Carrier

United Technologies

turn to the experts

BUILD THE NEW NORMAL

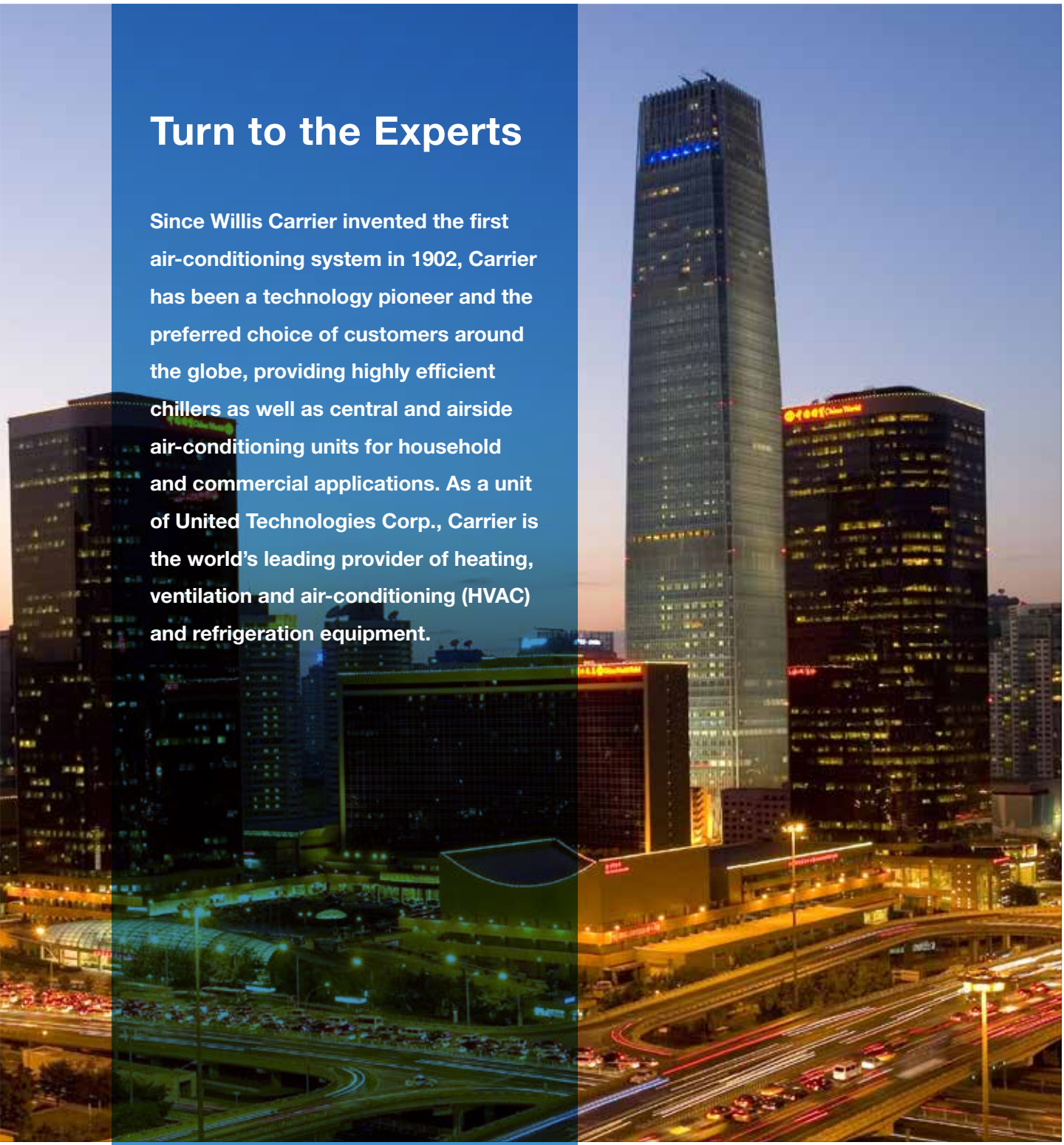
Carrier 2nd Generation

VWV INVERTER SERIES

Cooling capacity : 39.5 ~ 532kW

AQUAFLOW™

VWV system



Turn to the Experts

Since Willis Carrier invented the first air-conditioning system in 1902, Carrier has been a technology pioneer and the preferred choice of customers around the globe, providing highly efficient chillers as well as central and airside air-conditioning units for household and commercial applications. As a unit of United Technologies Corp., Carrier is the world's leading provider of heating, ventilation and air-conditioning (HVAC) and refrigeration equipment.

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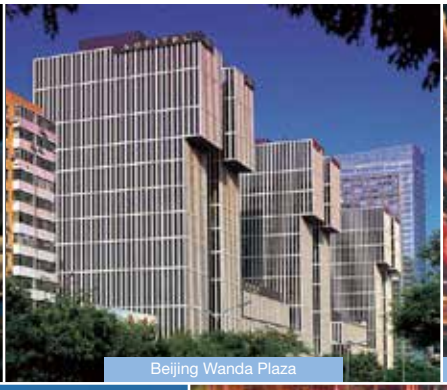
Shanghai Expo Boulevard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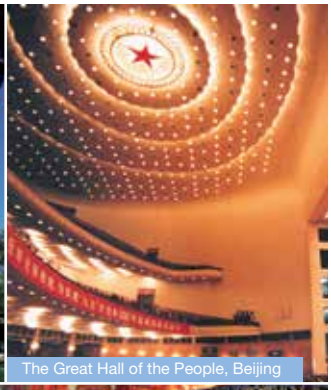
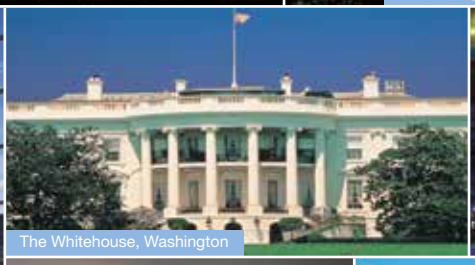
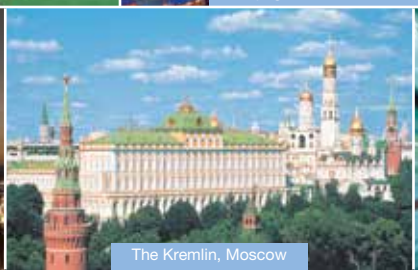

The Great Hall of the People, Beijing


Hongkong International Airport


The Whitehouse, Washington


Beijing "Water Cube" National Swimming Center


Taipei 101


The Kremlin, Moscow


Shanghai Metro

Carrier AquaFlow™
Variable Water Volume (VWV) System

THE BEST OF BOTH WORLDS

Carrier's innovative AquaFlow™ VWV System combines the benefits of conventional hydronic and VRF systems, providing superior indoor comfort and energy efficiency.

The AquaFlow™ VWV System includes modular outdoor air-cooled chiller and heat pump unit with self adaptive technology to control the variable refrigerant evaporating temperature*, low-noise fan coil unit, heat recovery fresh air handling unit, VFD hydronic kit, networked indoor thermostat, and intelligent system manager.
Single system capacity: 39.5kW – 532kW

* Self adaptive variable water temperature / Self adaptive variable refrigerant evaporating temperature

		Carrier AquaFlow™ VWV System		Conventional Hydronic System		Conventional VRF	
							
Expanding the benefits of conventional hydronic systems	Flexible Design	Max. indoor unit (IDU) / outdoor unit connectivity: 200%	😊	Case by case design on job basis	😐	Max. indoor unit/outdoor unit connectivity: 130%	☹
		Max. pipe length: 400m Max. ODU / IDU height difference: 120m*	😊	Case by case design on job basis	😐	Max. pipe length: 150m Max. ODU / IDU height difference: 50m	☹
	Indoor Comfort	Temp control +/-0.5°C, humidity detect +/-5%	😊	No humidity control function	☹	Air supplied too cold or too hot; no humidity control function	☹
		Complete anti-PM 2.5 solution for fresh air and indoor air	😊	Only fresh air handling unit with filter section	☹	No filter section for IDU	☹
		No risk of indoor refrigerant leakage	😊	No risk of indoor refrigerant leakage	😊	Potential risk of indoor refrigerant leakage	☹
	Easy retrofit	System changing conveniently via IDU adding or removing quickly	😊	System changing conveniently via IDU adding or removing quickly	😊	Longer cycle if IDU changing and impact on others in same loop	☹
Expanding the benefits of conventional VRF	Easy Installation and Maintenance	System centralized control	😊	No centralized control; no communication between IDU / ODU	☹	System centralized control	😊
		Energy metering and BA connection	😊	Extra hardware & software needed and substantial investment	😐	Extra hardware & software needed and substantial investment	😐
	Cost Savings	40% higher system IPLV vs. conventional hydronic system, 10% higher system IPLV vs. VRF	😊	IPLV is 40% lower than the VWV system	☹	IPLV is 10% lower than the VWV system	😐
		Self adaptive variable water temperature / Self adaptive variable refrigerant evaporating temperature Energy efficiency: grade 1(China GB)	😊	No variable refrigerant flow / variable refrigerant evaporating temperature Energy efficiency: grade 2 or below (China GB)	☹	Variable refrigerant flow Energy efficiency: grade 1(China GB)	😐
		No cooling/heating capacity loss in long pipes, Outdoor unit optimized 10-20%**	😊	No cooling/heating capacity loss in long pipes (subject to appropriate design)	😊	Cooling capacity loss: 10% – 20% in long pipes	☹
		Self adaptive variable water flow	😊	Constant water flow speed	☹	Not applicable	-
		100% fresh air effect, 25% fresh air operation cost	😊	100% fresh air effect, 100% fresh air operation cost	☹	100% fresh air effect, 100% fresh air operation cost	☹

* Outdoor unit and hydronic kit sited above the indoor unit
** Within the recommended pipe length range

New Carrier AquaFlow™ VWV System

Besides its easy installation, auto-commissioning and integrated intelligent control, the Carrier Variable Flow System brings you unprecedented new control experience.

Project progress		Customer value
 Planning and business	 Design	• Packaged selection by components and system • System level design validation • Flexible layout for any kinds of building
	 Purchase	• Efficient investment based on optimized system capacity and roof installation • Reduce finance pressure via phase-investment even room by room • Simple process via one contact, secured lead-time
 Construction	 Installation	Only water pipe and electrical connections are required, eliminating the risk of water leakage, with installation fees close to conventional VRF system
	 Commissioning	System automatically addressing, shorter commission cycle
 Service	 Operation	• Lower system running cost derived from variable ODU control (compressor & fan), variable flow rate control, variable leaving temperature and heat recovery from fresh air unit • Modularized outdoor unit w/ tandem compressor design can be backed up interchangeably.
	 Indoor air quality	• Sufficient fresh air according to CO2 sensor • Continuous heating during defrosting (multi-outdoor units system) • Indoor no refrigerant leakage risk
	 Management	• Integrated system with dedicated system controller (zone and schedule control) • Build-in individual billing function, only add one power meter for each system
 After-sales service	 Daily maintenance	• Rigid quality control by system level • Quick response by one to one correspondence
	 System modification	• Flexible for system retrofit in future • No impact with other users

* The case study is based on a specific office project with an air-conditioning area of 1200m^2.

Complete System Lineup

Single system capacity
39.5kw-532kw

Intelligent system manager

Control up to 8 outdoor units, 128 indoor units or fresh air units and 1 hydronic kit

Heat recovery fresh air handling unit and PM 2.5 option

9 models (1000~8000CMH)

Heat recovery fresh air unit

17 models (600~6000CMH)

Fresh air handling unit

38 models (1000~6000CMH)

VFD / Fixed outdoor unit

39.5kW/ 66.5kW

VFD packaged hydronic kit

5 models

Ducted indoor unit

28 models (1.9~15.2kW)

4 way cassette indoor unit

8 models (3.2-12.6kW)

High ESP Ducted indoor unit

38 models (5-44kW)

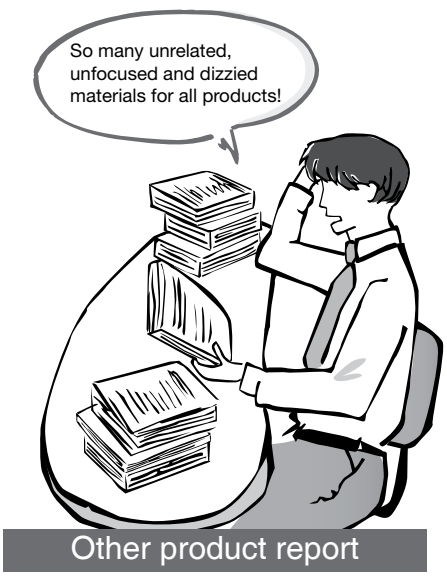
*Self adaptive variable water temperature / Self adaptive variable refrigerant evaporating temperature

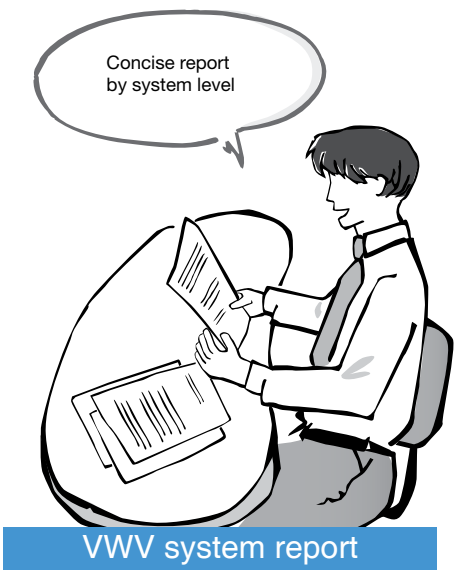

Six reasons to choose VWV
Design flexibility
Energy efficiency
Indoor comfort
Easy retrofitting
Powerful controls
Exceptional reliability

1. Design flexibility

Offering one station system, less design workload

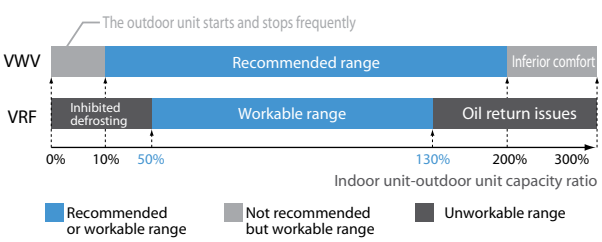
» Validated system selection report for business matters
» Components level report to review all facilities
» Packaged hydronic kits offering: test proven performance, smaller foot print, shorter install cycle and less labor burden





Mutiple configuration options are offered with a wide range of IDUs and ODUs

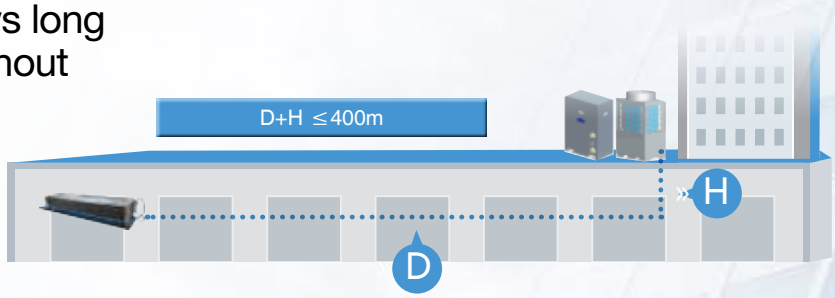
Wider workable load range for outdoor units (10% – 200%), lower initial cost and easier system upgrades.

