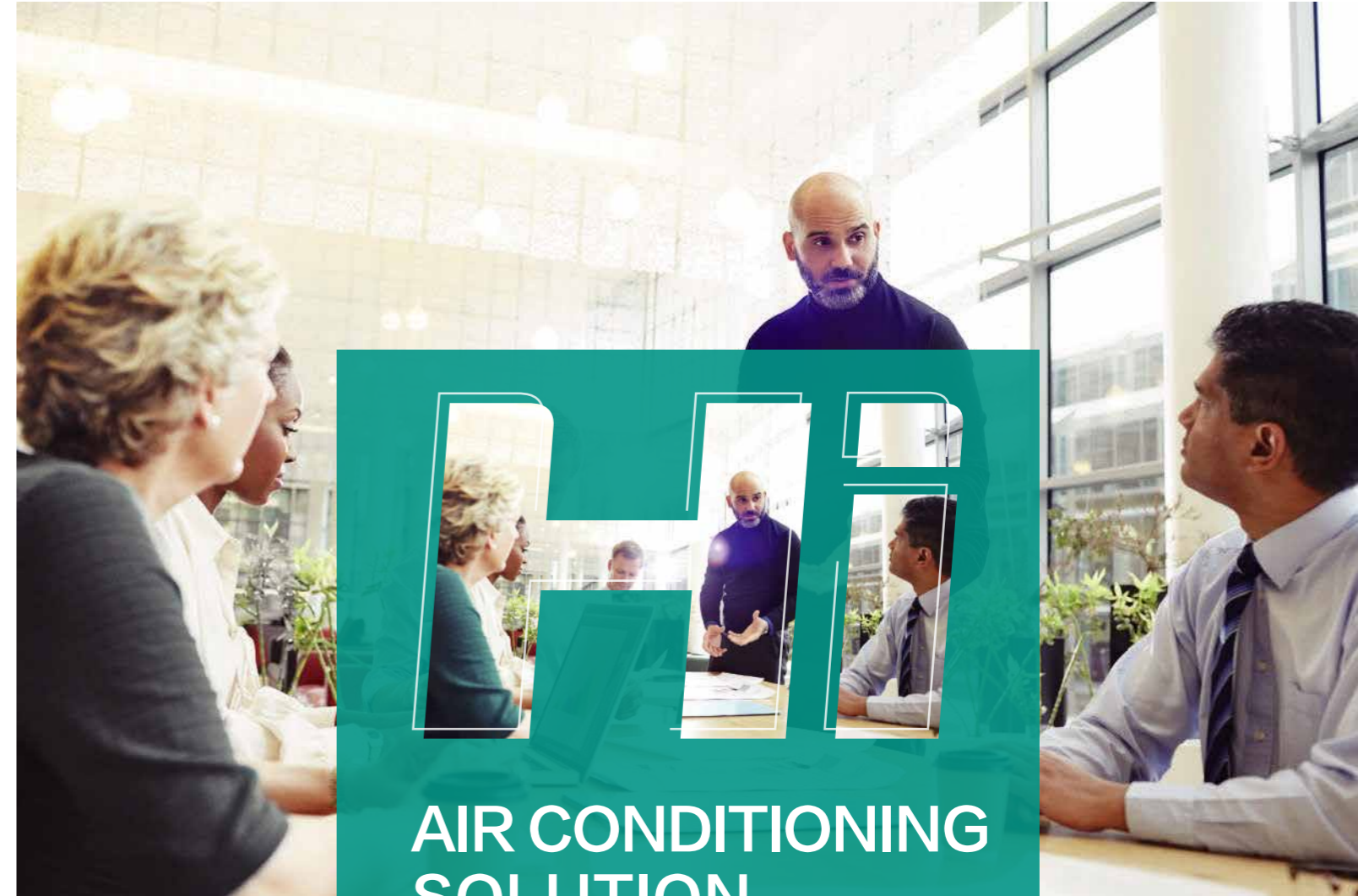


**Hisense VRF**

**Hisense**



Qingdao Hisense HVAC Equipment Co., Ltd.  
Hisense Tower, Qingdao, China

<http://www.hisensehvac.com>   [hhexport@hisense.com](mailto:hhexport@hisense.com)   [Hisense HVAC](#)   [Hisense HVAC](#)   [Hisense HVAC](#)

**CE CB**        **HCAC-CA-GP202301**

★ Design and specifications are subject to change without notice. Pictures and diagrams are for reference only and are subject to change without notice.  
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Reimagine your solution

# This is GENES AIRCRAFT SOLUTIONS GENERAL STORE

**Hisense VRF**



## Hisense SINCE 1969

Hisense is a well-known large-scale electronic information industrial group. With strong emphasis on technology and innovation, its efficient technological innovation system firmly grounds Hisense at the forefront of its peers. At present, Hisense brand family has expanded to include multiple famous brand Hisense, Toshiba, Gorenje and ASKO.

