VRF Product Overview

Compiled referring to training material in JCH

JCH-WX VRF-Com
Hitachi-Johnson Controls Ari Conditioning

The date of publication: Feb 20th 2019
Version: 1.00

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Air conditioning solutions

VRF Product Overview

TRAINING OBJECTIVES

- Capacity Range
- Expanded Line-up
- Feature & Benefit
- Design Flexibility
- Adaptability

Capacity Range

- Single module: Up to 24HP

(8-12HP)

(14-18HP)

(20-24HP)

Capacity Range

- Two module: Up to 48HP

(26-28HP)

(30-34HP)

(36-42HP)

(44-48HP)

Capacity Range

- Three module: Up to 72HP

(50HP)

(52-58HP)

(60-66HP)

(68-72HP)

Capacity Range

- Four module: Up to 96HP

(68-72HP)

(74HP)

(76-78HP)

(80-96HP)

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VRF Product Overview

Expanded Line-up

Expanded Line-up

Combination Configuration

Standard Model (HNCQ series)

Old

	Capacity	5HP	6HP	8HP	10HP	12HP	14HP	16HP	18HP	20HP	22HP	24HP
Standard	Structure	N/A							Combination of Base units			
	Dimension (W x D x H)			950 x 765 x 1720			1210 x 765 x 1720					
	HEX			2 rows	3 rows		3 rows					
	Compressor			INV 50cc	INV 65cc		INV 65cc + **Fix**					

New

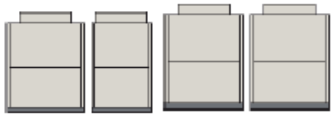
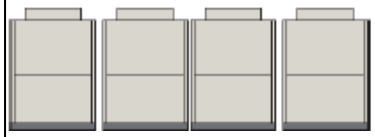
	Capacity	5HP	6HP	8HP	10HP	12HP	14HP	16HP	18HP	20HP	22HP	24HP
Standard	Structure	N/A										
	Dimension (W*D*H)			958 x 782 x 1725			1218 x 782 x 1725			1608 x 782 x 1725		
	HEX			2 rows	3 rows		3 rows			3 rows		
	Compressor			INV 50cc	INV 80cc		INV 50cc x 2			INV 80cc x 2		

Expanded Line-up

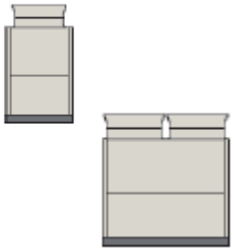
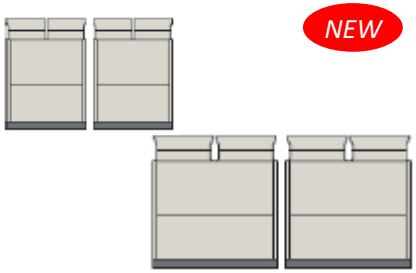
Combination Configuration

Standard Model (HNCQ series)

Old

HP	8-16	18-24	26-32	34-48	50-54	56-72	74-96
Cabinet	 Single Module	 2 Units		 3 Units	 4 Units		

New

HP	8-16	18-24	26-32	34-48	50-54	56-72	74-96
Cabinet	 Single Module		 NEW 2 Units		 NEW 3 Units	 NEW 3-4 Units	

Expanded Line-up

Line-up Comparison

Standard Model (HNCQ series)

HP	8	10	12	14	16	18	20	22	24	5	4-80	82-88	90-96
HITAHCHI	 958*782*1725			 1218*782*1725			 1608*782*1725						
MELCO	 920*740*1650			 1220*740*1650									
DAIKIN	 930*765*1685			 1240*765*1685									
LG	 920*760*1680			 1240*760*1680									
Samsung	 880*765*1695			 1295*765*1695				 1295*765*1795					

Large Single Module !

Expanded Line-up

Line-up Comparison

Standard Model (HNCQ series)

HP	8	10	12	14	16	18	20	22	24	56-60	62-72	74-80	82-88	90-96
HITAHCHI	958*782*1725			1218*782*1725			1608*782*1725							
MELCO	920*740*1650			1220*740*1650			1750*740*1650	1220*740*1650	2160*740*1650					
DAIKIN	930*765*1685			1240*765*1685				1880*765*1657						
LG	920*760*1680			1240*760*1680				1880*760*1680						
Samsung	880*765*1695			1295*765*1695				1295*765*1795						

Large Single Module !

Summary table

Item			Unit	HNCQ Series
Capacity	HP class			8- 96
	Nominal Cooling		kW	22.4 - 272.0
	Nominal Heating		kW	25.0 - 300.0
Maximum connectable indoor unit quantity				13 - 64
Combination capacity ratio between ODU and IDU			%	50 - 130
Maximum piping length	Total piping length		m	1,000
	Refrigerant piping length	Actual	m	165
		Equivalent	m	190
	Between piping connection kit and each outdoor unit		m	10
	Between 1st branch multi kit and farthest indoor unit		m	90
	Between multi kit and each indoor unit		m	40
	Between outdoor units (combination of base units)		m	0.1
	Between outdoor unit and indoor units	ODU above IDU	m	50 (standard) / Up to 110m (custom order)
		IDU above ODU	m	40
	Between indoor units		m	30
Cooling operation range *			℃DB	-5 to 52
Heating operation range *			℃WB	-20 to 15

* For more details, please consult your distributors or dealer, or, refer to technical catalogue.
** Concerning maximum level difference between ODU and IDU (ODU above IDU),
Standard: up to 50m/Custom Order: up to 110m. Longer piping (up to 110m) is available for 8 to 54HP models only.
Maximum level difference for 56-96HP is 90m.

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Feature & Benefit

HIGH EFFICIENCY

- **EER**
  Up to 4.50
- **COP**
  Up to 4.90

DESIGN FLEXIBILITY

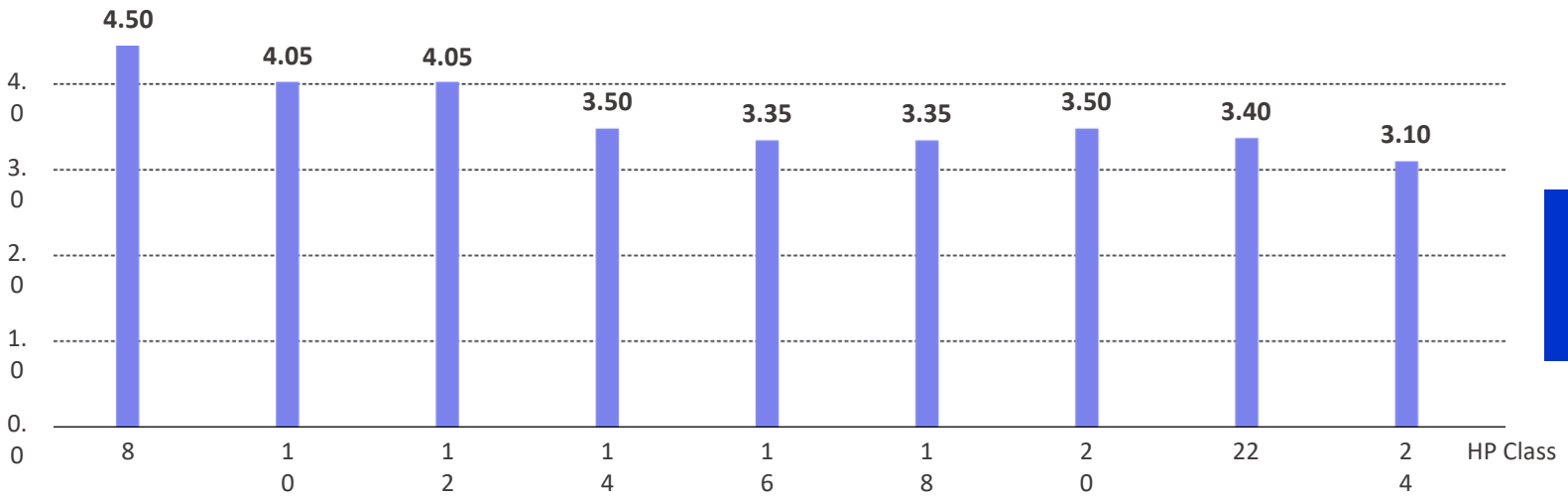
- **Smaller cabinet**
  Single module: 24HP
- **Better piping limit**
  Level difference between ODU and IDU: Up to 110m
- **Wider operation range**
  From -20℃ to +52℃
- **Higher ESP of ODU**
  Up to 80Pa

COMFORT

- **Smooth drive**
- **To prevent failure**
- **Back-up function**

High Efficiency(HNCQ series)

EER



EER up to 4.50

Notes:

1. The cooling and heating performances are the values when combined with our test indoor units.

Cooling Operation Conditions:
Indoor Air Inlet Temperature: 27°C DB 19°C WB
Outdoor Air Inlet Temperature: 35°C DB
Piping Length: 7.5 Meters

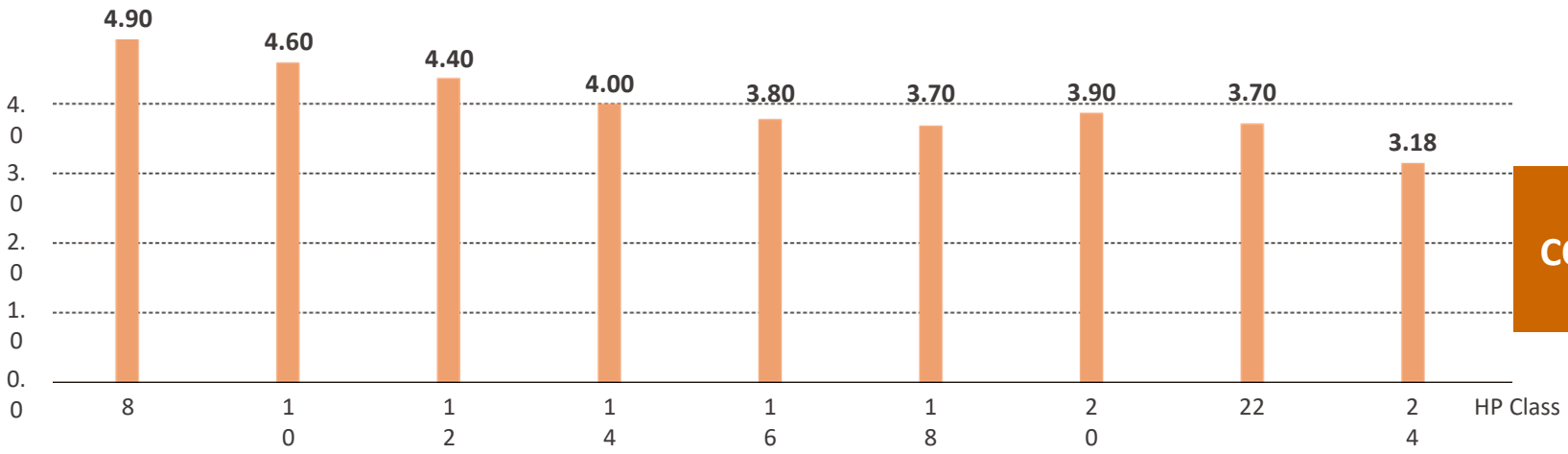
Heating Operation Conditions:
Indoor Air Inlet Temperature: 20°C DB
Outdoor Air Inlet Temperature: 7°C DB 6°C WB
Piping Lift: 0 Meter