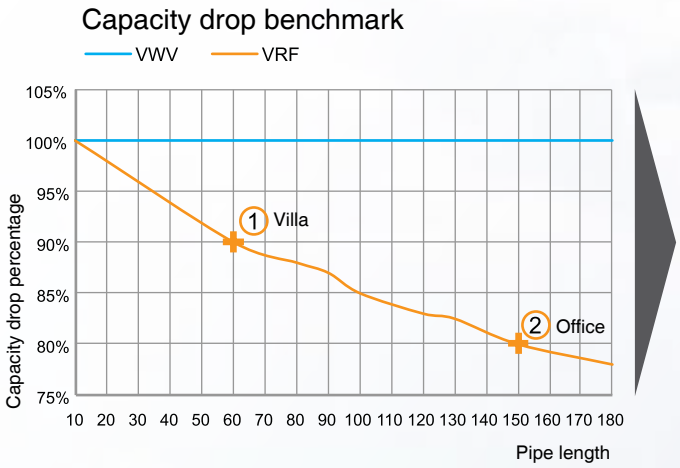


Indoor unit-outdoor unit capacity ratio = (combined capacity of all fresh air handling units and indoor units) / (total outdoor unit capacity) ×100%

The extra-long pipe allows long distance applications without attenuation

The farthest piping length is 400 meters (from outdoor unit to the farthest indoor unit), which is suitable for shopping mall and other large space application.



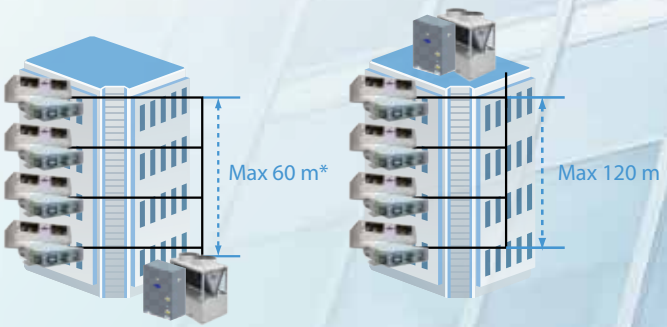


Office building with 20 floors
ODU roof installation
Air conditioning area: 20,000 m²

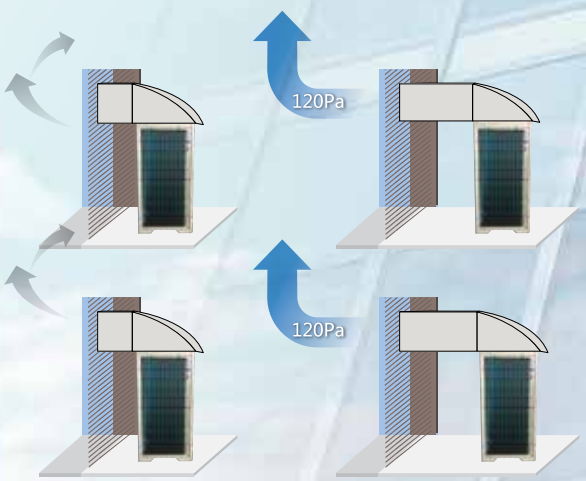
* Case study based on 0.8 diversity factor and cooling load index 200w/m²

Flexible installation of outdoor unit, design freedom

Outdoor unit centralized installed on roof
With a greater maximum elevation difference between the indoor and outdoor units, the system allows design flexibility to help solve problems associated with limited space for outdoor unit installation.



High external static pressure option for outdoor unit for install by floor or on refuge storey
Ultra-high external static pressure
It is possible to increase the external static pressure of the outdoor unit up to 120 Pa
without disrupting heat transfer in either hierarchical or centralized configurations.

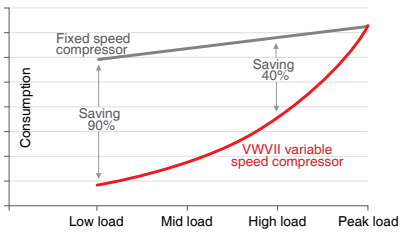


2. System efficiency

Efficient VDF outdoor unit—full DC VFD technique

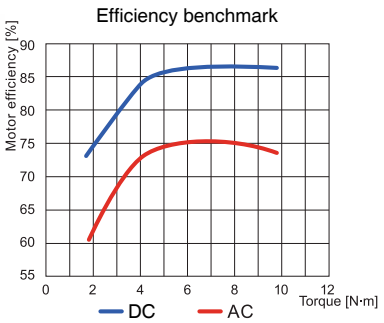
DC variable speed compressor

The VFD compressor could automatically adjust rotating speed to perfectly match loading changing and reduce power consumption from frequent start and stop.

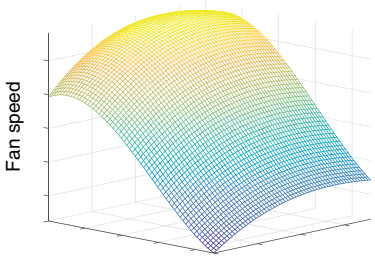


DC VFD fan

DC brushless VFD motor offers ~+12% higher efficiency than traditional AC motor.

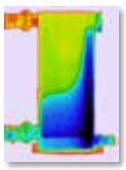


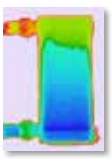
COP fan driver control logic: the speed of fan depends on outside ambient temperature and compressor speed based on simulation and optimization from MBD (model based design), which leads to fulfill best unit performance. Meanwhile traditional VFD fan control just focus on securing the condensing pressure in safe scope, which doesn't care efficiency improvement at what level.

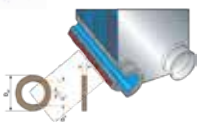


Efficient plate heat exchanger

The stainless steel brazed plate heat exchanger, with newly design upon refrigerant uniform distribution, helps to gain higher efficiency from more effective exchange surface area and lower frozen risk.







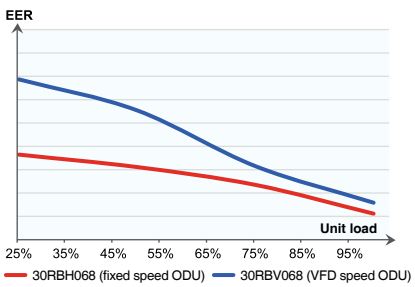
Refrigerant distribution effect based on traditional design

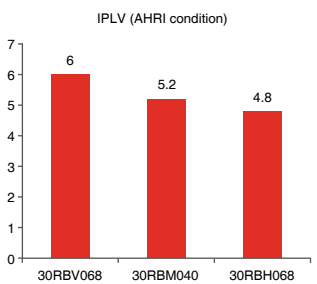
Refrigerant distribution effect based on newly design

Accurate electronic expansion valve

- Up to 2600 steps of EXV with +400% control accuracy compared to 500 steps of traditional product
- Dynamic EXV control based on MBD: higher use efficiency upon heat exchange surface area based on secured supper heat temperature of evaporator outlet, which also leads to the compressor running in the safe scope.

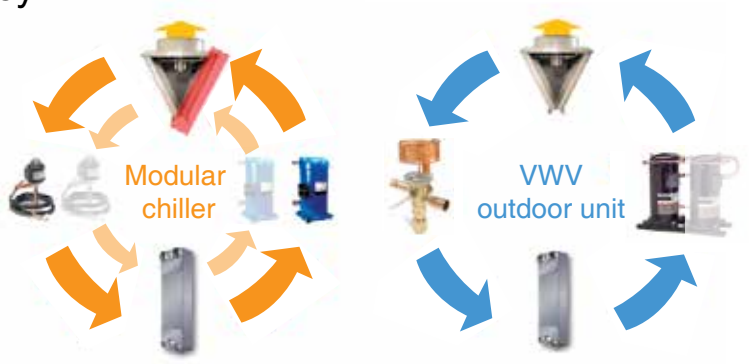
~20% energy saving vs. fixed speed outdoor unit





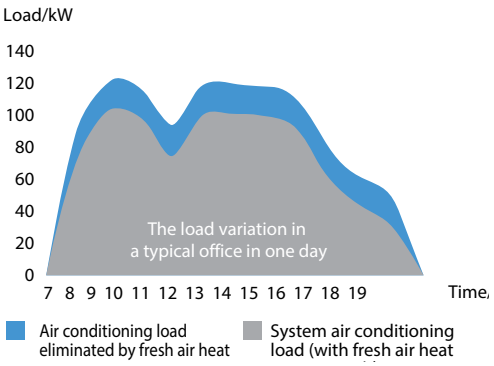
Tandem designed fixed speed outdoor unit-high part loading efficiency

Dual compressor shared single-circuit leads to high IPLV (up to 5.2), gaining double heat exchange surface once only one compressor runs. On the contrast, the IPLV of modular chiller is low (over 3.7) derived from dual compressor w/ individual circuit.

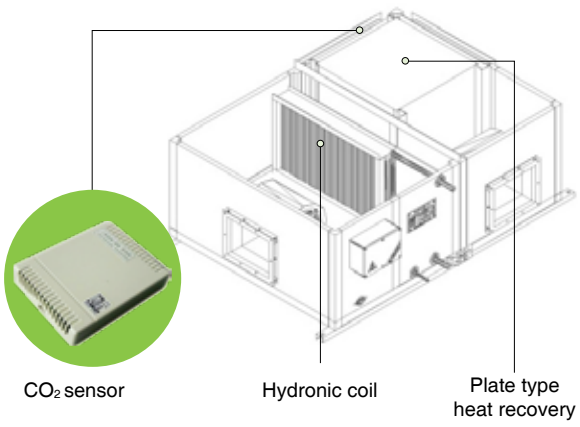


Efficient fresh air unit

Fresh air heat recovery
Reduce system load

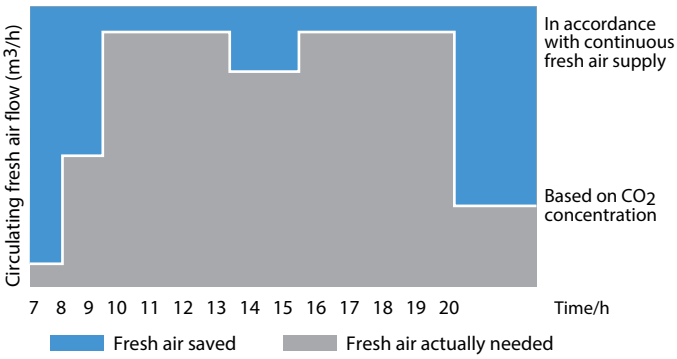


Carrier's new heat recovery fresh air handling unit (BFP) reduce ODU load 10%-15% (free cooling/heating for more than 50% of fresh air), saving initial investment.



Fresh air supplied on demand

CO_2 demand control



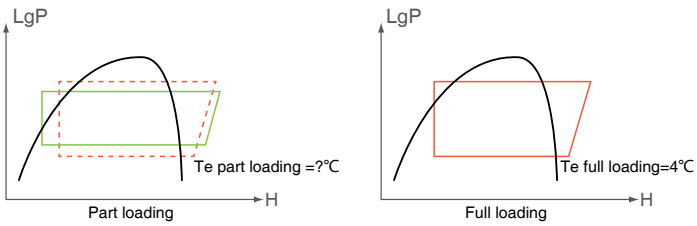
With an integrated CO_2 concentration detection device, the heat recovery fresh air handling unit (BFP) continuously monitors indoor CO_2 levels and intelligently starts or stops units on demand so as to reduce the energy needed for fresh air processing by the outdoor unit and fresh air discharge fan. When a building has large variations in personnel density, a great deal of cooling or heating capacity will be wasted if fresh air is supplied everywhere and at all times at a preset level suitable to meet the peak demand of the highest-density area.

* CO_2 can be used as an indicator of indoor air quality.
* The calculation references GB 50189-2005 〈China's national design standards for energy efficiency of public buildings〉, table B.0.6-2 (hour-by-hour personnel presence ratios).

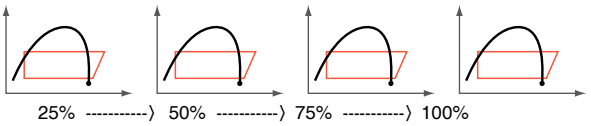
System efficiency–variable water temperature based on indoor comfort

Comparing part-load compressor operations

VWV = Self adaptive variable leaving water temperature
/Self adaptive variable refrigerant evaporation temperature

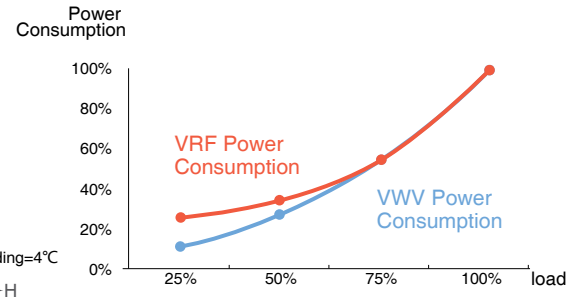


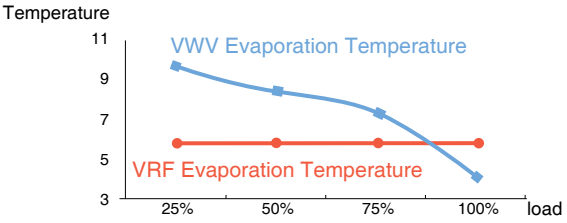
In a VRF system, the refrigerant evaporating temperature is set at 6℃



Under part load conditions, the VWV's unique technologies reduce power consumption and increase operating efficiency by varying the leaving water temperature and refrigerant evaporation temperature.

Power consumption drops rapidly under part-load conditions

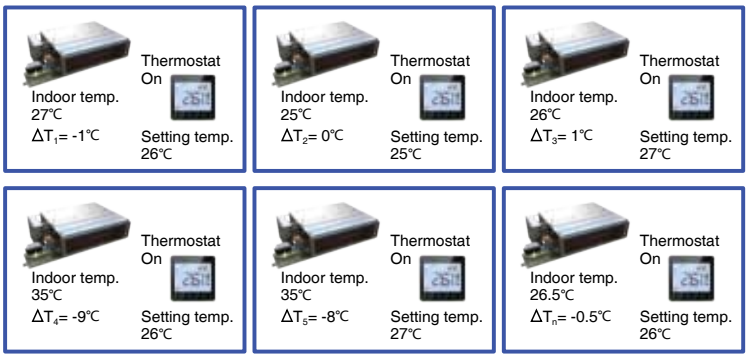




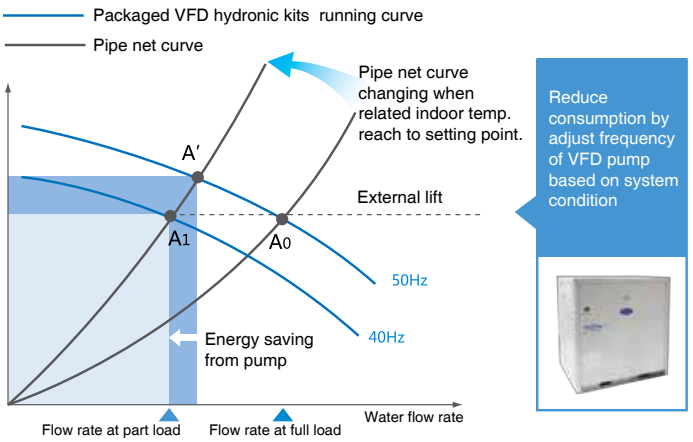
Carrier Variable Water Temperature algorithm enables moment-to-moment control that matches building loads with precision, by monitoring timely in major:

$$\overline{\Delta T} = \frac{\sum_{i=1}^{N} (T_{Set}\,i - T_{Room}\,i)}{i}$$

* IDU on / off
* Room temperature
* N is number of IDU that is ON, meanwhile remains constantly comfortable indoor climate.