SINCE 1969

## BUSINESS LAYOUT

### Multimedia

- TV and Display Devices
- Internet TV Operation
- Mobile Communication Devices
- Optical Communication Devices
- Chip

### Household Appliances

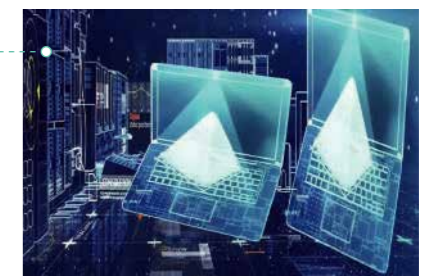
- Refrigerator
- Freezer
- Air-conditioner
- Washing Machine
- Kitchen Appliance

### IT Smart Systems

- Smart City
- Smart Community
- Smart Transportation
- Smart Business
- Medical Electronic Devices
- Smart Home System and Service

### Real Estate & Modern Services

- Real Estate
- High-end Plaza Chains
- Mould Design and Manufacturing
- Finance
- Trade



# GLOBAL HISENSE SINCE 1969

Hisense has started a long-term sports marketing strategy to increase brand awareness worldwide. After the successful sponsorship of **UEFA EURO 2016&2020** and **FIFA WORLD CUP 2018**, Hisense has made clear its focus on football. Hisense also is the official partner of **FIFA WORLD CUP 2022**.

A horizontal timeline showing Hisense's sports marketing milestones from 2014 to 2022. Each year is marked with a circular icon and a corresponding image or logo.

- 2014:** Official Sponsor of the Australian Open (Image of a tennis court).
- 2015:** Team Supplier to Red Bull Racing (Image of a Red Bull Formula 1 car).
- 2016:** Official Partner of UEFA EURO 2016 (Image of soccer players).
- 2018:** Official Sponsor of 2018 FIFA World Cup (Image of soccer players).
- 2020:** Official Partner of UEFA EURO 2020 (Hisense logo with UEFA EURO 2020 emblem).
- 2022:** Official Sponsor of 2022 FIFA World Cup (Hisense logo with FIFA World Cup Qatar 2022 emblem).



# Hisense HVAC MANUFACTURING BASE

Qingdao Hisense HVAC Equipment Co. Ltd. is a leading manufacturer of heating, ventilation, air conditioning and other HVAC equipments, integrated with the product development, manufacturing, sales and after-sales service as a whole.

Hisense HVAC always regards product technology research and development as the most important value. With strong technological innovation capabilities, Hisense HVAC has participated in the formulation and revision of 86 national standards, industry standards and association standards, and boasts 1440 authorized patents in the field of CAC and heat pump products. With the great support of all shareholders and customers, Hisense HVAC is expected to become the leading brand in the industry.

Note: The above data is as of Dec. 31th, 2022.



266,000 m<sup>2</sup>  
Manufacturing Area



40+  
Production Line



6,000,000 units/year  
Production Capacity



16,700 m<sup>2</sup>/70+  
Laboratory



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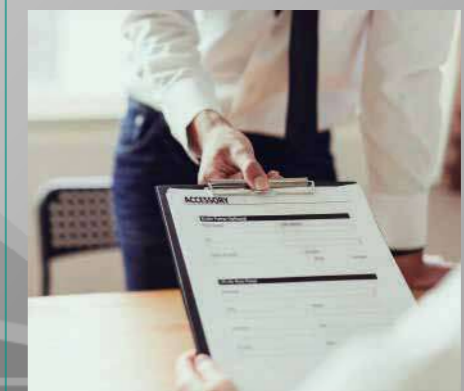
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ENGINEERING TOOLS