2. Please see the technical catalogues for more details.

HIGH EFFICIENCY

High Efficiency(HNCQ series)

- COP



COP up to 4.90

Notes:

1. The cooling and heating performances are the values when combined with our test indoor units.

Cooling Operation Conditions:
Indoor Air Inlet Temperature: 27°C DB 19°C WB
Outdoor Air Inlet Temperature: 35°C DB
Piping Length: 7.5 Meters

Heating Operation Conditions:
Indoor Air Inlet Temperature: 20°C DB
Outdoor Air Inlet Temperature: 7°C DB 6°C WB
Piping Lift: 0 Meter

2. Please see the technical catalogues for more details.

HIGH EFFICIENCY

High Performance

New Technology to achieve “Higher Performance”

NEW **Selling Point**

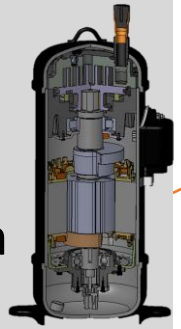
✓ **Compressor Control**

“Smooth Drive Control”

NEW **Selling Point**

✓ **Compressor**

Improve efficiency at low load operation



NEW **Selling Point**

✓ **Bell-mouth**

Long Bell-mouth

NEW **Selling Point**

✓ **Heat Exchanger**

- Σ Shape Heat Exchanger (STD>14HP)
- Improve path structure for better efficiency at low load operation

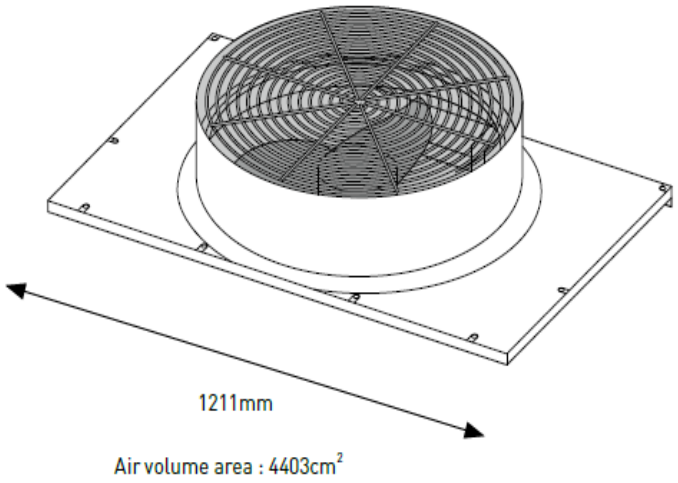
High Performance

- FAN

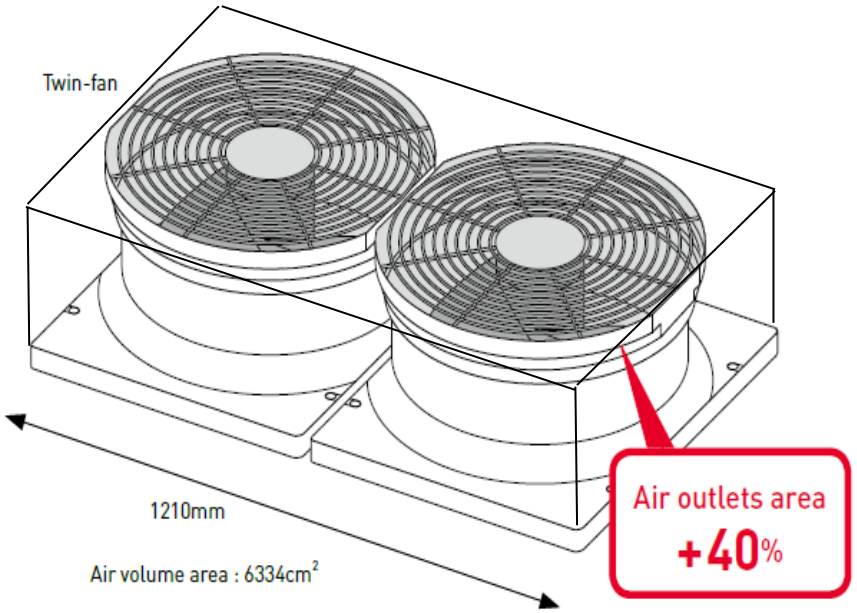
Improved!