Efficient system- variable water flow



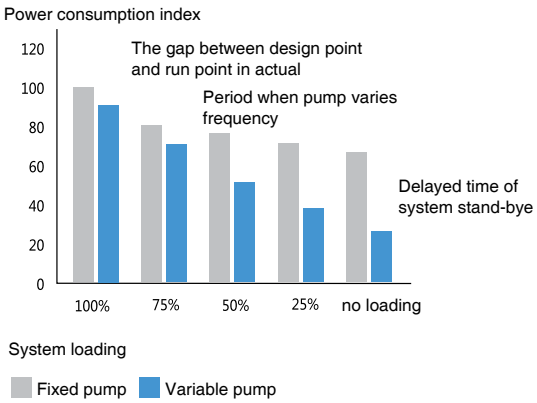
Reduce consumption by adjust frequency of VFD pump based on system condition

A_0 : Pump working point at full load

A' : Pump working point w/ constant frequency when partial outdoor and indoor units isolated at part-load

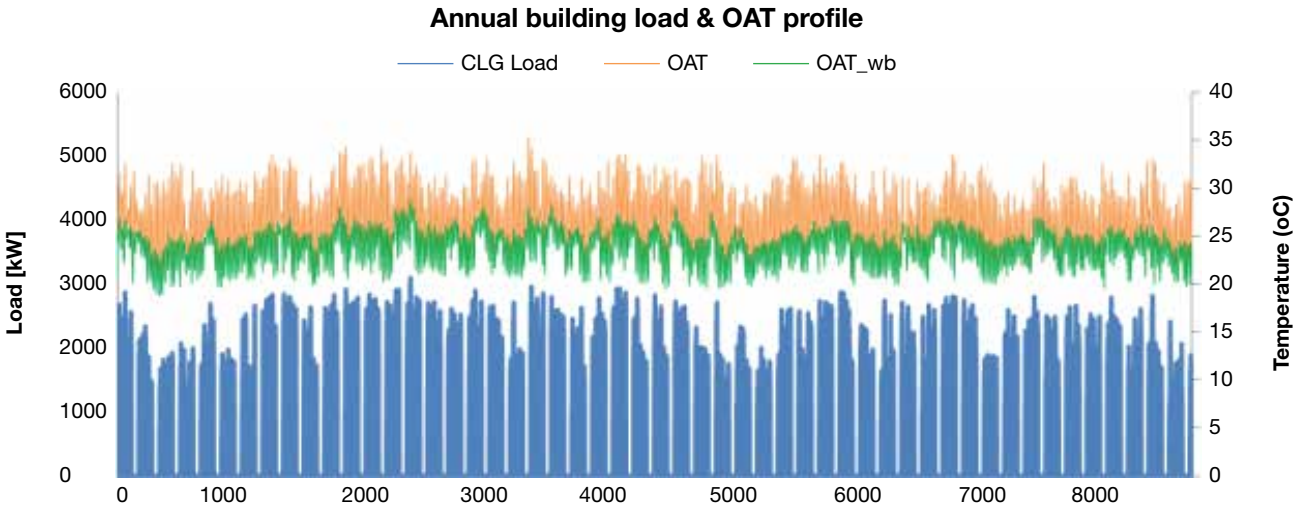
A_1 : Pump working point w/ smaller frequency when partial outdoor and indoor units isolated at part-load

Variable flow rate control, leads to -67% energy saving of water pump

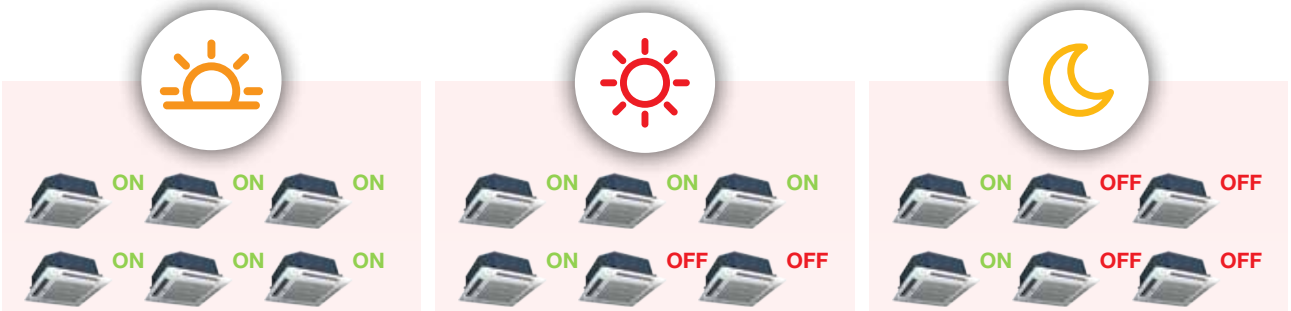


Case study

An office building with 7 floor in Kuala Lumpur, air-conditioning area 4200m2, indoor peak loading 3098kw, fresh air loading 150kw.
System configuration: outdoor unit 30RBV068 (66.5kw)*49 sets, HK520*7 sets, 42CT00730*525 sets, BFPR50*14 sets.



Harmony in Three Variables
Compare to VRF, VWVII leads to -16.5% energy saving in full year (259,700kw*h)*



Morning:
Outdoor Air Temperature: 28°C
All IDUs start on for pre-cooling
Low building load

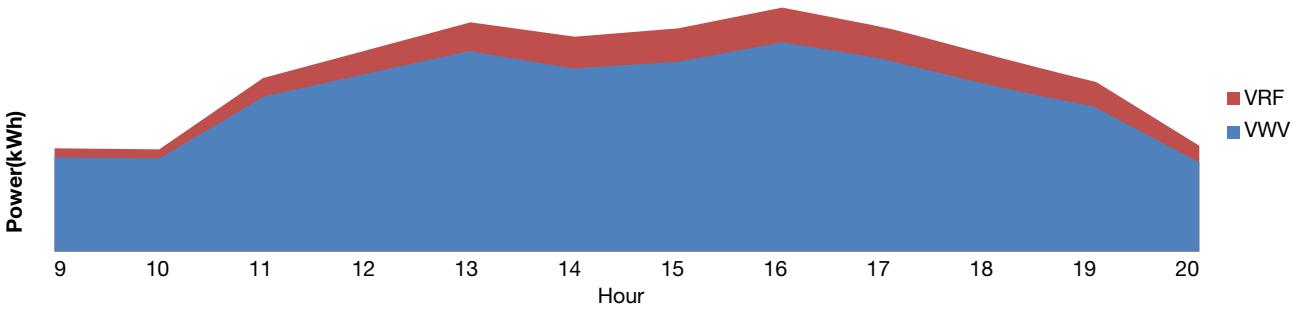
VFD ODU: 70%
Variable water flow rate: 100%
Variable water temperature: >7°C

Morning:
Outdoor Air Temperature: 35°C
IDUs keep ON except meeting rooms
High building load

VFD ODU: 95%
Variable water flow rate: 95%
Variable water temperature: 7°C

Morning:
Outdoor Air Temperature: 25°C
Only a few IDUs remain ON
Lowest building load

VFD ODU: 30%
Variable water flow rate: 30%
Variable water temperature: 8.5°C

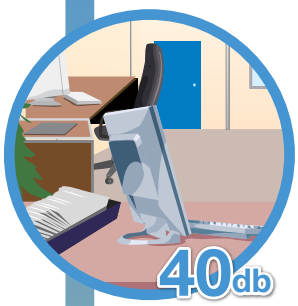


* Date source derived from Carrier internal case study

3. Indoor comfort

Low Indoor Noise

Whispered conversation; leaves rustling



A quiet office

Allowable noise for general office

4-way cassette fan coil unit (42GWC)

For large open-plan offices or meeting rooms; wide coverage, low noise, stylish design, and independent control

Allowable noise for general/premium offices

45db

Normal conversation

Allowable noise for a first-class office

Small ducted IDU (42CT

Small ducted IDU (42CT)
For large open-plane or individual small office, flexible control and effective investment

Street environment

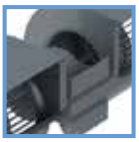
DC brushless motors are optional for 42CN and 42GWC units, further reducing the system's already minimal operating noise (by as much as 26% for the 42CN006).

Less Noise

DC brushless motor and drive

Low noise fan

Bigger impeller and low entering speed fan structure equipped with NSK bearing leads to reduce the mechanical noise



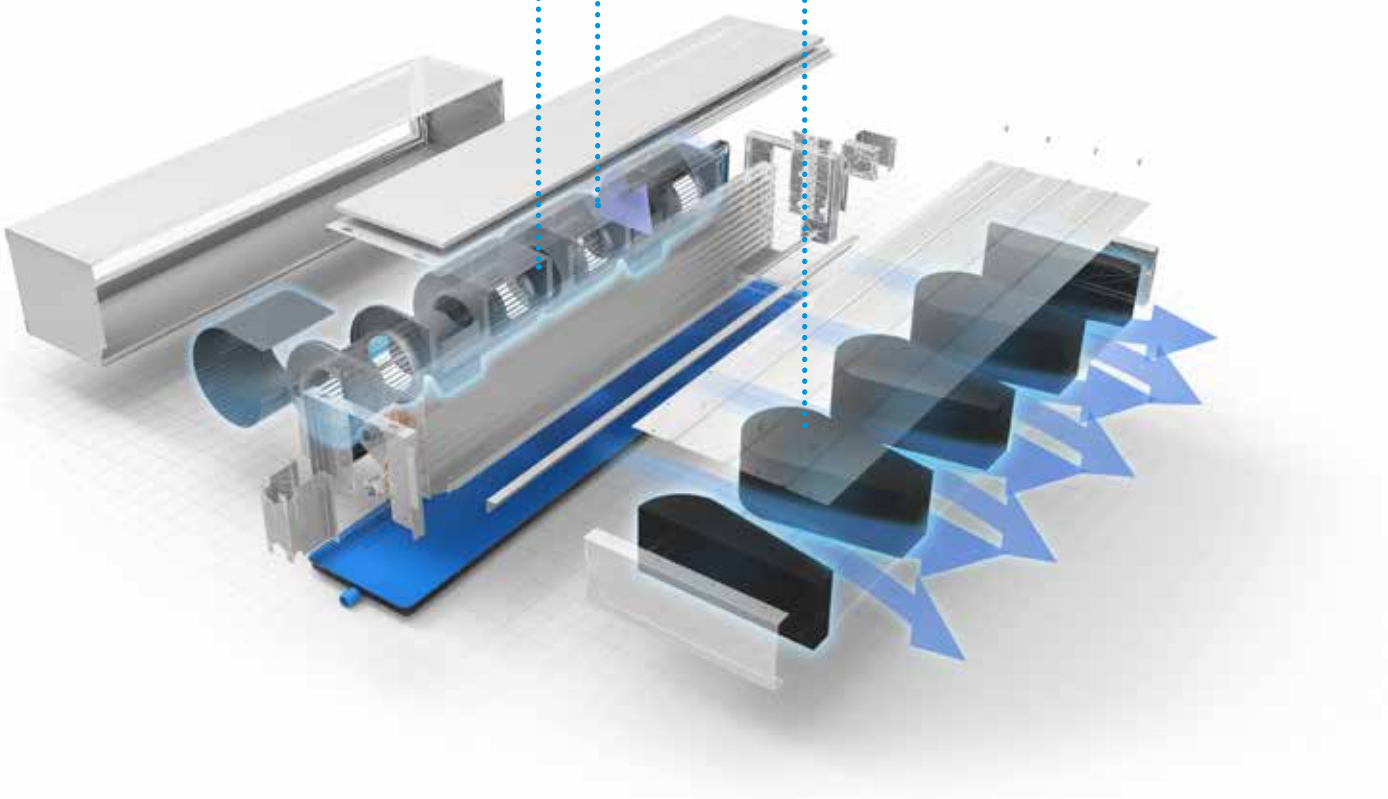
DC brushless motor

DC brushless motor can avoid low frequency noise and furtherly reduce running noise. Considering indoor unit operating at mid or low speed mostly, the effect of running noise is better than AC motor

The running noise of indoor unit can be decreased down to 22 dB(A) because of low noise fan and DC brushless motor

Carrier patent design Silencer

the noise generated by the dynamic pressure of the outlet of the wind turbine is absorbed by built-in wing type foam spacer, which involved with the advanced computational fluid dynamics to simulate the optimization, and the performance of the unit is not affected. At the same time, greatly reduce the unit noise at high speed (over -3 dB(A))



The air flow rate and static pressure of the unit is not affected by silencer, the performance of some models is also slightly improved, the following is measured contrast by unit

Ducted indoor unit	Silencer	ESP (Pa)	Test flow rate (CMH)	Test noise(dBA)	Noise drop
Unit 1 (2 fans)	No	30	1005.0	45.6	3.4 dBA
	Yes	30	1011.6	42.2	
Unit 2 (4 fans)	No	30	1333.1	46.0	3.5 dBA
	Yes	30	1351.4	42.5	
Unit 3 (4 fans)	No	12	1973.0	46.7	3.0 dBA
	Yes	12	1954.0	43.7	

Maintaining Pleasant Indoor Temperture and Humidity

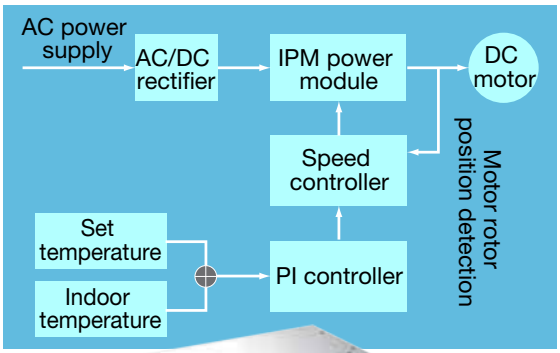
Powerful air conditioning doesn't mean better comfort, too cold in summer or too hot in winter leads to catch cold or serious water loss of the human body. Carrier VWV can offer better indoor comfort based on strong temperature and humidity control technology.

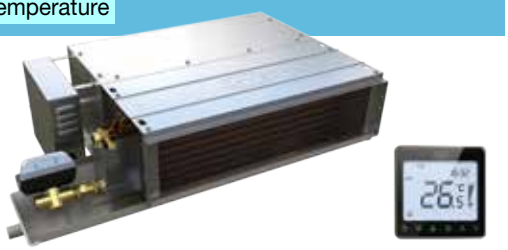
Precise humidity sensing(+/-5%)

Build-in temperature and humidity sensor for return air side

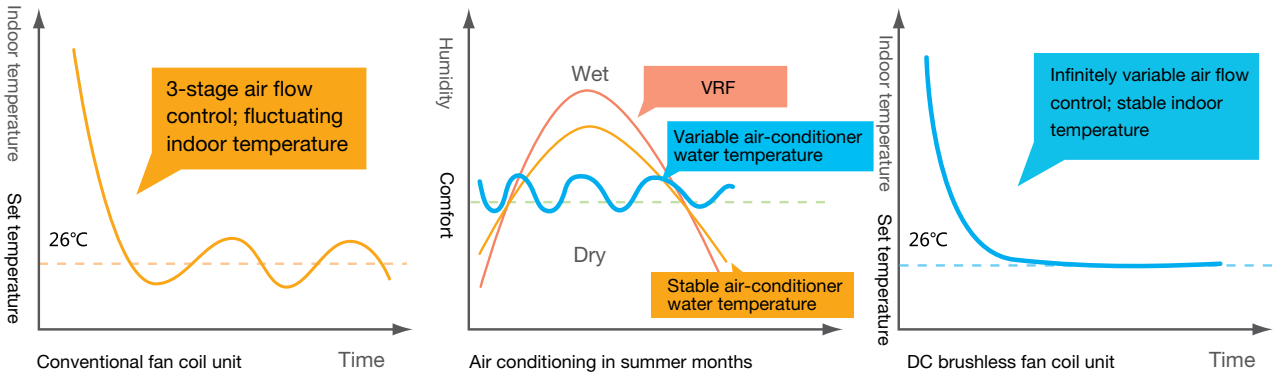
Optional wet film humidifier in winter

Precise temperature control(+/-5%)





Strong ability for indoor temperature and humidity control



Guaranteeing Indoor Air Quality

The heat recovery fresh air handling unit (BFP) intelligently monitors indoor CO2 concentration and supplies fresh air on demand, giving due consideration to both energy efficiency and comfort while also controlling the fan units to avoid negative indoor air pressure.

