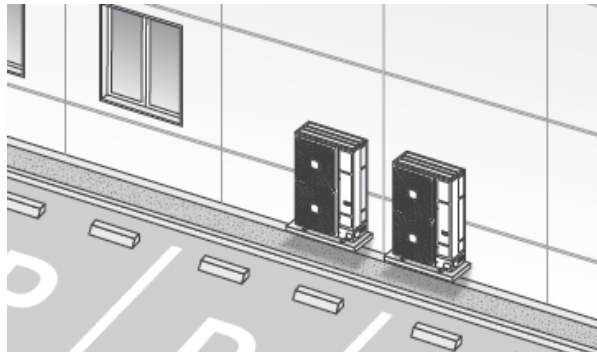
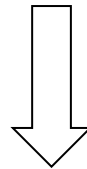
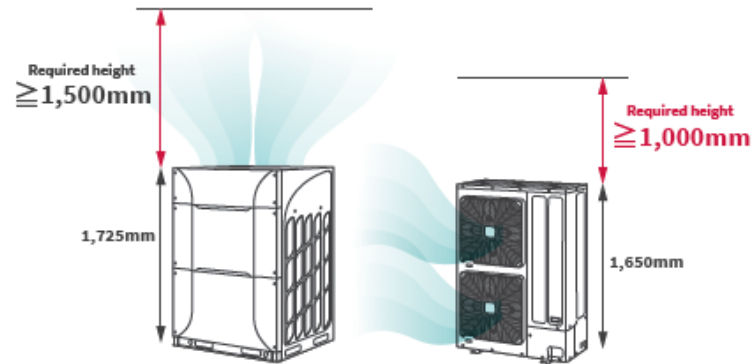
Depth difference -394mm

Footprint requirement -43%



Required height difference -575mm

Height requirement -18%



2. New Features Soundless

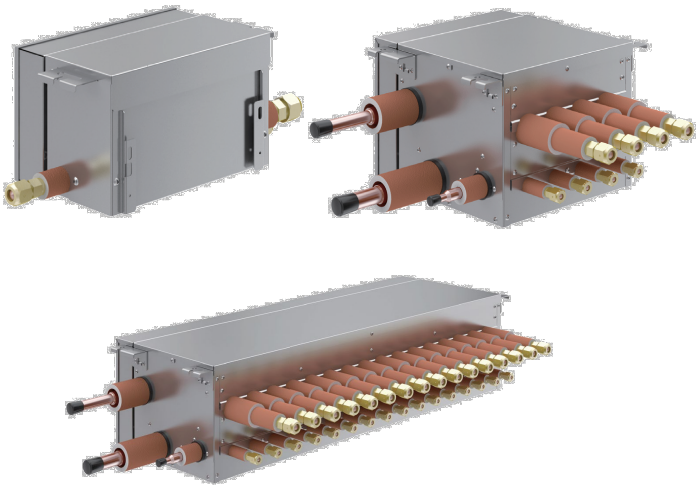
- SET FREE mini outdoor units incorporates advanced features to ensure a more peaceful environment with less disturbance to the outside environment



2. New Features
Accessory List

CH-Box (only for Heat Recovery (3 pipes) system)			
Single		CH-AP160SSX	60292158
		CH-AP280SSX	60292159
Multiple	4 Branch	CH-AP04MSSX	60292160
	8 Branch	CH-AP08MSSX	60292161
	12 Branch	CH-AP12MSSX	60292162
	16 Branch	CH-AP16MSSX	60292163

Available for RAS-8-10-12FSXNME

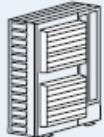
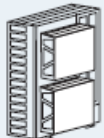
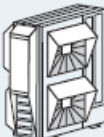


2. New Features Accessory List

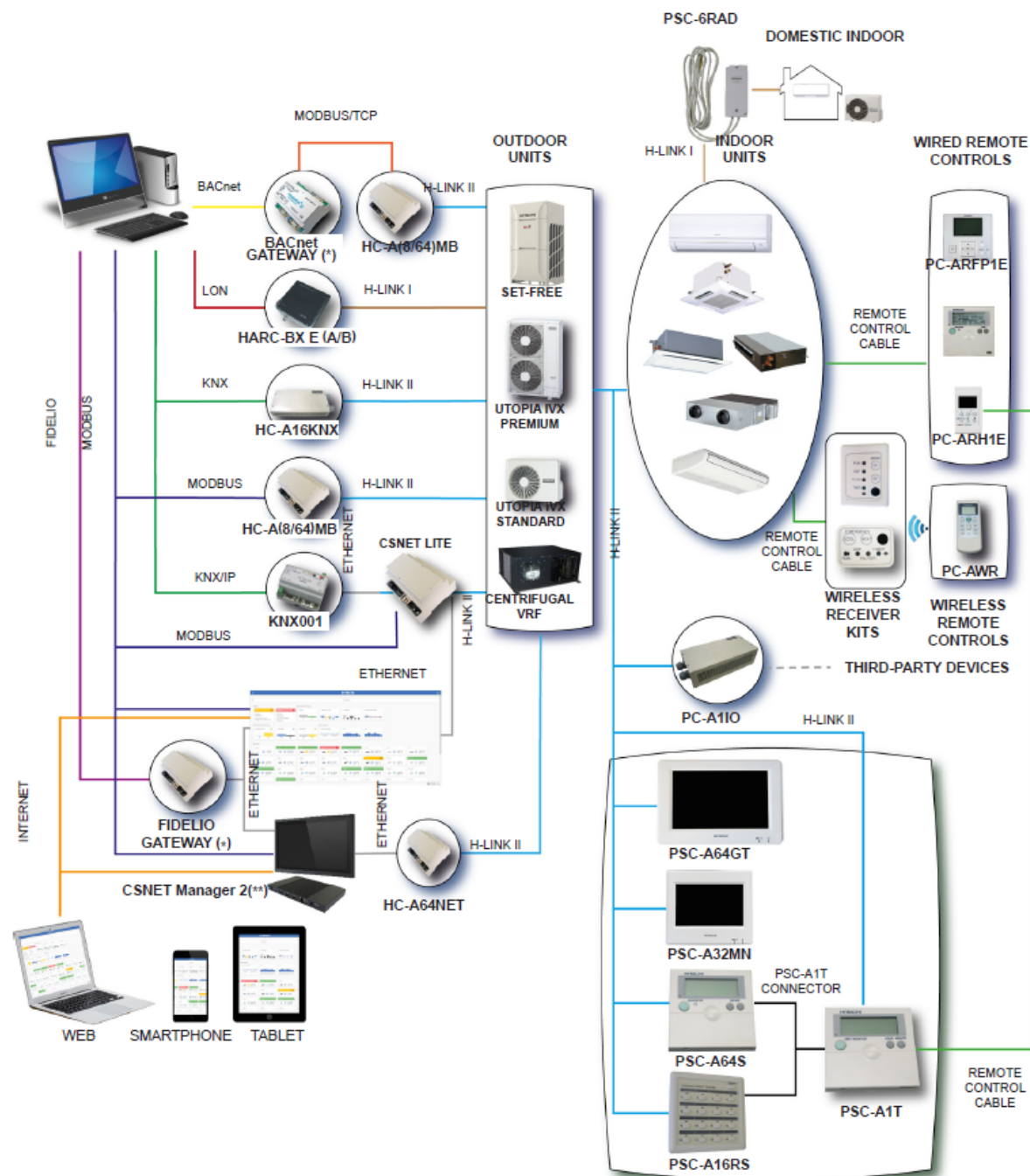
Name	Description	Code	Figure
DBS-26	Drain discharge connection	60299192	
E-102SN4	Line branch	70524201	
E-162SN4		70524202	
E-52XN3		70525100	
E-102XN3		70525101	
E-162XN3		70525102	
MH-84AN1	Header branch	70522009	
MH-108AN		70522008	
MH-108XN		70523108	

Name	Description	Code	Figure
MC-20AN1	Branch pipe (OU pipe connection kit)	70526209	
MC-21AN1		70526210	
MC-30AN1		70526211	
MC-NP31SA		60292293	
MC-NP40SA		60292294	
MC-20XN1		70526309	
MC-21XN1		70526310	
MC-30XN1		70526311	
DBS-TP10A	Drain Boss	60291683	

2. New Features Accessory List

Name	Model	Description		Code	Figure
AG-335A	RAS-(4-6)FS(V)NME, RAS-(8-12)FSXNME	Air flow guide		60291431	
WSP-160A	RAS-(4-6)FS(V)NME	Wind guard		60291753	
WSP-335A	RAS-(8-12)FSXNME			60291432	
Snow protection hood					
ASG-NP335F1	RAS-(4-6)FS(V)NME	Air outlet	(Zinc plate)	60291771	
ASG-NP335F	RAS-(8-12)FSXNME			60291433	
ASG-NP335FS4	RAS-(4-6)FS(V)NME		(Stainless plate)	60291940	
ASG-NP335FS	RAS-(8-12)FSXNME	Air inlet of rear side		60291433	
ASG-NP160B	RAS-(4-6)FS(V)NME		(Zinc plate)	60291777	
ASG-NP335B	RAS-(8-12)FSXNME			60291434	
ASG-NP280BS4	RAS-(4-6)FS(V)NME		(Stainless plate)	60291945	
ASG-NP335BS	RAS-(8-12)FSXNME	Air inlet of left side		60291434	
ASG-NP160L	RAS-(4-6)FS(V)NME		(Zinc plate)	60291779	
ASG-NP335L	RAS-(8-12)FSXNME			60291435	
ASG-NP280LS4	RAS-(4-6)FS(V)NME		(Stainless plate)	60291946	
ASG-NP335LS	RAS-(8-12)FSXNME			60291435	

HITACHI



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3. Components

- Indoor Units
- Expanded Installation Flexibility
- Energy Efficiency
- Wide Range of Unit Connection
- Unit
- Compressor
 - Cooling & Heating
- Refrigerant Cycle
- Unique PCB Fan & Compressor Control
- Heat Exchanger
- Long Bell-Mouth Structure
- Defrost
- CH-Box
- New Operation Control

3. Components
Indoor Units



3. Components
Indoor Units

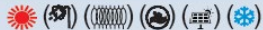
Small capacity to adjust any kind of ambient



Unit	Code	Power Supply
RPI-0.4FSN5E	7E422048	1~230V 50Hz
RCIM-0.4FSN4E	7E411148	
RPK-0.4FSN3M	60279061	
RPK-0.4FSNH3M	60279062	

3. Components
Indoor Units
Hydro Free

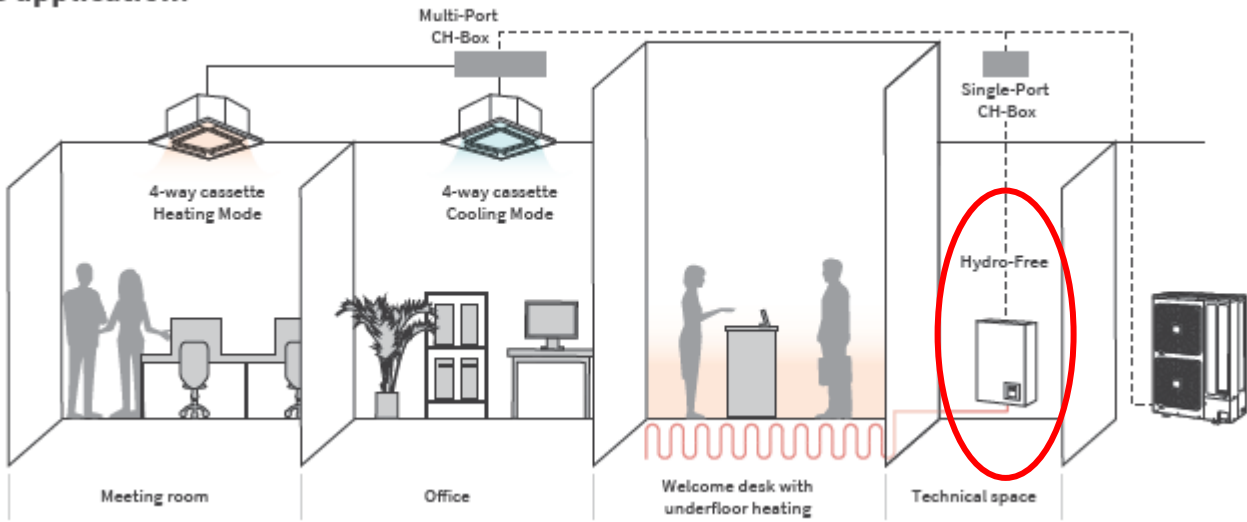
Low Temperature

 1~ 230V 50Hz					
Unit	Code	Unit	Code	Unit	Code
RWLT-3.0VN1E	7E476018	-	-	-	-
		RWLT-5.0VN1E	7E476021	-	-
		-	-	RWLT-10.0VN1E	7E476024
					

High Temperature

 1~ 230V 50Hz	
Unit	Code
RWHT-5.0VNF1E	7E484021
	

Office application:



3. Components Indoor Units

- **Combinability**

Outdoor unit	Indoor unit				
	Minimum combination capacity (HP)	Maximum combination capacity (HP)	Combination quantity	Min. individual operation capacity (HP)	Range of combination capacity
RAS-4FS(V)NME	2.0	5.2	13 (6)	0.4	50% to 130%
RAS-5FS(V)NME	2.5	6.5	16 (7)		
RAS-6FS(V)NME	3.0	7.8	18 (8)		
RAS-8FSXNME	4.0	10.4	26 (8)		
RAS-10FSXNME	5.0	13.0	32 (10)		
RAS-12FSXNME	6.0	15.6	39 (10)		

3. Components

Expanded Installation Flexibility

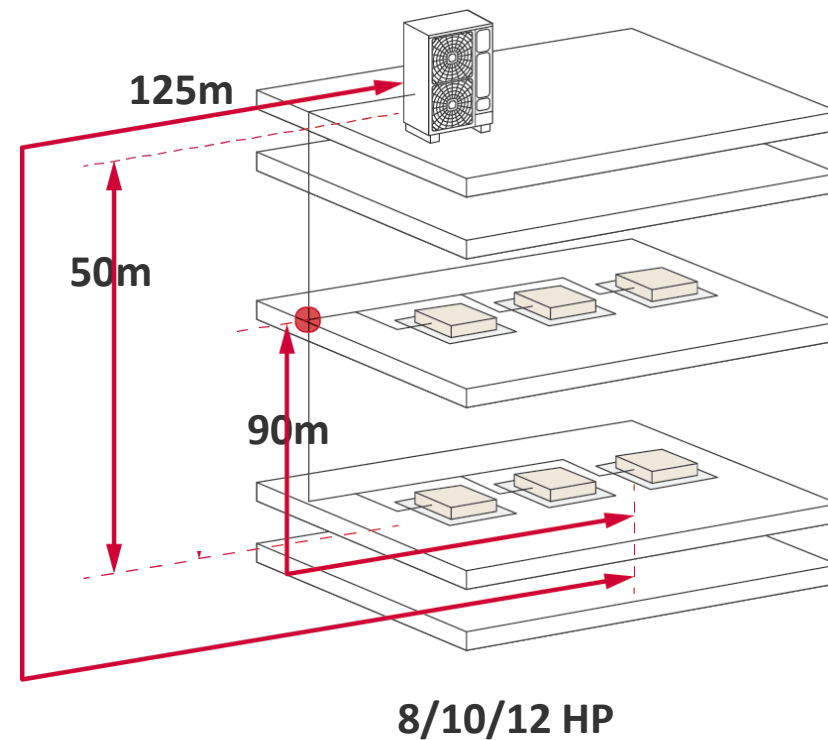
- **RAS-(4~6)FS(V)NME**

Features

- **Up to 125 m** between Outdoor unit and indoor unit (85 m for Set Free Mini S)
- **Up to 90 m** between 1st multikit and indoor unit (40 m for Set Free Mini S)
- **Up to 50 m height difference** between outdoor unit and indoor unit (30 m for Set Free Mini S)

Benefits

- More options for outdoor unit location
- Flexibility in piping configuration to adapt to building shape



3. Components

Expanded Installation Flexibility

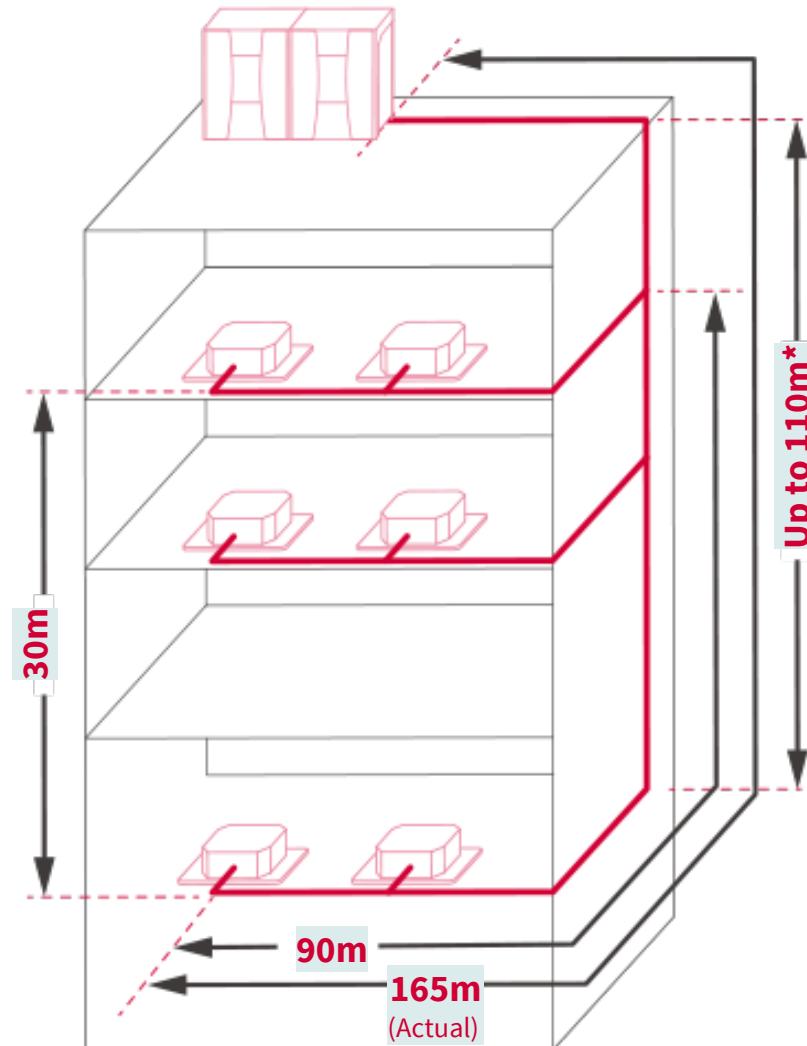
- **SetFree Sigma**

Features

- **Up to 165 m** between Outdoor unit and indoor unit
- **Up to 90 m** between 1st multikit and indoor unit
- **30 m** height difference **between indoor units**
- **Up to 110 m height difference** between outdoor unit and indoor unit (under approval of Customer Service)

Benefits

- More options for outdoor unit location
- Flexibility in piping configuration to adapt to building shape