Expansion of air outlets

Current model



New model

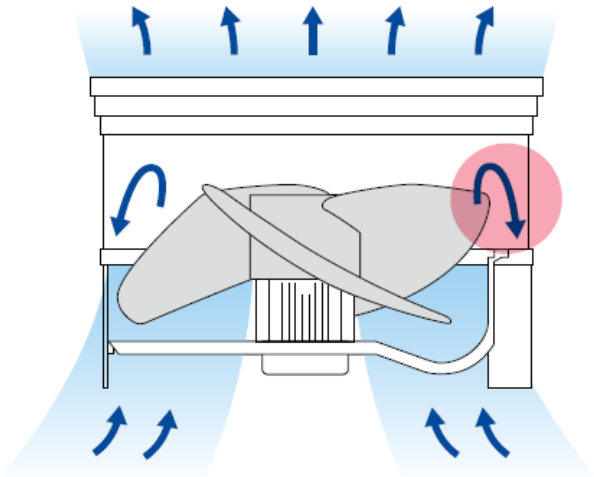


High Performance

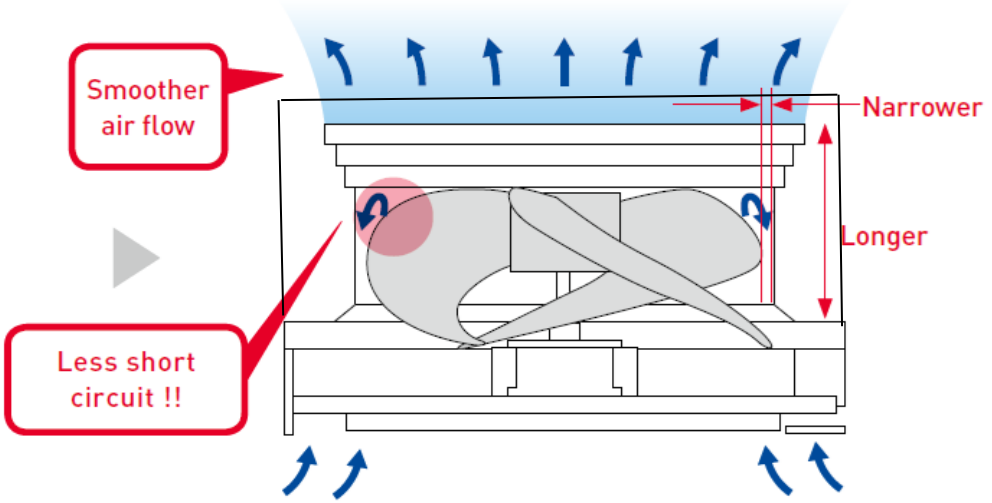
- FAN

Improvement in bell-mouth

Current model



New model

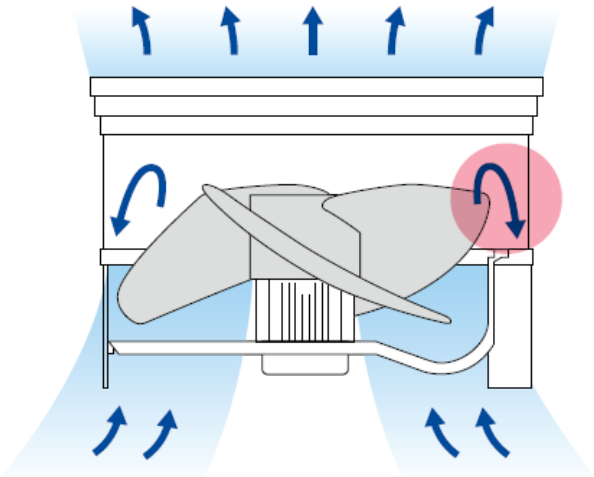


High Performance

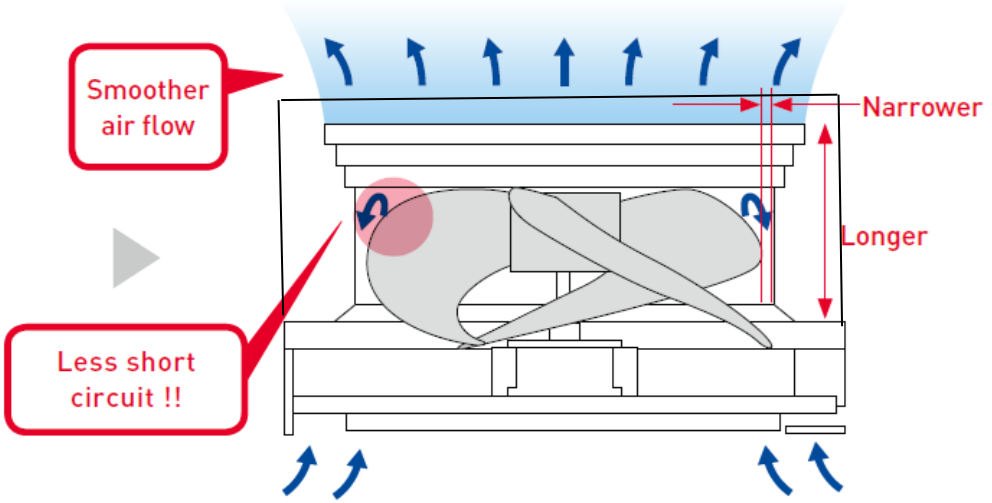
- FAN

Improvement in bell-mouth

Current model

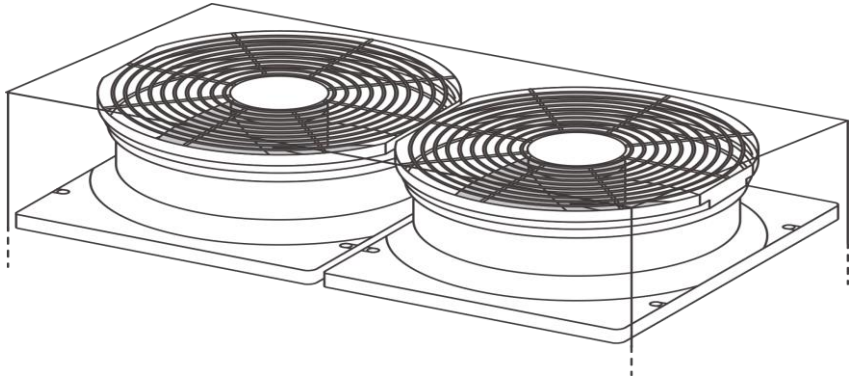


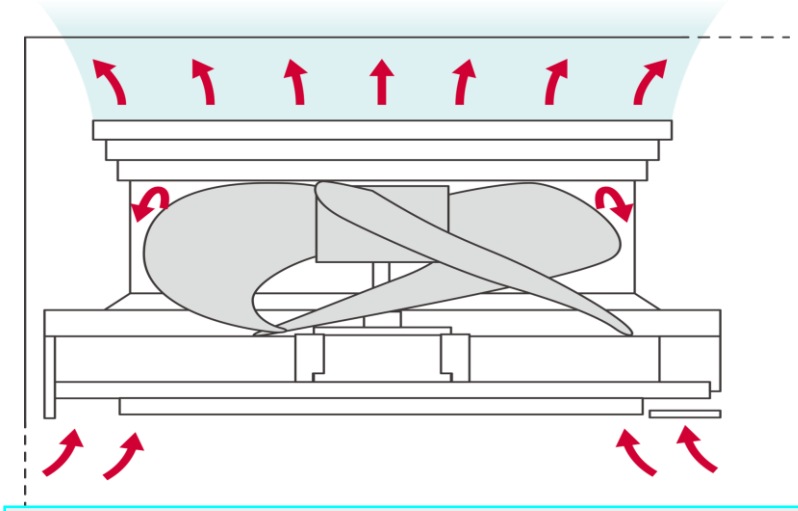
New model



High Performance

- FAN





Expansion of Air-inlet area

Improvement of Air flow

- Improvement of airflow volume by 23% (12HP)
- Energy consumption in the driving shaft has decreased by 20% on average

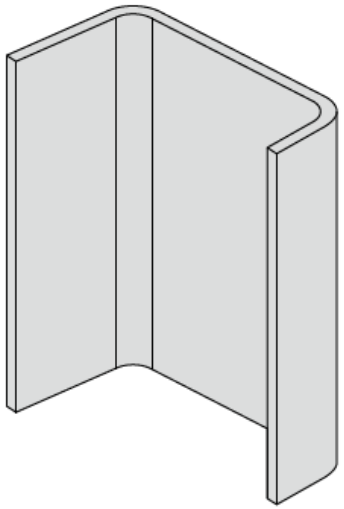
Improved!

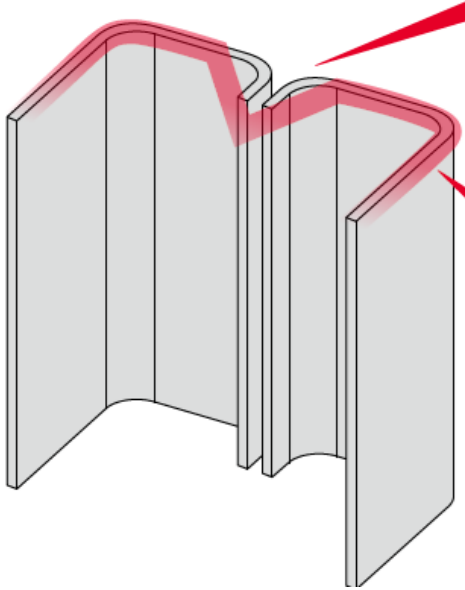
High Performance

- Heat Exchanger

New shape

Current model (14,16HP)	New model (14-24HP)





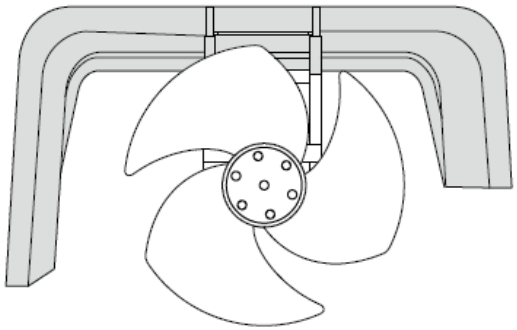
Hitachi Original!

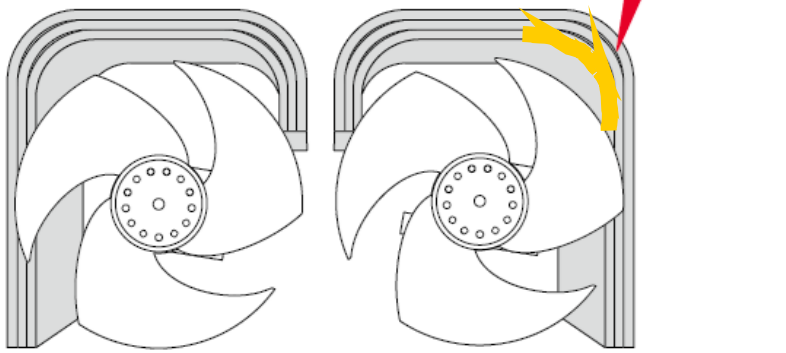
High Performance

- Heat Exchanger

New angle

Current model (14,16HP)	New model (14-24HP)



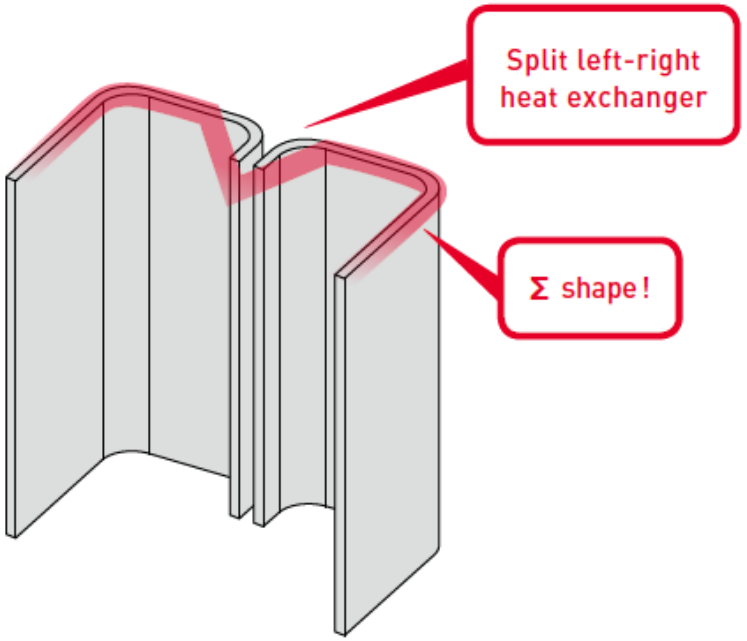


Improved!

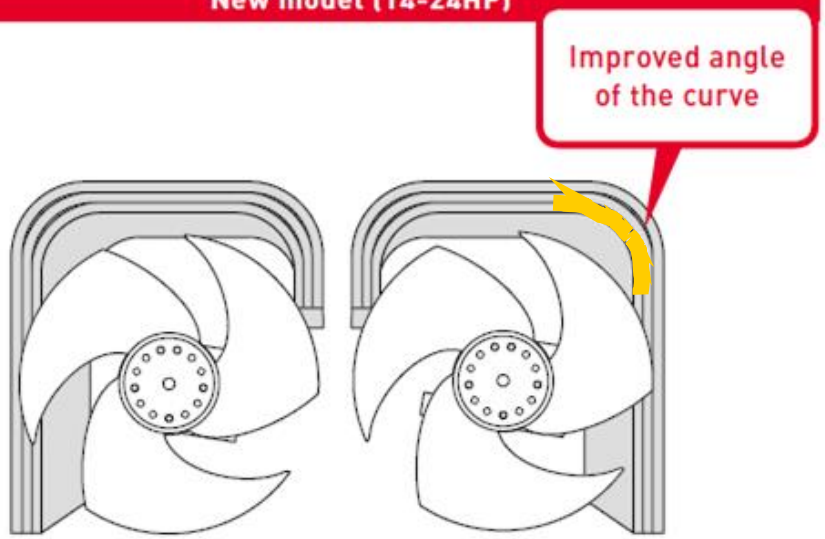
High Performance

- Heat Exchanger

New model (14-24HP)



New model (14-24HP)



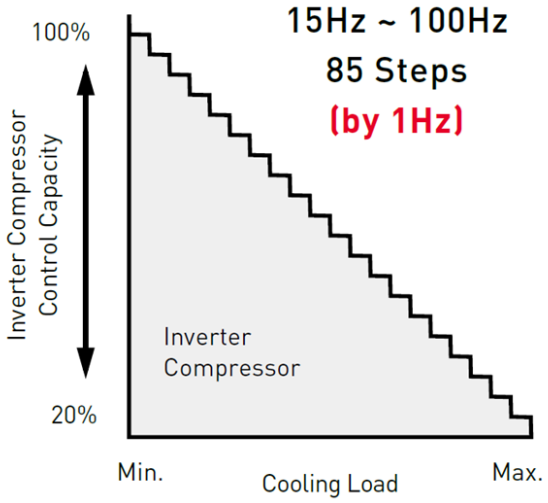
- The heat exchange area has been increased by more than **10%** (12HP)
- Greater heat exchange efficiency

Improved!

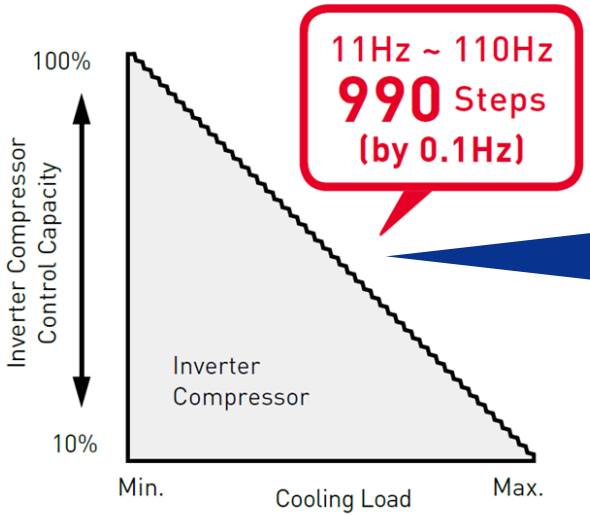
High Performance

- Compressor

Current model*



New model*



Improved!