National CO_2 density standard	VWV CO_2 Status
≤0.1%(2000mg/m^3)*	700±50PPM(1260±90mg/m^3)

* From GB/T 18883-2002 Indoor Air Quality Standard

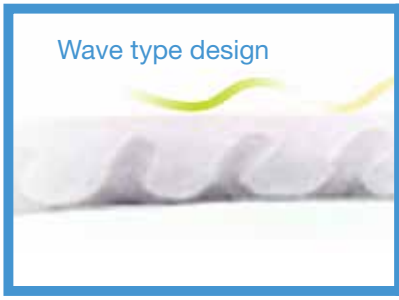
Fresh air purifier (anti PM 2.5)

Optional fresh air purifier, including supply fan, primary filter and no charged medium filter

Nanoscale mechanical filter, uncharged. Anti particle smaller than PM 2.5 especially: sandwich structure and ripple type design of filter contribute to filtering area.

Filter efficiency high to **98.5%*** stably (anti PM 2.5)

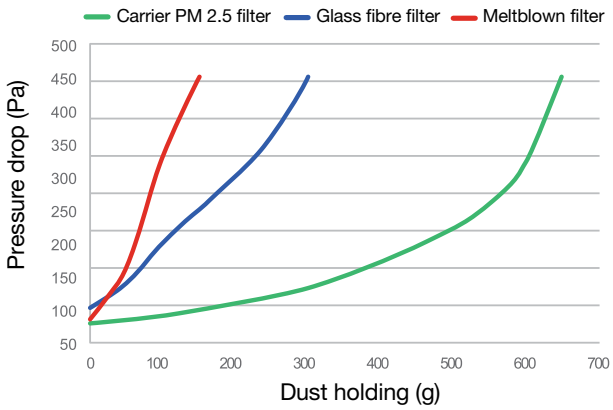
Wave type design

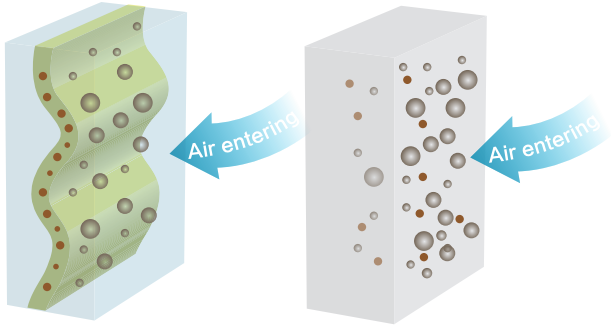


Longer life time due to **2-5 time** of dust holding compare to tridional filter

* Efficiency based on 0.1~2.5μm particle

Benchmark of pressure drop and dust holding



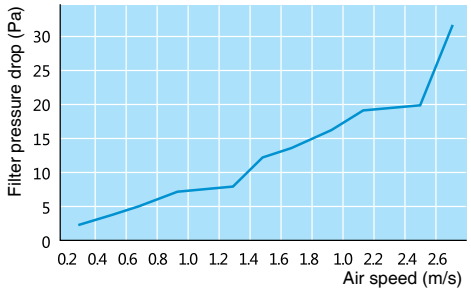


Indoor air purifier (anti- PM 2.5)

Optional HAF electrostatically charged media filter for ducted indoor unit (42CE/CN)

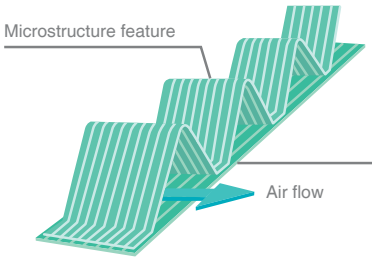
Efficient removal of PM2.5 particles

The unique electrostatic technology and microstructure technology, and to ensure stable effect of electrostatic filter, the filter can increase the effective area, more efficient capture and bearing micro particles. Test loop filter efficiency of PM2.5 is up to 98%.)



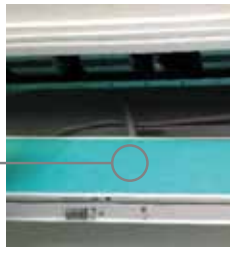
Low air flow pressure drop

The filter adopts the open channel structure, which ensures the high efficiency and low resistance, especially suitable for small ducted indoor unit w/ low static pressure



Resistance to mildew and moisture

The filter made of pure synthetic fiber material, which is non-toxic, non-detachment, resistance to mildew and moisture, can not lead to secondary pollution indoor.

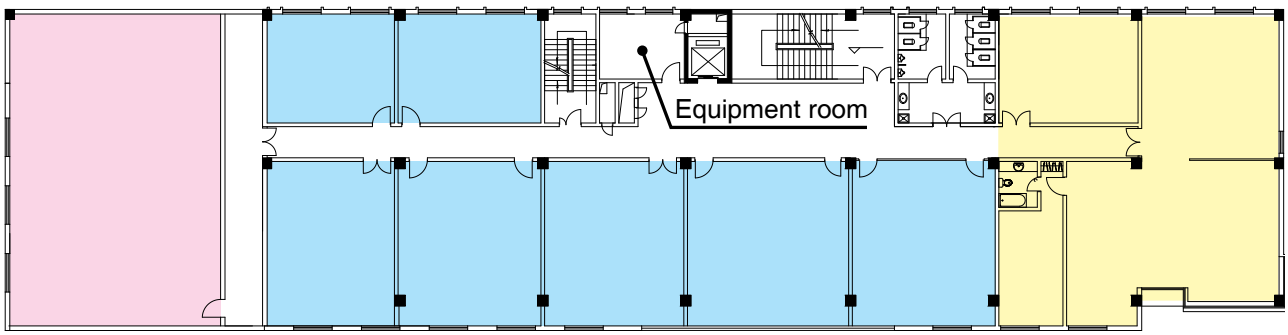


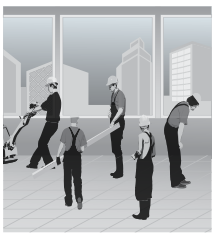
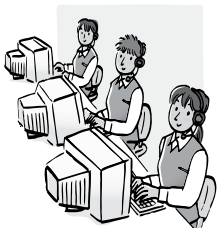
* Please select suitable model according to air speed and related pressure drop

4. Easy retrofitting

Multi-stage Installation to Spread Out Capital Investment

All indoor units can be installed first, followed by the outdoor units in batches, or the process can be reversed, with outdoor units deployed first and indoor units following in batches.
As shown in below case: developer can install outdoor unit for property management office firstly, then add related outdoor unit for trading company and customer service center step by step depending on leasing status.

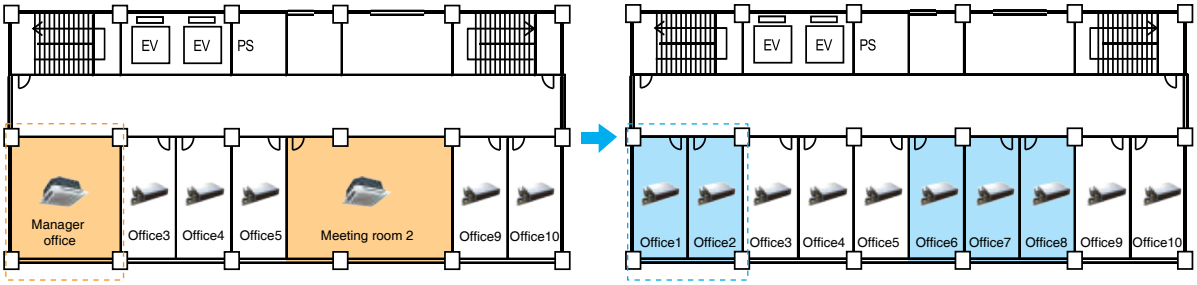


Zone	Status
1st stage Property management office	 Interior design with air duct layout  Typical office conditions
2nd stage Trading company	 Rental or sales period  Interior design with air duct layout  Typical office conditions
3rd stage Customer service center	 Typical office conditions  Interior design with air duct layout  Typical office conditions

More flexibility for changing pipe and products in future

For rental office building, we often face tenants changing, which will impact on re-decoration indoor, transforming of structure layout and system expansion.

▼ Space rearrangement

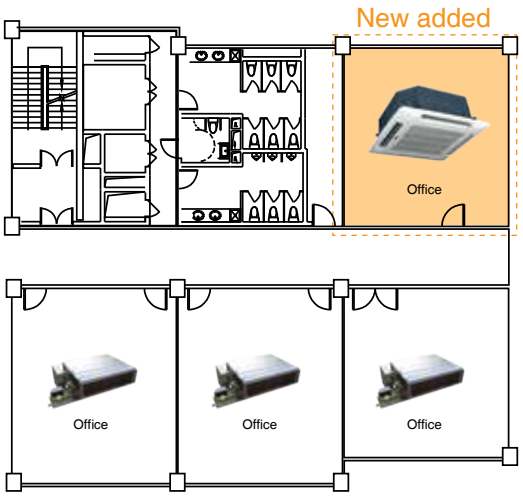


▼ Newly decorated

Cassette

Ceiling mounted

▼ Air conditioning area change



Easy operation

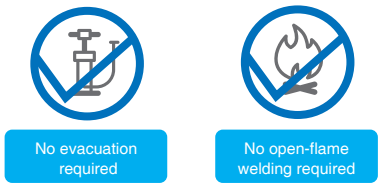
Shut off 2-way valve only

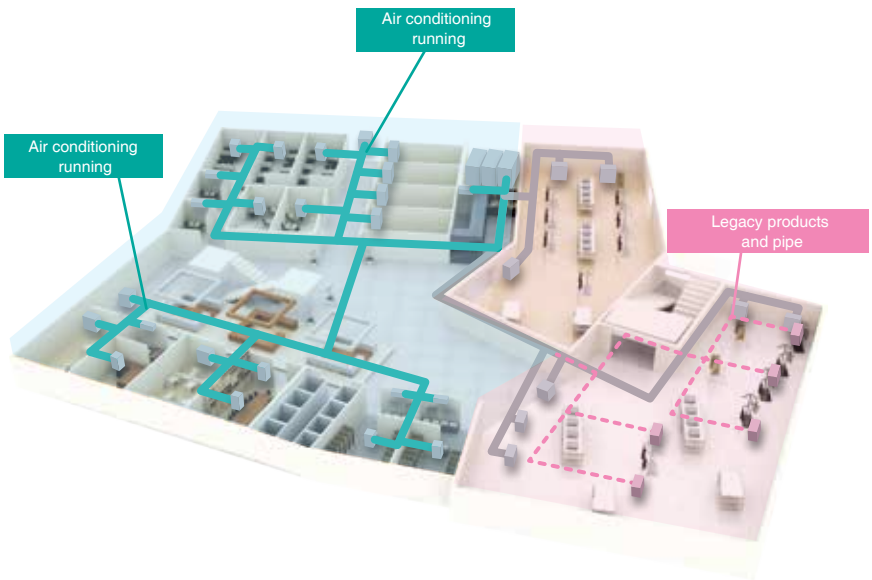
Less cost

Cheaper water piping and no refrigerant waste

No impacts to other users

System continue operation





5. Powerful control

New Networked Thermostat

- » Easy operation with backlit LCD display and touch buttons
- » Multi-modes: cooling , heating, ventilation, dehumidifying, E-heating, floor heating
- » Option fan speed: high/mid/low/auto
- » Indoor temperature display and setting
- » Multiple colors available to complement interior design
- » Optional remote control for easy operation of multiple indoor units
- » support to allocate address of products manually or automatically
- » System keep running if one thermostat power off or damaged

Intelligent System Manager

- » 7” color capacitor touch screen
- » Graphical touch-screen interface
- » Chinese and English languages
- » Zone control (up to 128 zones)
- » display and storage running data based on SD card
- » Schedule control (week/month/year)
- » Build-in Modbus-IP protocol
- » Remote control and indoor unit locking functions
- » remote diagnosis and reset for products
- » several levels accouter for logo in

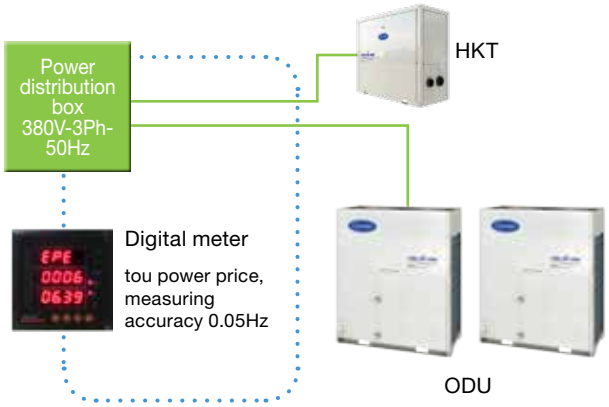
Powerful intelligent management system

System structure diagram

Precise energy metering

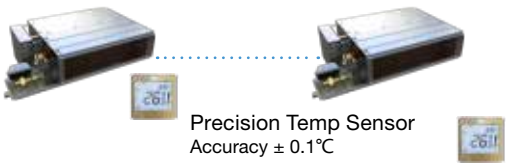
Shared power consumption
accurate collection (Per 2s)

Shared power = HKT power + ODU power



IDU capacity consumption
accurate calculation (Per 10s)

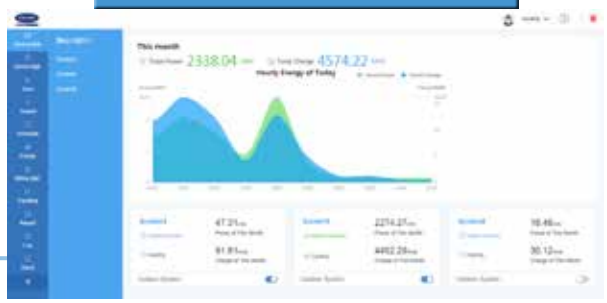
$$\text{Tenant Cap. Consumption Rate} = \frac{\text{Tenant IDU Cap. Consumption}}{\text{All IDU Cap. Consumption}}$$



2 Accurately calculates each tenant's actual consumption of cooling and heating from power consumption data and air-conditioning unit parameters

1

Energy Metering



3

4

Tenant power consumption
transform to Tenant bill

Tenant Bill = Discount x (Peak price bill + Basic price bill + Valley price bill)

Tenant cap. consumption transform to tenant power consumption (Per 10s)

Tenant power consumption /10s = Tenant power consumption x Tenant Cap. consumption rate

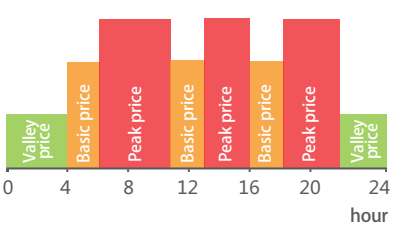
Tenant power consumption /30m = Σ 10-second tenant power consumption

AAA billing history | Electricity bills

Period	Peak	Low	Total
2013-6	120	30	150
2013-5	120	30	150
2013-4	120	30	150
2013-3	120	30	150
2013-2	120	30	150
2013-1	120	30	150
2012-12	120	30	150
2012-11	120	30	150

2012 total: 2500RMB,
2013 until now: 1400RMB

Power consumption indicators of a typical summer air-conditioning system



Time	A Tenant	B Tenant	C Tenant	....
...	0.27	0.9	1.11	0
14:00~14:30(2013/8/9)	0.46	0	1.58	0
14:30~15:00(2013/8/9)	0.39	0	1.77	0
15:00~15:30(2013/8/9)	0	0	1.09	0.44
15:30~16:00(2013/8/9)	0.41	0.29	0	0.27
...	0	0.44	0	0.53

Easy operation for admin team

» 1. Definition for detail information of tenants including combined unit cross system

Tenant information

Tenant name *	Carrier	Contact	Carrier	Location	West of floor 5
Tenant number	295023	Contact info.	1567295023	System	System
Billing date	30th	Email	We.bu@carrier.utc.com		