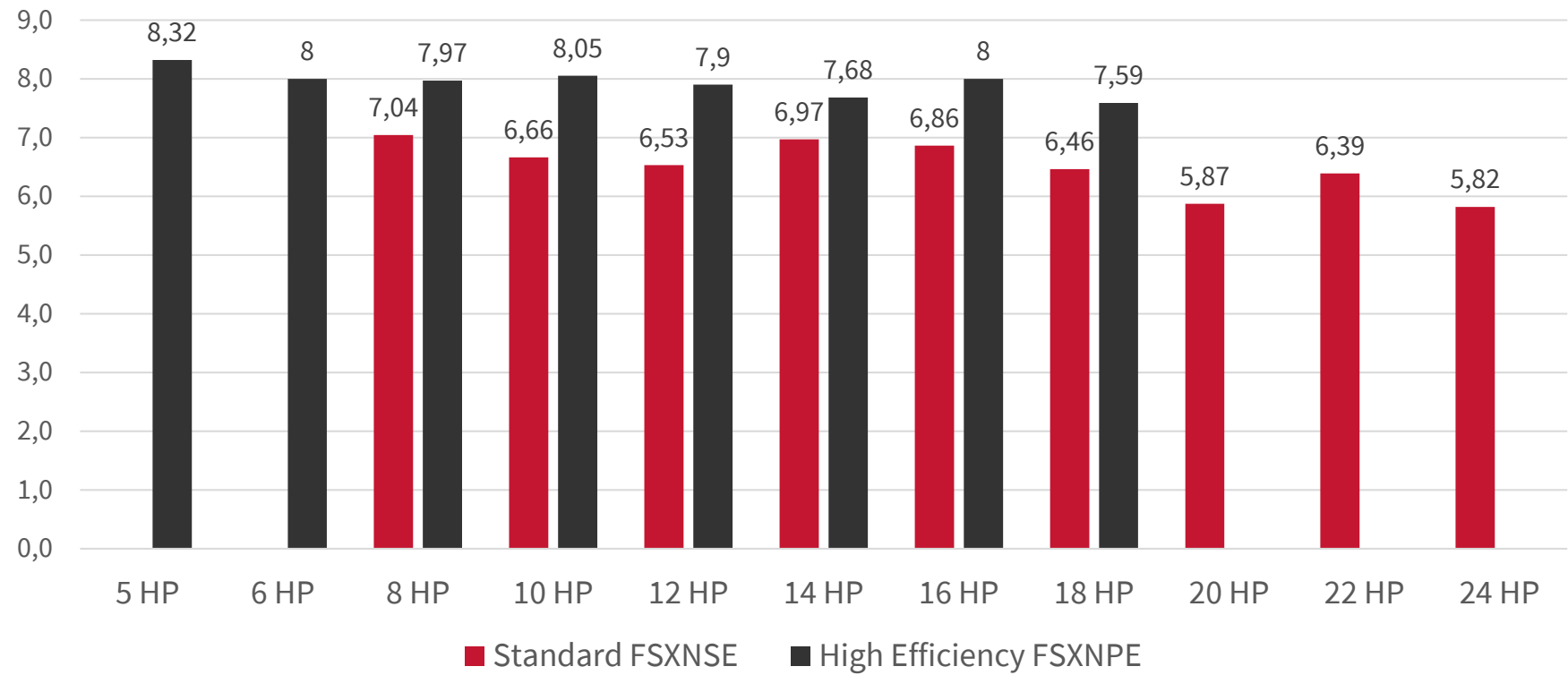
3. Components Energy Efficiency

SEER and SCOP with cassettes RCI-FSN4



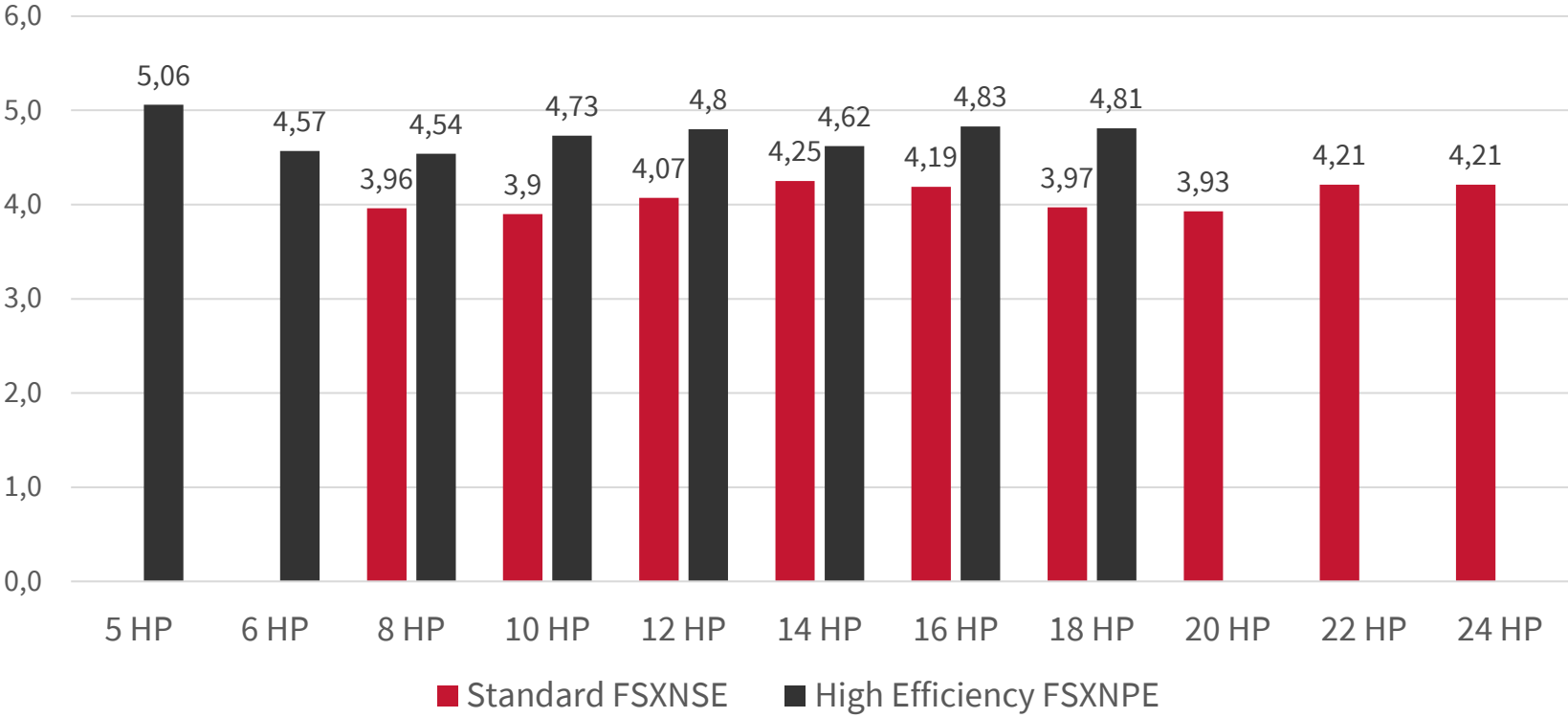
3. Components
Energy Efficiency

SEER with cassettes RCI-FSN4

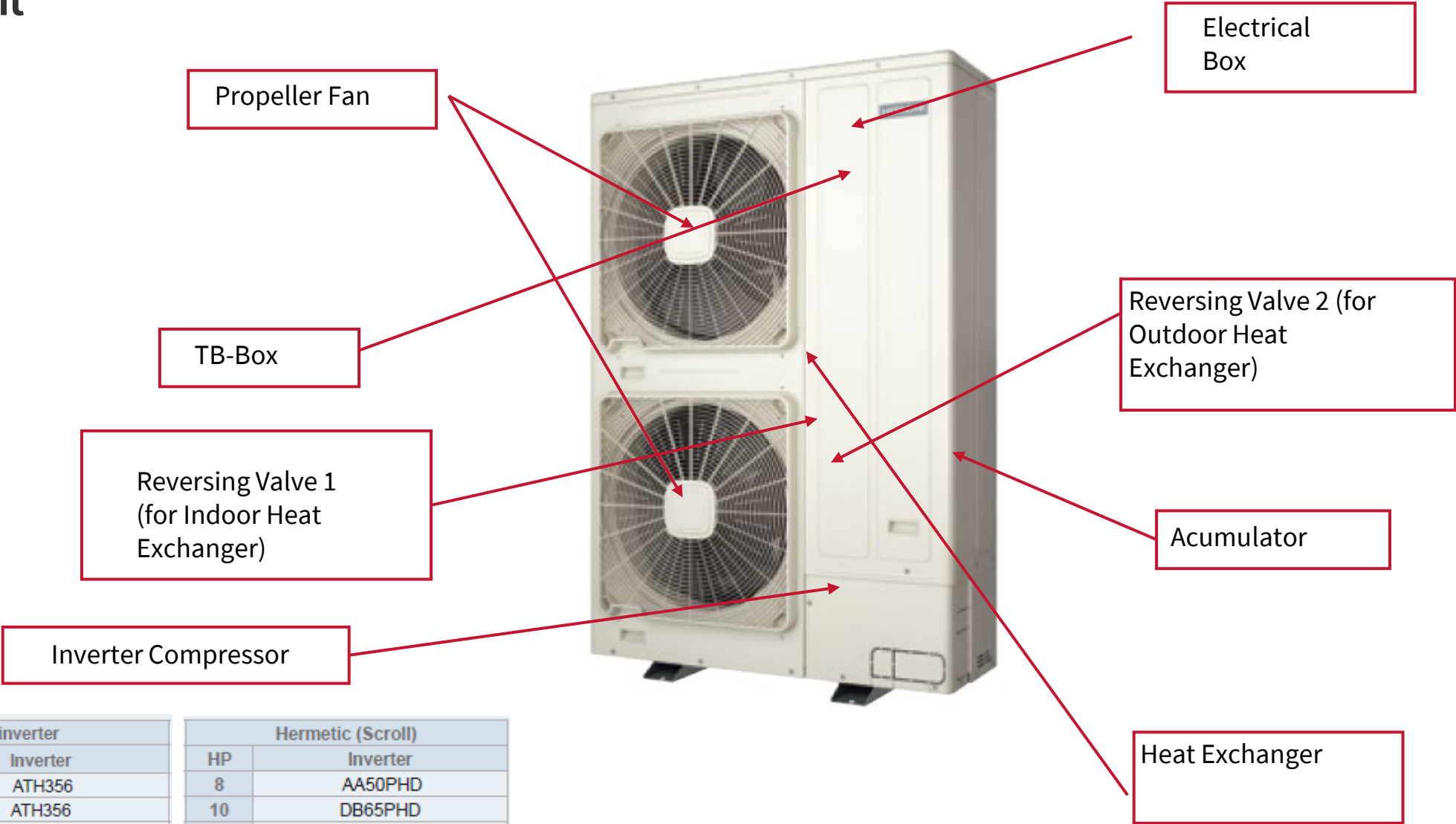


3. Components
Energy Efficiency

SCOP with cassettes RCI-FSN4



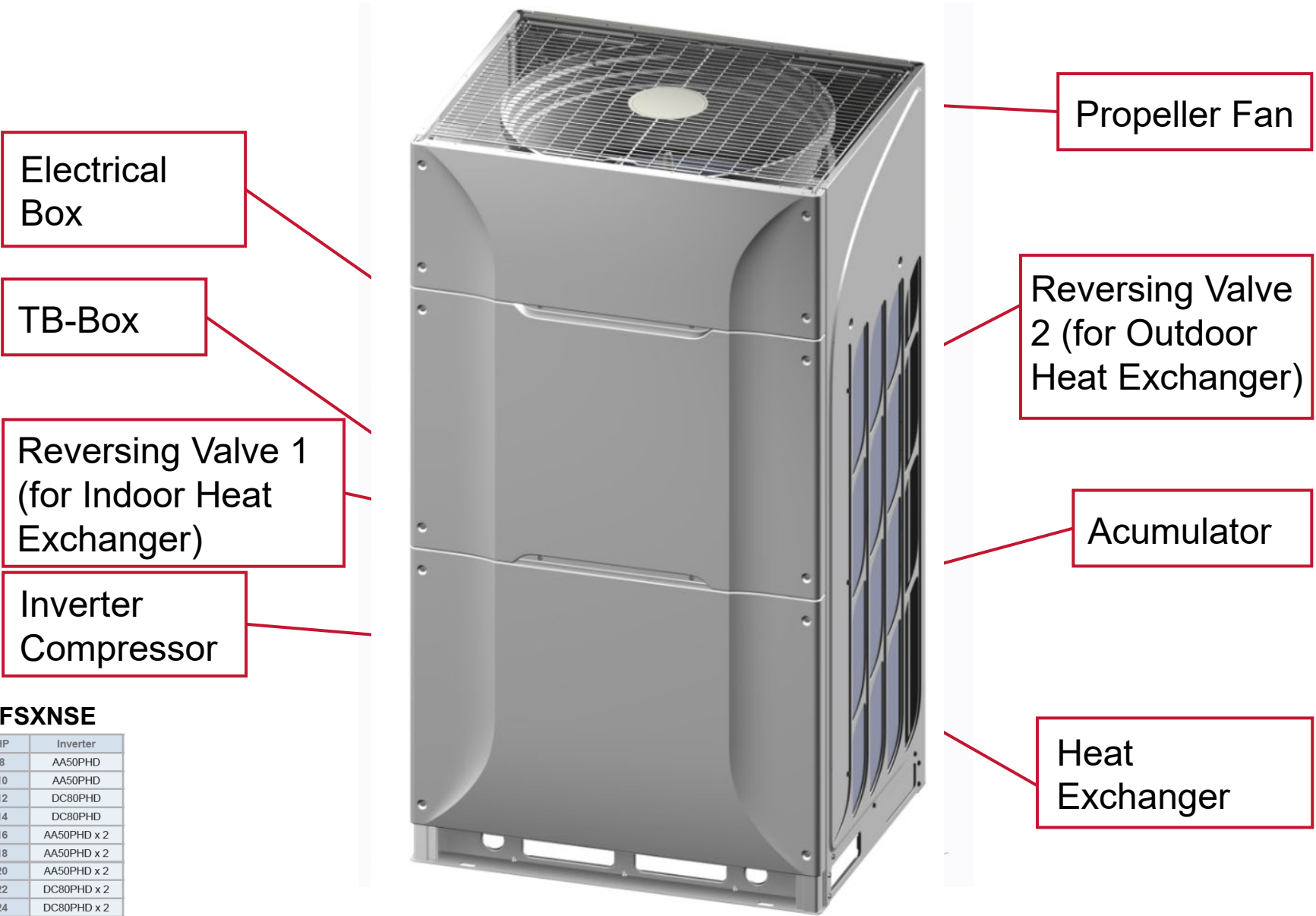
3. Components
Unit



Rotary inverter	
HP	Inverter
4	ATH356
5	ATH356
6	ATH420

Hermetic (Scroll)	
HP	Inverter
8	AA50PHD
10	DB65PHD
12	DC80PHD

3. Components
Unit



FSXNPE

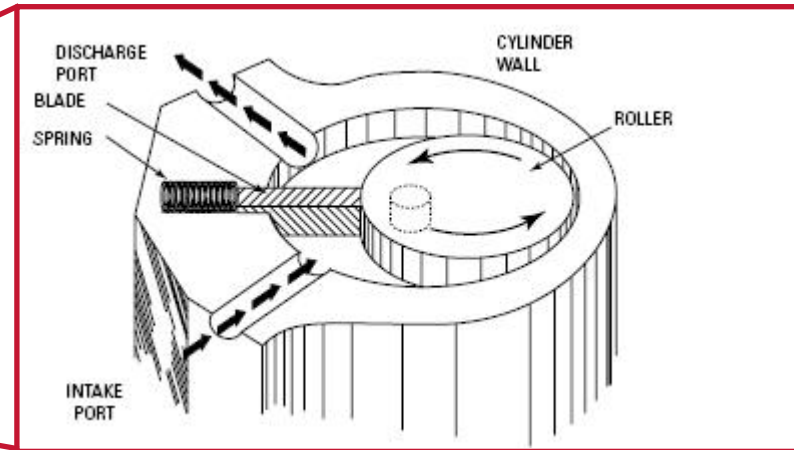
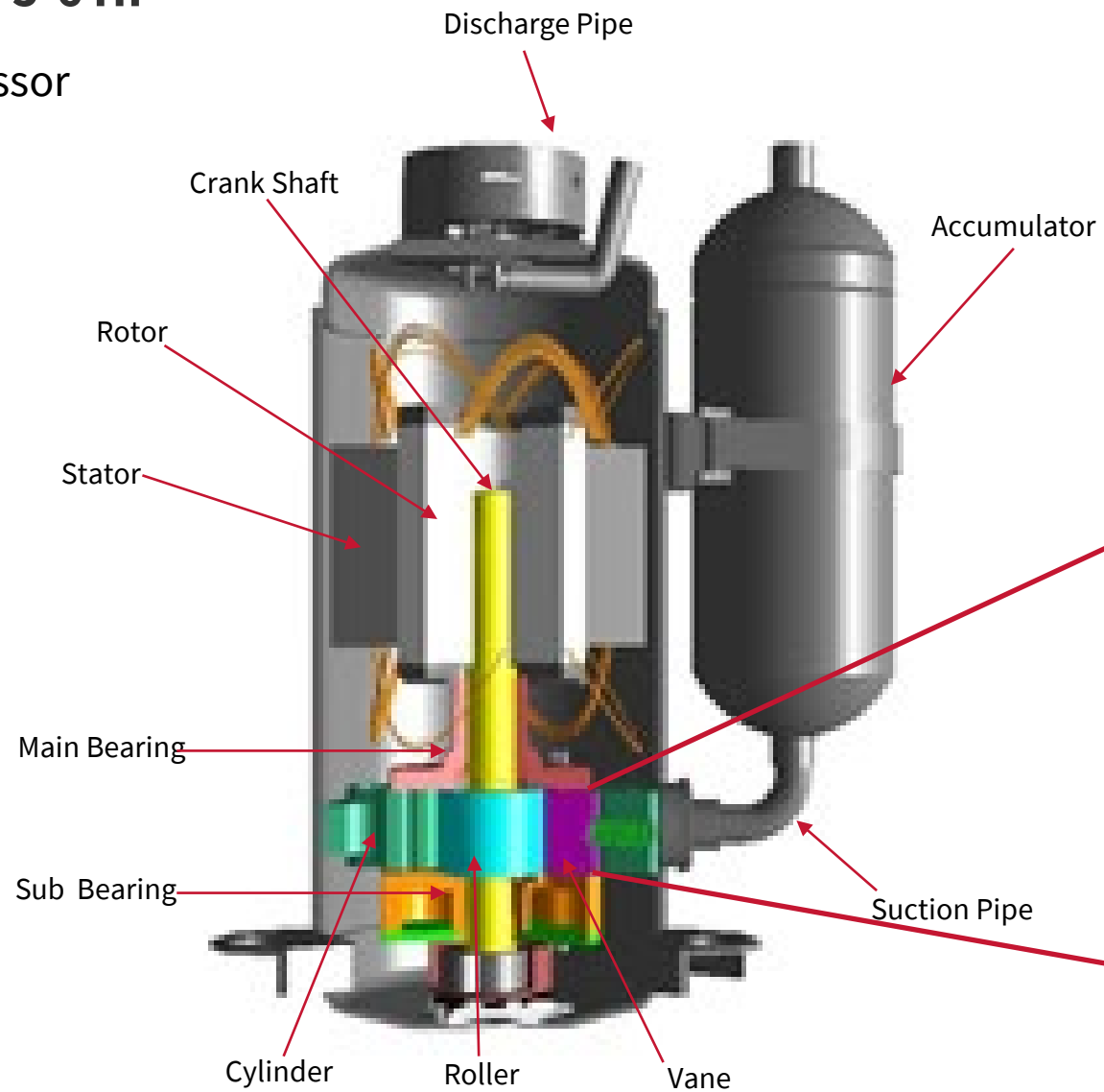
HP	Inverter
5	AA50PHD
6	AA50PHD
8	AA50PHD
10	DB85PHD
12	DC80PHD
14	DC80PHD
16	AA50PHD x 2
18	DC80PHD x 2

FSXNSE

HP	Inverter
8	AA50PHD
10	AA50PHD
12	DC80PHD
14	DC80PHD
16	AA50PHD x 2
18	AA50PHD x 2
20	AA50PHD x 2
22	DC80PHD x 2
24	DC80PHD x 2