# RELIABILITY

Refrigerant Circuit

Enhanced Anti-corrosion Solution

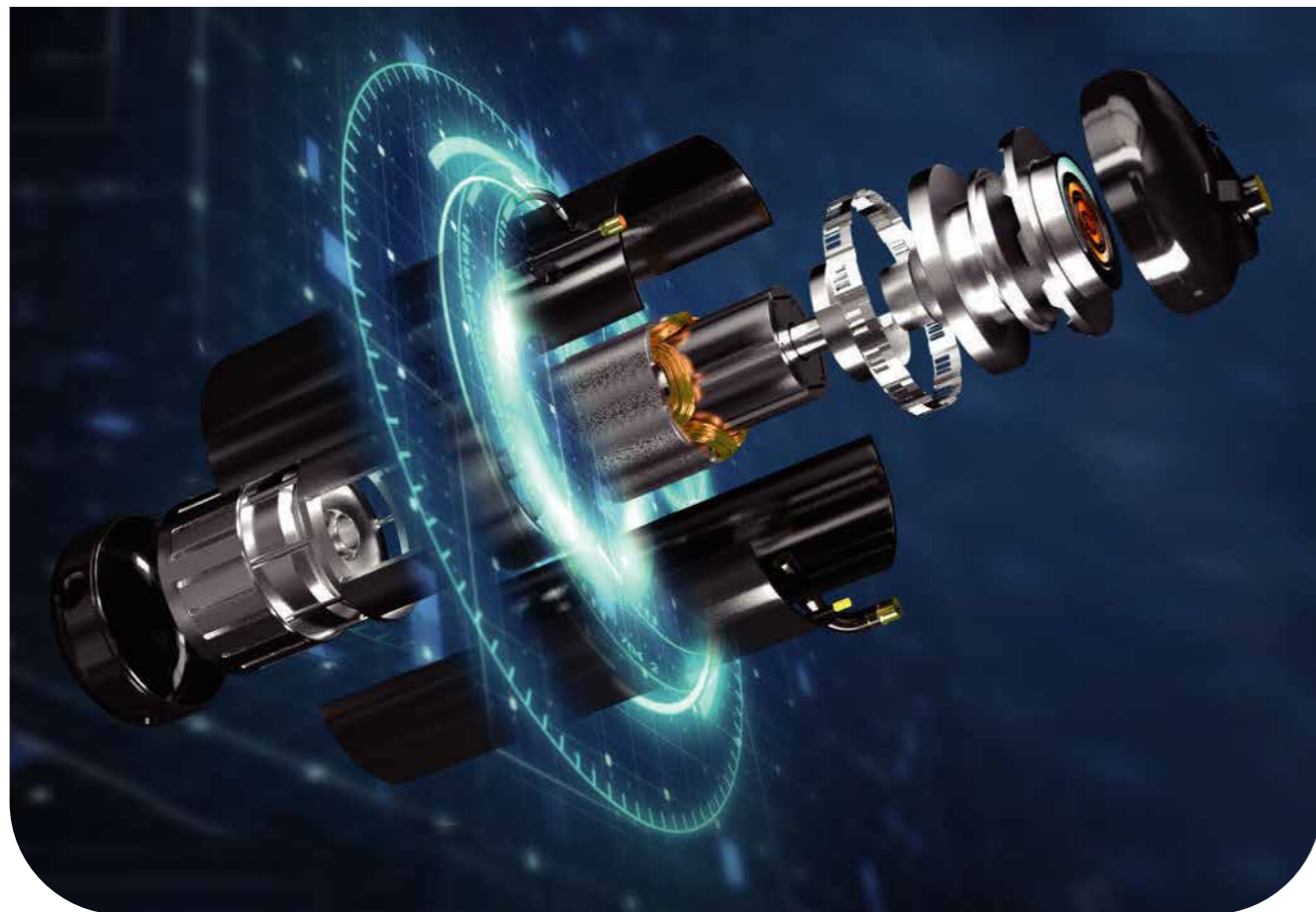
System & Operation

Electrical & Electronics

Indoor Unit Reliability

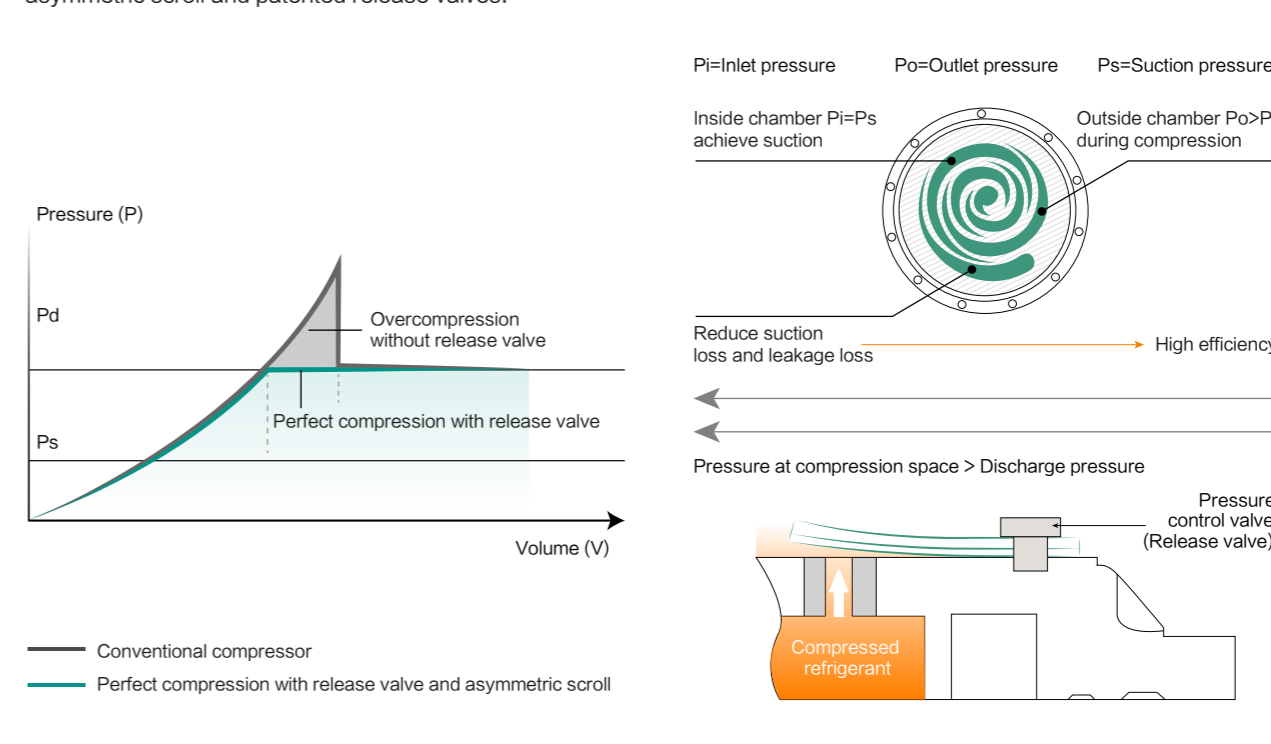


# Refrigerant Circuit



## Efficient energy usage

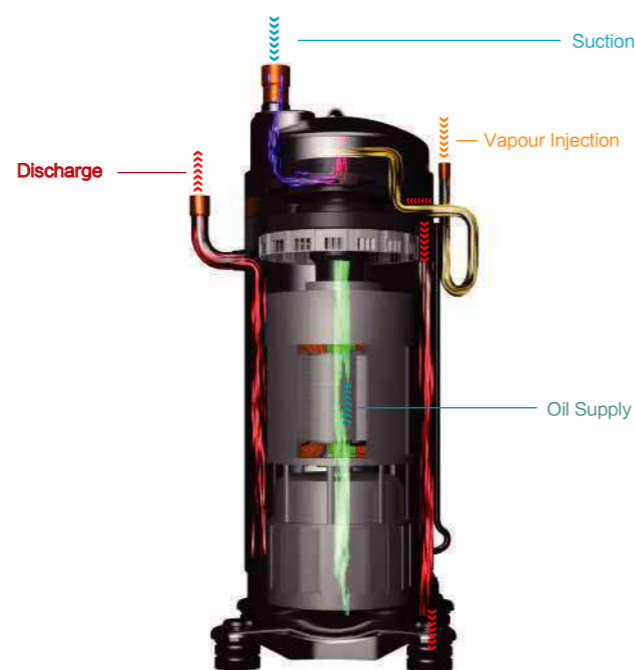
Wasted power is reduced by minimizing leakage and anti-overcompression while compressing refrigerant gas with asymmetric scroll and patented release valves.



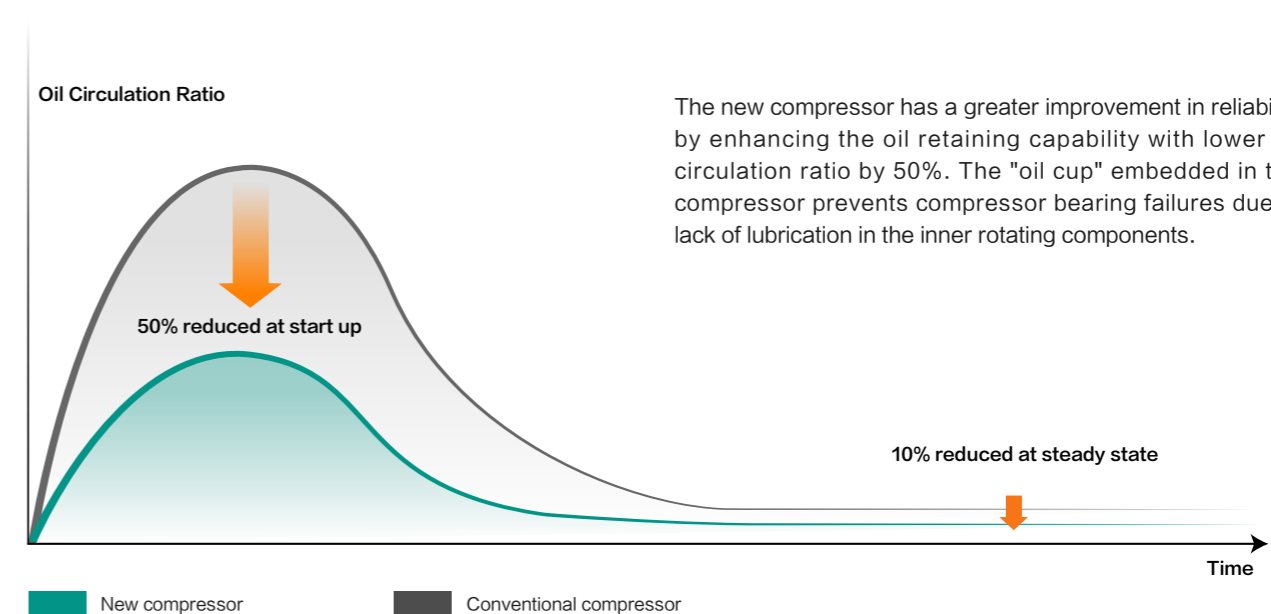
## Revolutionary HVAC compressor

### Vapour injection technology

New generation scroll compressor is now patented with higher performance capability vapour injection technology, increasing capacity up to 25% compared to conventional scroll compressor with same amount of power consumed.