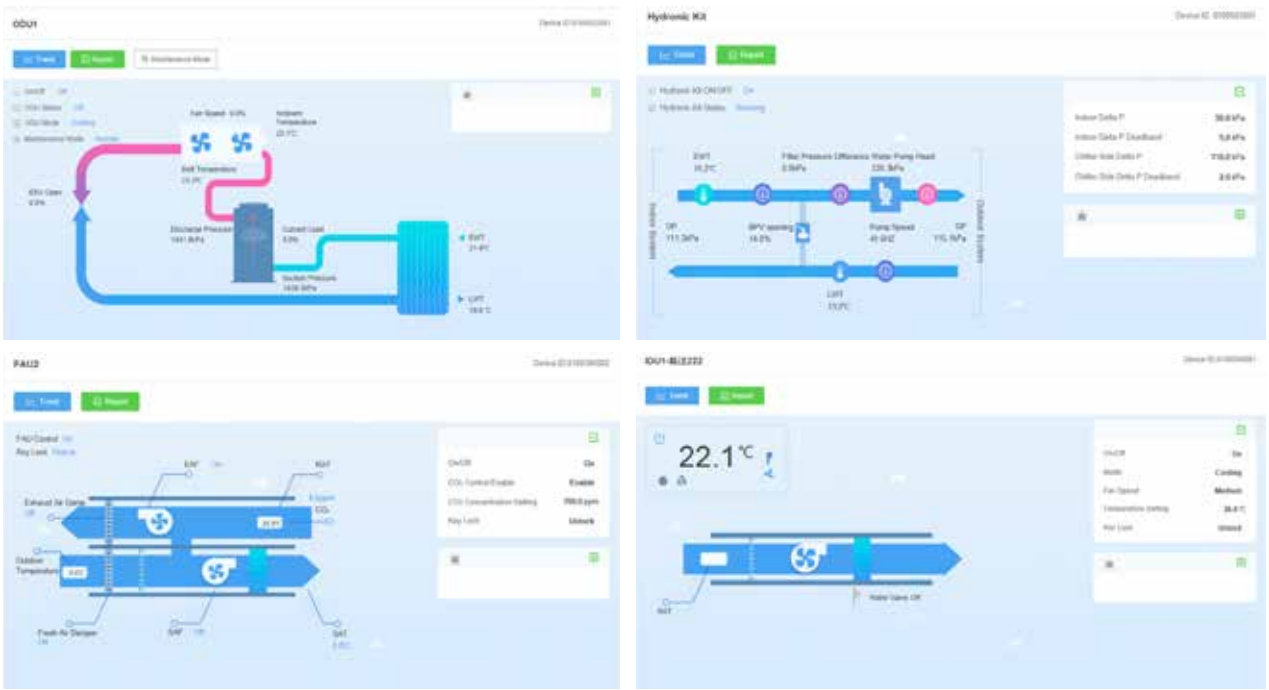
Selected device

Key | System | Tenant | Search

System selected	Device selected					
SYSTEM1	FAU1	FAU2	FAU3	FAU4	FAU5	FAU6
SYSTEM1	FAU7	FAU8	FAU9	FAU10	FAU11	FAU12
SYSTEM1						
SYSTEM1	IDU1	IDU2	IDU3	IDU4	IDU5	IDU6
SYSTEM1	IDU7	IDU8	IDU9	IDU10	IDU11	IDU12
SYSTEM1	IDU13	IDU14	IDU15	IDU16	IDU17	IDU18
SYSTEM1	IDU19	IDU20	IDU21	IDU22	IDU23	IDU24
SYSTEM1	IDU25	IDU26	IDU27	IDU28	IDU29	IDU30

Device selected: system 1-FAU3, system 1-FAU11, system 1-IDU2, system1-IDU16

» 2. Device information clear at a glance



» 3. Billing report with multi-type solve potential worries

➢ Building level report for admin department, easy management without omission

Item	Tenant	Peak power (kWH)	Normal power (kWH)	Valley power (kWH)	Peak charge (RMB)	Normal charge (RMB)	Valley charge (RMB)	Power (kWH)	Charge (RMB)
1	Company A	1.03	1.52	18.08	1.13	3.04	11.75	20.63	15.92
2	Company Y	1.18	1.37	16.27	1.3	2.74	10.57	18.82	14.61
3	Company T	5.19	5.75	78.65	5.71	11.5	51.12	89.59	68.33
4	Sum	7.4	8.64	113	8.14	17.28	73.45	129.03	98.86
Building :	B Tower								
Billing cycle :	2017-08-01 - 2017-08-31								

➢ Monthly or daily tenant level report with accurate information

Item	System	Device	Peak power (kWH)	Normal power (kWH)	Valley power (kWH)	Peak charge (RMB)	Normal charge (RMB)	Valley charge (RMB)	Power (kWH)	Charge (RMB)
1	System5	IDU2	0.11	0.12	1.2	0.12	0.24	0.78	1.43	1.14
2	System5	IDU9	0.56	0.51	6.22	0.62	1.01	4.04	7.29	5.68
3	System5	IDU16	0.5	0.73	8.71	0.55	1.47	5.66	9.94	7.68
4	Sum of Device	-	1.17	1.36	16.13	1.29	2.72	10.48	18.66	14.49
5	Sum of shared Device	-	0.14	0.01	0.01	0.09	0.01	0.02	0.16	0.12
6	Sum of shared Device	-	1.31	1.37	16.14	1.38	2.73	10.5	18.82	14.61
Tenant :	Company Y									
Billing cycle :	2017-08-01 - 2017-08-31									

➢ Detail IDU running record to solve potential challenge from tenant

Item	Time	Time	Device ID	Tenant	Operation
60	8/4/2017 8:06:31 AM	IDU16	0100504016	Company Y	Turn on
86	8/4/2017 8:02:31 AM	IDU16	0100504016	Company Y	Turn off
112	8/4/2017 7:44:31 AM	IDU16	0100504016	Company Y	Turn on
142	8/4/2017 7:37:31 AM	IDU16	0100504016	Company Y	Turn off
164	8/4/2017 7:21:30 AM	IDU16	0100504016	Company Y	Turn on
193	8/4/2017 6:57:30 AM	IDU16	0100504016	Company Y	Turn off
251	8/3/2017 9:01:17 AM	IDU16	0100504016	Company Y	Turn on
263	8/3/2017 8:51:17 AM	IDU16	0100504016	Company Y	Turn off
274	8/3/2017 6:22:15 AM	IDU16	0100504016	Company Y	Turn on
287	8/3/2017 3:31:14 AM	IDU16	0100504016	Company Y	Turn off

6. Overall safety and reliability

Integrated system, reliable performance and secured quality

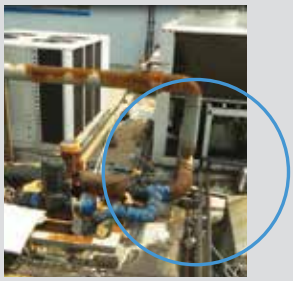
Fragmental system

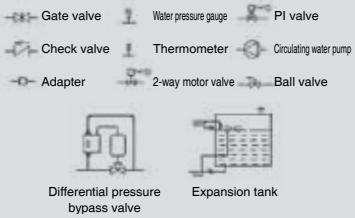
- Components combined on site, compatibility concern and uncertain performance
- Lots of hydronic kits installed on site, more leakage points
- Failure shoot product by product, fussy and long cycle

Integrated system

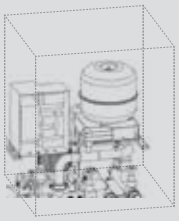
- Design and test by system, no compatibility issue and reliable performance
- Packaged hydronic kits preinstalled, secured quality and less leakage points
- All alarm in one screen, quick and precise failure shoot

Conventional hydronic system

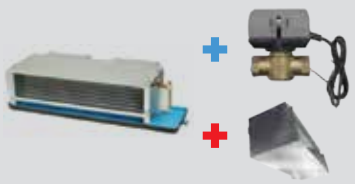




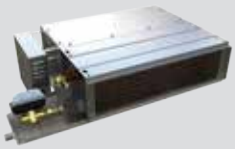
Carrier VWV system packaged hydronic kits



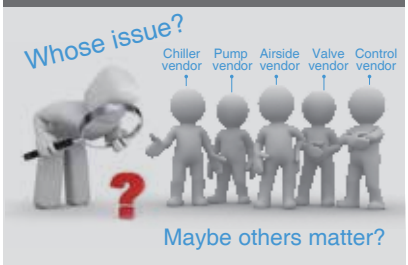
Conventional indoor unit



Carrier VWV system indoor unit

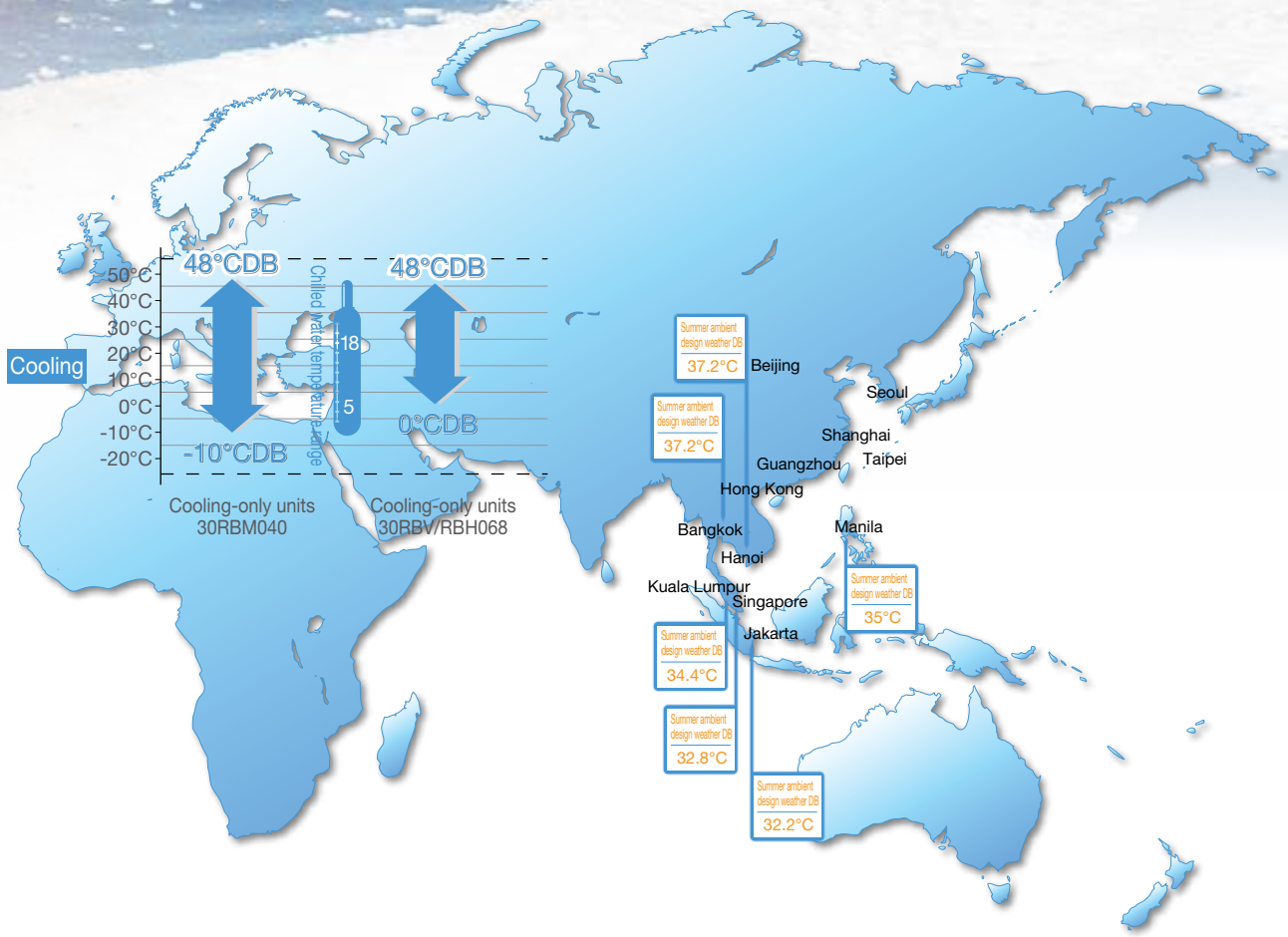


System failure shoot



Carrier VWV system manager

Wider running envelop

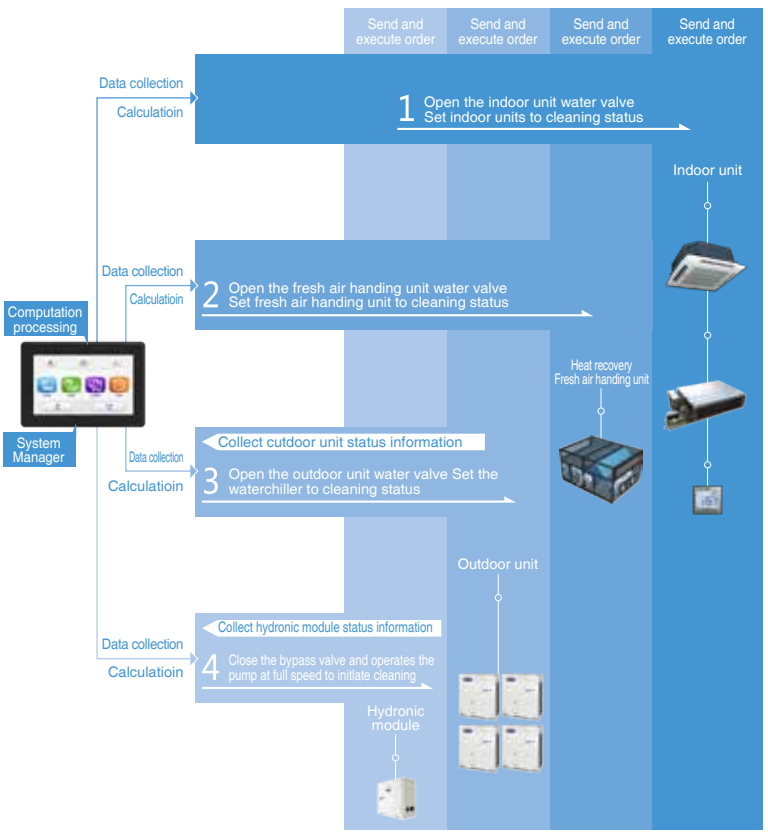


Auto-Cleaning Process

» Auto-cleaning: The Carrier hydronic kit has an auto-cleaning function that is used to clean water pipes during commissioning and also at regular intervals to prevent fouling and ruating.

» Automated pressure control: The system automatically calculates and sets optimal flow and lift without the need for operator intervention.

*When it comes to first time installation or restart system after long time power off, it should do auto-cleaning process to ensure product efficiency.



High efficiency and modularized outdoor unit, high reliability derived from back up unit

- » GB grade 1 product (30RQV068)
- » Modularly combined outdoor unit can be backed up interchangeably and in combination to simplify servicing.
- » Staggered equipment start-up to minimize the impact on the power grid.
- » Small cooling capacity gap and a combination of up to 8 units in 8 specifications, catering to different needs.
- » Side-by-side installation.