New DC Inverter Compressor

*Example at 12HP

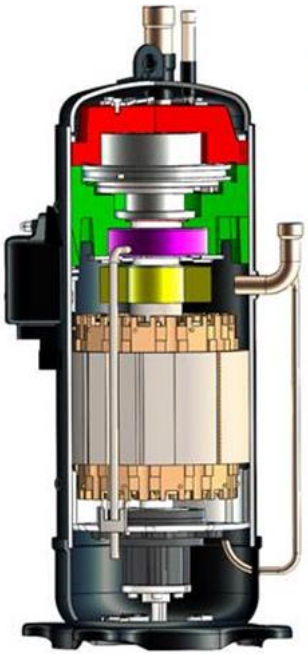
High Performance

- Compressor

Current model*

16 – 100 Hz
Increments 1.0 Hz
(85 steps)

New model*



Improved!

New DC Inverter Compressor

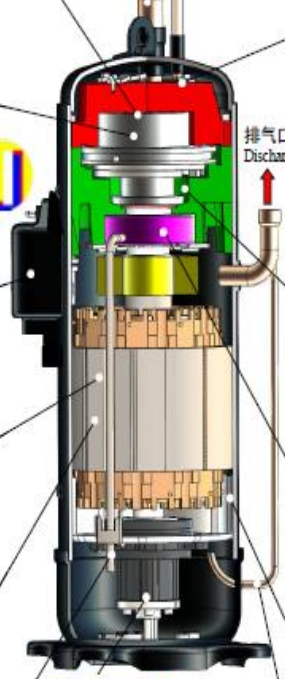
11 – 110 Hz
Increments 0.1 Hz
(990 steps)

High Performance

- Compressor

The 14 colored parts are new!

日立高能效(APF)喷气增焓涡旋式直流变频压缩机
Hitachi High Efficiency (APF) Gas Injection DC Inverter Scroll Compressor



优化非对称涡旋线
Improved asymmetric wrap
采用新型非对称涡旋型线，降低泄漏损失，减少吸气无效过热，更适合APF条件，提高压缩机效率。
New asymmetric wrap is more suitable for APF conditions and improving compressor efficiency by reducing leakage and invalid suction superheat.

非接触式油膜密封
Non-contact oil membrane
压缩腔的轴向与径向采用非接触式密封，依靠润滑油形成油膜密封，降低摩擦，提高效率和可靠性。
Non-contact seal adopted in anvial and diametrical of compression chamber, oil film seal formed by lubricating oil , so friction dinimished and better effiency and reliability achieved.

电源端子盖设计
Terminal Cover
安装更稳固，安全性更高，防护等级更高。
Installation more stable, more secure, higher rank of protection.

集中卷电机
Concentrated Motor
集中卷电机线圈高度降低，铜损减少，中低速区域效率更高，更适应APF条件。
Concentrated winding has advantages in mid-low speed area with lower height and less copper loss, and more adaptable to APF condition.

高转速特性
High Speed Features
转速范围10-140rps，能力范围更宽广。
Speed range 10-140 rps, a wider range of capability achieved.

内部油循环构造
Internal oil circulation structure
润滑油实现内部循环，减少过热损失，降低吐油率，提高效率及可靠性
Internal circulation of lubricating oil to reduce over-heat losses and oil discharge rate and to improve efficiency and reliability.

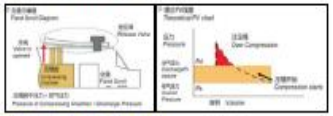
直接吸气
Direct Suction
吸气预热小，容积效率高
Little suction preheat, high volumetric efficiency.
吸气口 Suction

容积式齿轮油泵
Positive displacement gear pump
容积式齿轮油泵保证高低频均能满足必要供油量，提升压缩机的可靠性
Positive displacement gear pumps ensure high and low frequency both can meet the necessary oil supply and improve the compressor reliability.

喷气增焓技术
Gas injection technique
降低排气温度，增加压缩机能力，拓宽使用范围，提升产品性能
Lower discharge temperature, bigger compressor capacity, wider running range, better product performance.

泄压阀构造
Release-Valve
提高部分负荷能效，适应变压比工况，提升压缩机性能。
Improving partial load energy efficiency, adapting to the condition of variable pressure ratio, upgrading compressor performance.

排气口 Discharge



中间压力伺服机构
Mid-pressure server
根据运行压力动态调整中间压力，实现了轴向柔性，优化动定涡旋盘啮合，提高产品性能。
Adjusting mid-pressure according to operation pressure dynamics, achieving axial flexibility, optimizing orbiting and fixed scroll engagement, improving product performance.

高可靠性轴承
Highly-reliable bearings
采用圆柱轴承加调心球轴承的轴承组，提高压缩机的可靠性。
Cylindrical bearings plus aligning ball bearings to improve compressor reliability.

高压腔结构
High Pressure Type
大排气缓冲容积，能降低运行时的气流噪音和振动。
Big displacement buffing capacity can bring down operation noise and vibration.

动态油平衡构造
Dynamic oil balance structure
油平衡管实现并联压缩机油量动态平衡，保证多台压缩机并联使用的可靠性，申请了专利。
Oil balance pipe to achieve dynamic oil balance of compressors in paralle operation, ensure their oprationality; patent applied.

Hitachi Original!

Compressor performance +4.6% improved

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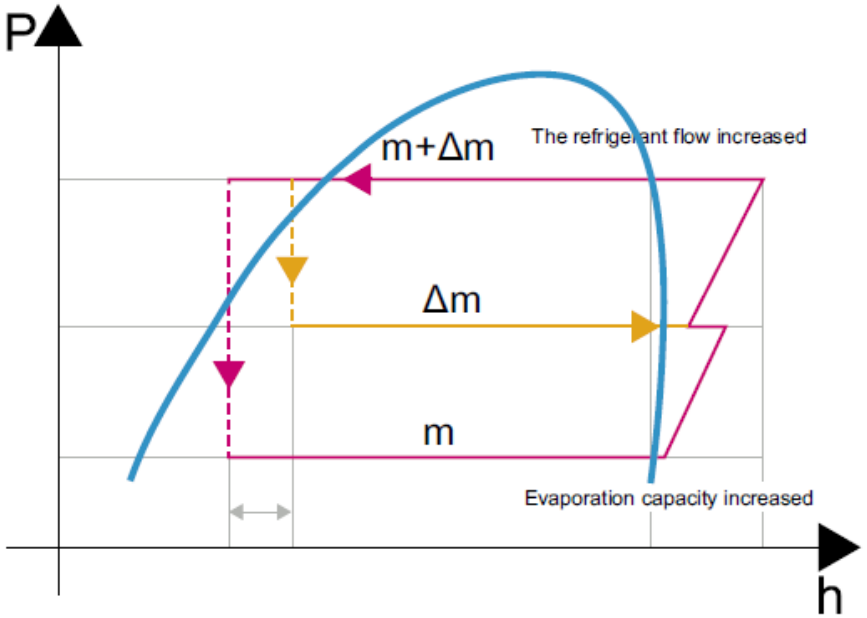
High Performance

- Compressor

- **To increase about 20% capacity at low ambient heating compared to without EVI function;**
- **Improve EER/COP at rated conditions**



High Performance

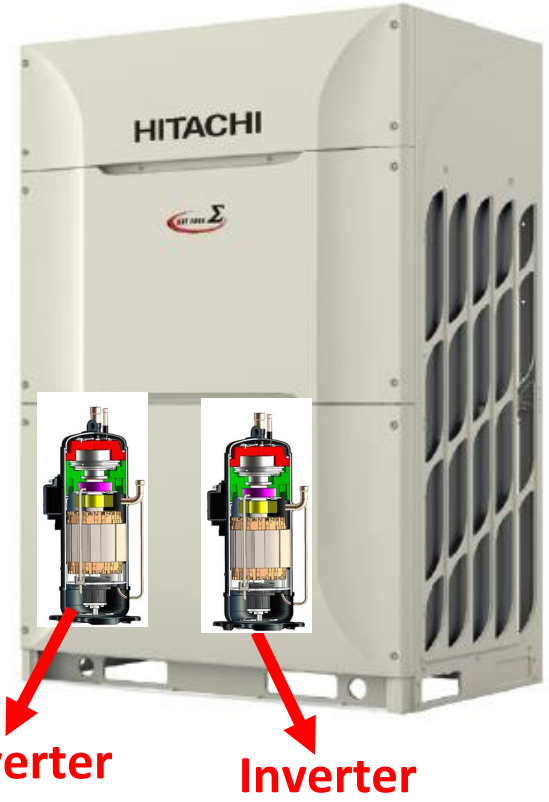
- Compressor

Improved!

Current model*

New

New model*



Longer pipe range

High Performance

- Compressor Control

Smooth Drive

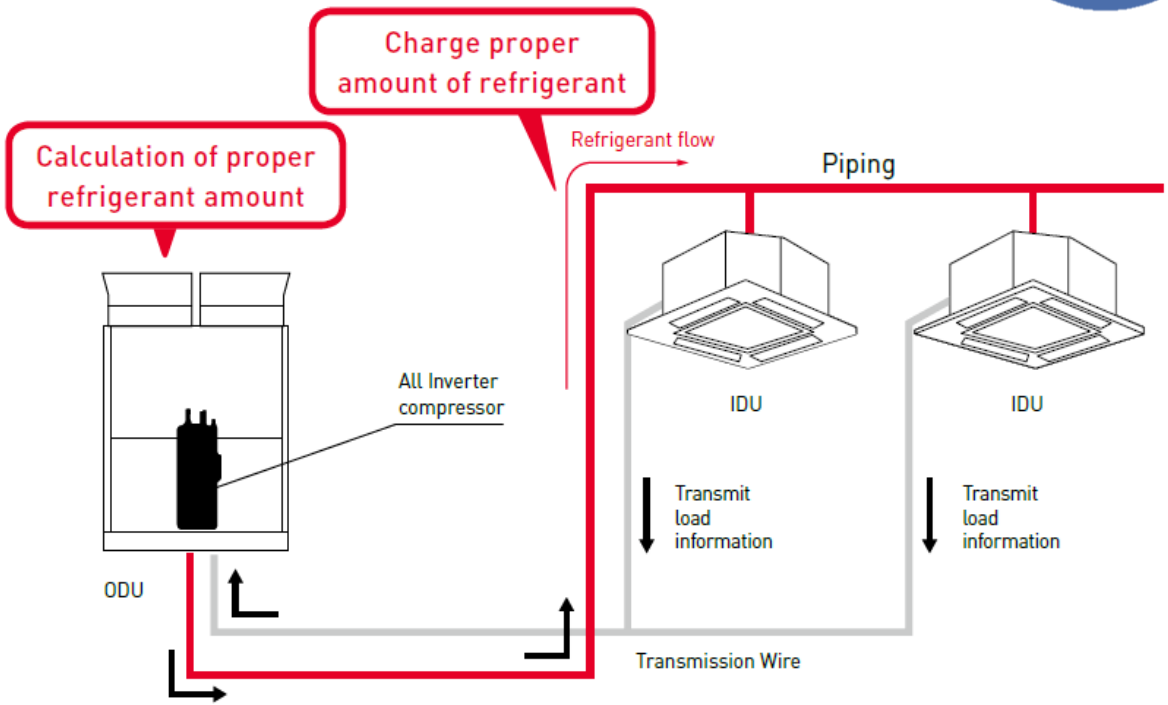
Hitachi Original!