3. Components Compressor 4-5-6 HP

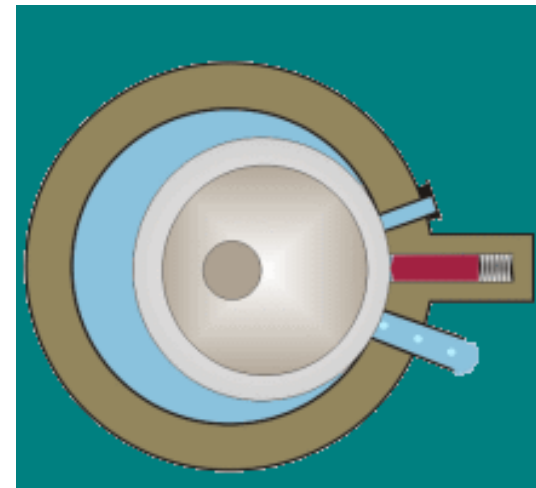
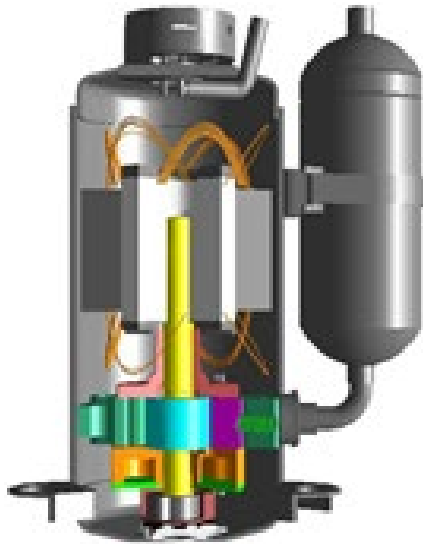
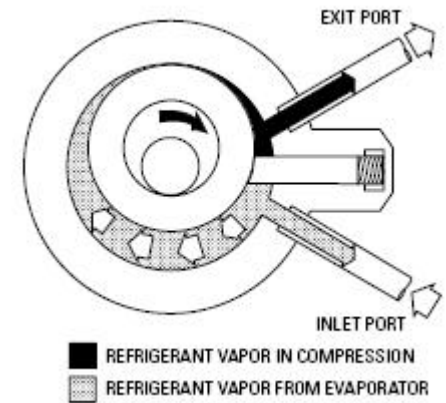
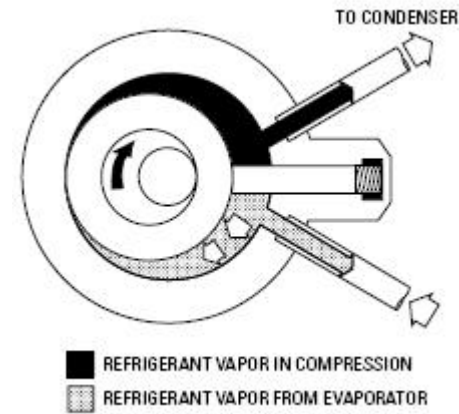
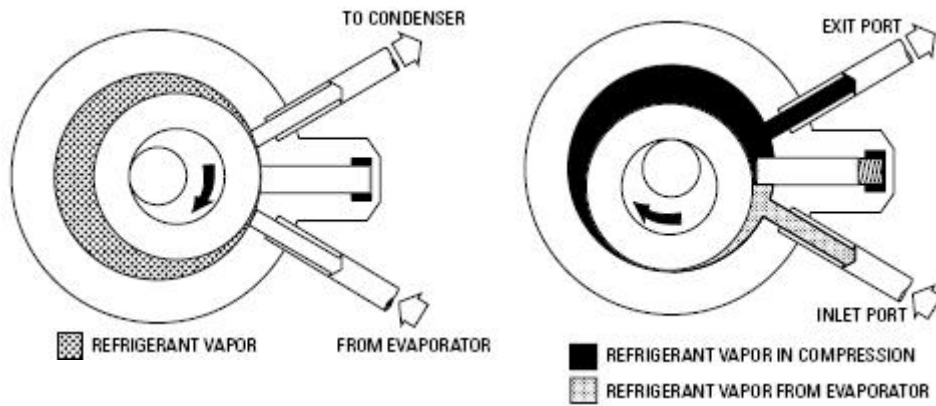
- Rotary compressor



3. Components

Compressor 4-5-6 HP

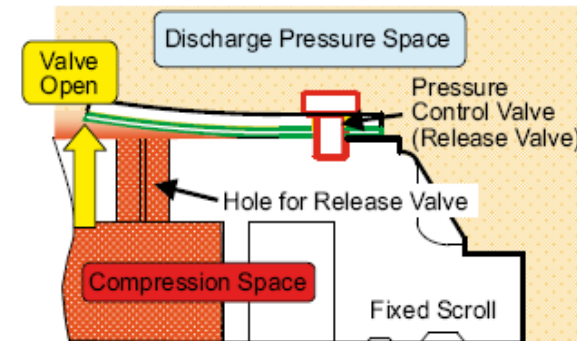
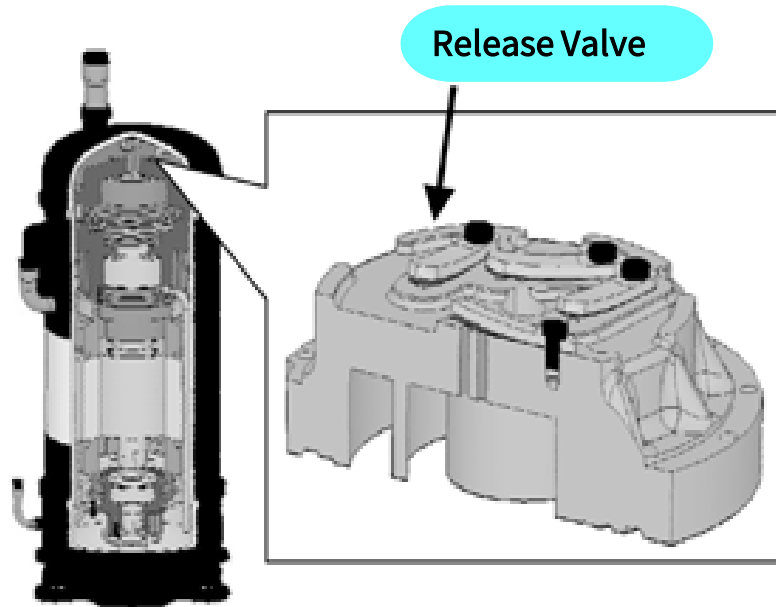
- Rotary compressor



3. Components

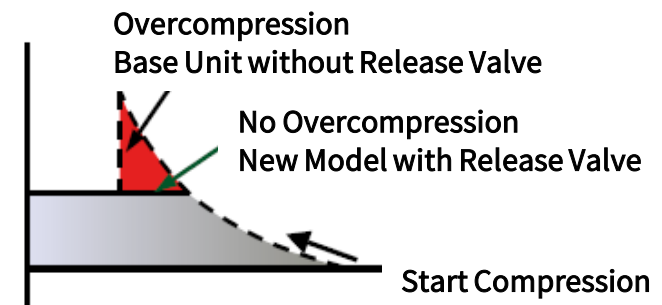
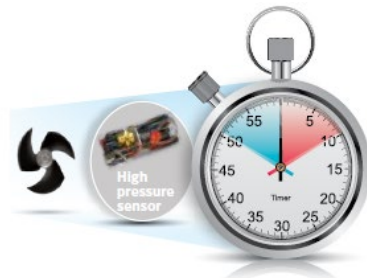
Compressor 8-10-12 HP

- Over Compression Prevention Technology



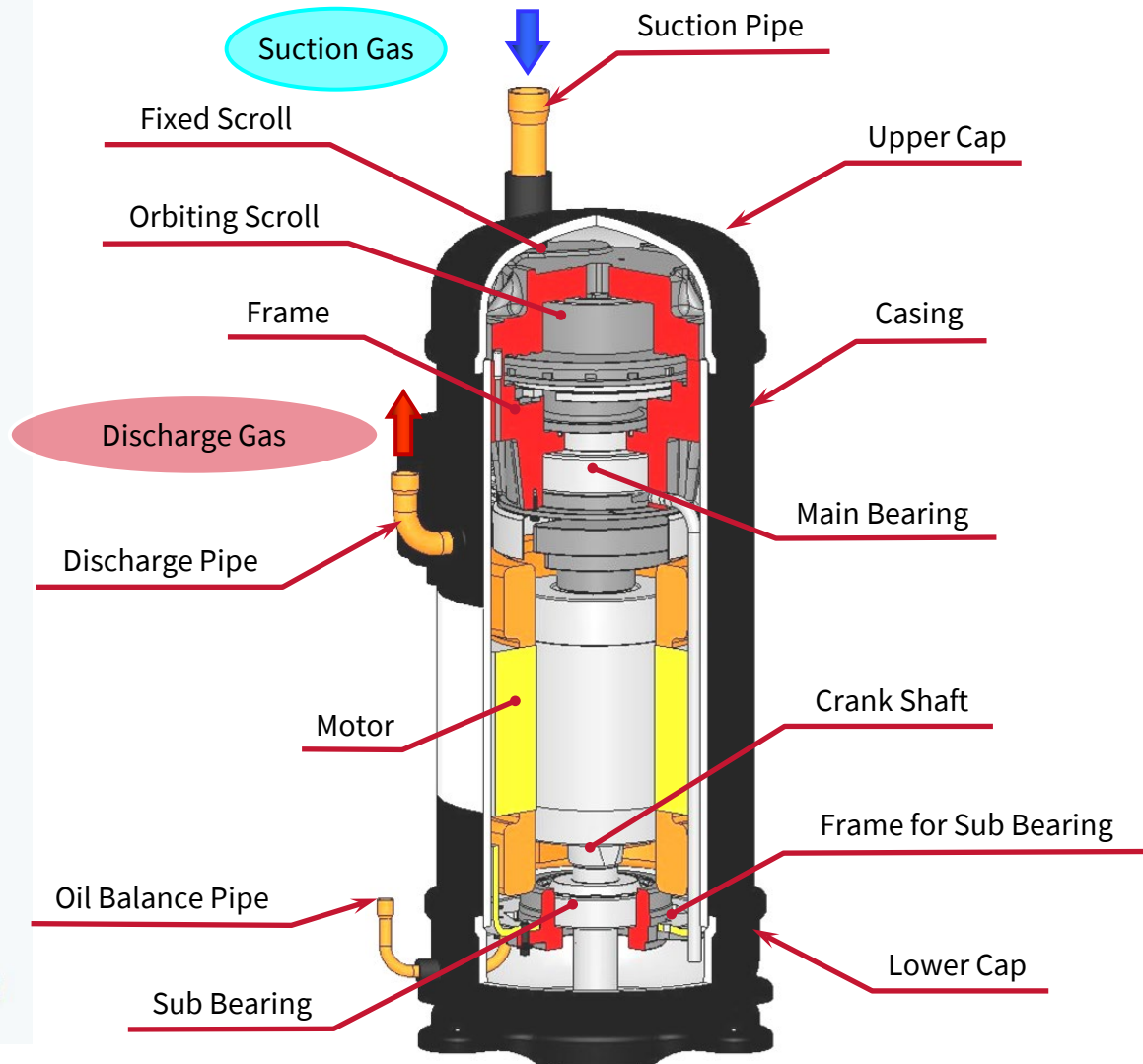
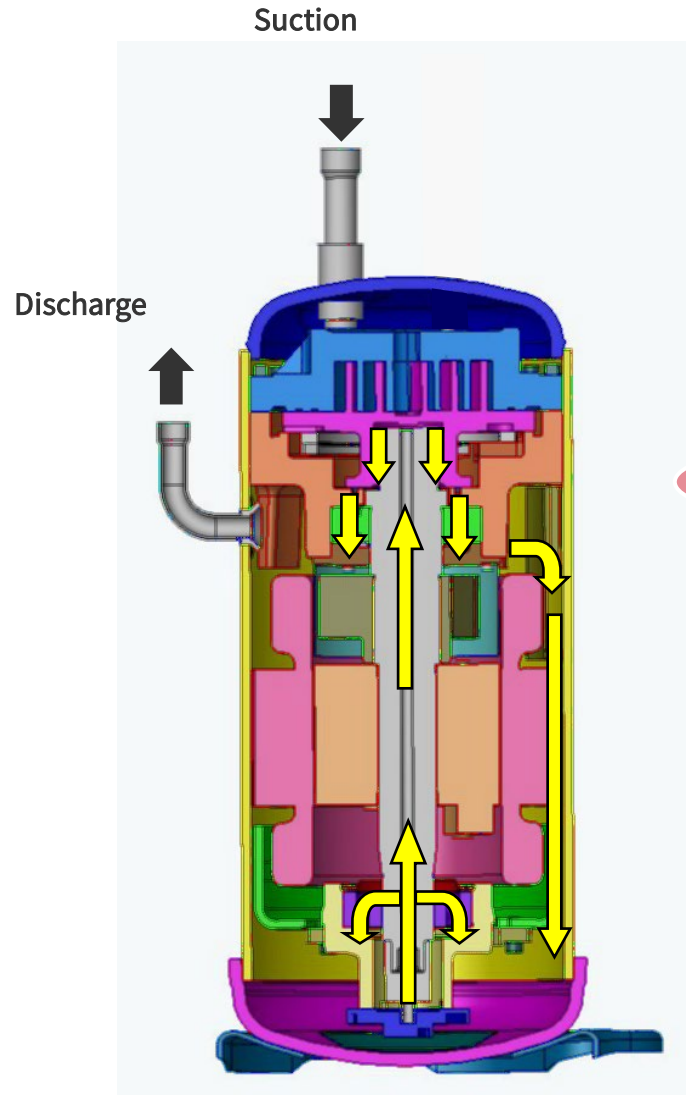
Pressure at Compression Space > Discharge Pressure

Change fan speed using high-pressure sensor to adjust the discharge pressure

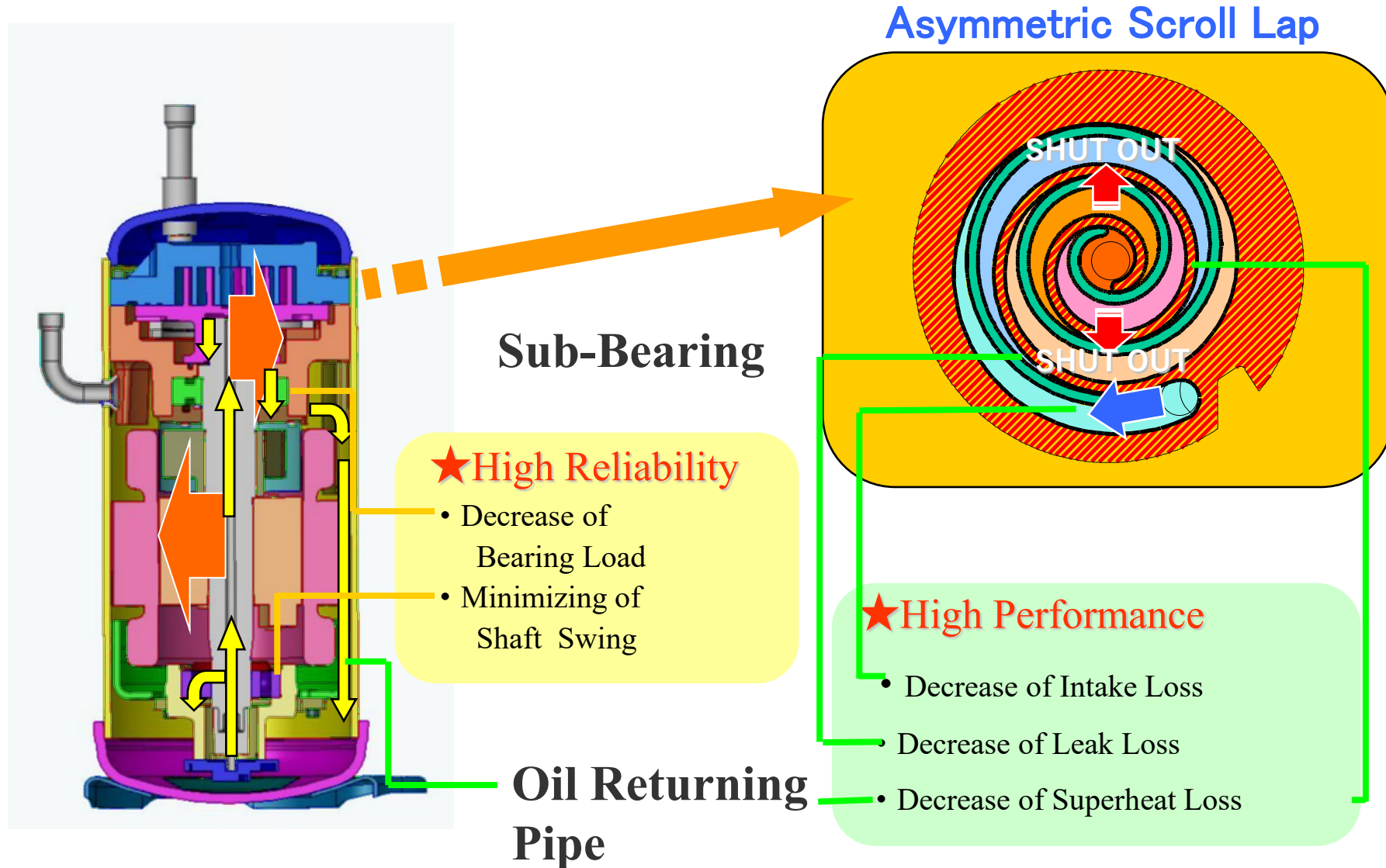


3. Components

Compressor 8-10-12 HP



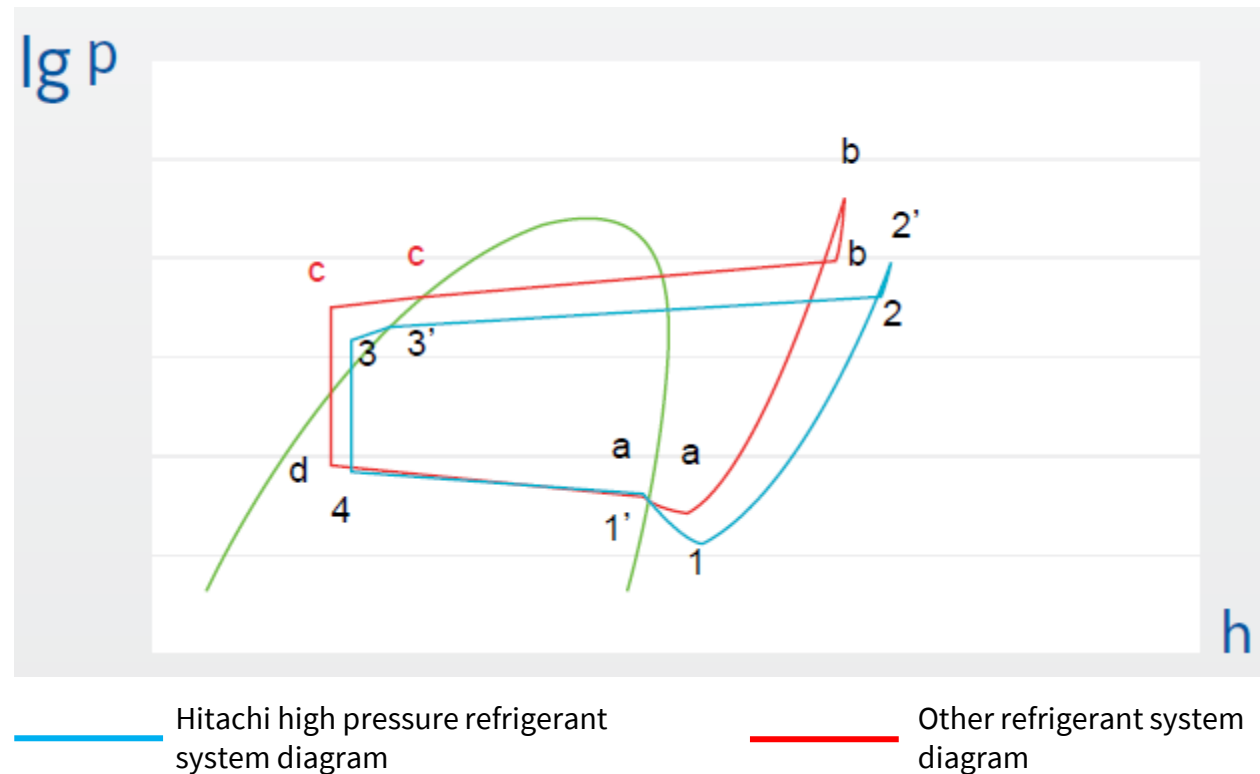
3. Components Compressor 8-10-12 HP



3. Components

Compressor 8-10-12 HP

- High Pressure Chamber Scroll Compressor allows to directly get the suction refrigerant from the indoor unit. On this way refrigerant is not heated by the motor, so it can get a better compression ratio and a relatively higher energy efficiency.