Modularized design for complete back up
Alternative running to balance product life

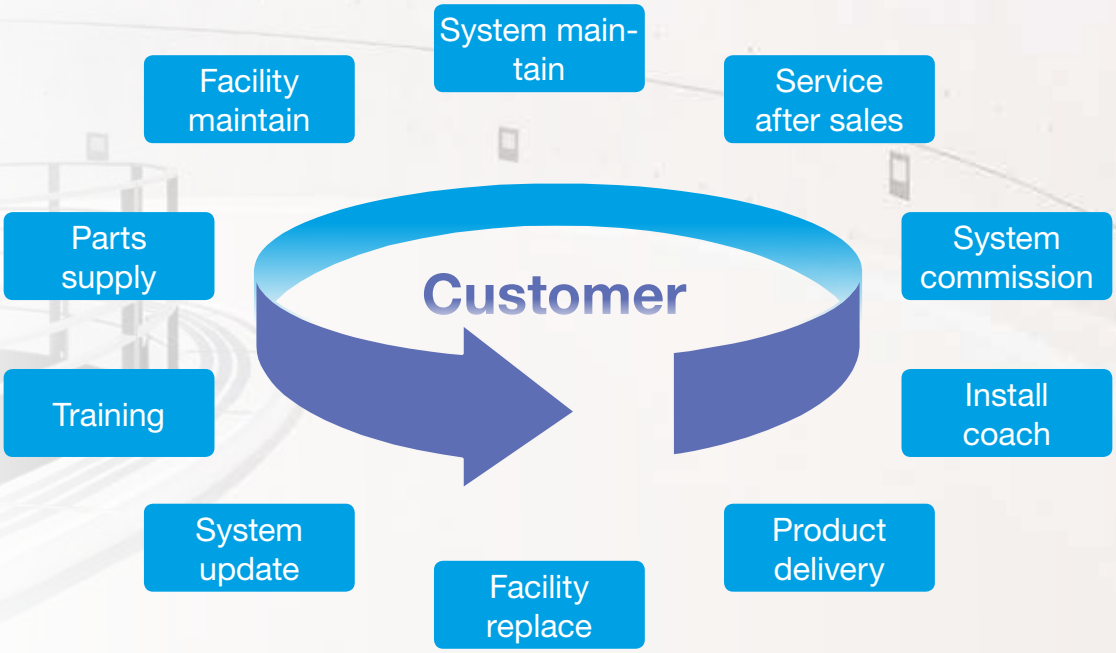
Fixed speed ODU (30RBH068)
Dual compressor design for higher reliability

Eliminating Oil-return Issues

Conventional variable refrigerant flow (VRF) unit: refrigerant is sent from the outdoor unit to the indoor unit, so oil return may be inhibited through long pipes.
Carrier AquaFlowTM VWV System : water flows between the outdoor and indoor units, eliminating the potential for compressor damage due to insufficient oil return.

Professional service, quick response

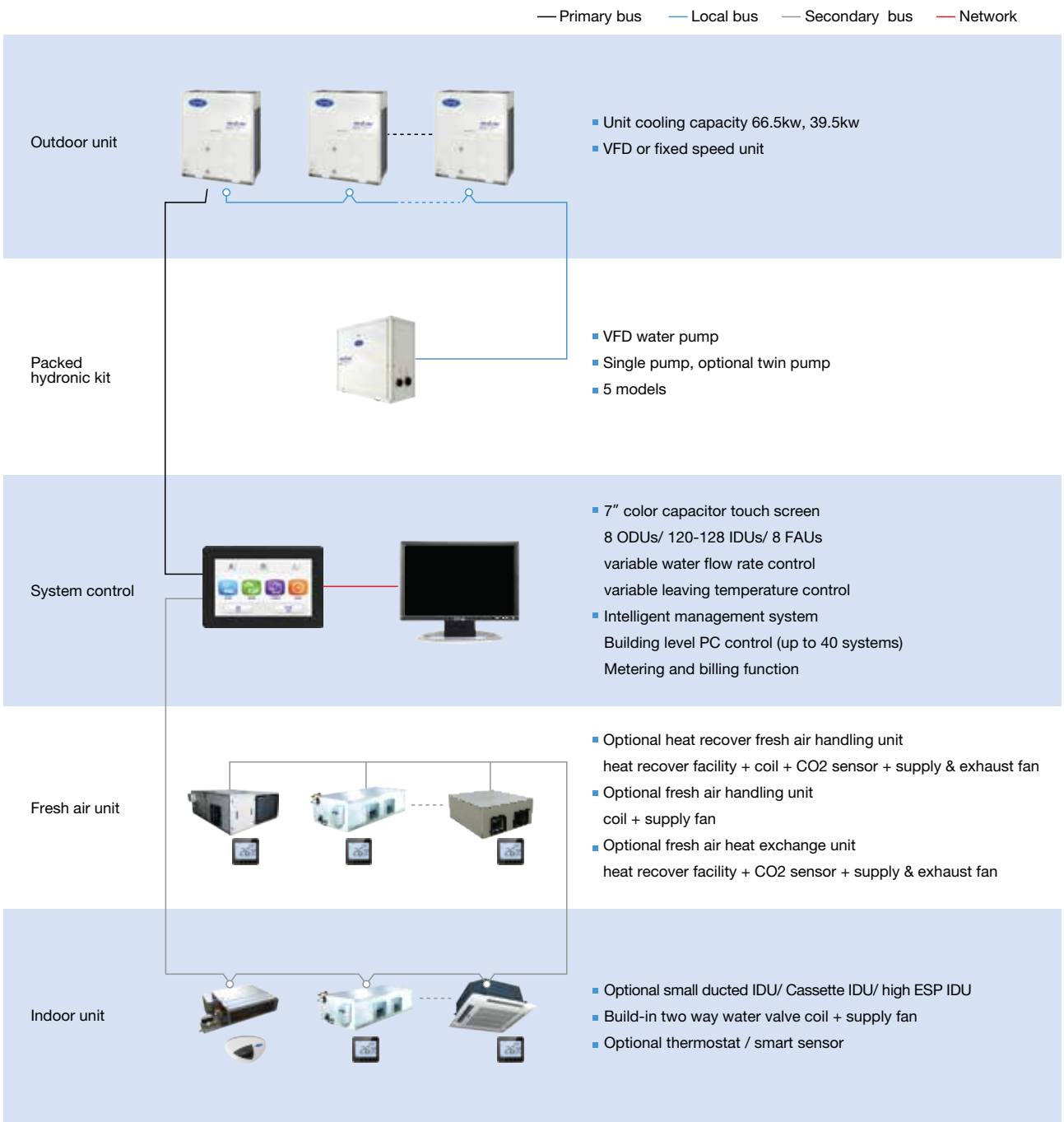
- » More professional analysis for failure and faster repairing due to well known for system and components
- » Carrier global service network, quick response



Technical Specifications

Carrier AquaFlow™ VWV System

System structure



Standard System Configuration

Cooling only outdoor unit system

Unit model	System cooling capacity	Sets of outdoor unit	Packaged hydronic kit		System water flow rate	System external lift	Intelligent system manager
			Model	Sets	m^3/h	kPa	
SHSRBH065V*	66.5	1	HK080 S	1	11.5	213	HSM*1
SHSRBH130V*	133	2	HK150 S/T	1	23	203	
SHSRBH195V*	199.5	3	HK210 S/T	1	34.5	230	
SHSRBH260V*	266	4	HK325 S/T	1	46	238	
SHSRBH325V*	332.5	5			57.5	221	
SHSRBH390V*	399	6	HK520 S/T	1	69	227	
SHSRBH455V*	465.5	7			80.5	208	
SHSRBH520V*	532	8			92	178	
Note: * means the sets of VFD outdoor unit, optional from “0~8” which can not bigger than max outdoor unit sets in same system							

Unit model	System cooling capacity	Sets of outdoor unit	Packaged hydronic kit		System water flow rate	System external lift	Intelligent system manager
			Model	Sets	m^3/h	kPa	
SHSRBM080	79	2	HK080 S	1	13.6	218	HSM*1
SHSRBM120	118.5	3	HK150 S/T	1	20.4	178	
SHSRBM160	158	4	HK210 S/T	1	27.2	246	
SHSRBM200	197.5	5			34	234	
SHSRBM240	237	6	HK325 S/T	1	40.8	248	
SHSRBM280	276.5	7			47.6	239	
SHSRBM320	316	8			54.4	223	

Indoor equipment

Other important components	Indoor unit	Small ducted IDU (42CT), 4-way cassette IDU (42GWC) and high ESP IDU (DBFP/DFP), up to 120~128 sets for each system
	Fresh air handling unit	Heat recovery fresh air handling unit (BFP) and fresh air handling unit (DBFP/DFP) , up to 8 units for each system
	Thermostat	Heat recovery fresh air handling unit (BFPR), fresh air exchange unit (DXF) and fresh air handing unit (DFBP/DFP), up to 8 sets for each system
Options		1. HMI (00PSY143780200); 2. Remote control (CTCIR01); 3. Manual stop value (00PPY141440200)

VWV power option

1. Triple phase power

Type	Product	Power: 3Ph - 380V-50Hz	Power: 3Ph - 400V-50Hz	Power: 3Ph - 415V-50Hz	Power: 3Ph - 380V-60Hz
Chiller	Air cooled chiller	30RBH068 / 30RBV068 / 30RMB040	30RBH068 / 30RBV068 / 30RMB040	30RBH068 / 30RBV068 / 30RMB040	30RBV068
	High ESP option	30RBH068 / 30RBV068 / 30RMB040	30RBH068 / 30RBV068 / 30RMB040	30RBH068 / 30RBV068 / 30RMB040	30RBV068
HK	HK080S-HK520S	√	√	√	√
	HK150T-HK520T	√	√	√	√
	60m water pressure option	√	√	√	√
Fresh air unit	BFPR10-BFPR80	√	√	√	√
	BFPR PM 2.5 filter option	√	√	√	
	DXF1000PQ-DXF6000PQ	√	√	√	

2. Single phase power

Type	Product	Power: 1Ph - 220V-50Hz	Power: 1Ph - 230V-50Hz	Power: 1Ph - 240V-50Hz	Power: 1Ph - 220V-60Hz
Fresh air unit	DBFP1-6/DFP2-4	√	√	√	
	DXF600SQ-DXF3000SQ	√	√	√	
Small ducted IDU	42CT_AC(002-014)	√	√	√	√
	42CT_DC(002-014)	√	√	√	√
High ESP ducted IDU	DBFP1-6/DFP2-4	√	√	√	
4 way cassette IDU	42GWC-AC(003-008)	√	√	√	
	42GWC-AC(010-014)	√	√	√	√
	42GWC-DC(003-008)	√	√	√	√

Outdoor system paerformance data

Outdoor unit

Model		30RBV068	30RBH068	30RBM040
Nominal Cooling Capacity	kW	66.5	66.5	39.2
EER* (1)	kW/kW	4.10	3.70	3.77
IPLV(China GB)	kW/kW	4.80	3.90	4.12
Refrigerant		R410A		R410A
Charging	kg	12.5	10.5	12
Compressor		VFD hermetic scroll compressor	Hermetic scroll compressor	Hermetic scroll compressor
Quantity	set	1	2	2
Capacity control step		stepless	2	2
Min. capacity	%	33	50	50
Control System		SPIC6		SPIC6
Condenser		Grooved copper tubes and aluminum fins		Grooved copper tubes and aluminum fins
Type of fan		Axial fan		Axial fan
Quantity of Fan		2	2	1
Fan Speed	RPM	150~1000	950	720
Evaporator		Brazed plate heat exchanger		Brazed plate heat exchanger
Water volume	l	5.78	5.25	4.31
Nominal water flow	M3/h	11.5	11.5	6.8
Nominal water-side pressure drop	kPa	67	67	63
Max. water-side pressure	kPa	1000	1000	1000
Inlet/Outlet Pipe		Victaulic		male thread
Nominal Diameter	DN	50	50	40
Electrical Data				
Nominal Power Supply		380V/415V-3Ph-50Hz380V-3Ph-60Hz	380V/415V-3Ph-50Hz	380V/400V-3Ph-50Hz230V-3Ph-60Hz
Nominal unit current	A	44.1	48.1	36.5
Unit length	mm	1585	1585	1240
Unit width	mm	796	796	860
Unit height	mm	1811	1811	1820
operation weight	kg	542	489	360
Noise level	dB(A)	66	66	64
NPLV (2)	kW/kW	7.45	6.00	6.69
IPLV (ARI)	kW/kW	6.00	4.80	5.18
EER	kW/kW	3.35	3.18	3.29
High ESP option				
Total Power Input	kw	21.3	21.4	Non-standard option
Total Power Input	A	36	41	
Max extend pressure	Pa	120	120	
Max fan speed	rpm	1450	1360	

(1) VWV EER condition: Indoor 27°C (DB)/19°C(WB) , Outdoor: 35°C

(2) VWV NPLV: 100% load Indoor 27°C(DB)/19°C(WB) , Outdoor: 35°C; 75% load Indoor 27°C(DB)/19°C(WB) , Outdoor: 26.7°C; 50% load Indoor 27°C(DB)/19C(WB) , Outdoor:18.3°C; 25% load Indoor 27°C(DB)/19°C(WB) , Outdoor: 12.8°C

Packaged hydronic kit

Singlea pump

Model	HK080S0100001THC	HK150S1100001THC	HK210S1100001THC	HK325S1100001THC	HK520S1100001YLC
System cooling capacity range	39.5-79kw	39.5-133kw	39.5-199.5kwC	39.5-332.5kw	39.5-532kw
Nominal flow and hydronic kit external lift	13.6m^3/h | 250KPa	23m^3/h | 270KPa	34.5m^3/h | 297KPa	57.5m^3/h | 288KPa	92m^3/h | 245KPa
Major components	VFD pump, differential pressure bypass valve, water replenishing valve, expansion tank (excluded if system endure pressure>20m) , automatic relief valve, filter, etc.				
Dimension (L*W*H, mm)	820x420x998	1312×608×1186			1277×700×1186
Pump sets	1				
Nominal diameter of joint	DN 60	DN 65	DN 80	DN 100	DN 100
Bypass pipe connector	DN 42	DN 50	DN 50	DN 65	DN 65
Joint connection type	Clamp				
Expansion tank capacity	12 L	35 L	50 L	80 L	80 L
Power supply	380/400V-3Ph-50Hz; 380V-3Ph-60Hz				
Rated power	1.85kW	4kW	5.5kW	7.5kW	11kW
Maximum operating current	5 A	8.2 A	10.9 A	14.5 A	21 A
Net weight (kg)	130	229	262	288	369

Twin pump

Model	HK150T0100001THC	HK210T0100001THC	HK325T0100001THC	HK520T0100001YLC
System cooling capacity range	39.5-133kw	39.5-199.5kw	39.5-332.5kw	39.5-532kw
Nominal flow and hydronic kit external lift	23m^3/h | 270KPa	34.5m^3/h | 297KPa	57.5m^3/h | 288KPa	92m^3/h | 245KPa
Major components	VFD pump, differential pressure bypass valve, water replenishing valve, expansion tank (excluded if system endure pressure>20m) , automatic relief valve, filter, etc.			
Dimension (L*W*H, mm)	1404×798×1186	1462×878×1186		1462×918×1186
Pump sets	2 (100% back up)			
Nominal diameter of joint	DN 65	DN 80	DN 100	DN 100
Bypass pipe connector	DN 50	DN 50	DN 65	DN 65
Joint connection type	Clamp			
Expansion tank capacity	35 L	50 L	80 L	80 L
Power supply	380/400V-3Ph-50Hz; 380V-3Ph-60Hz			
Rated power	4kW	5.5kW	7.5kW	11kW
Maximum operating current	7.7 A	10.2 A	13.7 A	22A
Net weight (kg)	270	348	411	546

Note: 1. Please refer to Design, Installation and Commissioning Manual for Aqua-flow™ VWV System for nomenclature and detailed specifications.

2. The standard working pressure of packaged VFD hydronic kits (HK 080-520) is 20 meter ; for HK150-520 Carrier can offer 60 meter option without expansion tank, which should be installed on the top of system lop and is purchased by customer or is supplied by Carrier.