System calculates the appropriate refrigerant amount according to each indoors' load.

Control the inverter compressor precisely through the smooth operation control technology

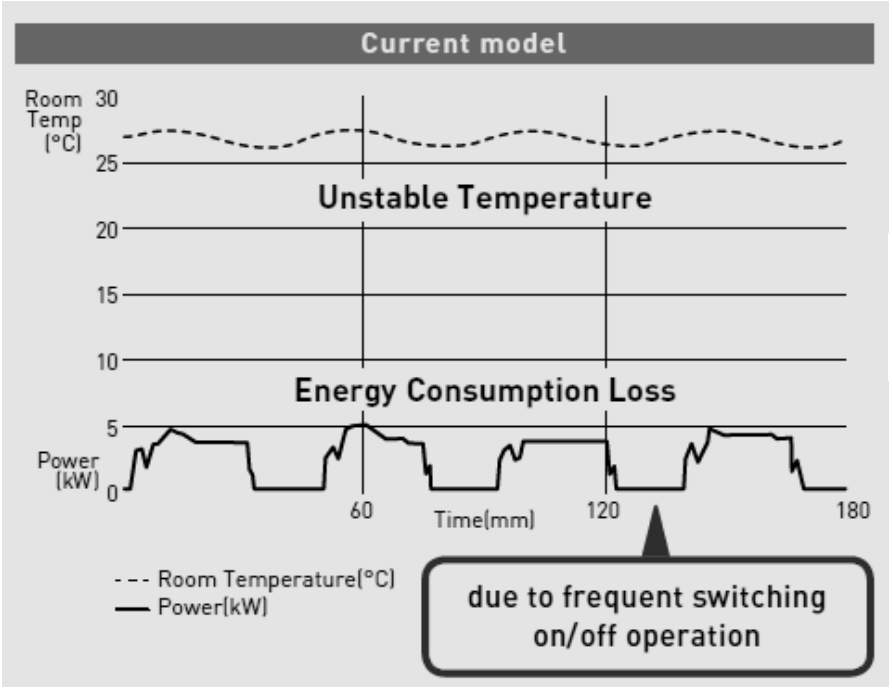
Supplies proper refrigerant to indoor units according to required load.

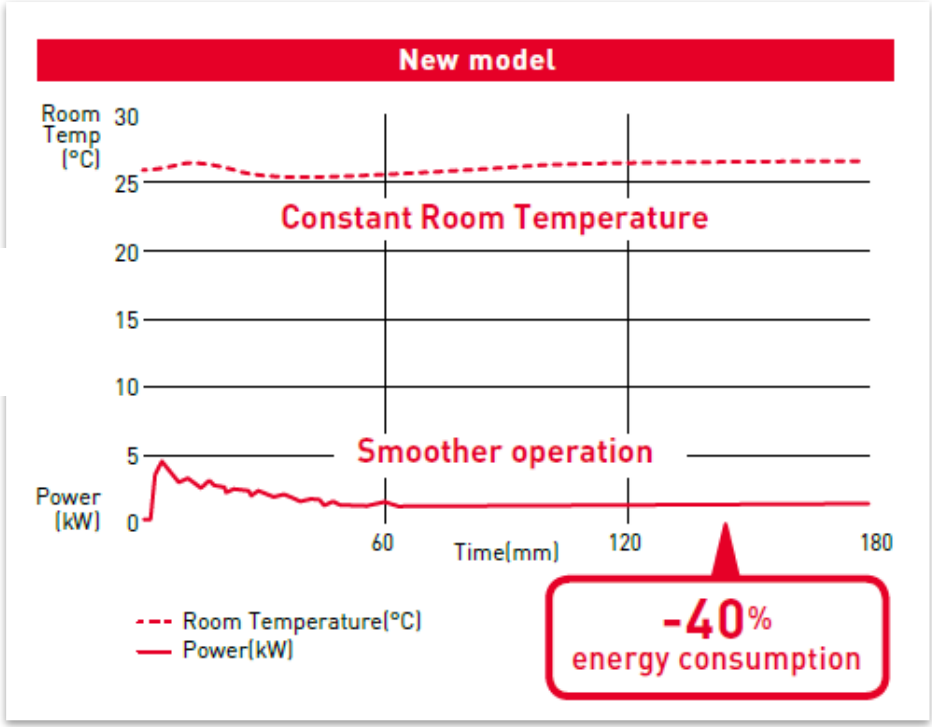
System Saving energy efficiently by optimize control compressor at low-load operation.



High Performance

- Compressor Control





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VRF Product Overview

Design Flexibility

Sum -up

- 8HP to 96HP

- Smaller footprint

(-11% on average compared to Current)

- Lighter cabinet

(-16% on average compared to Current)

- Higher ESP

(Up to 80 Pa)

- Better piping application

(Height difference between IDU & ODU up to 110M)

- Wider operation temperature range

(Up to 52℃)

- Wider IDU combination range

(Up to 130%)

Compact

Standard Model (HNCQ series)

Current Model

New

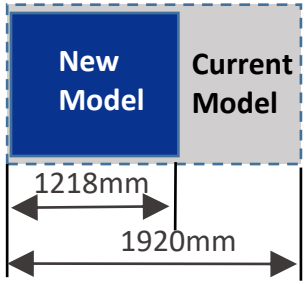
New Model

*Example at 24HP class [68.0kW]

24HP (68.0kW)	**Installation Space**	**-24.4%** (1.67m² => 1.26m²)
	Product Weight	**-17.8%** (506kg => 416kg)

Compact

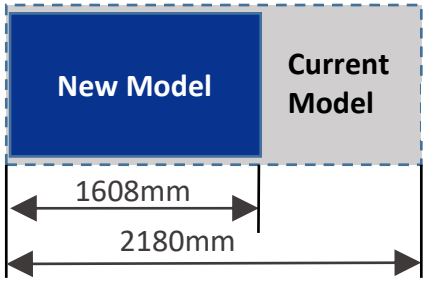
18HP class 50.0kW



Space -35%
Weight -20%

Space:1.47㎡→ 0.95㎡
Weight : 445kg→ 356kg

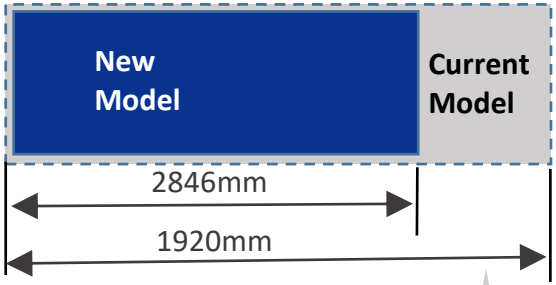
24HP class 68.0kW



Space -25%
Weight -18%

Space:1.67㎡→ 1.26㎡
Weight : 506kg→ 416kg

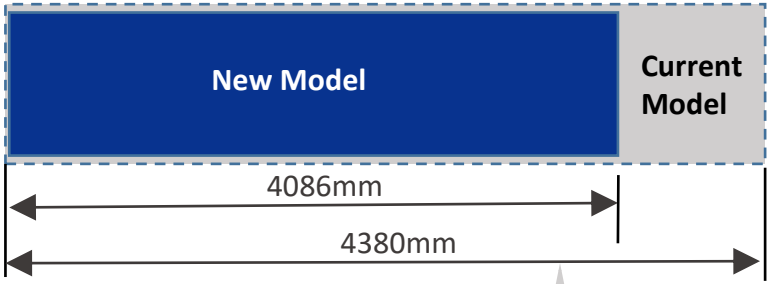
42HP class 118.0kW



Space:2.61㎡→ 2.16㎡
Weight : 850kg→ 772kg

Space -17%
Weight -10%

54HP class 68.0kW



Space:3.35㎡→ 3.19㎡
Weight : 1080kg→ 1035kg

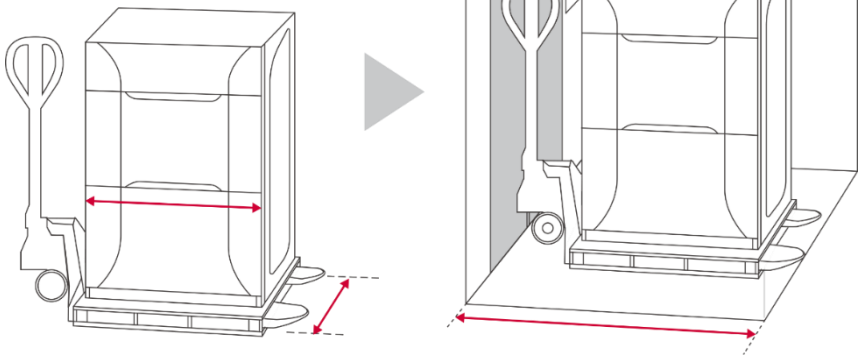
Space -5%
Weight -5%

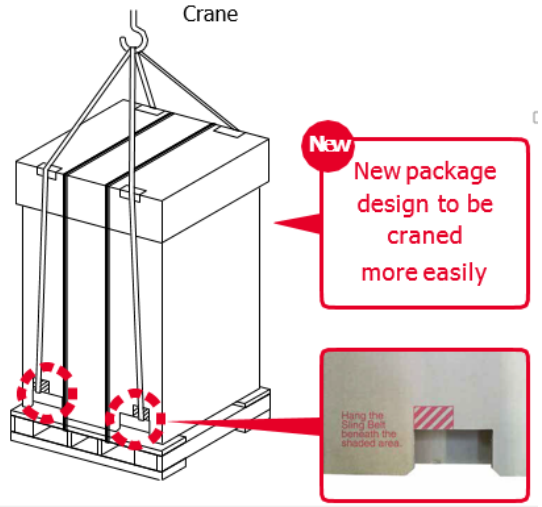
Compact

Smaller

Lighter

Can be transported
in an elevator by pallet jack
HNCQ:18HP class(50.0kW)





Higher ESP

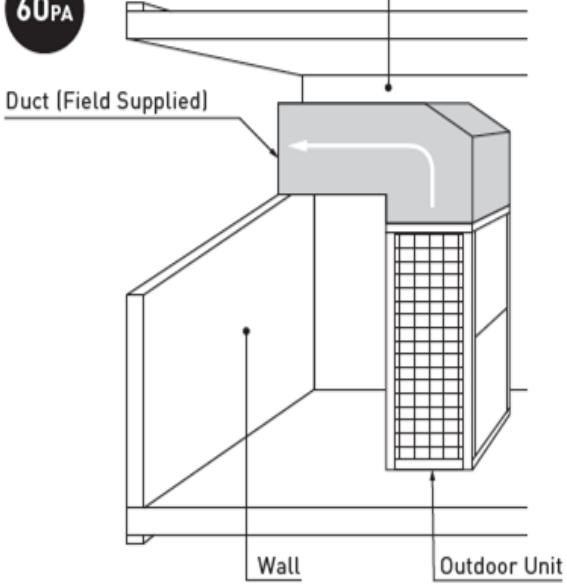
SET FREE Σ

Improved!