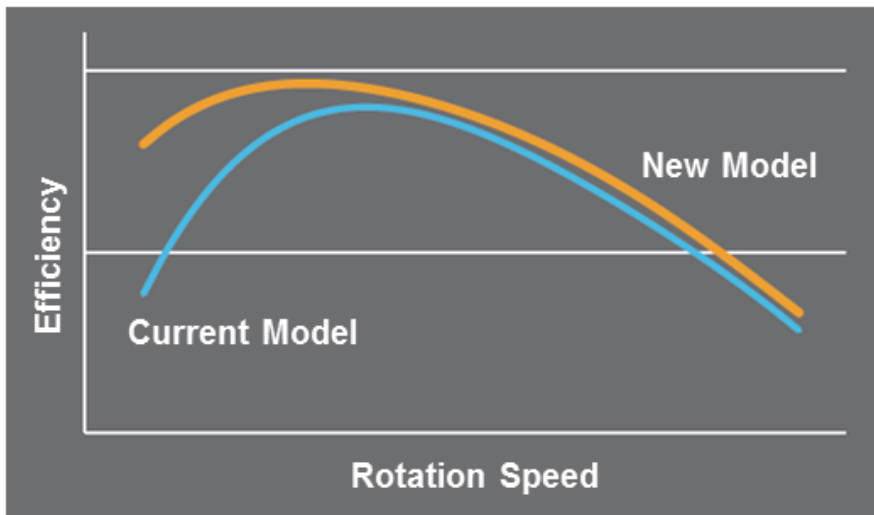


3. Components Compressor

- Optimized control to improve seasonal efficiency

COMPRESOR HITACHI DC with neodimium magnet

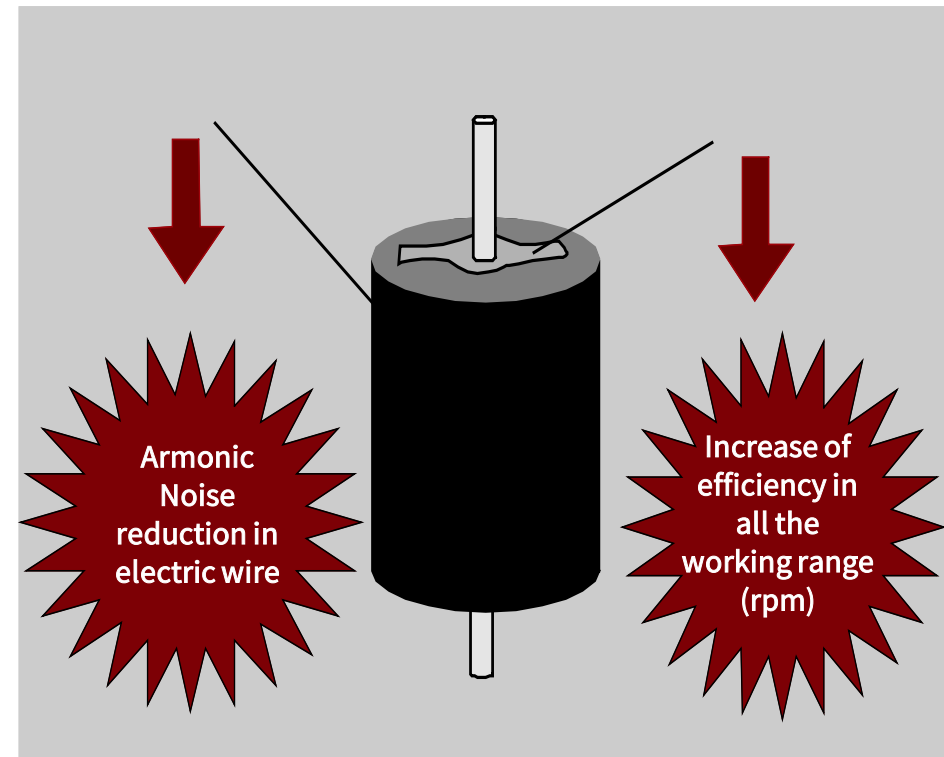
High Efficiency
Motor (%)



Improve Compressor Efficiency at Low Load Operation.
Optimize oil rate by improving oil distribution to the compressor and expand operation range at low load operation.

Rotor Shape
Optimized

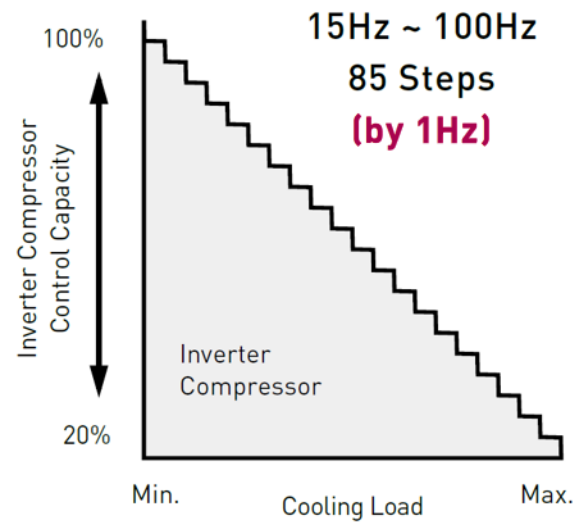
Use of Neodimium
Magnet



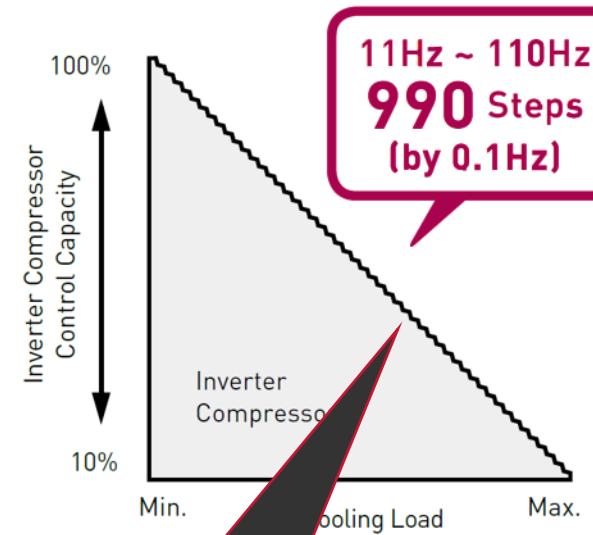
3. Components

Compressor 8-10-12 HP

Current model*



New model*



New DC
Inverter
Compressor

*Example at 12HP

3. Components
Sigma Compressor Insulation System

Current System



HP	8	10	12	14	16
Sound Power Level	81.5	82.5	84	85.4	85.5

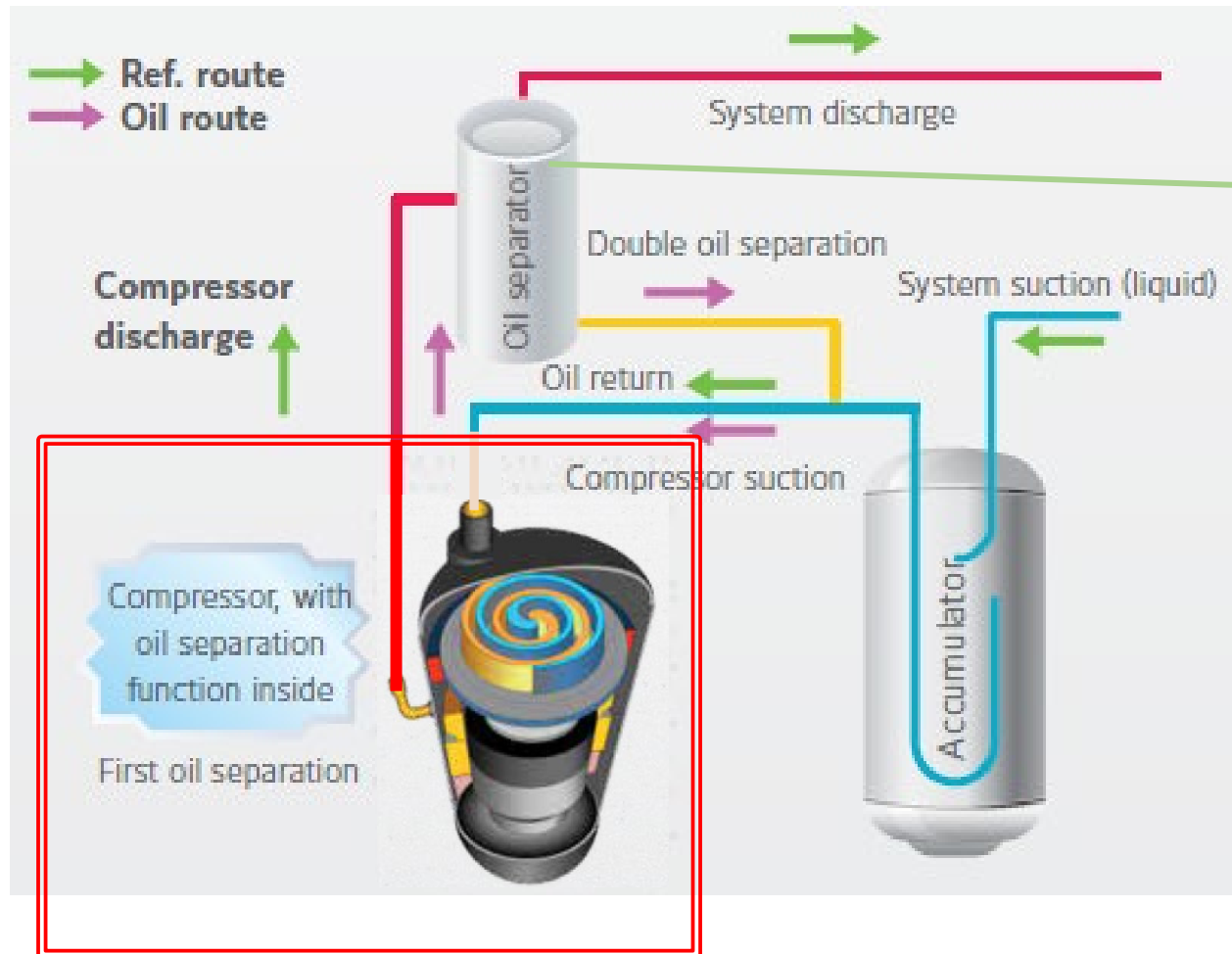
New System



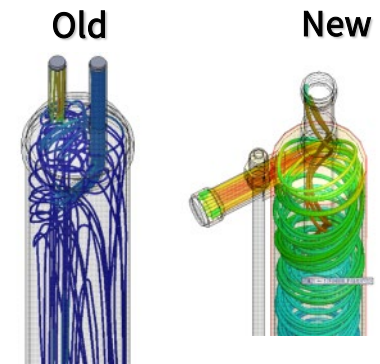
HP	8	10, 12	14, 16	18, 20	22	24
Sound Power Level	80	82	85	86	84	86

3. Components Refrigerant Cycle

- Double Oil Separation Technology

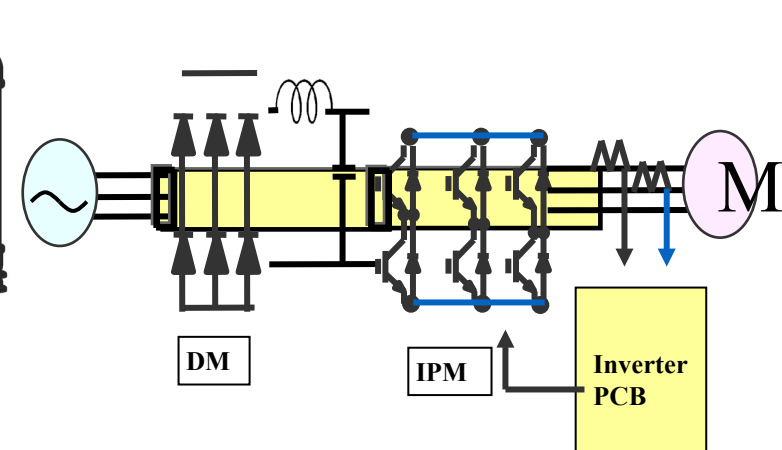
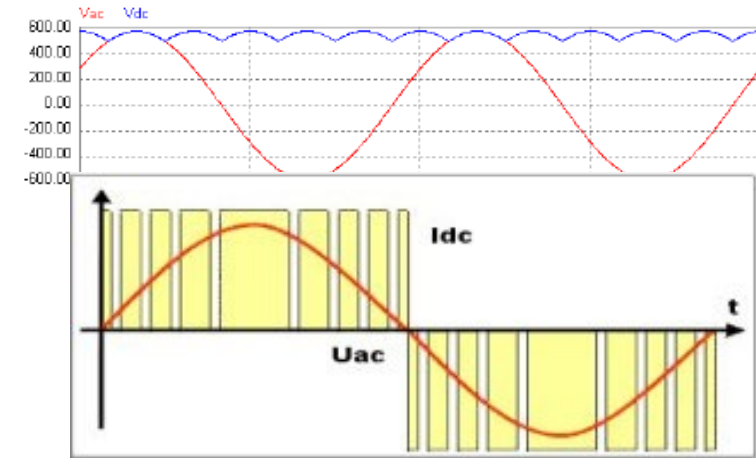
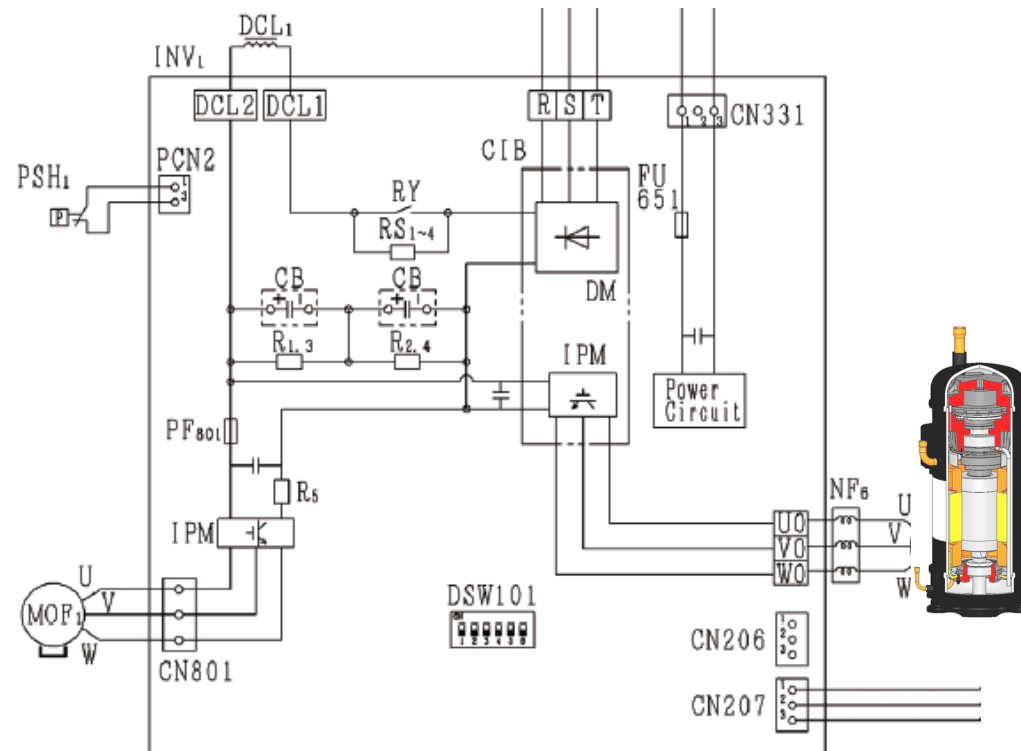


Oil Separator Method



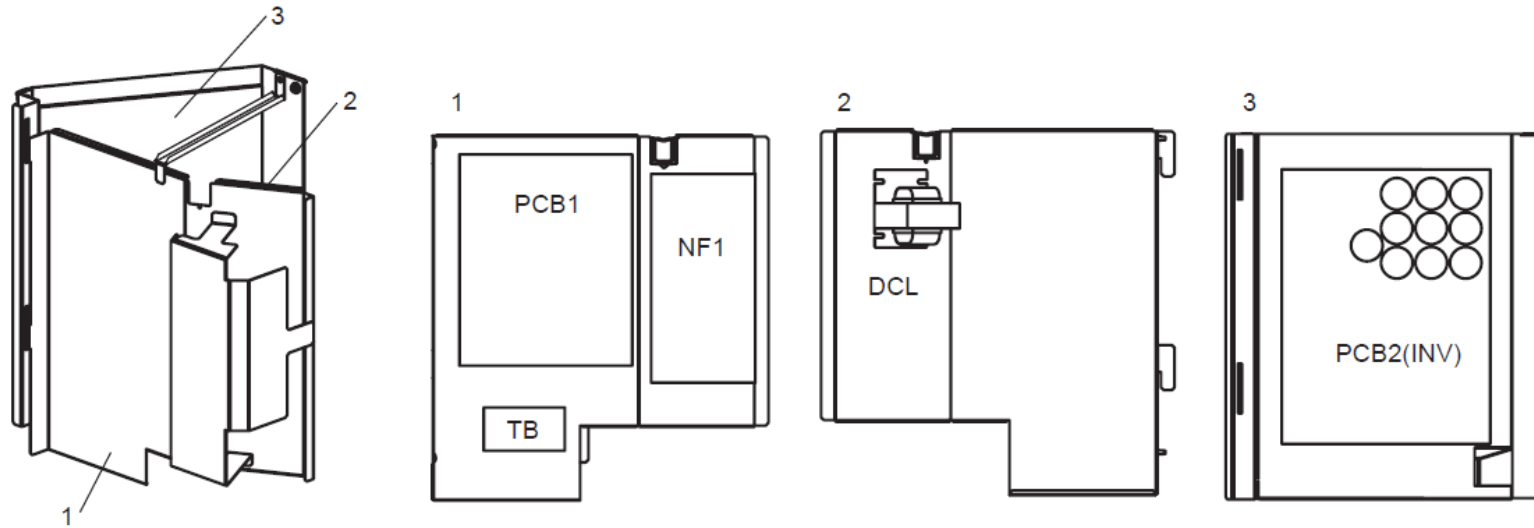
3. Components

Common PCB Fan & Compressor Control



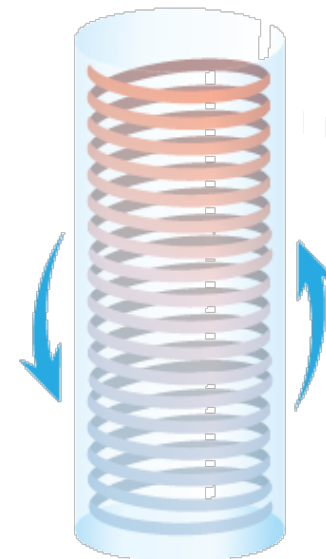
3. Components

Common PCB Fan & Compressor Control



Current Step Technology

12 HP
15Hz ~ 100Hz
85 Steps
(by 1Hz)



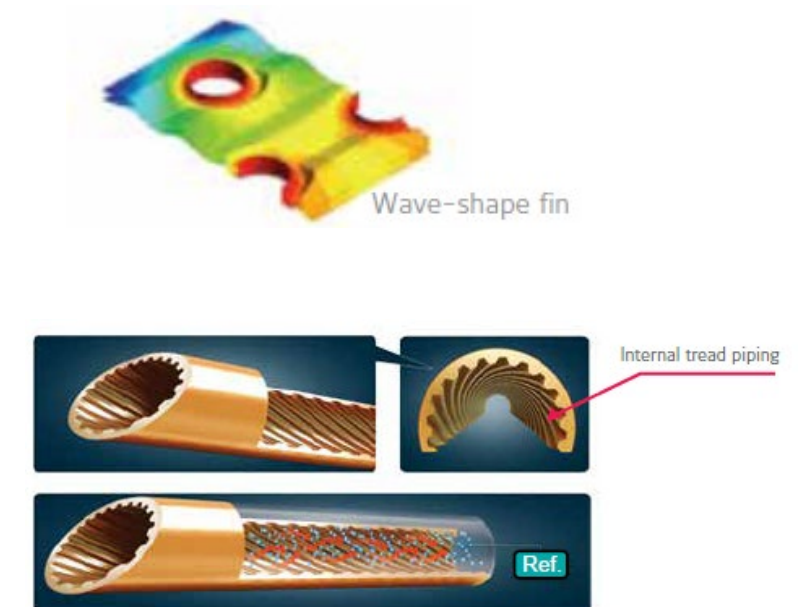
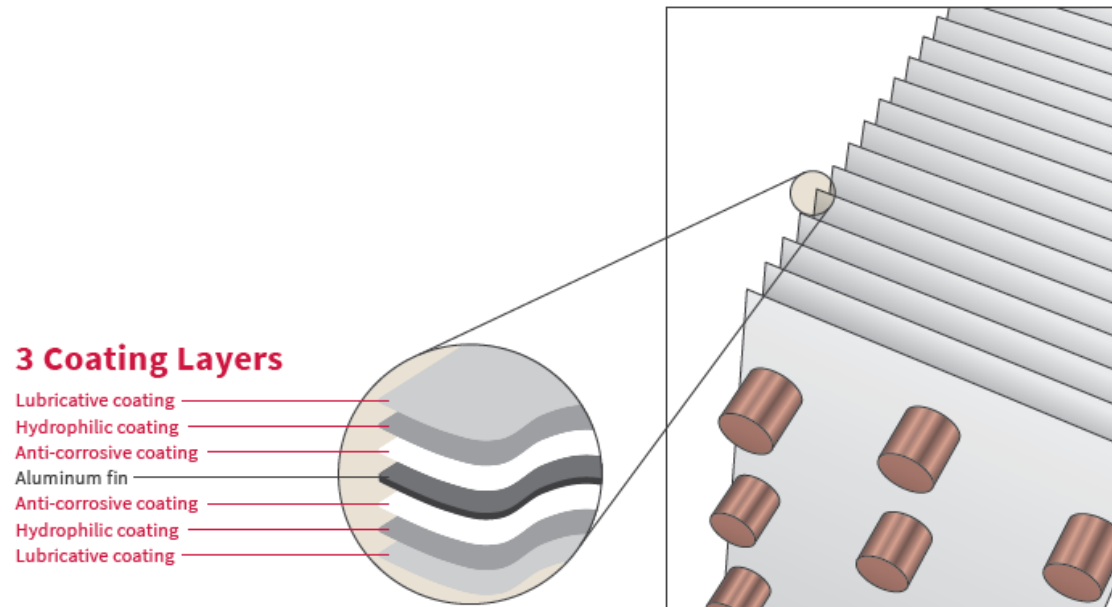
New Stepless Technology