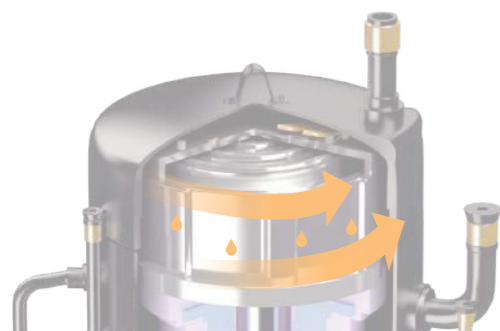
## Enhanced oil level retaining capability



The new compressor has a greater improvement in reliability by enhancing the oil retaining capability with lower oil circulation ratio by 50%. The "oil cup" embedded in the compressor prevents compressor bearing failures due to lack of lubrication in the inner rotating components.

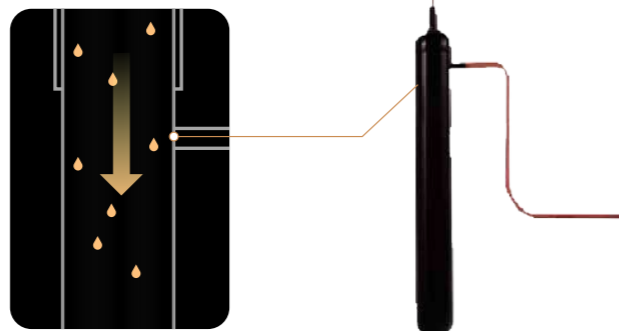
## Oil separation and oil return

### Oil separation



First-stage Oil Separation

First-stage oil separation is realized through efficient oil separation structure inside the high-pressure-chamber compressor. Only a small amount of oil is brought out of the compressor.