Technical parameters for heat recovery fresh air handing unit

Heat recovery fresh air handling unit BFPR

2-Row										
Unit model			BFPR10	BFPR15	BFPR20	BFPR25	BFPR30	BFPR40	BFPR50	BFPR60	BFPR80
Airflow	CMH		1000	1500	2000	2500	3000	4000	5000	6000	8000
Type			Ceiling-mounted								Horizontal
Total pressure at outlet	Fresh air side	L (Pa)	135	189	161	116	160	248	321	362	240
		H (Pa)	266	233	251	265	253	425	365	449	417
	Air discharge side	L (Pa)	128	84	90	107	103	244	205	284	141
		H (Pa)	174	234	244	168	217	312	386	428	317
Heat exchange rate	Sensible heat	Summer (%)	67.2	66.9	67.1	65.7	64.3	66.2	67.9	68.9	63.0
	Total heat	Summer (%)	53.3	53.3	53.7	52.2	51.3	52.6	53.8	54.5	50.5
Motor input power	Fresh air side	L (kW)	0.29	0.42	0.57	0.66	0.79	1.66	1.83	2.96	3.32
		H (kW)	0.41	0.42	0.63	0.82	1.11	1.83	1.99	3.14	3.66
	Air discharge side	L (kW)	0.16	0.31	0.39	0.57	0.66	1.54	1.75	2.08	2.5
		H (kW)	0.29	0.42	0.63	0.66	0.79	1.66	1.83	2.96	3.1
Total capacity	Cooling capacity	kW	10.3	15.9	21.9	26.5	31.2	42.4	55.3	68.2	92.7
Recovery capacity	Cooling capacity	kW	6	9.1	12.2	14.8	17.5	23.9	30.5	37.1	45.8
Coil cooling	Cooling capacity	kW	4.3	6.8	9.7	11.7	13.7	18.5	24.8	31.1	46.9
	Water flow rate	T/h	0.73	1.17	1.66	2.01	2.36	3.18	4.26	5.34	8.06
Net weight		LL (kg)	160	200	230	240	260	325	375	470	595
		LH (kg)	160	200	230	240	265	325	375	475	610
		HH (kg)	160	200	230	245	265	330	390	475	615
		HL (kg)	160	200	230	240	265	325	390	470	600

4-Row										
Unit model			BFPR10	BFPR15	BFPR20	BFPR25	BFPR30	BFPR40	BFPR50	BFPR60	BFPR80
Airflow	CMH		1000	1500	2000	2500	3000	4000	5000	6000	8000
Type			Ceiling-mounted								Horizontal
Total pressure at outlet	Fresh air side	L (Pa)	111	161	131	82	122	203	275	316	196
		H (Pa)	243	205	221	231	215	380	320	403	373
	Air discharge side	L (Pa)	128	84	90	107	103	244	205	284	141
		H (Pa)	174	234	244	168	217	312	386	428	317
Heat exchange rate	Sensible heat	Summer (%)	67.2	66.9	67.1	65.7	64.3	66.2	67.9	68.9	63.0
	Total heat	Summer (%)	53.3	53.3	53.7	52.2	51.3	52.6	53.8	54.5	50.5
Motor input power	Fresh air side	L (kW)	0.29	0.42	0.57	0.66	0.79	1.66	1.83	2.96	3.32
		H (kW)	0.41	0.42	0.57	0.82	1.11	1.83	1.99	3.14	3.66
	Air discharge side	L (kW)	0.16	0.31	0.39	0.57	0.66	1.54	1.75	2.08	2.5
		H (kW)	0.29	0.42	0.63	0.66	0.79	1.66	1.83	2.96	3.1
Total capacity	Cooling capacity	kW	15.5	23.3	31.3	38.2	45.2	60.2	70.3	86.8	119.7
Recovery capacity	Cooling capacity	kW	6	9.1	12.2	14.8	17.5	23.9	30.5	37.1	45.8
Coil cooling	Cooling capacity	kW	9.5	14.2	19.1	23.4	27.7	36.3	39.8	49.7	73.9
	Water flow rate	T/h	1.64	2.43	3.28	4.01	4.76	6.24	6.84	8.53	12.7
Net weight		LL (kg)	165	205	235	245	270	335	385	485	615
		LH (kg)	165	205	235	250	270	335	390	490	630
		HH (kg)	165	205	235	250	275	340	400	485	635
		HL (kg)	165	205	235	250	270	335	400	485	620

Unit model			BFPR10	BFPR15	BFPR20	BFPR25	BFPR30	BFPR40	BFPR50	BFPR60	BFPR80
Outline dimensions	L	mm	1450	1520	1610	1660	1750	1970	2130	2300	2430
	W	mm	960	1120	1220	1180	1180	1370	1520	1710	1800
	H	mm	520	580	640	700	770	770	770	770	1220

Build-out purifier option of BFPR

Unit model	BFPR10	BFPR15	BFPR20	BFPR25	BFPR30	BFPR40	BFPR50	BFPR60	BFPR80
Air flow rate	1000	1500	2000	2500	3000	4000	5000	6000	8000
Power source (V)	380V/3P/50Hz								
Rated power (kW)	0.2	0.32	0.37	0.55	0.75	1.0	1.5	2.2	3.8
Input power (kW)	0.38	0.65	0.64	0.84	1.1	1.6	2.0	3.1	62.1
Current (A)	0.8	1.3	1.21	1.6	2.3	3.0	3.9	5.9	7.8
Primary filter level	G3	G3	G3	G3	G3	G3	G3	G3	G3
Medium filter level	F7	F7	F7	F7	F7	F7	F7	F7	F7
Weight (kg)	45	60	65	85	95	110	135	145	165
Width (mm)	431	635	635	822	1026	1230	1128	1230	1230
Length (mm)	1130	1200	1240	1280	1320	1360	1360	1480	1480
Height (mm)	480	480	582	582	582	582	684	684	871

Summertime calculations based on: outdoor conditions of 35°C DBT and 59.1% RH, indoor conditions of 27°C DBT and 50% RH, and inlet/outlet water temperature of 7°C/12°C.

Note: Please refer to Design, Installation and Commissioning Manual for Aqua-flow™ VWV System for nomenclature and detailed specifications

Fresh air unit performance data

Fresh air handling unit (suspending AHU)

Model	Air flow rate (m^3/h)	Width (unit + control box) ×length×height	Motor kW-pole	Input power (kW)	Fan /motor sets	ESP (Pa)	TP (Pa)	Cooling capacity (kW)	Chilled water flow rare(l/s)	Cooling WDP (Kpa)	Unit weight (kg)	Noise level (dB(A))
DBFP010L3X	1000	(680+154)×986×380	0.175-4	0.34	1/1	130	234	12.6	0.6	53.4	46	52
DBFP010H3X			0.275-4	0.44		220	321				47	55
DBFP015L3X	1500	(875+154)×986×380	0.275-4	0.44	1/1	115	227	19	0.9	50.4	53	55
DBFP015H3X			0.425-4	0.79		215	320				55	58
DBFP020L3X	2000	(872+150)×986×500	0.35-4	0.63	1/1	195	300	25.3	1.2	53.7	63	56.5
DBFP020H3X			0.55-4	0.84		280	381				64	59.5
DBFP025L3X	2500	(1018+150)×986×500	0.45-4	0.83	1/1	165	265	31	1.5	53.2	67	60
DBFP025H3X			0.55-4	0.84		250	356				70	61
DBFP030L3X	3000	(1166+150)×986×500	0.65-4	1.09	1/1	120	250	38.7	1.9	87.9	75	62
DBFP030H3X			0.65-4	1.09		200	330				75	62
DBFP040L3X	4000	(1458+150)×986×500	0.35-4X2	0.63X2	2/2	185	300	53.4	2.6	86.8	108	58
DBFP040H3X			0.55-4X2	0.84X2		250	381				112	61
DBFP050L3X	5000	(1752+150)×986×500	0.45-4X2	0.83X2	2/2	160	265	64.1	3.1	81.7	123	60.5
DBFP050H3X			0.55-4X2	0.84X2		250	356				127	61.5
DBFP060L3X	6000	(2044+150)×986×500	0.65-4X2	1.09X2	2/2	150	250	78.1	3.7	104	134	62.5
DBFP060H3X			0.65-4X2	1.09X2		220	330				138	63.5
DBFP010L5X	1000	(680+150)×986×380	0.175-4	0.34	1/1	90	234	15.8	0.8	44	49	52
DBFP010H5X			0.275-4	0.44		175	321				50	55
DBFP015L5X	1500	(875+150)×986×380	0.275-4	0.44	1/1	70	227	24	1.2	57.7	56	55
DBFP015H5X			0.425-4	0.79		170	320				58	58
DBFP020L5X	2000	(872+150)×986×500	0.35-4	0.63	1/1	160	300	31.4	1.5	46.8	67	56.5
DBFP020H5X			0.55-4	0.84		230	381				68	59.5
DBFP025L5X	2500	(1018+150)×986×500	0.45-4	0.83	1/1	140	265	39.7	1.9	58.9	75	60
DBFP025H5X			0.55-4	0.84		210	356				75	61
DBFP030L5X	3000	(1166+150)×986×500	0.65-4	1.09	1/1	85	250	49.5	2.4	101.1	81	62
DBFP030H5X			0.65-4	1.09		150	330				81	62
DBFP040L5X	4000	(1458+150)×986×500	0.35-4X2	0.63X2	2/2	150	300	65.5	3.1	81.6	115	58
DBFP040H5X			0.55-4X2	0.84X2		215	381				119	61
DBFP050L5X	5000	(1752+150)×986×500	0.45-4X2	0.83X2	2/2	120	265	80.4	3.8	76.5	129	60.5
DBFP050H5X			0.55-4X2	0.84X2		210	356				133	61.5
DBFP060L5X	6000	(2044+150)×986×500	0.65-4X2	1.09X2	2/2	115	250	98.7	4.7	109.9	142	62.5
DBFP060H5X			0.65-4X2	1.09X2		185	330				146	63.5

Rated condition: Cooling- entering air temperature of 35°C DBT and 28°C WBT; entering water temperature of 7°C.

Note: 1. Connect position- left connect, when it comes to face inlet vent and the coil connector is on the left of AHU; opposition is right connect.
2. Digital number 8 means external pressure (H- high, L – low); digital number 9 means cooling capacity (3- standard capacity, 5- high capacity).
3. Input power means total input power by unit level.

Model	Width (unit + control box) a*length*height	Air flow rate (m^3/h)	ESP (Pa)	TP (Pa)	Input power (kW)	Unit weight (kg)	Noise level (dB(A)
DFP020LX	(1018+154)×986×380	2000	95	297	0.79×1	65	58.2
DFP020HX		2000	65	297	0.79×1	67	58.2
DFP030LX	(1458+154)×986×380	3000	130	320	0.79×2	92	58.5
DFP030HX		3000	100	320	0.79×2	95	58.5
DFP040LX	(1752+154)×986×380	4000	85	297	0.79×2	105	60
DFP040HX		4000	55	297	0.79×2	109	60

Note: 1. Unit capacity refer to DBFP(X) w/ same air flow rate.
2. Digital number 7 means external pressure (H- high, L – low).
3. Input power means total input power by unit level.

Note: Please refer to Design, Installation and Commissioning Manual for Aqua-flow™ VWV System for nomenclature and detailed specifications

Indoor unit performance data

Small ducted indoor unit

42CT

2 rows coil unit									3 rows coil unit											4 rows coil unit										
Content	Model	002	003	004	005	006	007	008	002	003	004	005	006	007	008	010	012	014	002	003	004	005	006	007	008	010	012	014
Air flow rate (CMH)	High	340	510	680	850	1020	1190	1360	340	510	680	850	1020	1190	1360	1700	2040	2380	340	510	680	850	1020	1190	1360	1700	2040	2380
	Mid	270	400	530	670	800	940	1070	270	400	530	670	800	940	1070	1340	1610	1890	270	400	530	670	800	940	1070	1340	1610	1890
	Low	200	300	400	500	600	700	800	200	300	400	500	600	700	800	1000	1200	1400	200	300	400	500	600	700	800	1000	1200	1400
Cooling capacity (W)	Total	1900	2950	3600	4500	5400	6300	7200	2300	3350	4300	5250	6300	7250	8450	9850	11500	13000	2660	3690	4680	5600	6900	7780	9300	11220	13000	15200
	Sensible	1440	2190	2770	3450	4130	4790	5520	1630	2390	3110	3810	4580	5280	6140	7300	8610	9830	1810	2560	3300	4010	4890	5560	6550	7980	9400	10960
AC unit input power (W)	12Pa	34	45	58	75	94	112	130	34	45	58	75	94	112	130	152	180	228	34	45	58	75	94	112	130	152	180	228
	30Pa	41	55	72	83	102	120	140	41	55	72	83	102	120	140	172	210	250	41	55	72	83	102	120	140	172	210	250
	50Pa	44	63	78	95	108	130	155	44	63	78	95	108	130	155	185	225	298	44	63	78	95	108	130	155	185	225	298
DC unit input power (W)	12 Pa	14	19	27	37	46	64	62	14	19	27	37	46	64	62	88	110	139	14	19	27	37	46	64	62	88	110	139
	30 Pa	19	26	35	46	57	73	77	19	26	35	46	57	73	77	101	130	166	19	26	35	46	57	73	77	101	130	166
	50 Pa	27	35	45	60	70	90	98	27	35	45	60	70	90	98	125	158	195	27	35	45	60	70	90	98	125	158	195
Noise (dB (A)	12Pa	34	37	39.5	42	44	47	44	34	37	39.5	42	44	47	44	47	49	51	34	37	39.5	42	44	47	44	47	49	51
	30Pa	37.5	39.5	42	44	45.5	48	46.5	37.5	39.5	42	44	45.5	48	46.5	50	50.5	52.5	37.5	39.5	42	44	45.5	48	46.5	50	50.5	52.5
	50Pa	41.5	43	44	47	47	49	48.5	41.5	43	44	47	47	49	48.5	51	51.5	54	41.5	43	44	47	47	49	48.5	51	51.5	54
Water flow rate (l/min)		5.4	8.5	10.3	12.9	15.5	18.1	20.6	6.6	9.5	12.3	15.0	18.2	20.8	24.2	28.2	33.0	37.3	7.6	10.6	13.4	16.1	19.8	22.3	26.7	32.2	37.3	43.6
Water pressure drop (kPa)		12	28	20	28	30	36	30	22	24	22	30	32	35	33	40	40	45	20	18	18	18	22	30	26	36	35	48
Fan type		Centrifugal, forward multi-blade																										
Motor type		Permanent Split Capacitor																										
Coil	Row	2							3										4									
	Working pressure	1.6 MPa																										
Connecting	In-Out	3/4" FPT																										
	Drain Connection	3/4" MPT																										
Net weigh (kg)		15.8	17.8	18.7	20.5	22.7	23.7	30.3	16.8	18.8	19.7	21.5	23.7	24.7	31.5	34.4	37.8	40.8	17.3	19.3	20.2	22.2	24.4	25.4	32.3	35.2	38.8	41.6

Note:

1. The performance data in the table is measured at a high airflow rate with corresponding residual pressure.
2. Cooling capacity is measured at an inlet cold water temperature of 7°C, inlet air temperature of 27°C DBT/19.5°C WBT, and inlet-outlet temperature difference of 5°C.
3. Noise level is measured at a location 1m from both the front and bottom of the unit in a semi-anechoic room.
4. The water pressure drop shown in table excludes 2 way water valve (kv=3.0)
5. Additional input power for 2 way water valve and control board is 10W.