Precision $\pm 0.1\text{Hz}$
Fast Step Jump

12 HP
11Hz ~ 110Hz
990 Steps
(by 0.1Hz)

3. Components Heat Exchanger

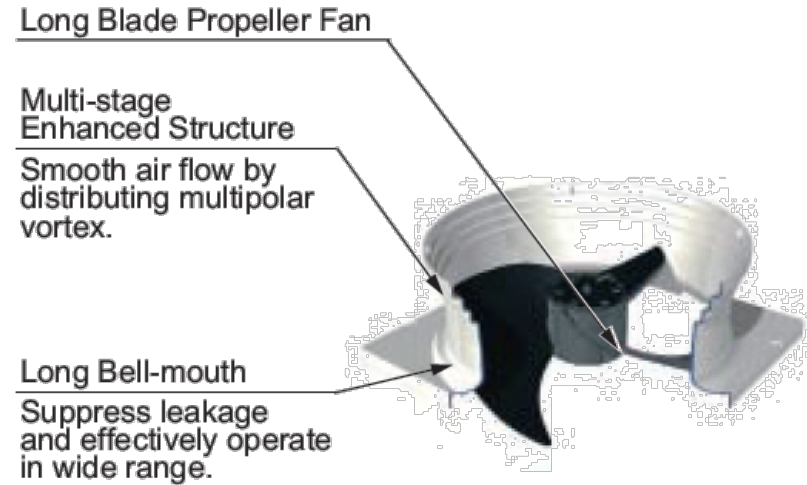
- High-Efficiency Heat Exchanger
 - Compact design and high-efficiency by arranging narrow heat exchanger tubes in 3 rows.
 - Newly-Developed High-Efficiency Heat Transfer Fin.
 - Internal tread piping. This design adds more turbulence to the refrigerant flow enlarging heat-exchanging.
 - Heat Exchanger Configuration Aiming at fluid Loss Reduction.
 - 3 Coating Layers for corrosion protection



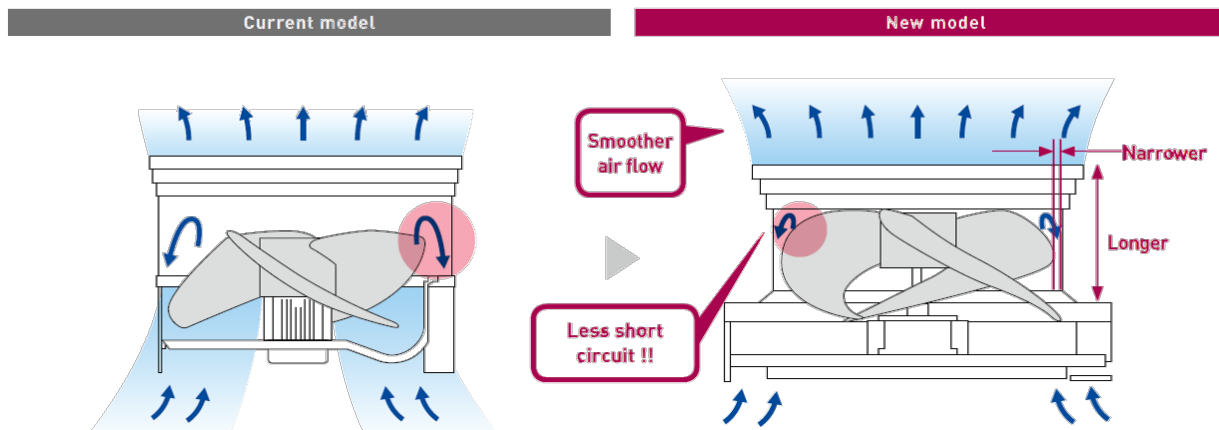
3. Components

Long Bell-Mouth Structure for Sigma

- Create smooth air flow and reduce fan input by adopting multi-stage enhanced structure



Improvement in bell-mouth



3. Components

Defrost

SMART DEFROSTING

Features

- Monitoring of refrigerant circuit parameters and fan motor consumption to optimize defrosting cycles number
- Short defrosting cycles (3 to 9 mn), with a duration determined by exact need
- User comfort : indoor units fans are stopped during defrosting and blow again only when outlet temperature > 30°C

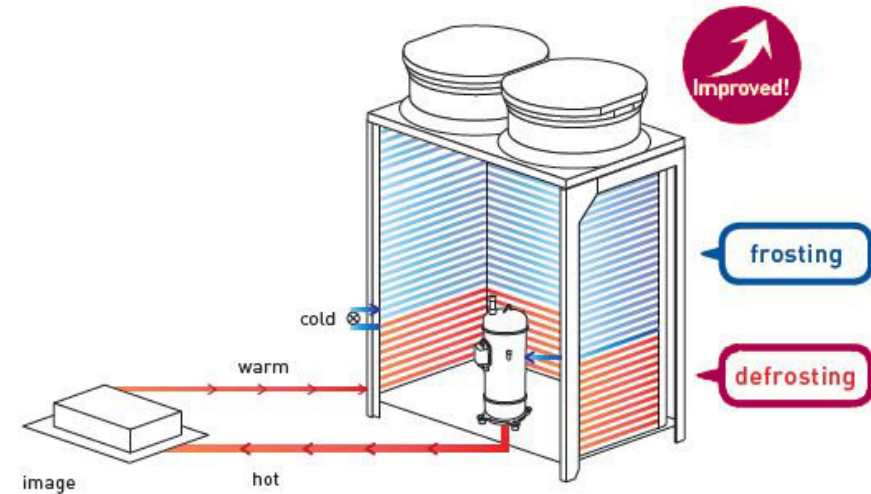
Benefits

- Reduction of defrosting cycles frequency and duration
- Maximum heating capacity
- Continuous comfort with unnoticeable defrosting for user : temperature is stable and only hot air is blown by indoor units

3. Components Defrost

Prevention

for defrosting prevention, the model controls frost and ice formation during heating operation by running mid-temperature coolant (5°C-20°C) before decreasing the pressure through a heat exchanger to control frost and ice formation on the lower part of the outdoor heat exchanger.



Better sensing

Even while defrosting, Hitachi's original sensing function has improved the system for detecting the frost amount.

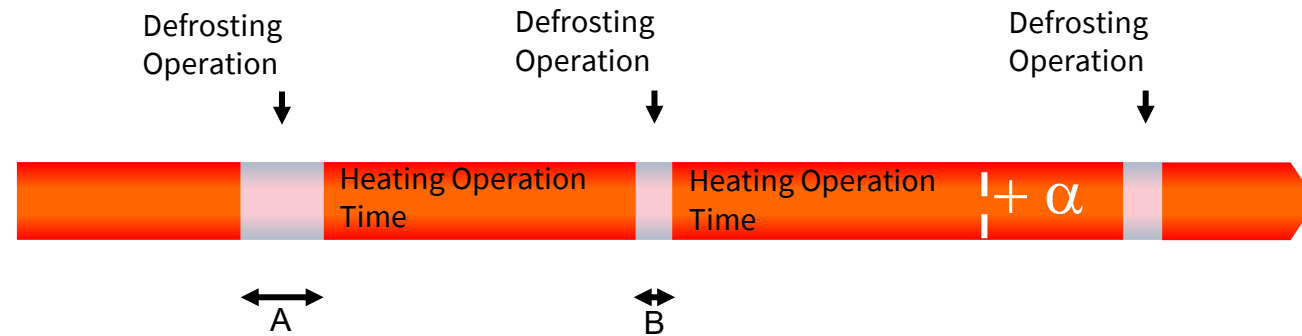


More efficient defrosting

In addition, the defrosting interval has been increased by more than 200%, from 120 minutes to 250 minutes. Undertakes defrosting more efficiently, rather than unnecessary defrosting every two hours.

3. Components Defrost

- Defrost parameters
 - T_e
 - T_a
- Adaptive Intelligent Defrost
 - Heating operation time is adjusted in relation with defrosting operation length



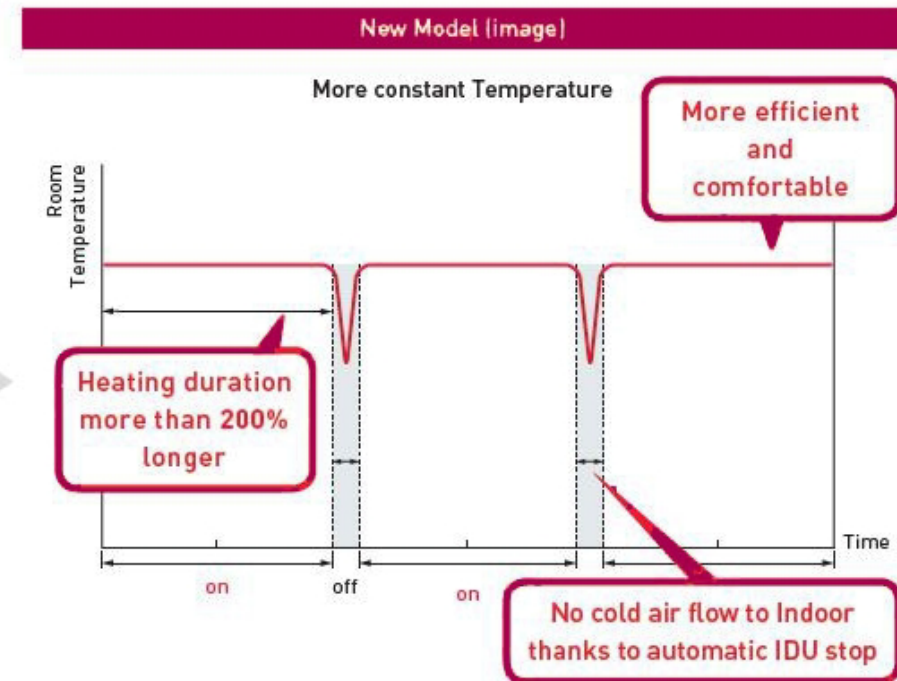
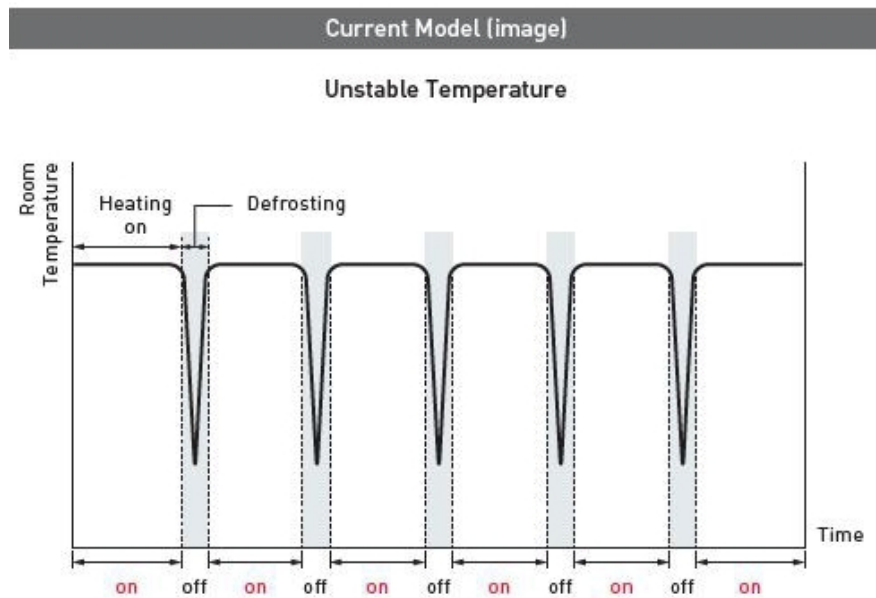
If $B < A$ Then Heating Operation Time + a

If $B > A$ Then Heating Operation Time - a

If $B = A$ Then Heating Operation Time + 0

3. Components Defrost

- More efficient defrosting
 - In addition, the defrosting interval has been increased by more than 200%, from 120 minutes to 250 minutes.
 - Undertakes defrosting more efficiently, rather than unnecessary defrosting every 2 hours.



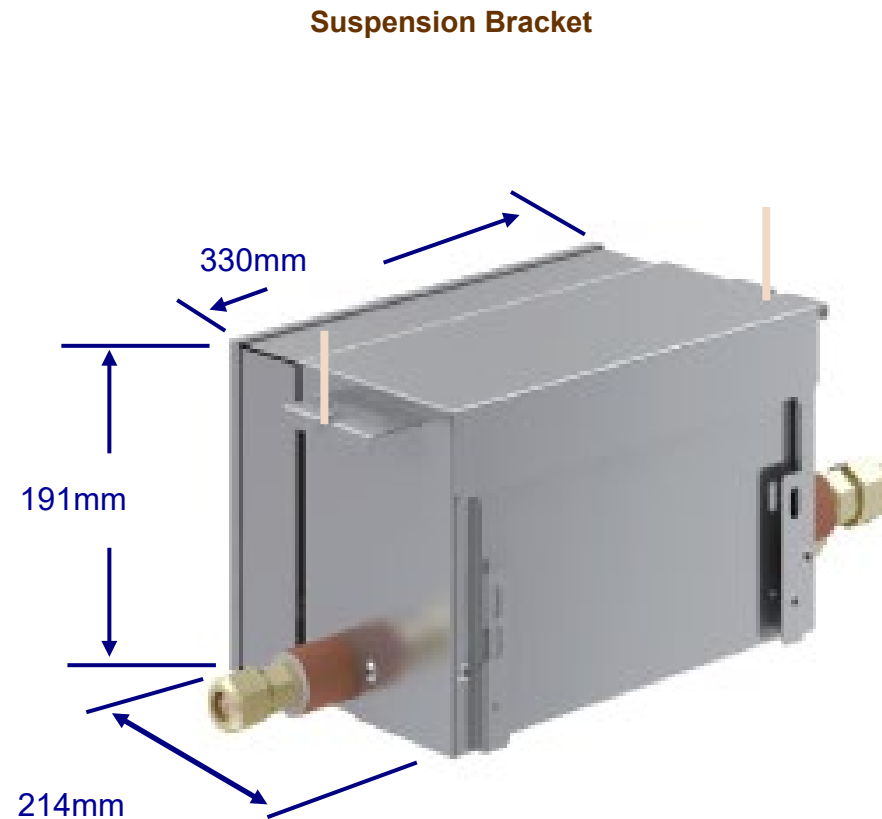
3. Components

CH-Box

Type			Single Branch		Multiple Branch				
Model Name				CH-AP160SSX	CH-AP280SSX	CH-AP04MSSX	CH-AP08MSSX	CH-AP12MSSX	CH-AP16MSSX
Appearance									
Electrical	Power Supply			AC1ϕ 230V/50Hz, 220-240V/50Hz, 220V/60Hz					
	Power Consumption		W	5	5	11.2	22.4	33.6	44.8
	Current		A	0.1	0.1	0.2	0.4	0.6	0.8
Maximum Total Capacity Index			kW	16	28	44.8	85	85	85
Number of Branches(for Indoor Unit)				1	1	4	8	12	16
Maximum Capacity Index per Branch			kW	-	-	16	16	16	16
Maximum Connectable Indoor Units Per Branch				7	8	6	6	6	6
Dimmensions Height x Width x Depth			mm	191 x 301 x 214	191 x 301 x 214	260 x 303 x 352	260 x 543 x 352	260 x 783 x 352	260 x 1023 x 352
Refrigerant				R410A					
Refrigerant Piping	Outdoor Unit Side	Gas Line (High and Low pressure side)	mm (in.)	ϕ15.88 (5/8)	ϕ15.88 (5/8)	ϕ22.2 (7/8)	ϕ22.2 (7/8)	ϕ25.4 (1)	ϕ28.58 (1-1/8)
		Gas Line (Suction Gas)	mm (in.)	ϕ19.05 (3/4)	ϕ19.05 (3/4)	ϕ25.4 (1)	ϕ28.58 (1-1/8)	ϕ28.58 (1-1/8)	ϕ31.75 (1-1/4)
		Liquid Line	mm (in.)	Not included	Not included	ϕ12.7 (1/2)	ϕ12.7 (1/2)	ϕ15.88 (5/8)	ϕ19.05 (3/4)
	Indoor Unit Side	Gas Line	mm (in.)	ϕ15.88 (5/8)	ϕ19.05 (3/4)	ϕ15.88 (5/8)	ϕ15.88 (5/8)	ϕ15.88 (5/8)	ϕ15.88 (5/8)
		Liquid Line	mm (in.)	Not included	Not included	ϕ9.52 (3/8)	ϕ9.52 (3/8)	ϕ9.52 (3/8)	ϕ9.52 (3/8)
Net Weight			kg	6.0	6.0	14.0	25.0	36.0	47.0

3. Components CH-Box

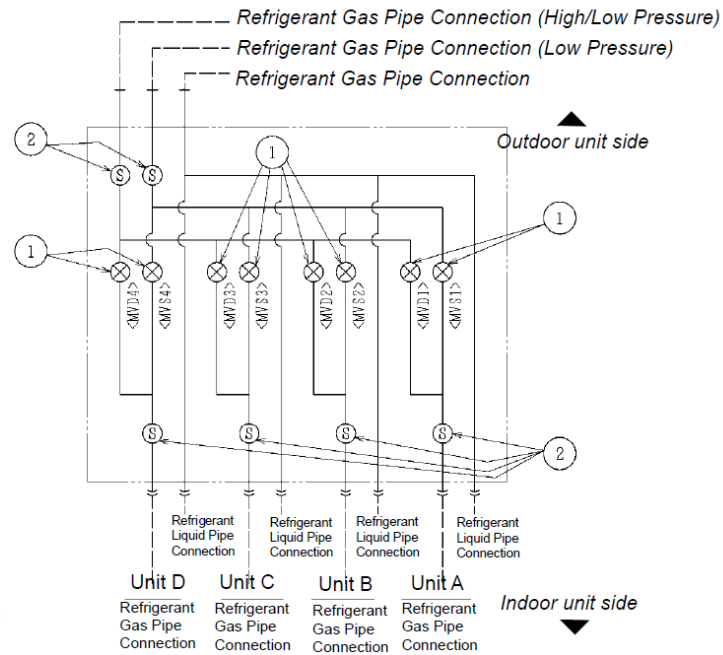
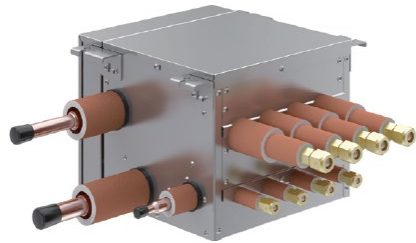
- CH-AP160SSX / CH-AP280SSX



* When opening flow refrigerant at Operation ON/OFF, Thermo ON/OFF, Defrost Operation and Operation Mode, refrigerant flow may be heard from CH Unit.