Second-stage Oil Separation

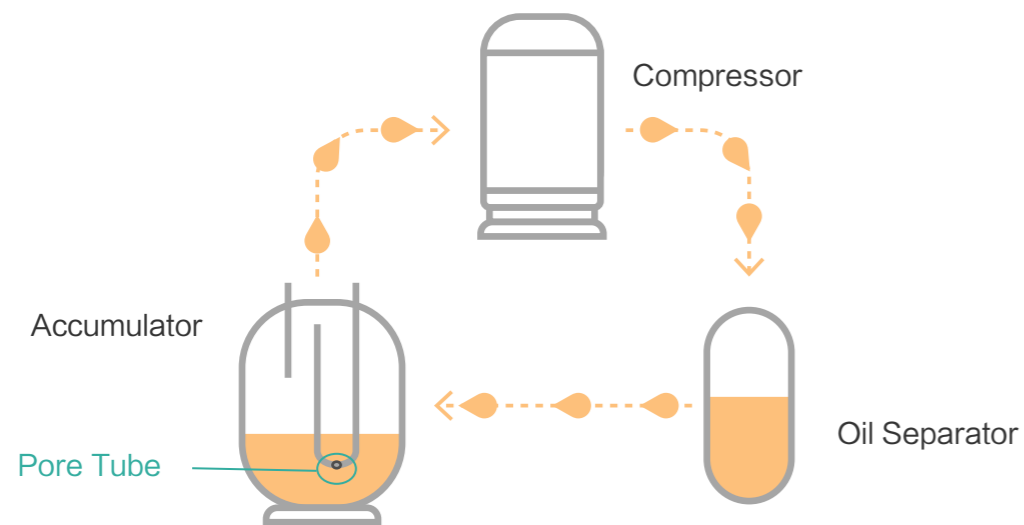
During second-stage oil separation, the small amount of oil discharged from compressor is separated by a large-capacity high-efficiency centrifugal oil separator, with efficiency over 99%.

### Oil return

The accumulator adopts pore tube oil return technology with a built-in fine strainer, which not only ensures oil balance between compressors within one module, but also plays an important role in the oil balance between modules.

Besides this, the system implements oil-return function based on compressor frequency and corresponding operation time. The oil-return takes 60 seconds and can return to previous condition when it is finished.

In winter under heating mode, this operation is implemented without switching to cooling mode, which guarantees the heating performance.



## Enhanced Anti-corrosion Solution

Hisense's complete corrosion-proof is a perfect solution in seaside and chemical factory applications (sulphide contamination occasion), providing ultimate comfort without sacrificing life span and reducing maintenance cost simultaneously.

The components from top to toe are treated with effect treatments, and the systems have acquired UL certification.



- 1 Front Panel** Galvanized steel treated with zirconium & 100 μm ~ 180 μm epoxy zinc rich primer + pure polyester paint coating.
- 2 Heat Exchanger** Black fin (with epoxy resin & hydrophilic film); Cooper fin.
- 3 Electrical Box** Galvanized steel treated with zirconium & 50 μm~120 μm pure polyester.
- 4 Fan Motor** Coated with 10 μm ~ 30 μm Acrylic Resin coating Thickness: 10 μm ~30 μm.
- 5 Top Grill**
- 6 Motor Bracket**
- 7 Protection Net**

**Note**

Please refer to the catalog of Hisense VRF Anti-corrosion Solution for detailed anti-corrosion treatment measures.

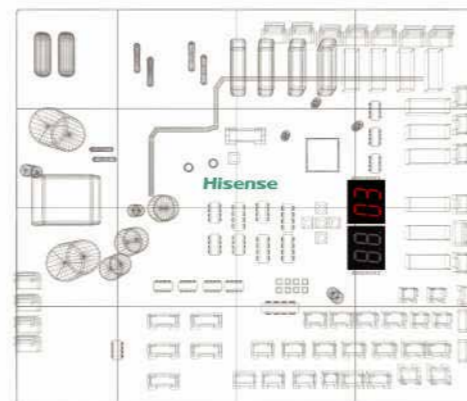
# System & Operation



## Self-diagnosis & self-protection measures

### Self-diagnosis

Operation monitoring and maintenance are made simpler by having the AC unit tells you what and where is wrong with them. Alarm codes will be flashed out when an error or breakdown occurs. Extremely helpful for installers during test run and also end-users to understand what's going on. Besides alarm codes, operating status and parameters like history temperature, pressure, compressor frequency and etc are traceable on controllers and the outdoor unit, easing service maintenance and troubleshooting.