4 way cassette indoor unit (42GWC)

Content	Model	003	004	005	006	008	010	012	014
Air flow rate (CMH)	High	540	680	850	1020	1360	1700	2040	2380
	Mid	430	540	680	810	1080	1300	1570	1830
	Low	350	440	550	660	880	1010	1210	1410
Cooling capacity	W	3200	3700	5800	6600	8700	9100	10900	12600
AC unit input power	W	35	48	50	60	102	150	160	190
DC unit input power	W	14	25	22	28	50	/	/	/
Current	(AC) A	0.18	0.24	0.25	0.3	0.48	0.70	0.74	0.88
Noise	dB (A)	35/32/29	40/35/31	35/31/27	37/33/29	45/40/35	48/45/41	50/47/44	52/49/46
Panel dimension (mm)		720*720		960*960			1050*1050		
Unit dimension (mm)		575*575*298		825*825*298			930*930*290		
Panel weight (kg)		2.5	2.5	5.0	5.0	5.0	6.5	6.5	6.5
Unit weight (kg)		17.0	17.0	37.5	37.5	40.1	42	42	42

Note:

1. The performance data in the table is measured at a high airflow rate.
2. Cooling capacity is measured with an inlet cold water temperature of 7°C, inlet air temperature of 27°C DBT and 19.5°C WBT, and inlet-outlet temperature difference of 5°C.
3. Noise level is measured at a location 1m from both the front and bottom of the unit in a semi-anechoic room.

Note: Please refer to Design, Installation and Commissioning Manual for Aqua-flow™ VWV System for nomenclature and detailed specifications

High ESP IDU (suspending AHU)

Model	Air flow rate (CMH)	Width (unit + control box) *length*height	Input power (KW)	ESP (Pa)	TP (Pa)	Cooling capacity (kw)	Cooling WDP (Kpa)	Unit weight (kg)	Noise level (dB(A))
DBFP010L3R	1000	(680+154)×986×380	0.34	130	234	5.0	10.1	46	52
DBFP010H3R			0.44	220	321			47	55
DBFP015L3R	1500	(875+154)×986×380	0.44	115	227	7.8	14.5	53	55
DBFP015H3R			0.79	215	320			55	58
DBFP020L3R	2000	(872+150)×986×500	0.63	195	300	11.1	22.0	63	56.5
DBFP020H3R			0.84	280	381			64	59.5
DBFP025L3R	2500	(1018+150)×986×500	0.83	165	265	13.9	25.8	67	60
DBFP025H3R			0.84	250	356			70	61
DBFP030L3R	3000	(1166+150)×986×500	1.09	120	250	16.9	30.0	75	62
DBFP030H3R			1.09	200	330			75	62
DBFP040L3R	4000	(1458+150)×986×500	0.63X2	185	300	22.1	28.3	108	58
DBFP040H3R			0.84X2	250	381			112	61
DBFP050L3R	5000	(1752+150)×986×500	0.83X2	160	265	28.9	43.8	123	60.5
DBFP050H3R			0.84X2	250	356			127	61.5
DBFP060L3R	6000	(2044+150)×986×500	1.09X2	150	250	34.5	57.2	134	62.5
DBFP060H3R			1.09X2	220	330			138	63.5
DBFP010L5R	1000	(680+150)×986×380	0.34	90	234	6.4	8.3	49	52
DBFP010H5R			0.44	175	321			50	55
DBFP015L5R	1500	(875+150)×986×380	0.44	70	227	10.0	10.9	56	55
DBFP015H5R			0.79	170	320			58	58
DBFP020L5R	2000	(872+150)×986×500	0.63	160	300	12.7	8.6	67	56.5
DBFP020H5R			0.84	230	381			68	59.5
DBFP025L5R	2500	(1018+150)×986×500	0.83	140	265	16.1	18.8	75	60
DBFP025H5R			0.84	210	356			75	61
DBFP030L5R	3000	(1166+150)×986×500	1.09	85	250	20.2	28.3	81	62
DBFP030H5R			1.09	150	330			81	62
DBFP040L5R	4000	(1458+150)×986×500	0.63X2	150	300	27.2	31.3	115	58
DBFP040H5R			0.84X2	215	381			119	61
DBFP050L5R	5000	(1752+150)×986×500	0.83X2	120	265	37.0	61.5	129	60.5
DBFP050H5R			0.84X2	210	356			133	61.5
DBFP060L5R	6000	(2044+150)×986×500	1.09X2	115	250	44.0	66.0	142	62.5
DBFP060H5R			1.09X2	185	330			146	63.5

Rated condition: Cooling- entering air temperature of 27°C DBT and 19.5°C WBT; entering water temperature of 7°C, entering and leaving temperature difference of 5°C.

Note:

1. Connect position- left connect, when it comes to face inlet vent and the coil connector is on the left of AHU; opposition is right connect
2. Digital number 8 means external pressure (H- high, L – low); digital number 9 means cooling capacity (3- standard capacity, 5- high capacity)
3. Input power means total input power by unit level.

Model	Width (unit + control box) *length*height	Air flow rate (CMH)	ESP (Pa)	TP (Pa)	Input power (KW)	Input power (KW)	Noise level (dB(A))
DFP020LR	(1018+154)×986×380	2000	95	297	0.79×1	65	58.2
DFP020HR		2000	65	297	0.79×1	67	58.2
DFP030LR	(1458+154)×986×380	3000	130	320	0.79×2	92	58.5
DFP030HR		3000	100	320	0.79×2	95	58.5
DFP040LR	(1752+154)×986×380	4000	85	297	0.79×2	105	60
DFP040HR		4000	55	297	0.79×2	109	60

Note:

1. Unit capacity refer to DBFP(R) w/ same air flow rate.
2. Digital number 7 means external pressure (H- high, L – low).
3. Input power means total input power by unit level.

Heat recovery fresh air unit (DXF)

Model	Air flow rate (CMH)	Sensible efficiency Summer (%)	Total efficiency summer(%)	Power (kw)	External pressure(Pa)	Power supply	Weight (kg)	Noise (dB(A)	Length (mm)	Width (mm)	Height (mm)
DXF0600SQ	600	72.1	57.7	0.09x2	177	220V-1P-50Hz	95	52	1130	900	480
DXF0800SQ	800	68.7	55.4	0.09x2	144		110	53	1130	980	480
DXF1000SQ	1000	67.5	54.4	0.09x2	104		125	55	1240	1120	480
DXF1500SQ	1500	66.8	54.5	0.275x2	273		145	58	1360	1120	565
DXF2000SQ	2000	64.2	52.8	0.35x2	225		165	60	1440	1290	565
DXF2500SQ	2500	63.4	52.3	0.425x2	152		190	60	1520	1490	565
DXF3000SQ	3000	64.6	53.2	0.55x2	179		225	62	1620	1390	650
DXF1000PQ	1000	67.2	54.4	0.12x2	143	380-3P-50Hz	125	52	1240	1120	480
DXF1500PQ	1500	66.8	54.5	0.275x2	242		145	55	1360	1120	565
DXF2000PQ	2000	64.3	52.8	0.32x2	201		165	57	1440	1290	565
DXF2500PQ	2500	63.2	52.3	0.45x2	188		190	58	1520	1490	565
DXF3000PQ	3000	64.6	53.2	0.55x2	204		225	59	1620	1390	650
DXF3500PQ	3500	65.2	53.3	0.45x2	144		260	59	1780	1620	650
DXF4000PQ	4000	66.2	54.2	0.75x2	140		295	60	1840	1540	735
DXF4500PQ	4500	65.7	53.8	0.75x2	116		310	61	1900	1660	735
DXF5000PQ	5000	66.1	54.3	1.1x2	125		335	62	2020	1940	735
DXF6000PQ	6000	67.3	55.2	1.5x2	213		370	62	2140	1940	820

Note: DXF can realize on/off control based on build-in CO_2 sensor.

Note: Please refer to Design, Installation and Commissioning Manual for Aqua-flow™ VWV System for nomenclature and detailed specifications

Controller performance data

Model	Integrated installation: HSM7IP2MA	Flush mounted installation: HSM7RP2MA
Product name	Intelligent system manager	
Power supply	220~240V ± 10%/1ph/50-60Hz	
Appearance	7' color LCD touch screen with graphical display in Chinese and English	
Basic functions	Control scope : up to 8 outdoor units, 1 packed hydronic kit, up to 128 IDU and FAU (Max 8 FAU)	
Advanced functions	Zone control, schedule control, VFD pump control, self adaptive variable water temperature control, fresh air unit CO2 concentration control	
Network protocol	Modbus IP protocol (link to BA)	

Model	CTC300BR (for AC IDU) CTC301BR (for DC IDU)	CTC300GR (for AC IDU) CTC301GR (for DC IDU)	CTC300SR (for AC IDU) CTC301SR (for DC IDU)
Color	Black	Gold	Silver
Name	Indoor thermostat		
Dimensions (W×H×D)	86×86×40 mm		
Rated power supply	DC 12V		
Appearance	LED back light, soft key, graphical display in English		
Basic functions	On/Off; Operating mode selection; Cool, heat, Ventilation, Dehumidify; Sleep mode setting; Wind speed setting; Temperature setting CTC100 applied for 2 pipes, 2 pipes + E-heater, floor heating, and floor heating + 2 pipes CTC200 applied for 2 pipe, and 2 pipe + E-heater		
Advanced functions	Real-time clock setting; User parameter setting		
Network connection	Modbus protocol		
Options	Wireless remote control: CTCIR01		

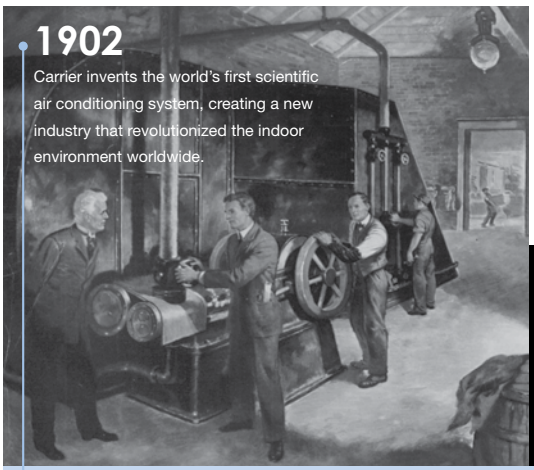
Model	30RBM90E003
Name	Repeater
Dimensions (WxHxD)	70x120x25mm
Rated power supply	Build-in power adapter,220V-240V+/-10%1P,50-60Hz
Shell material	ABS plastic
Basic function	Enhance the signal between thermostats and system manager Suggestion: add one repeater per 400 meter control line or per 40 thermostats

Model	OOPPY140131900
Name	Network multifunction Power Meter
Size(W x H x D)	96 x 96 x92 mm
Grid	Three-Phase Three-Wire System
Frequency	45~65Hz
Rated Power	AC85~265V or DC100~350V: Power ≤ 100VA
Voltage	Rated Value: AC 100V/400V, Overload: 1.2 times rated value (Continuity): Sustain 2 times rated value.
Current	Rated Value: AC 1A/5A, Overload:1.2 times rated value (Continuity): Sustain 10 times rated value
Measurement Accuracy	Current/Voltage: level 0.2, Power/Active Electric Energy: level 0.5/Frequency 0.01Hz, Reactive Electric Energy: level 1
Communication Protocol	Interface: RS485, Protocol: Modbus-RTU/Profibus

Note: Please refer to Design, Installation and Commissioning Manual for Aqua-flow™ VWV System for nomenclature and detailed specifications

Carrier air-conditioner milestones

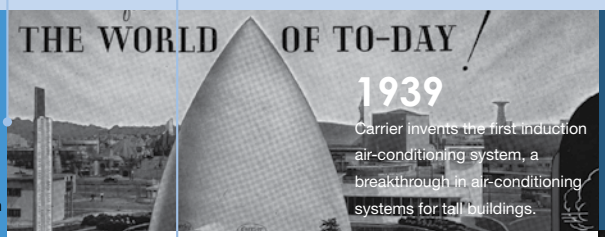
1902
Carrier invents the world's first scientific air conditioning system, creating a new industry that revolutionized the indoor environment worldwide.



1911
Dr. Carrier publishes his basic principles of temperature and humidity control, which later evolved into his "Rational Psychrometric Formulae" paper and laid the foundation for modern air conditioning calculation.

1922
Carrier develops the first centrifugal water chiller, now displayed at the Washington State Museum.

1939
Carrier invents the first induction air-conditioning system, a breakthrough in air-conditioning systems for tall buildings.



1945
Carrier produces the world's first lithium bromide absorption chiller.

1952
Carrier develops the first residential central air conditioning system.

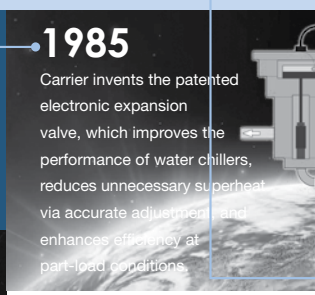
1955
Carrier, an early first champion of energy conservation, develops the first automatic variable airflow supply fan, controlled by system pressure.

1962
Carrier's pioneering thermoelectric air-conditioning system is used in the aerospace industry.

1972
Carrier manufactures the first centrifugal water chiller with single unit cooling capacity of 10,000 RTH.

1982
Carrier introduces the first centrifugal water chiller with a titanium heat exchange pipe, completely overcoming pipe corrosion issues.

1985
Carrier invents the patented electronic expansion valve, which improves the performance of water chillers, reduces unnecessary superheat via accurate adjustment and enhances efficiency at part-load conditions.



1992
Carrier develops the cone diffuser for eco-friendly refrigerant. Used in a positive-pressure environment, it improves the efficiency of the centrifugal compressor by reducing loss in the diffusion section.

1994
Carrier adopts the patented expansion turbine technology in its centrifugal water chillers to replace conventional throttle technology used by the rest of the industry. Carrier receives the Energy Saver Award from the US Department of Energy.

2009

Carrier brings the 30XQ air-cooled screw heat pump to market.Carrier introduces the NGA air-cooled scroll water chiller/heat pump. Carrier launches the 30XW water-cooled screw chiller, with models ranging from 133 RTH o 500 RTH, all of which achieve China's national energy efficiency grade 1 or 2.

2002

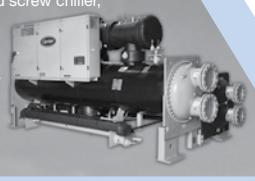
Carrier and its industry peers jointly celebrate the 100 anniversary of Wills H. Carrier's invention of air conditioning.

2005

Carrier globally launches Starfire, the 30RB/RQ large air-cooled scroll chiller/heat pump that is the first to use the eco-friendly refrigerant HFC-410A .

2010

Carrier launches 23XRV, the world's first variable-frequency water-cooled screw chiller, achieving 40% higher energy efficiency than the industry standardby combining a 3-rotor screw compressor with leading inverter technologies.



2013

Innovative Carrier AquaFlow™ VWV System

2018

Carrier AquaFlow™ VWVII inverter series

AQUAFLOW™ VWV system

1999

Carrier establishes a global strategic alliance with Toshiba Corporation to engage in technology research and develop new residential and commercial air-conditioning products.

1996

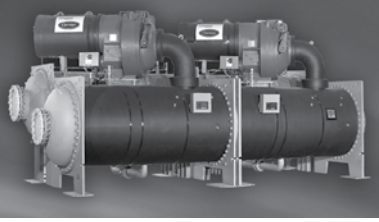
Carrier launches the 30HXC water-cooled screw chiller and the 30GX air-cooled screw chiller, fully adopting the eco-friendly chlorine-free refrigerant HFC-134a.
It also launches a compact new centrifugal chiller with the latest centrifugal compression technology and HFC-134a refrigerant to achieve improved COP.

2006

Carrier globally launches the AquaForce water chiller, using HFC energy efficiency. It is also honored with the Chinese construction industry's Gold Energy-saving Air Conditioning Product Award

2008

Carrier launches the 19XRD twin-compressor centrifugal chiller with HFC-134a, raising the cooling capacity of a single unit to 3000 RTH and enhancing part-load energy efficiency by 7%



2011

The AdvanTE3C Solutions Center is established in Shanghai, gathering experts in energy efficiency and environment protection from across the globe to engage in research and development of sustainable building solutions.

AdvanTE3C United Technologies

improve buildings™

We make the world a better place to live. We create comfortable, efficient, healthy, safe and secure environments, and ensure the global food supply is transported and preserved for safe consumption.

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