3. Components CH-Box

- CH-AP04MSSX / CH-AP08MSSX / CH-AP12MSSX / CH-AP16MSSX

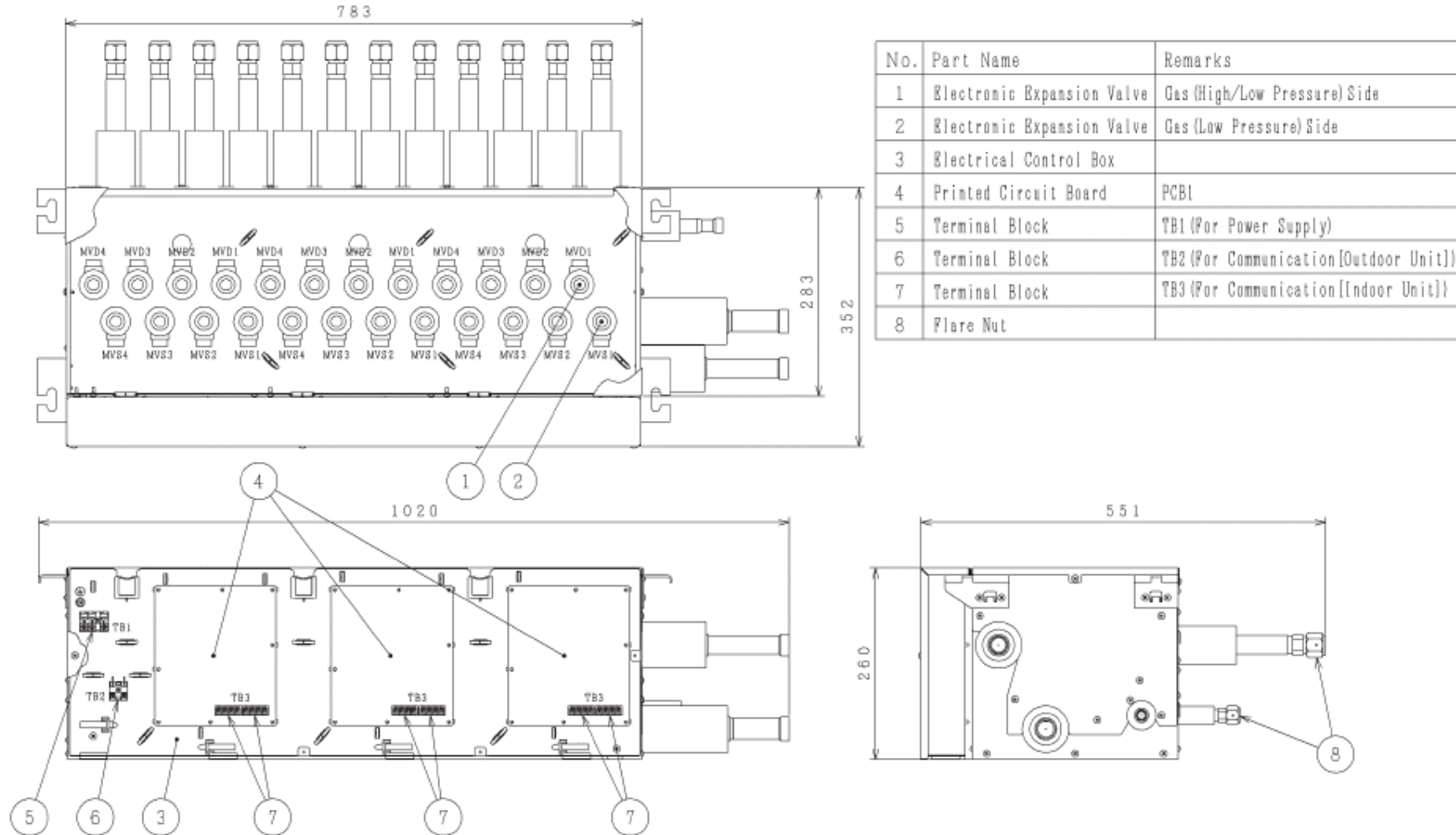


Electronic Expansion Valve

Reduced Switchover & Refrigerant Flow Noise

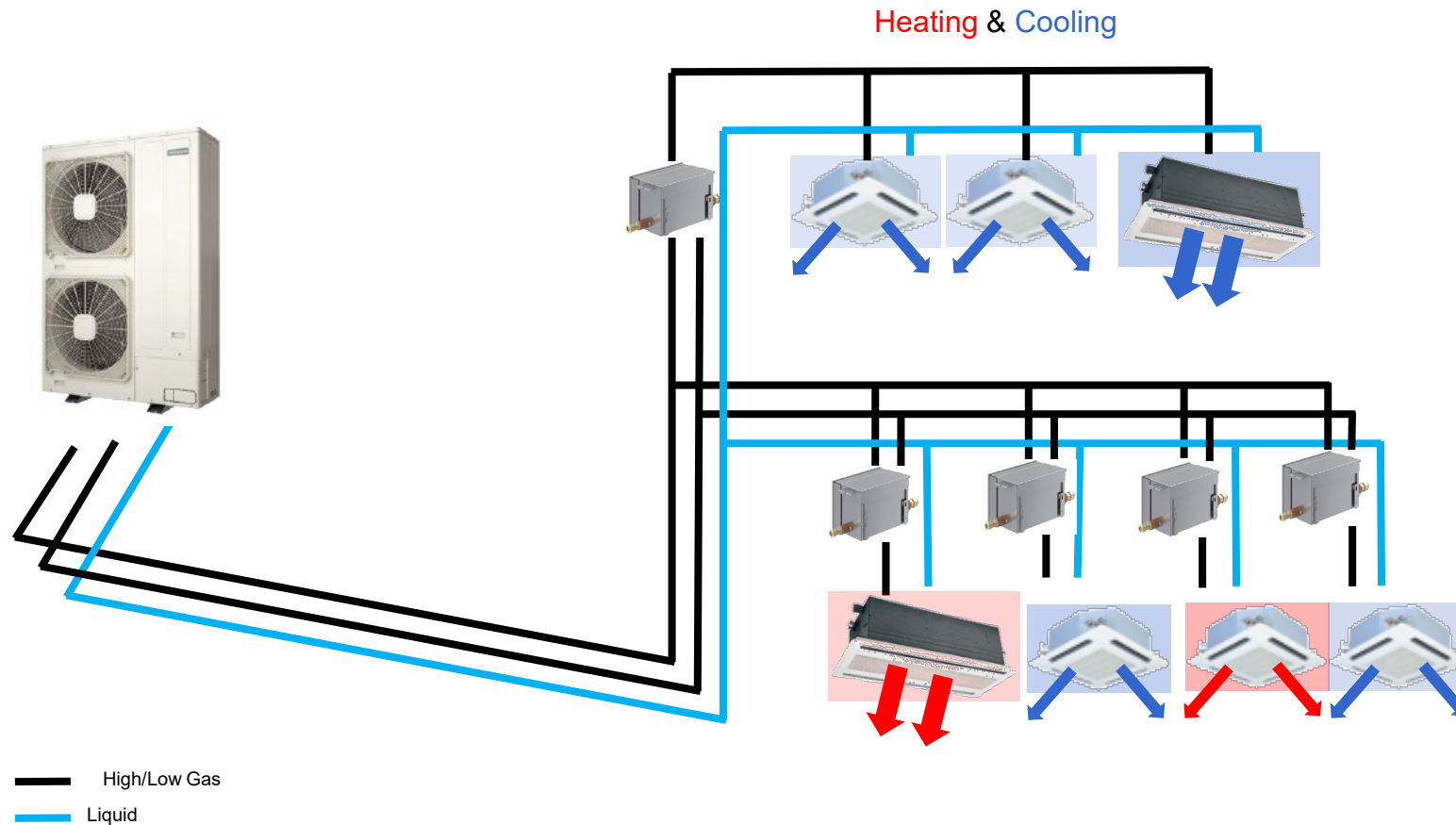
3. Components CH-Box

■ Structure (Example CH-AP12MSSX)



3. Components CH-Box Multiple

- Now CH-Box can be installed on most convenient place for:
 - Piping design



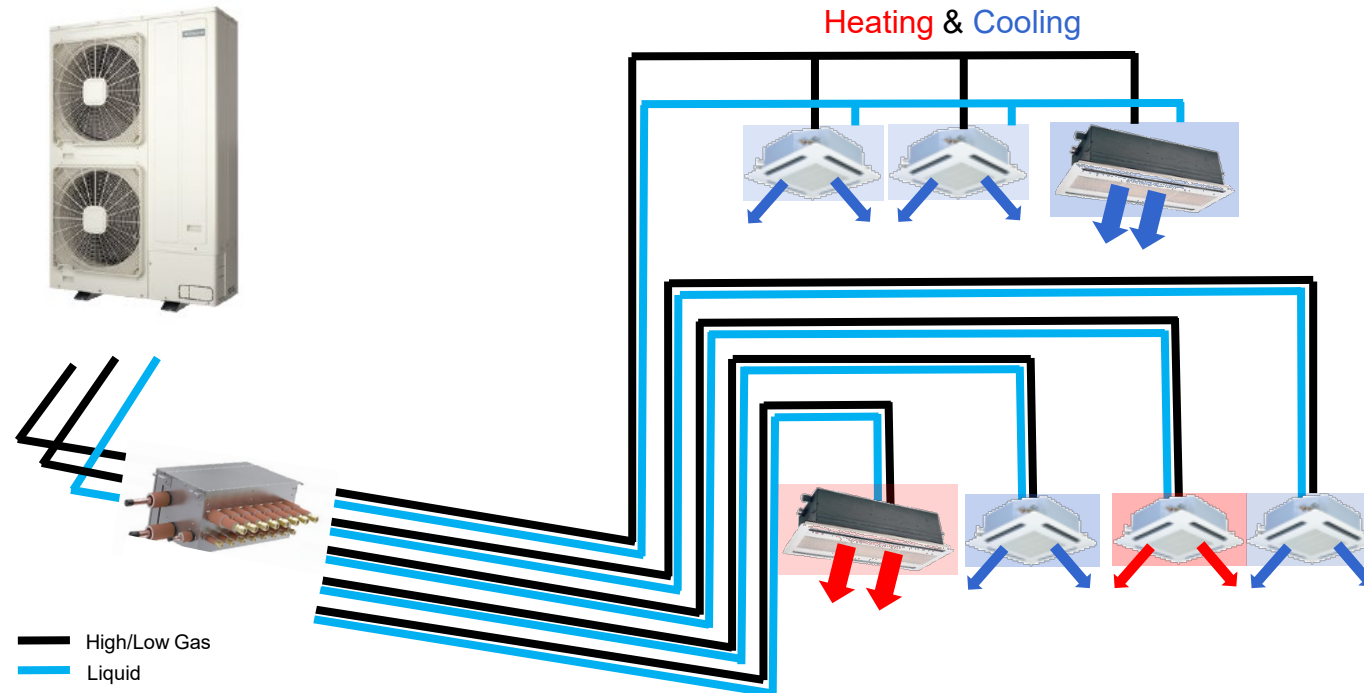
3. Components CH-Box Multiple

- Now CH-Box can be installed on most convenient place for:

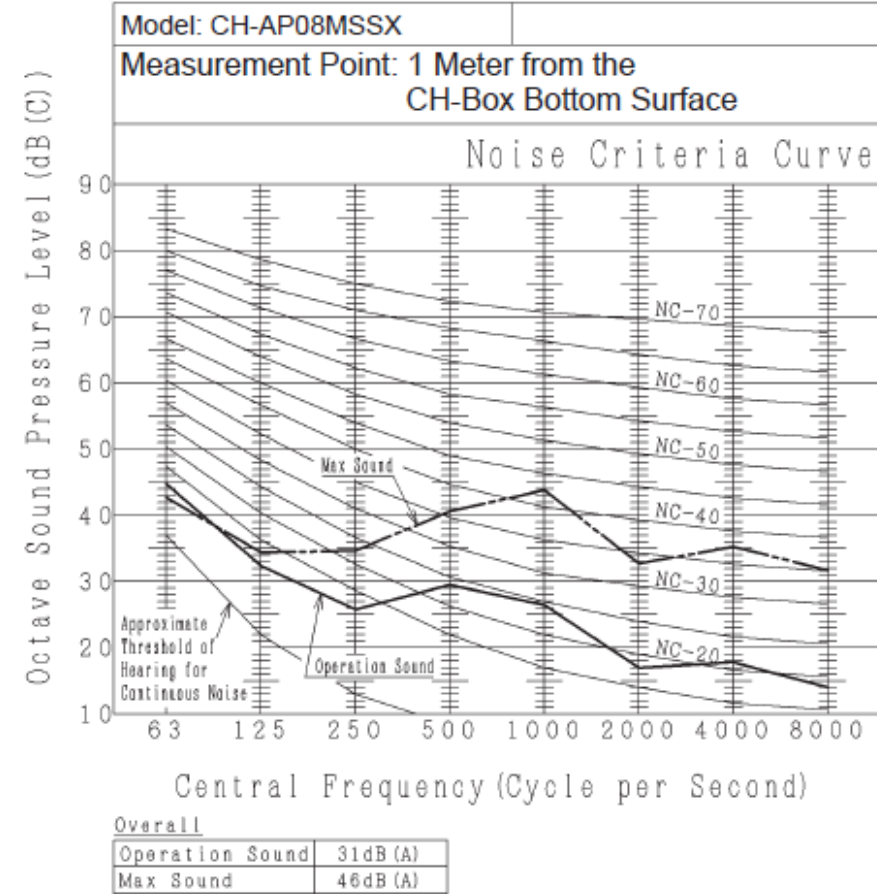
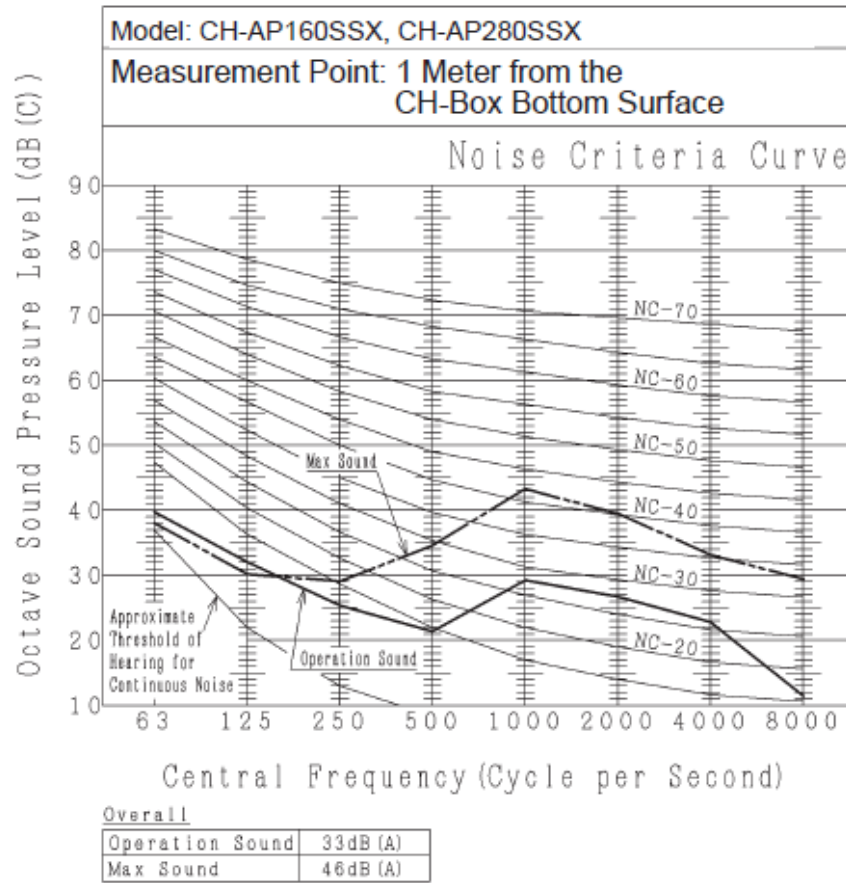
- Piping design

- Comfort design

- ...



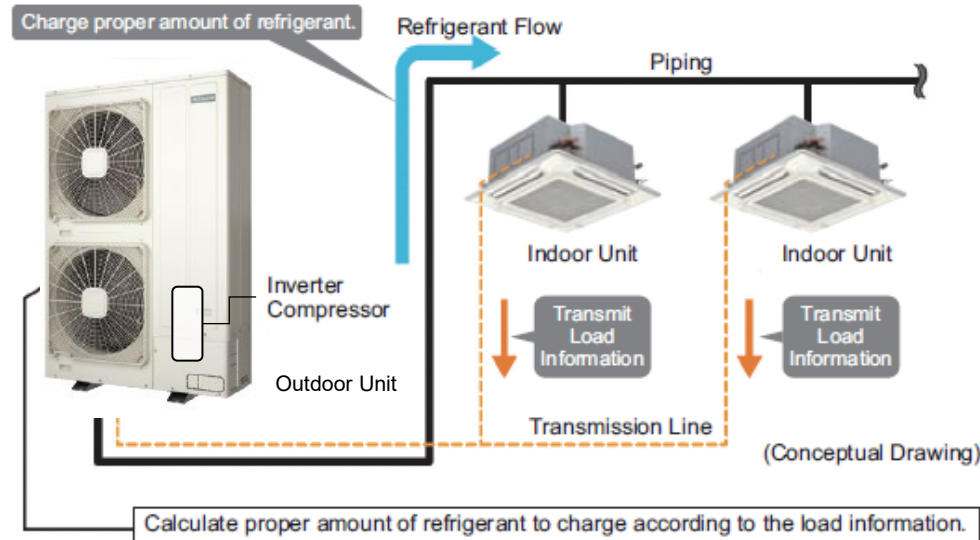
3. Components CH-Box Sound Data



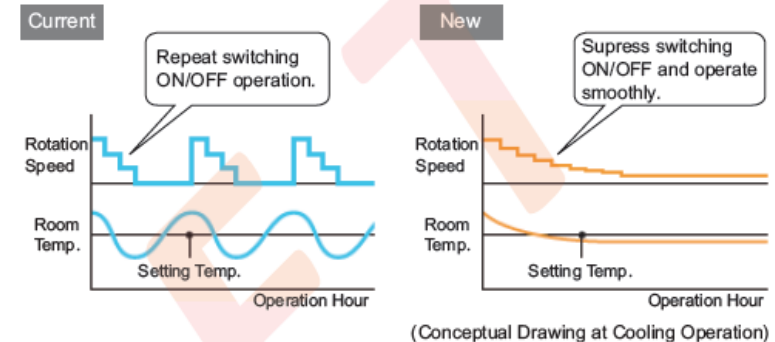
3. Components

New Operation Control

- Smooth Drive Control System
 - Calculate the amount of refrigerant to charge based on the load information from the indoor units. Control inverter compressor rotation speed and charge proper amount of refrigerant to indoor unit at each loading condition. Suppress compressor switching ON/OFF at low load operation for better energy efficiency with smooth operation.



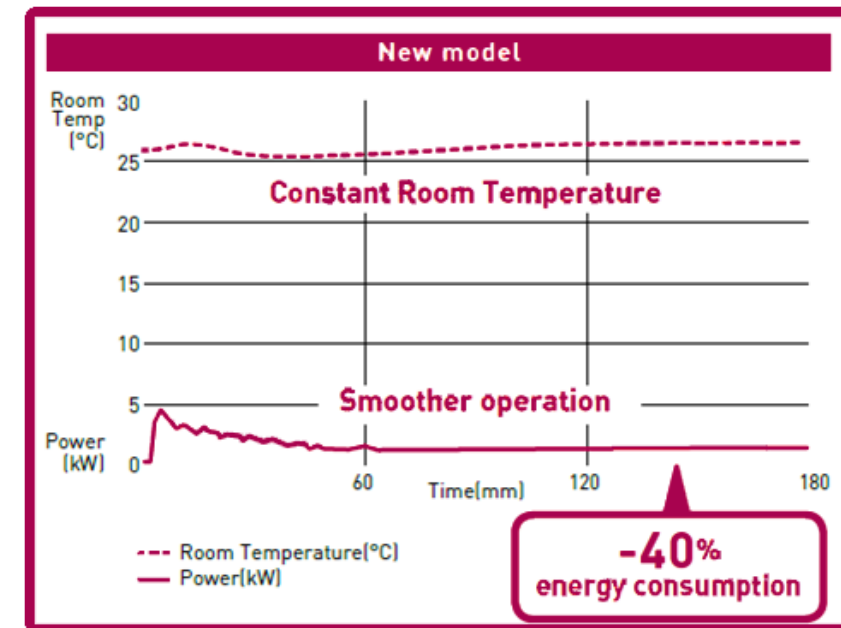
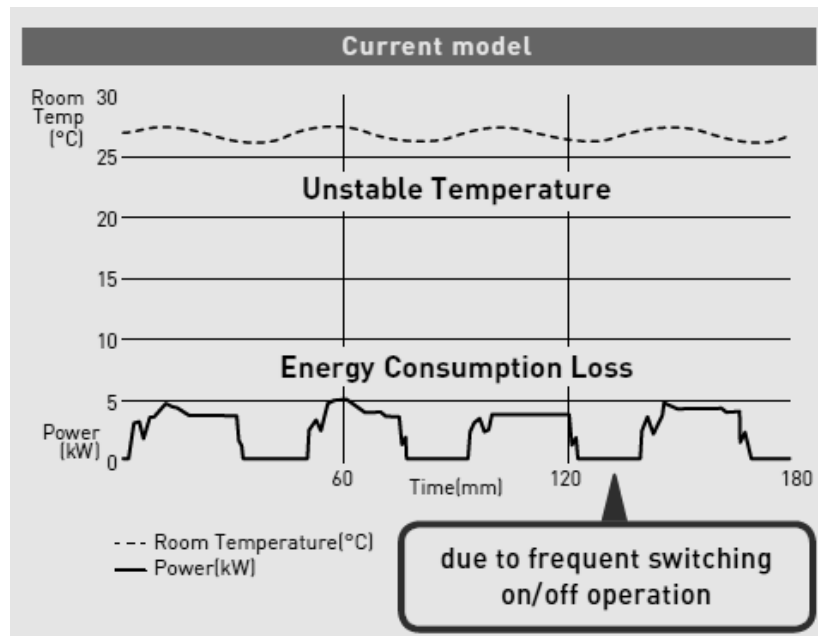
Comparison at Low Load Operation



3. Components

New Operation Control

- Smooth Drive Control System
 - Precise control of 0,1 Hz increments inverter frequency with expended working range down to 10% of maximum capacity.
 - More energy savings allowed by removing compressor switching ON/OFF at low load operation.