### Self-protection

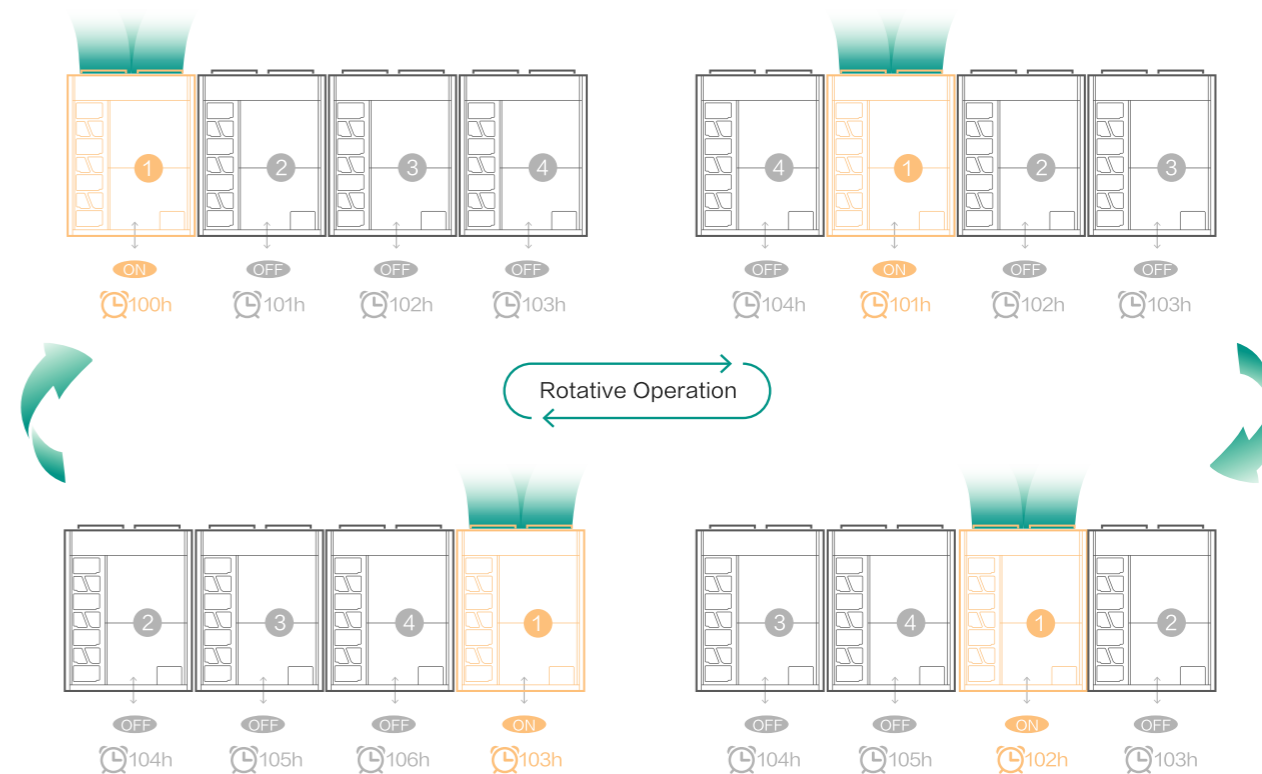
Hisense VRF can protect itself with algorithms embedded to make necessary protective decisions and measures by different sensor readings and parameters, including compressor protections, system protections, inverter protections and electric protections.



## Smart rotative operation & triple backup operation

### Smart rotative operation

Operation duties are smartly balanced in higher capacity module combinations to prevent occurrence of individual unit overworked and hence extending the overall operating life of the overall system.



### Triple backup operation

#### Module backup operation

If one module in a combination system malfunctions, the other ones can still keep working to ensure an emergency operation until service and repair.



### Compressor backup operation

In the single module system equipped with two compressors, if one compressor malfunctions, the other one can provide emergency operation. In the combined modules, if the compressor in one module goes wrong, the other modules can provide emergency operation. Thus a stable and continuous operation can be ensured thanks to the backup of compressors.



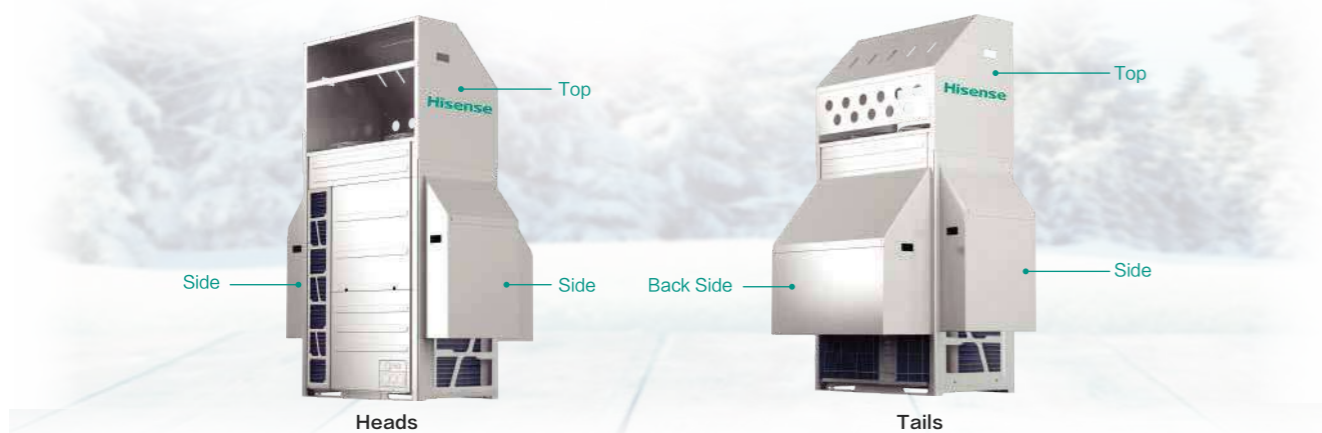
### Fan backup operation

For the module equipped with two fans, if one fan breaks down, the other one won't be influenced, the module can still keep working.