Current Model

60PA

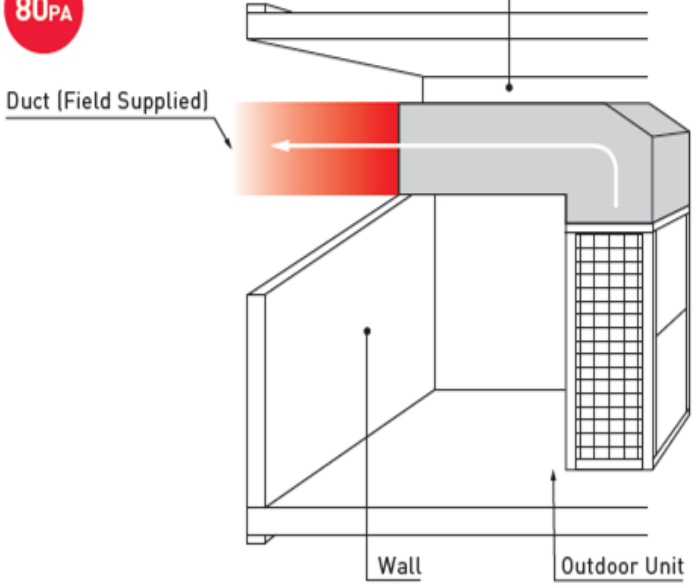
0Pa | 60Pa



New Model

80PA

0Pa | 30Pa | 60Pa | 80Pa



offers more options for the indoor installation of the outdoor unit

- Less piping length
- Lower installation cost
- Visual aesthetics

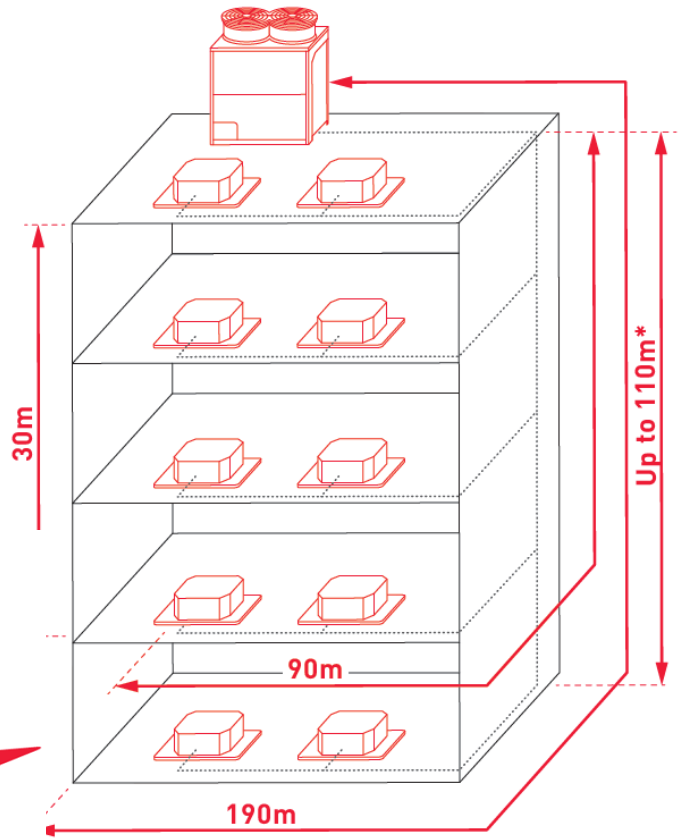
Better Piping Limit

Improved!

SET FREE Σ

Total piping length		1000m
Longest length actual (Equivalent)		165m (190m)
Longest length after first branch		90m
Level difference between ODU and IDU	Higher ODU	Standard 50m Optional 110m(*)
	Lower ODU	40m
Level difference between IDUs		30m

* Please consult your distributor or dealer if the height difference is over 50m.



- Suitable for a high-rise building or complex facilities.
- Leads to cost/time saving for designers, with more efficient design.

Better Piping Limit

Improved!

SET FREE Σ

- Piping connection workability

Maximum piping length	Total piping length		1,000m
	Refrigerant piping length	Actual	165m
		Equivalent	190m
	Between "Piping connection kit" and each ODU		10m
	Between "1st branch Multi Kit" and farthest IDU		90m
	Between "Multi Kit" and each IDU		40m

Maximum level difference	Between ODU (combination of base units)		0.1m
	Between ODU and IDU	ODU above IDU	50 (standard) / up to 110m (custom order)*
		IDU above ODU	40m
	Between indoor units		30m

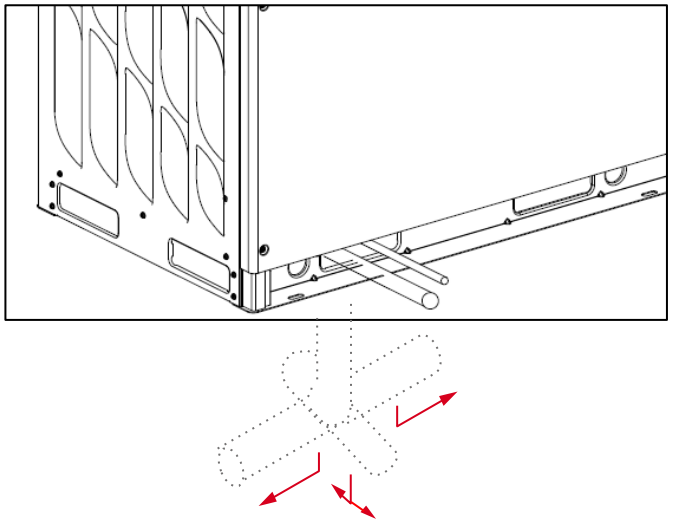
Each maximum length or level difference has several conditions, please refer to the technical documents in inquiry.

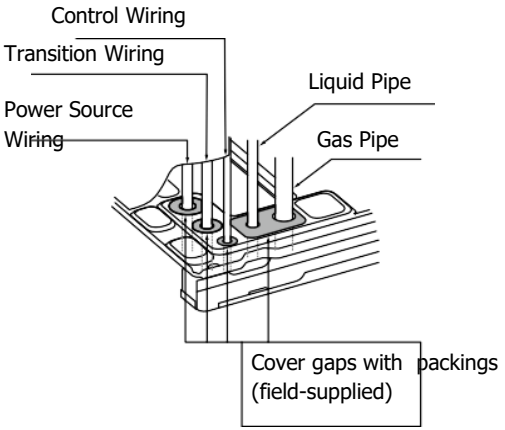
* Standard: up to 50m/Custom Order: up to 110m.
  Longer piping (up to 110m) is available for 8 to 54HP models only.
  Maximum level difference for 56-96HP is 90m.

Piping Direction

4 directions →←↓↑

For Piping from Bottom base to Left, Right and Rear side





For more service space in front.

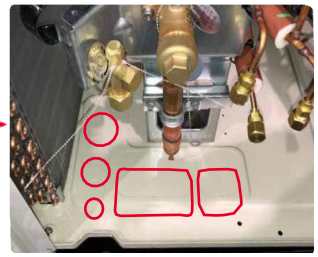
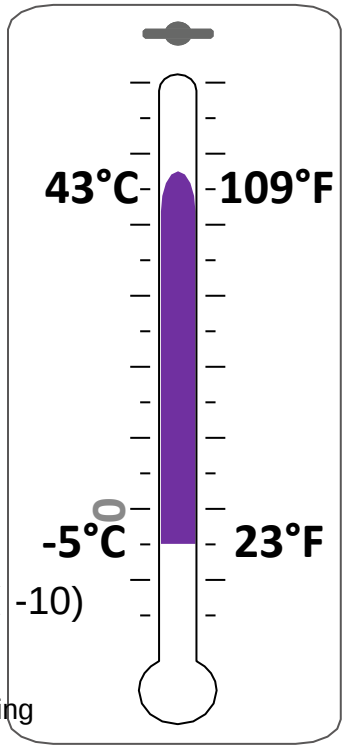


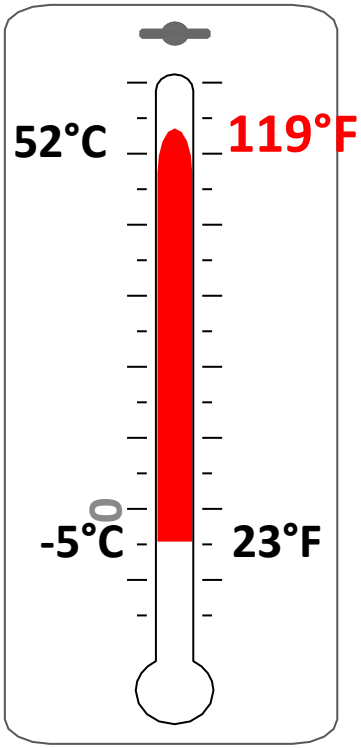
image: bottom

Wider operation range in Cooling



※ With Low Ambient Setting

Current Model



Standard Model (HNCQ series)

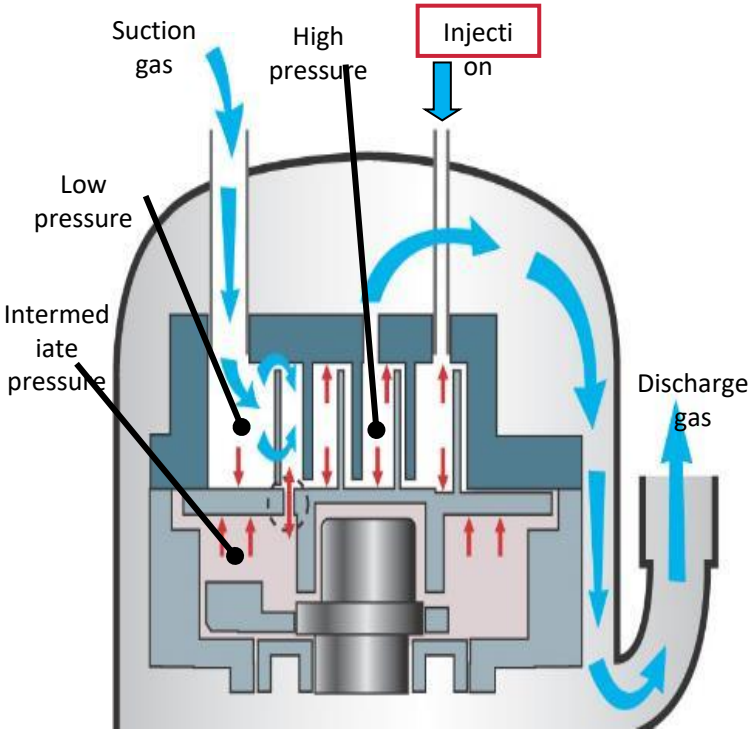
Improved!