4. Standard Functions

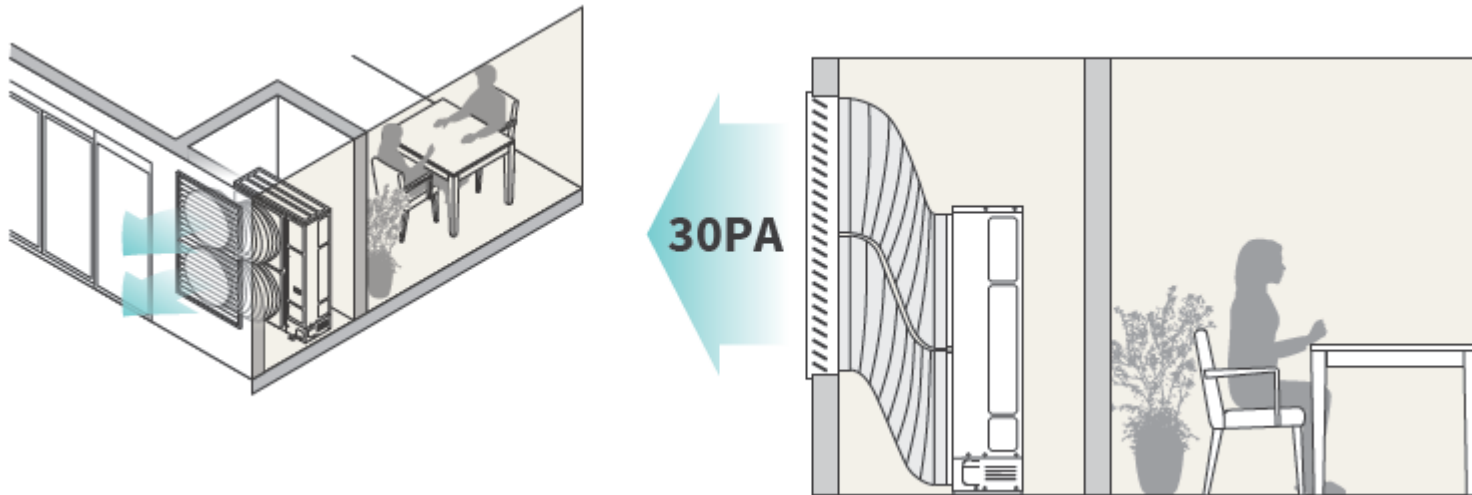
- External Static Pressure
- Installation Flexibility
- Easy Access to Main PCB
- Rotating Operation Function
- Compressor Frequency Control
- Backup Operation Function for Outdoor Unit Failure

Cooling & Heating

air

4. Standard Function External Static Pressure

- Our SET FREE mini outdoor units are designed to allow internal location by the straightness of air flow thanks to higher external static pressure with DC inverter fan, leading to more options for installation and visual aesthetics of buildings.



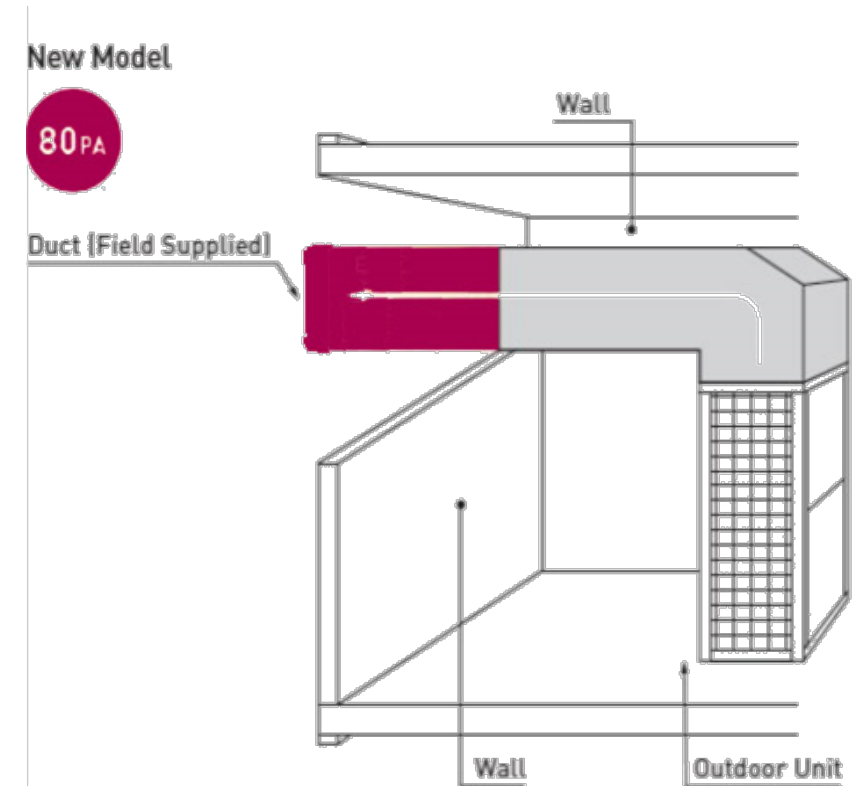
4. Standard Function External Static Pressure

Features

- **80 Pa** external static pressure on all range

Benefits

- Ductable Outdoor Unit
- Allows discreet installation with hidden outdoor unit



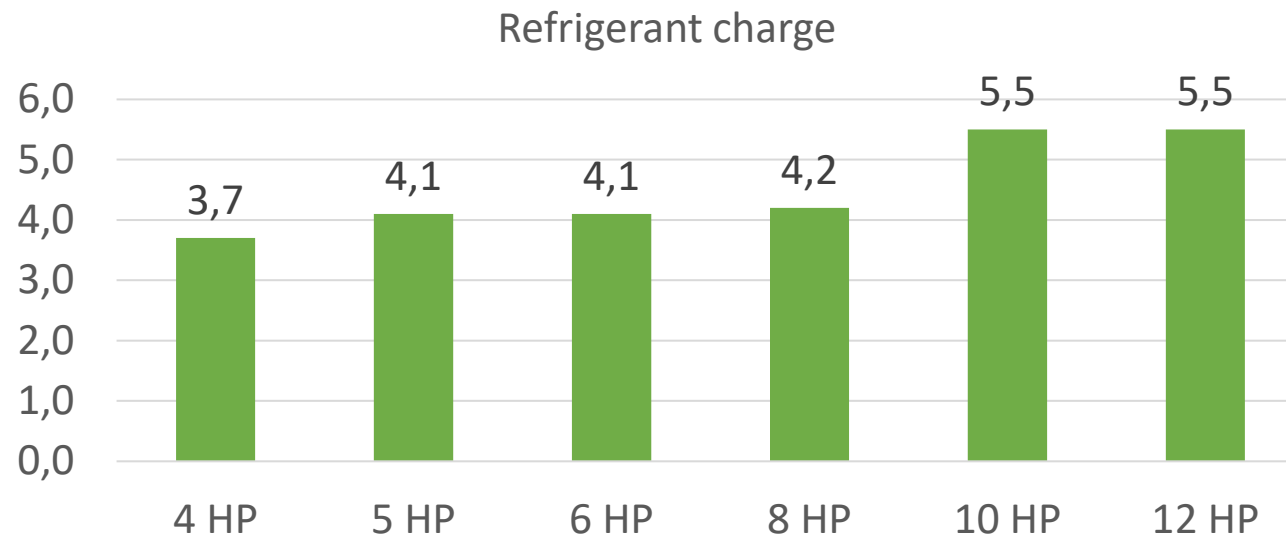
Setting for External Static Pressure	DSW8	
	#1	#2
30Pa	ON	OFF
60Pa	OFF	ON
80Pa	ON	ON

4. Standard Function

Low Refrigerant Charge SetFree Mini

Features

- Low refrigerant charge with only **4,2 kg** of R410A for **8 HP**



Benefits

- Best solution to comply to EN378, especially in hotels and buildings with small rooms

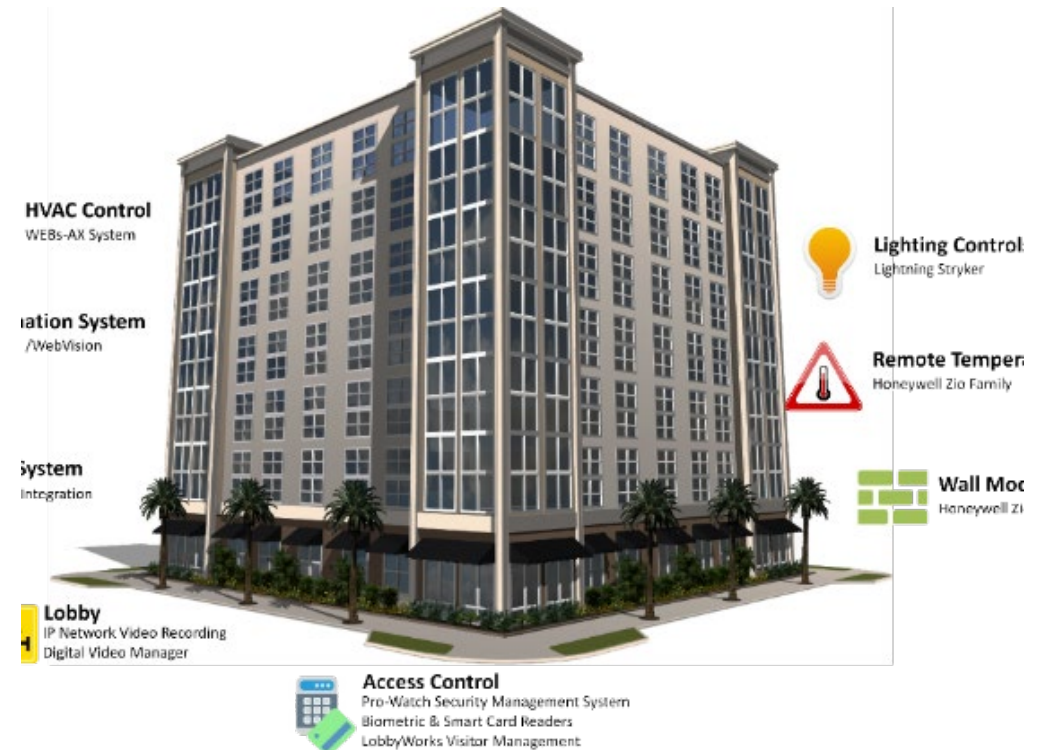
4. Standard Function Smart Building Ready

Communicate easily with other building components

- 3 inputs and 2 outputs included

Built in functions

- Reduce sound level (up to 3 stages)
- Limit energy consumption between 0 and 100% with up to 4 stages
- Operate an emergency stop or a mode change between cooling and heating
- Communicate operation status : Default alarm, Compressor ON/OFF, defrosting...
- Stop operation from contact (thermostat, windows, key card...)





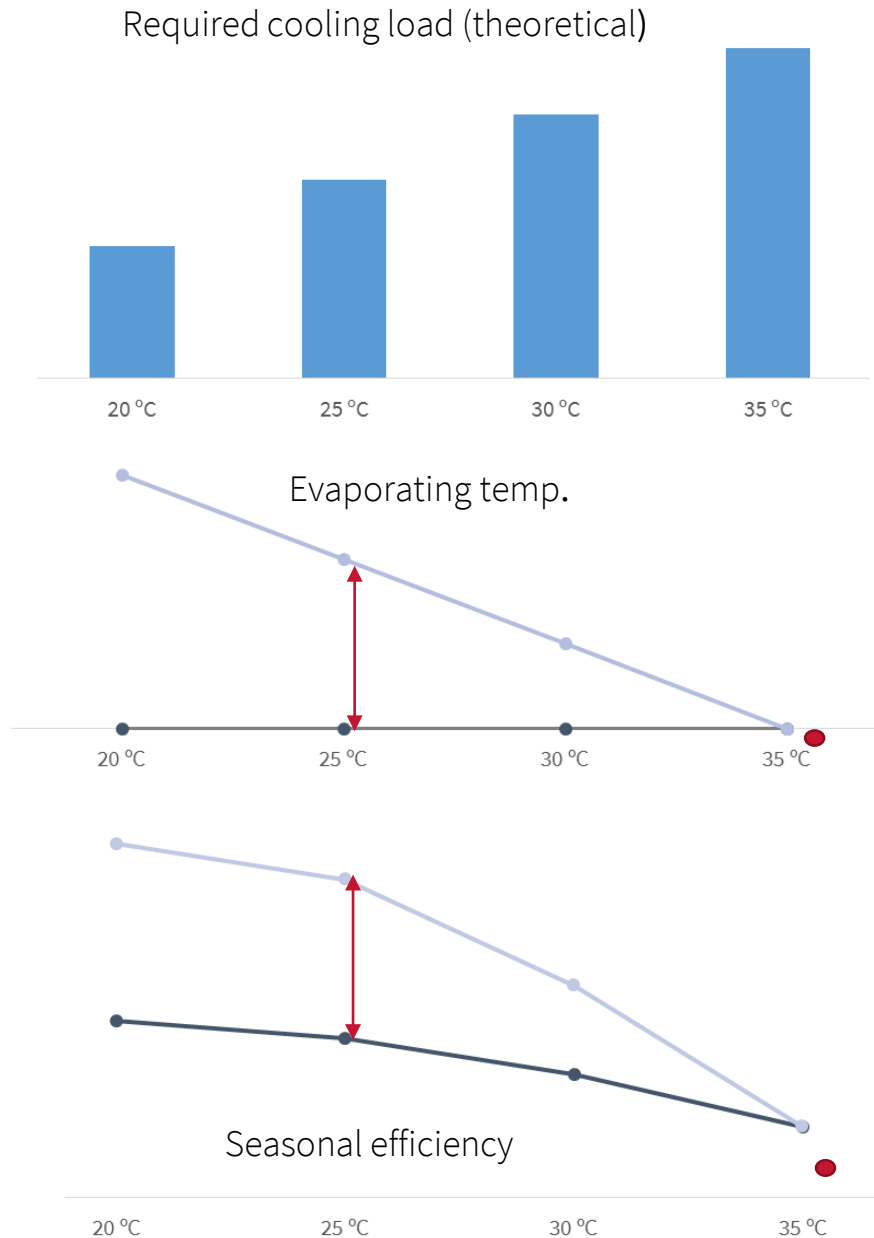
4. Standard Function Operation Control

SMART VARIABLE EVAPORATING TEMPERATURE

Higher evaporating temperature when cooling need is lower increases efficiency

Market solutions

- Evaporating temperature in cooling mode is based on outdoor conditions (Temperature, Humidity)
- Cooling capacity for each indoor unit depends on outdoor conditions
- Theoretical conditions define cooling capacity and energy savings



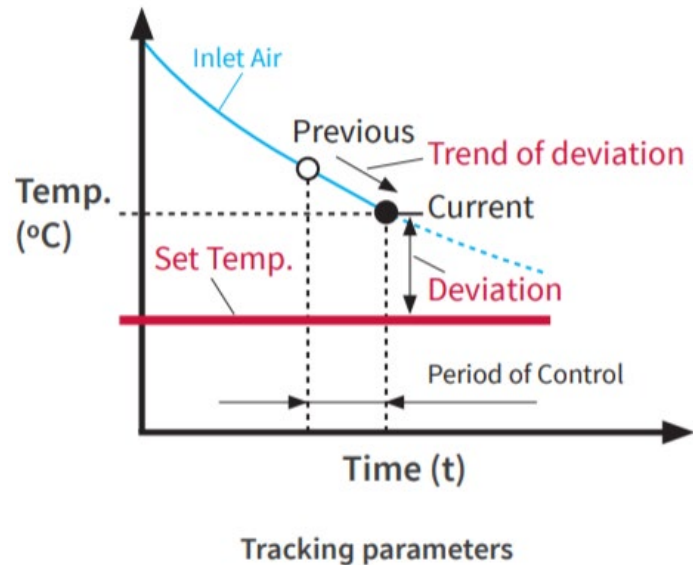
4. Standard Function Operation Control

SMART VARIABLE EVAPORATING TEMPERATURE

Variable evaporating temperature to maximize energy efficiency and comfort

Hitachi unique

- Adaptative evaporating temperature based on indoor conditions and real need



Meeting Room, mid season

High cooling needs: occupancy (variable), computers and sun

Evaporating temperature is decreased :

Blown air temperature = 8°C

Cooling capacity = 100%, nominal energy consumption



Office desk

Low cooling needs : stable occupancy

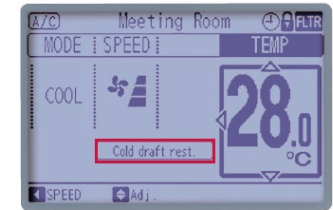
Evaporating temperature is increased :

Blown air temperature = 16°C

Cooling capacity = 53%, with 30% energy consumption savings

4. Standard Function Operation Control Gentle Cool

- Set your comfortable temperature not only for “Room” but also for “Air” in cooling operation.
- You can be in comfort and avoid cold draft from the moment when cooling operation starts, while the room gently cools down.