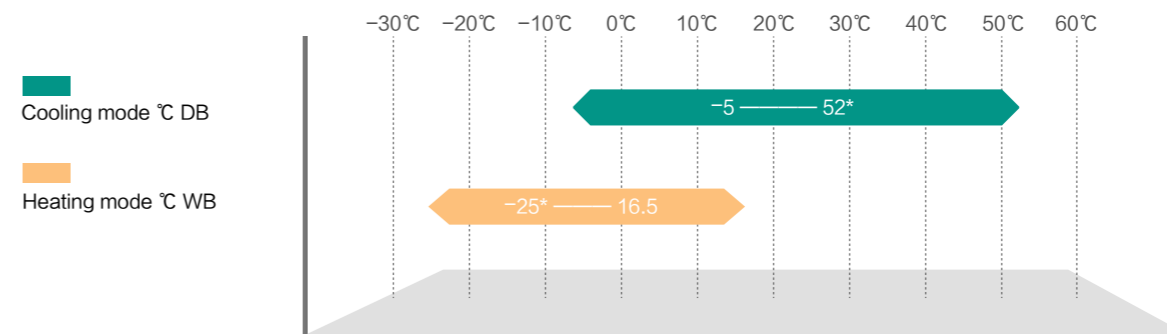
### Snow hood (optional)

The snow hood kit can effectively prevent heavy snow from accumulating on the top of the unit and covering the heat exchanger. Heavy snow accumulating will affect the heat exchange seriously, thus stable operation can be ensured thanks to the snow hood.



### Wider operation range

Extended operation range creates wider application potential, in cooling mode the operation range is from  $-5^{\circ}\text{C DB}$  to  $52^{\circ}\text{C DB}$  and in heating mode the operation range is from  $-25^{\circ}\text{C WB}$  to  $16.5^{\circ}\text{C WB}$ , which adapts to extreme conditions.

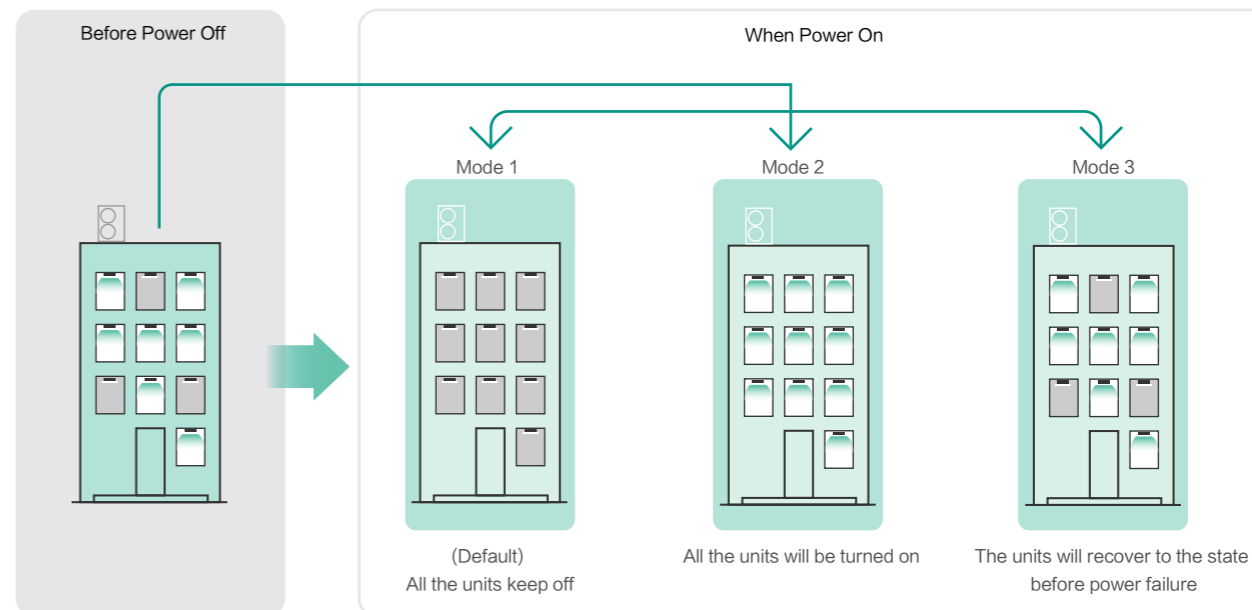


#### Note

1. When the temperature is in  $48^{\circ}\text{C} \sim 52^{\circ}\text{C}$  and  $-20^{\circ}\text{C} \sim -25^{\circ}\text{C}$ , the module is in intermittent operation.
2. The dry temperature range of heating operation mode is from  $-25^{\circ}\text{C}$  to  $26^{\circ}\text{C}$ .
3. Please refer to the specification table of each series for detailed operation range.