*48~52 interval operation

Wider operation range in Cooling

- Up to 48ºC stable running
- Up to 52ºC interval running

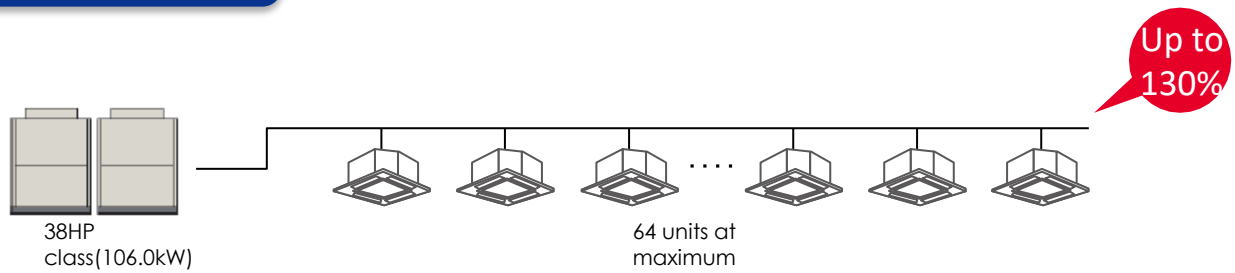
Special Vapor injection technology for compressor to cool down discharge gas temperature. Simple structure without the tip-seal and thrust bearing assures stable operation in high ambient



Improved!

*48~52 interval operation

Indoor Unit combination range



Outdoor Unit Capacity_HP class	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38-96
Cooling Capacity_kW	22.4	28.0	33.5	40.0	45.0	50.0	56.0	61.5	67.0	73.0	77.5	85.0	90.0	95.0	100.0	106.0-272.0
Range of combination capacity	Standard Type : 50 to 130%															
Maximum Connectable IDU Quantity	13	16	19	23	26	26	33	36	40	43	47	50	53	56	59	64
Recommended Connectable IDU Quantity	8	10	10	16	16	16	18	20	26	26	32	32	32	32	32	38

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VRF Product Overview

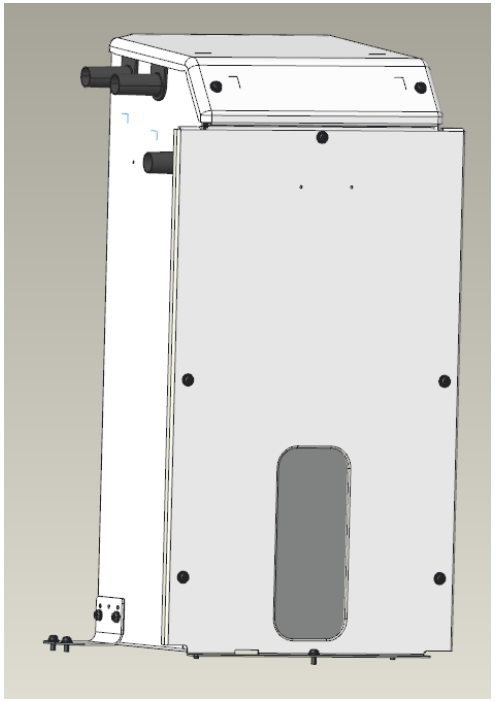
Adaptability

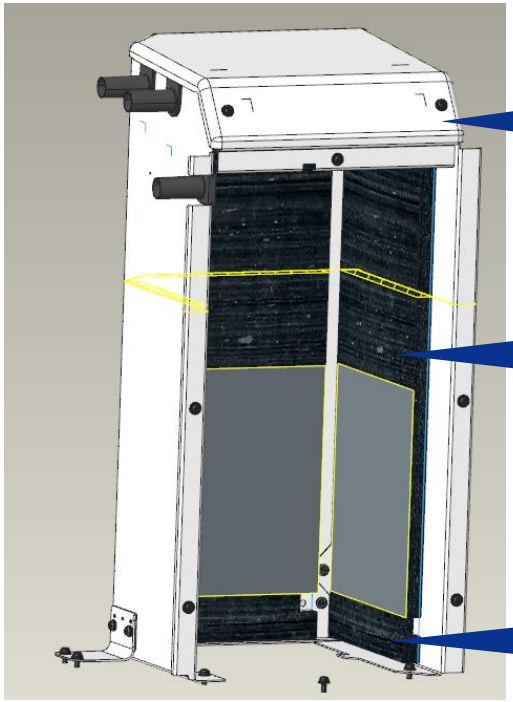
Sum -up

- 8HP to 96HP

- Low noise operation
- Silent mode
- To prevent failure
- Back-up function
- Maintenance ease

Low Noise operation



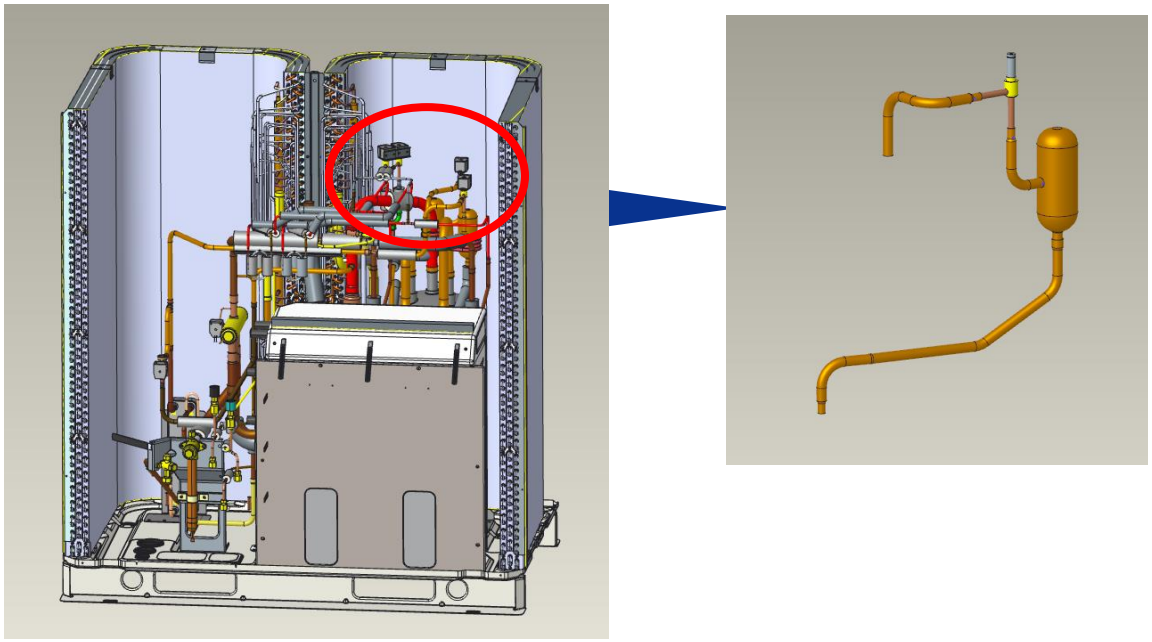


1.5mm thickness sheet metal forming parts. Efficient high frequency sound insulation and sealing performance

2mm thickness of the rubber sheet. High efficiency low frequency sound insulation

High quality soundproof cotton , High sound-absorbing performance

Low Noise operation



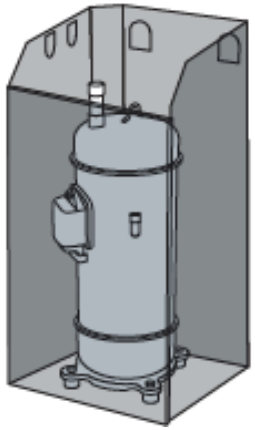
Fill gas increase Han line increase the silencer eliminate pressure fluctuation, effectively reduce the compressor running pulse noise.

Low Noise operation

Sound Power Level								dB(A)
HP	8	10	12	14	16	20	22	24
Current Model	81.5	82.5	84	85.4	85.5	86	87	87
New Model	80	82	82	85	85	86	84	86

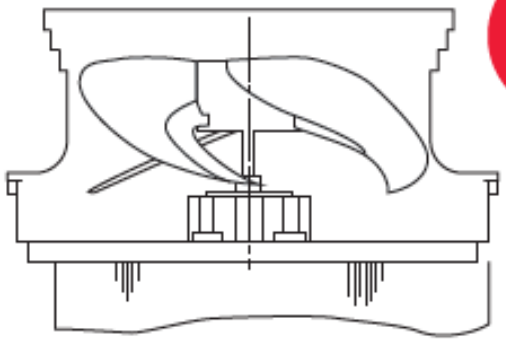
-1.5dB(A)
on Average !
The performance capability has increased, but the running Sound Power Lebel (dB(A)) has decreased.

Thanks to 2 New Designs



New Cover

New metal shielding cover for compressor



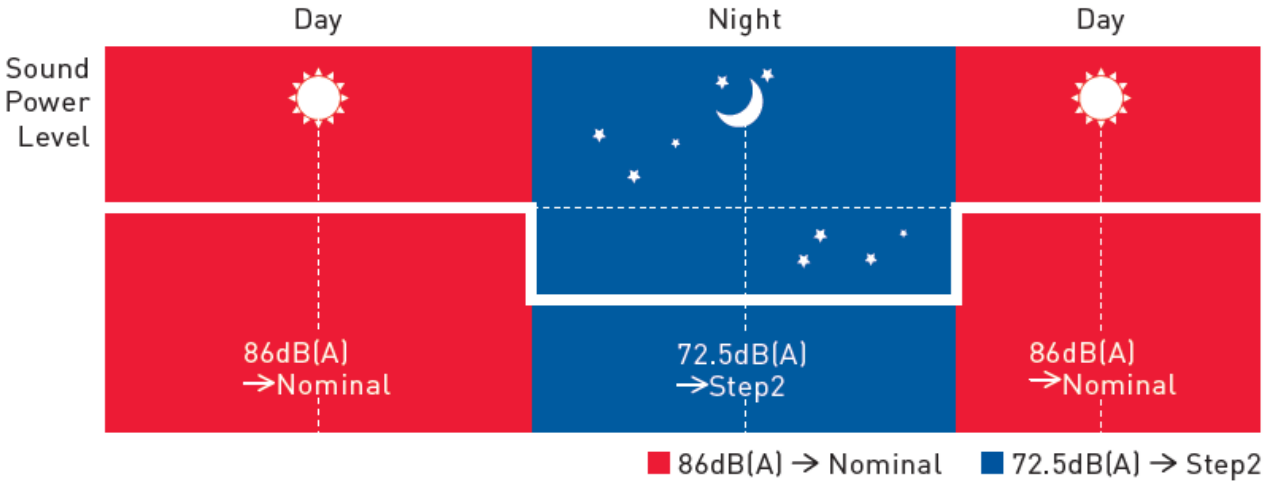
New Model

New air blower to suppress the fan noise

Silent Mode

Noise Reduction Mode	18HP	42HP
	Sound Power Level (dB(A))	
Nominal	86	89
Step 1	82.5	86
Step 2	77.5	81
Step 3	72.5	76