"Comfort Setting" Control Cool Air in PC-ARFP1E

Potential Discomfort



GentleCool: OFF

GentleCool → No Cold Draft



GentleCool: LOW



GentleCool: MED



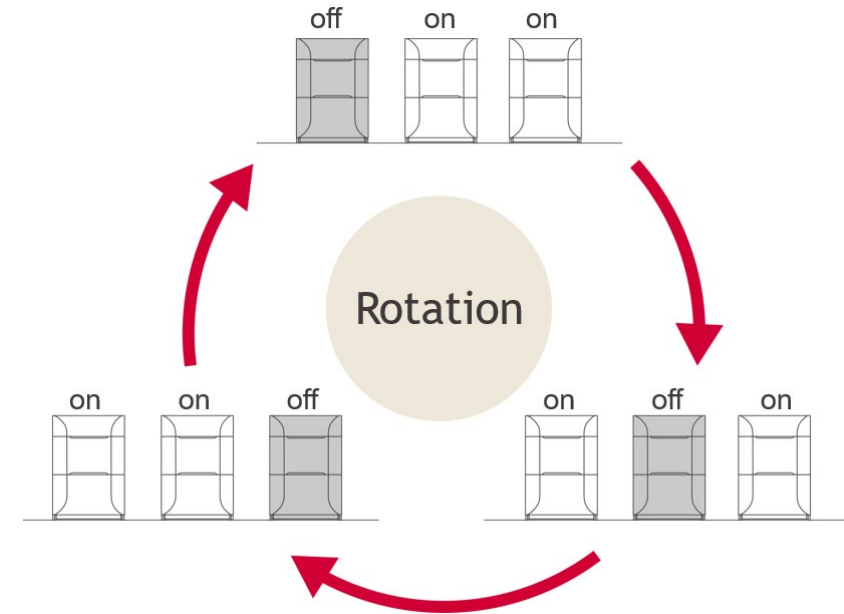
GentleCool: HIGH

4. Standard Function

Rotational for better endurance

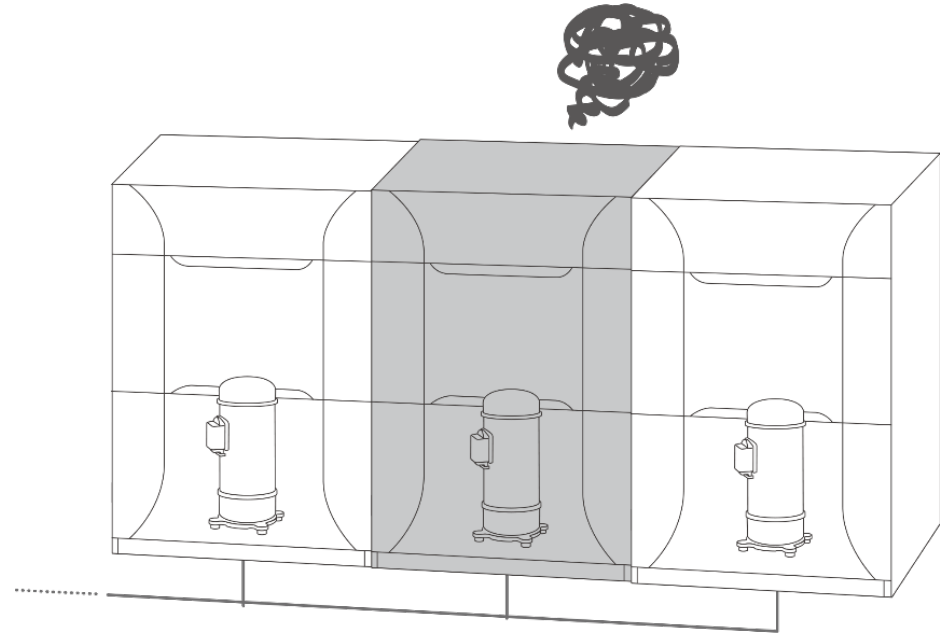
Operation time of each outdoor unit is regulated to reduce compressors load.

Same rotation frequency of inverter compressor is applied during multiple unit operation to have an equivalent load on each compressor.



4. Standard Function Back up function

In case of outdoor unit failure, system can continue to operate using the remaining outdoor units.



5. Optional Functions

- External Input / Output Functions
- Noise Reduction Preference Mode
- Forced Open Valve Mode
- Optional Function Outdoor Unit

Cooling & Heating

air

5. Optional Function External Input / Output Functions

Control Function Number	Setting of Input Functions	Configuration of Output Functions
1	Fixing the heating mode	Operating signal
2	Fixing the cooling mode	Alarm signal
3	Demand stoppage	Compressor ON signal
4	Outdoor unit fan motor start/stop	Defrost signal
5	Forced stoppage	Without setting
6	Control of 40% current demand	-
7	Control of 60% current demand	-
8	Control of 70% current demand	-
9	Control of 80% current demand	-
10	Control of 100% current demand	-
11	Low noise level setting 1	-
12	Low noise level setting 2	-
13	Low noise level setting 3	-
14	External abnormality detection setting	-
0	No setting	No setting

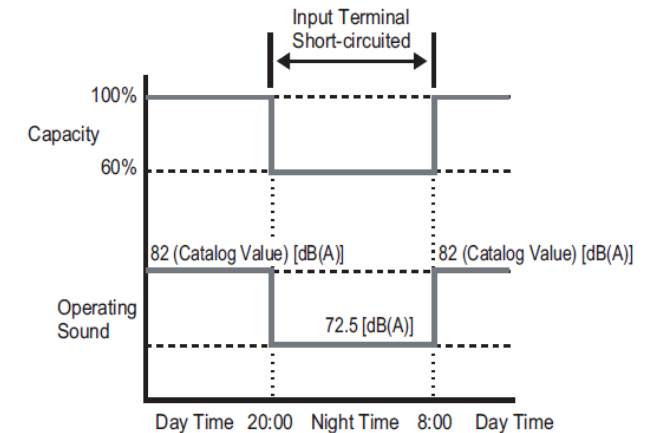
5. Optional Function Noise Reduction Preference Mode

In addition to “Night Shift”, “Noise Reduction Preference Mode”(Enforced Noise Reduction) is adopted.

The sound pressure level for a particular time zone can be set based on the usage environment.*1

Selectable 3 Stages of Sound Pressure Level by External Input/Output Setting at O.D.Unit PCB

Control Function No.	Operating Sound (Targeted Value) (tbc)	Outdoor Unit Capacity (Specification Ratio)
No Setting	Catalog Value	100%
11 (Low Noise Setting 1)	Catalog Value -2[dB]	80%
12 (Low Noise Setting 2)	Catalog Value -5[dB]	60%
13 (Low Noise Setting 3)	Catalog Value -8[dB]	40%



Noise reduction setting 1: 80% of standard capacity.

Noise reduction setting 2: 60% of standard capacity.

Noise reduction setting 3: 40% of standard capacity.

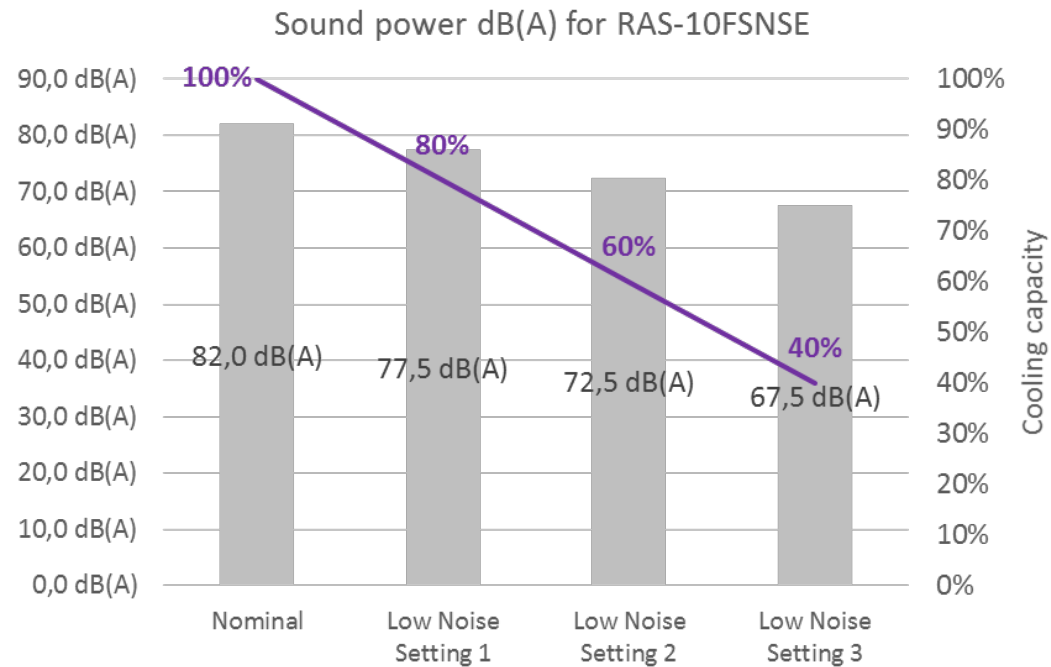
Notes for Setting:

*1: A range of performance and operation are limited due to enforced decreasing on rotation frequency of compressor and outdoor fan.

*2: Above table shows approximate values. The value may be temporarily higher than indicated.

5. Optional Function Noise Reduction Preference Mode

Features



Benefits

- Best VRF solution to fulfill local noise regulations : up to 14,5 dB(A) noise reduction with embedded functions

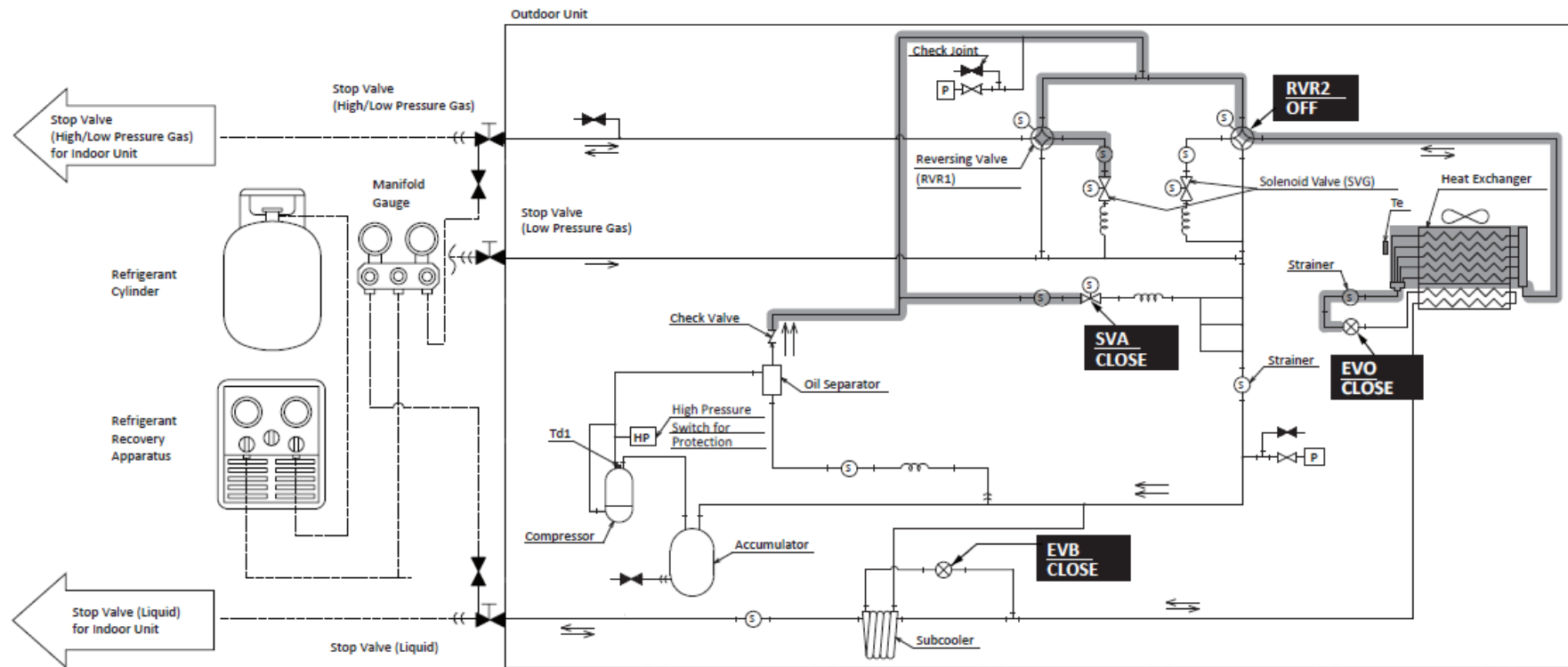
5. Optional Function

Optional Function Outdoor Unit

No.	Setting Item	SEG2	SEG1	Contents
17	Low noise setting (in the case of low noise setting, the working range in cooling/heating will be restricted)	db	00	Initial setting
			01	Maximum fan rotation limit 1
			02	Maximum fan rotation limit 2
			03	Maximum fan rotation limit 3
			04	Frequency limit 1
			05	Frequency limit 2
			06	Frequency limit 3
			07	Operating sound value, 5 and 6HP: 74.5 dB(A) / 8~14HP: 77.5 dB (A) / 6~24HP: 82.5 dB(A)
			08	Operating sound value, 6~14HP: 72.5 dB(A) / 16~24HP: 77.5 dB (A)
			09	Operating sound value, 6~14HP: 69.5 dB(A) / 16~24HP: 72.5 dB (A)

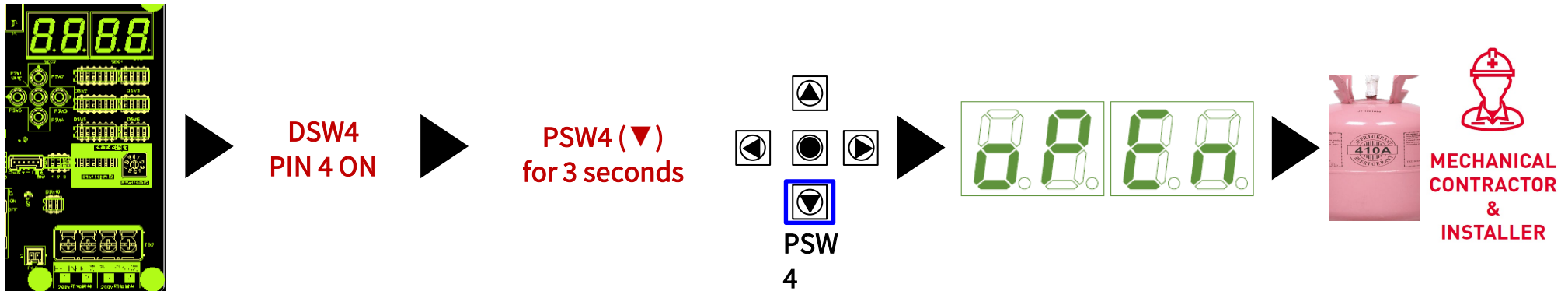
5. Optional Function Forced Open Valve Mode

- Simplify “refrigerant recovery & evacuation work” and “air tight test” during servicing.
- By fully opening the expansion valves of outdoor unit (EVO, EVB) and the expansion valve of indoor unit (EVI), and opening the solenoid valve of outdoor unit.



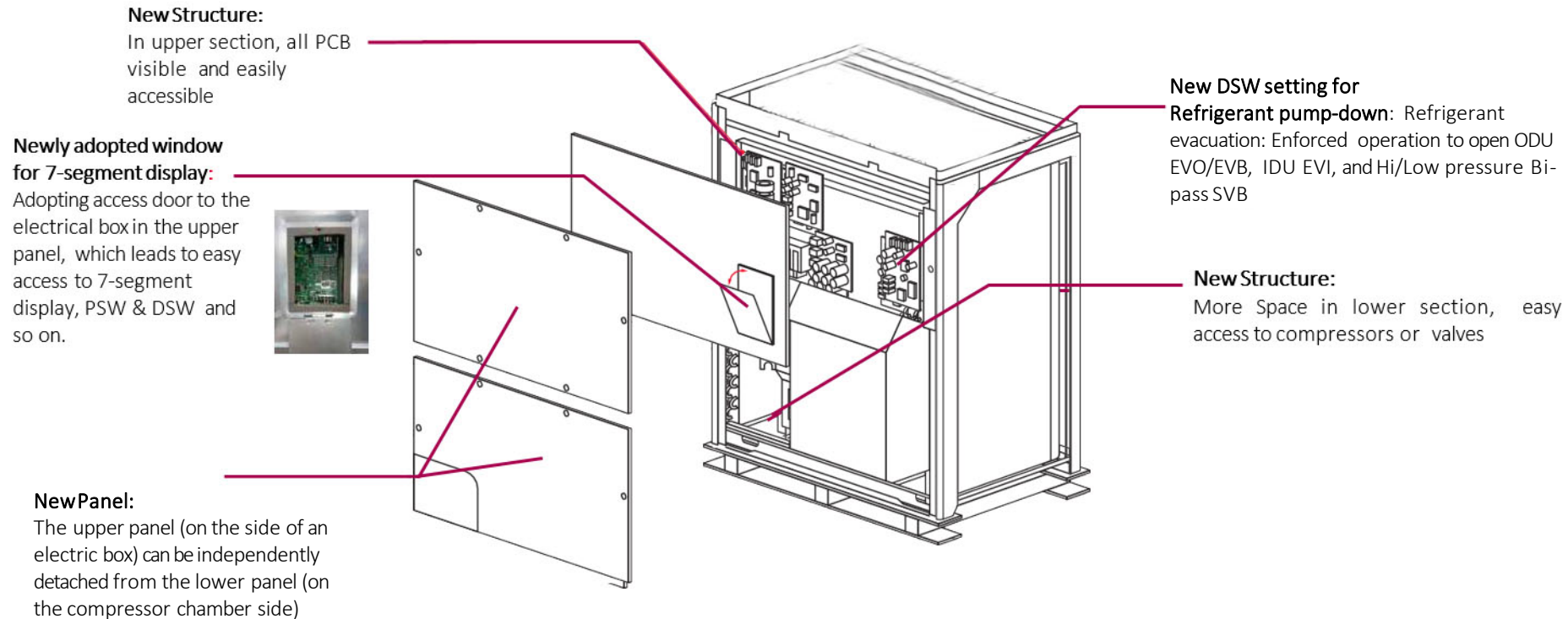
5. Optional Function Forced Open Valve Mode

Procedure:



5. Optional Function Easy Maintenance Access

- Easy access to compressors and valve : more space in lower section



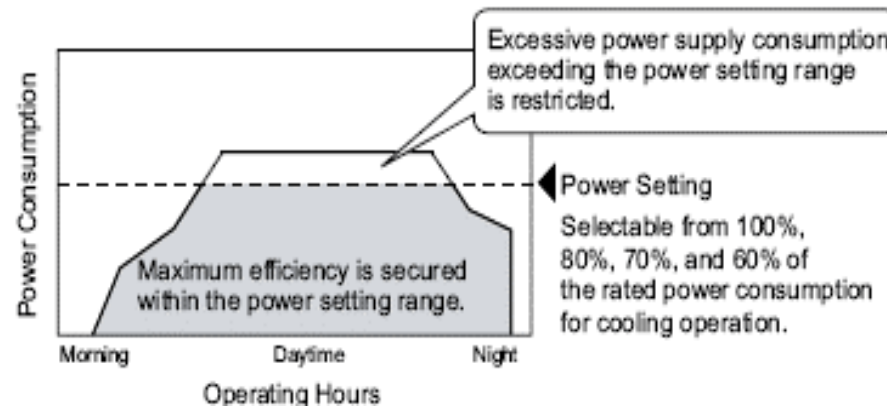
5. Optional Function

Optional Function Outdoor Unit

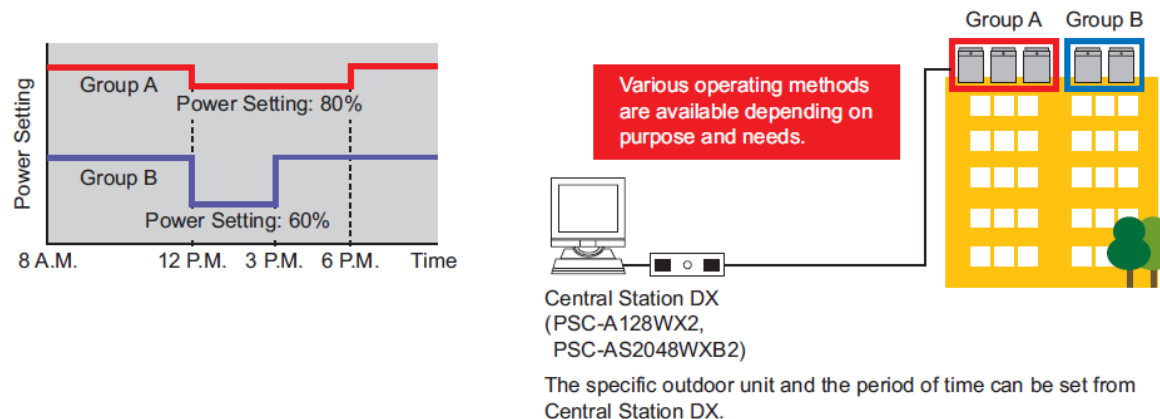
- New Functions

- Demand Control

Adopting self-demand function which drastically decreases power consumption has largely improved energy-saving.



- Schedule Setting for Each Group by Central Station DX



5. Optional Function

Optional Function Outdoor Unit

- Control over operating values

Setting method in the PCB on the outdoor unit			
Operation Mode	Setting	Managed Element	Set Element
Cooling	Adjust the lenght of the pipes between the outdoor and indoor units.	Opening on the expansion valve on the indoor unit.	Target super-heating value on the indoor unit heat exchanger.
	Capacity priority.	Compressor frequency. rotation	Target suction pressure value for the compressor.
	Demand.		Electrical power demand 60/70/80/100%.
Heating	Adjustment in height between indoor units.	Opening on the expansion valve on the indoor unit.	Target super-cooling value on the indoor unit heat exchanger.
	Capacity priority.	Compressor frequency. rotation	Target discharge pressure value for the compressor.
	Start-up priority.	Opening on the expansion valve on the outdoor unit.	

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**Thank you for
your attention**

Cooling & Heating