Setting example

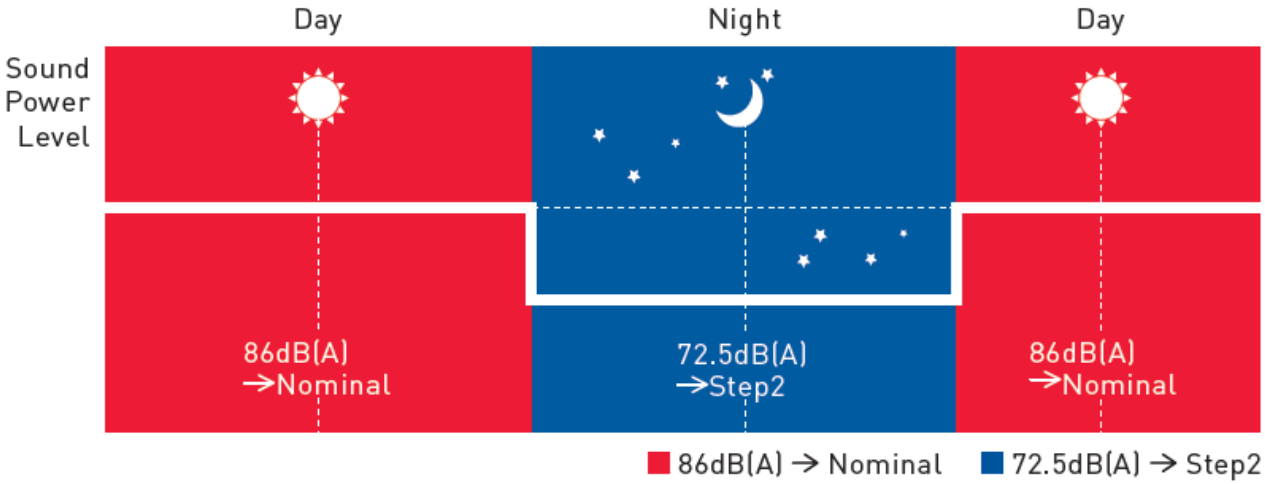


Decrease
Up to -14
dB(A)

Silent Mode

Noise Reduction Mode	18HP	42HP
	Sound Power Level (dB(A))	
Nominal	86	89
Step 1	82.5	86
Step 2	77.5	81
Step 3	72.5	76

Setting example

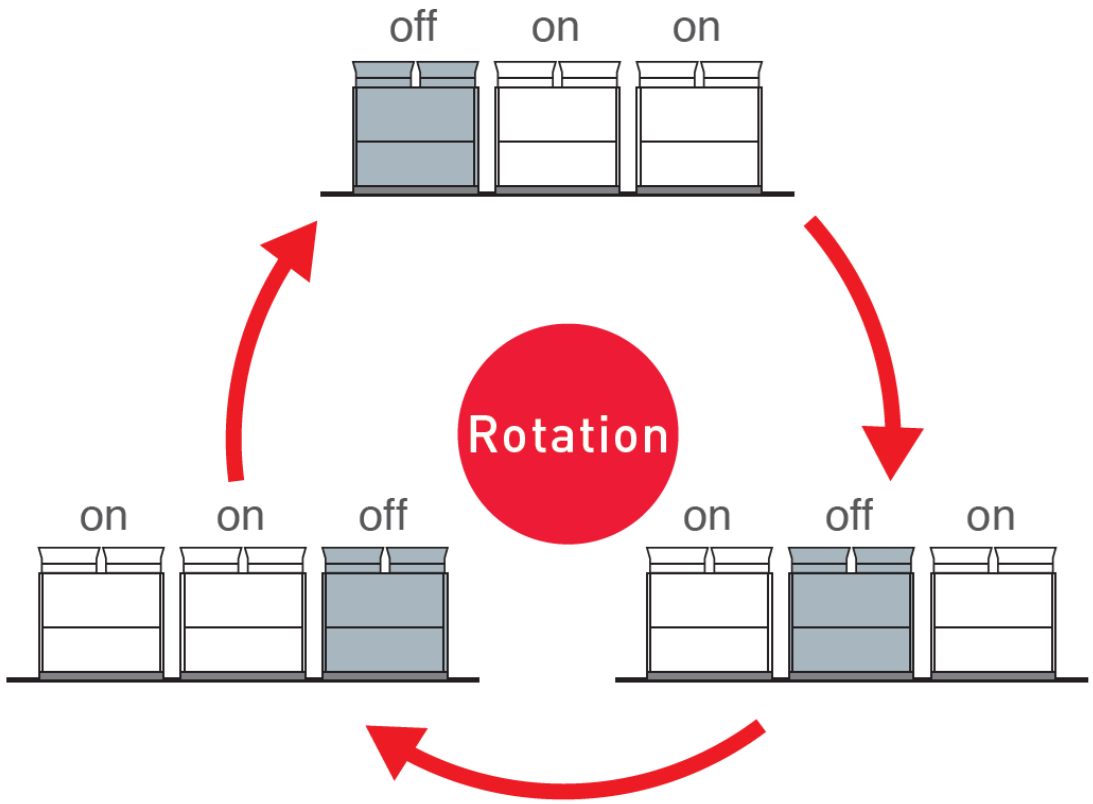


Decrease
Up to -14 dB(A)

Adaptability

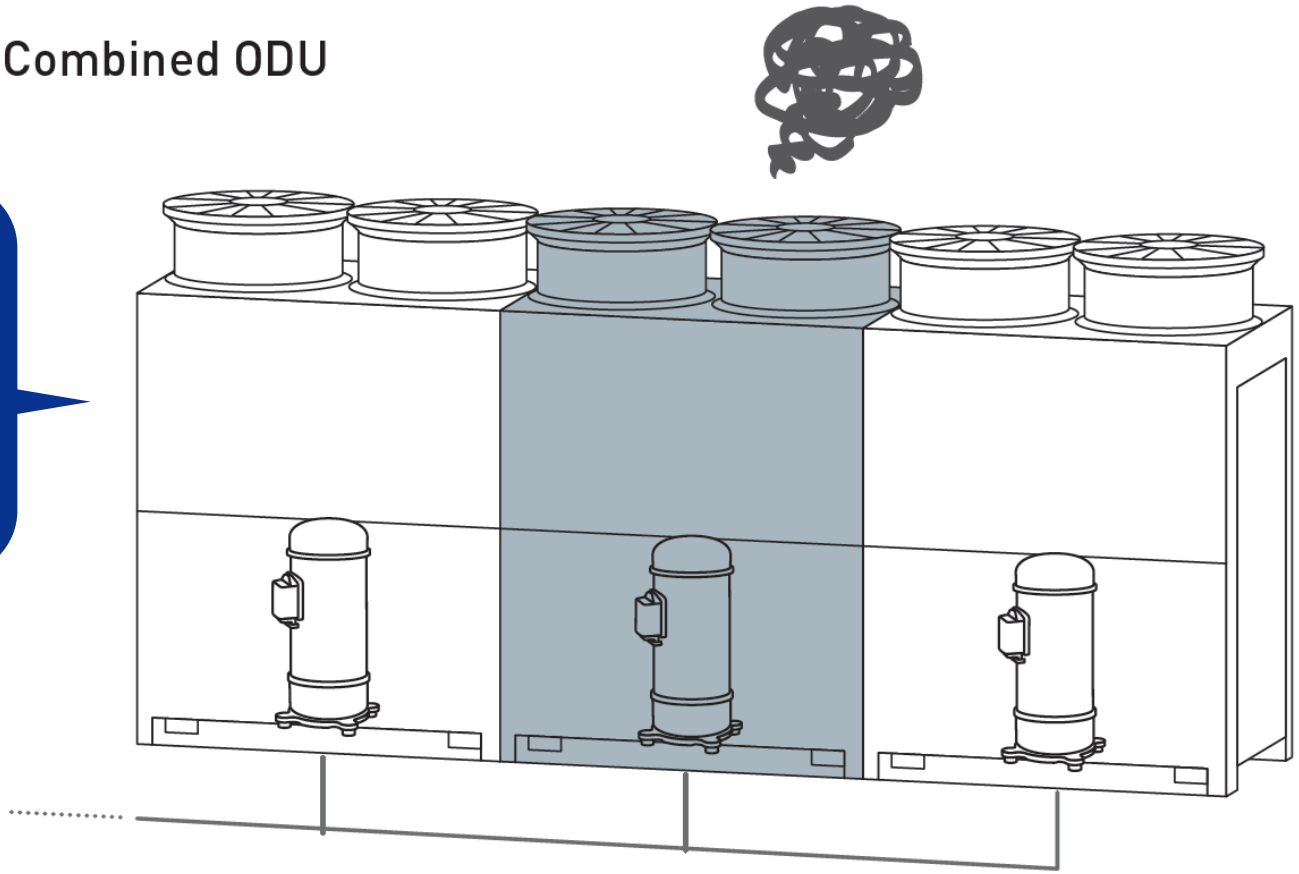
To prevent failure

Balance each outdoors' running time to extend system life cycle.



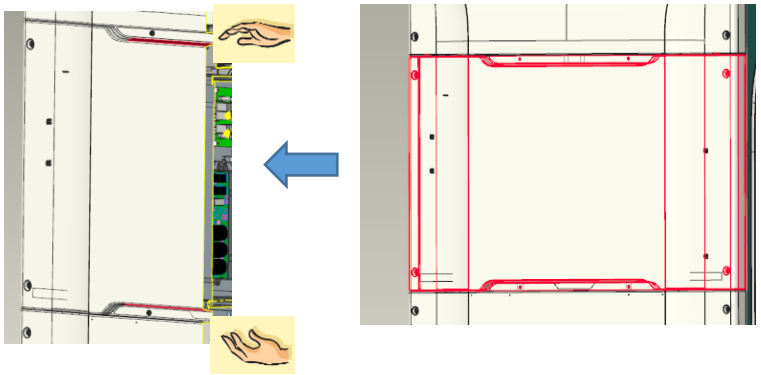
Back-up function

Preventing total system failure. Even one outdoor unit fault, other model can continue run.



Back-up function

- The strong and angular appearance of the structure;
- Automotive covering parts type high tensile panels, improve panel rigidity and impact resistance;
- Design multi-level molding area, improve the panel rigidity and impact resistance;
- The panel has the function of the handle part shape, convenient installation;



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Questions?

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THANK YOU