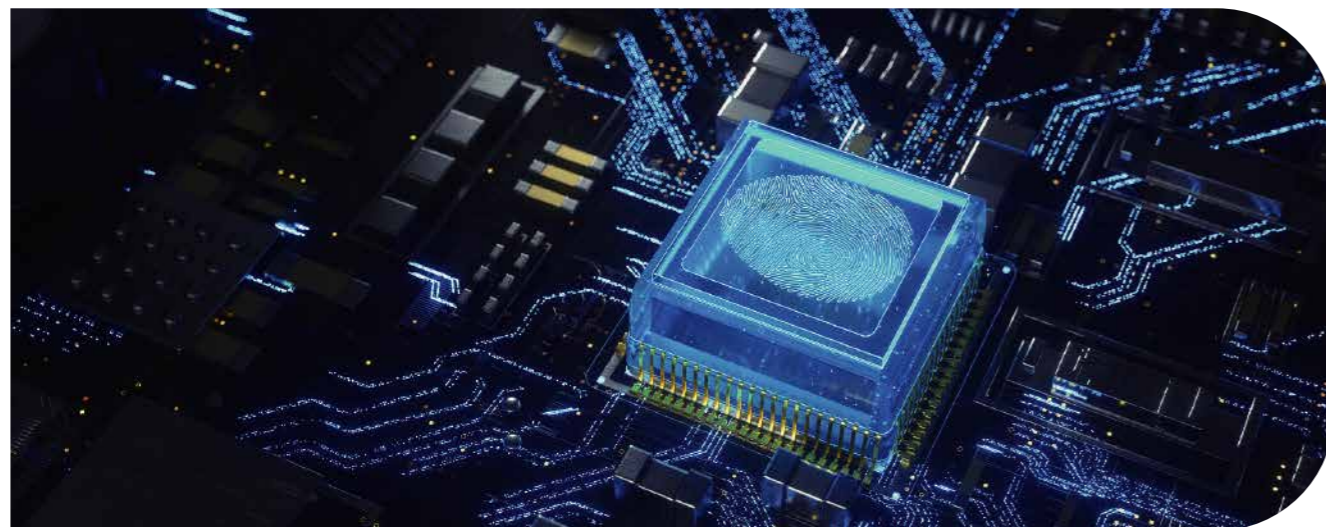
### Automatic Restart

Hisense indoor units are capable to restart automatically to the previous state whenever the power supply is shut off suddenly and restores immediately. When there is long power shortage, the default setting is to keep all the indoor units off when the power restores. Also there are two other settings for users' choice, recovering to the state before power failure or restarting all the indoor units.



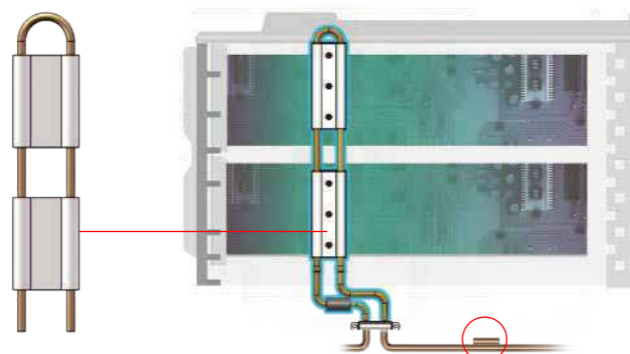
\* DIP setting is necessary for mode 2 and mode 3.

# Electrical & Electronics



## Patented 360° fitted refrigerant cooling technology

Hisense VRF uses refrigerant cooling technology to cool the electrical control box. It overcomes the poor heat dissipation and high ambient temperature issues to maintain efficient operation even at harsh environment. Compared with air-cooled technology, the temperature inside the electrical box can be reduced by up to 20%\*. Moreover, the refrigerant cooling kit adds a temperature sensor, which could be more precise to control the refrigerant cooling temperature and ensure the whole reliability.

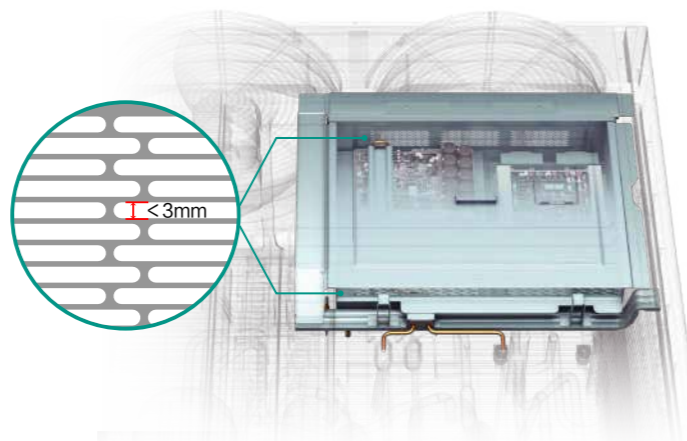


**Note**

1. \* The data is based on the S mavo+ unit under low fan speed operation. 2. Temperature sensor is only available for S mavo+ series.

## Insect protection design

Special design nettings are placed on insect easy-entry openings, effectively preventing unnecessary electrical component damages.



## Voltage protector reserved (optional)

Too low or too high voltage can easily damage the electronic components. The new generation of top flow unit has reserved the space for assembling the voltage protector, which can be an effective solution to protect outdoor units from any voltage spikes. The power supply of outdoor unit will be automatically cut off when there is abnormal voltage, and will be restored when power supply returns to normal after 30s. Meanwhile, it's helpful for checking the phase sequence error or phase loss according to the indicator lights, convenient for commission and maintenance.



Can bear **15000** times actions



Can be installed in the factory or on site

## Quality electrical and magnetism precaution measure

Air-conditioning unit produced by Hisense VRF requires strict electromagnetic protection and preventive quality assurance to not allow electromagnetic wave from other devices surrounding the unit to interfere the normal operation and function of our unit and vice versa onto other equipment. Another typical damage causes of electronic and electrical failure is sudden high external power source exerted into the electronic compositions like thunder strike during a storm. As to overcome such inevitable natural phenomenon to cause damage, 4000V sudden high voltage test is infused into the long list of electromagnetism quality test in our internationally qualified test lab.

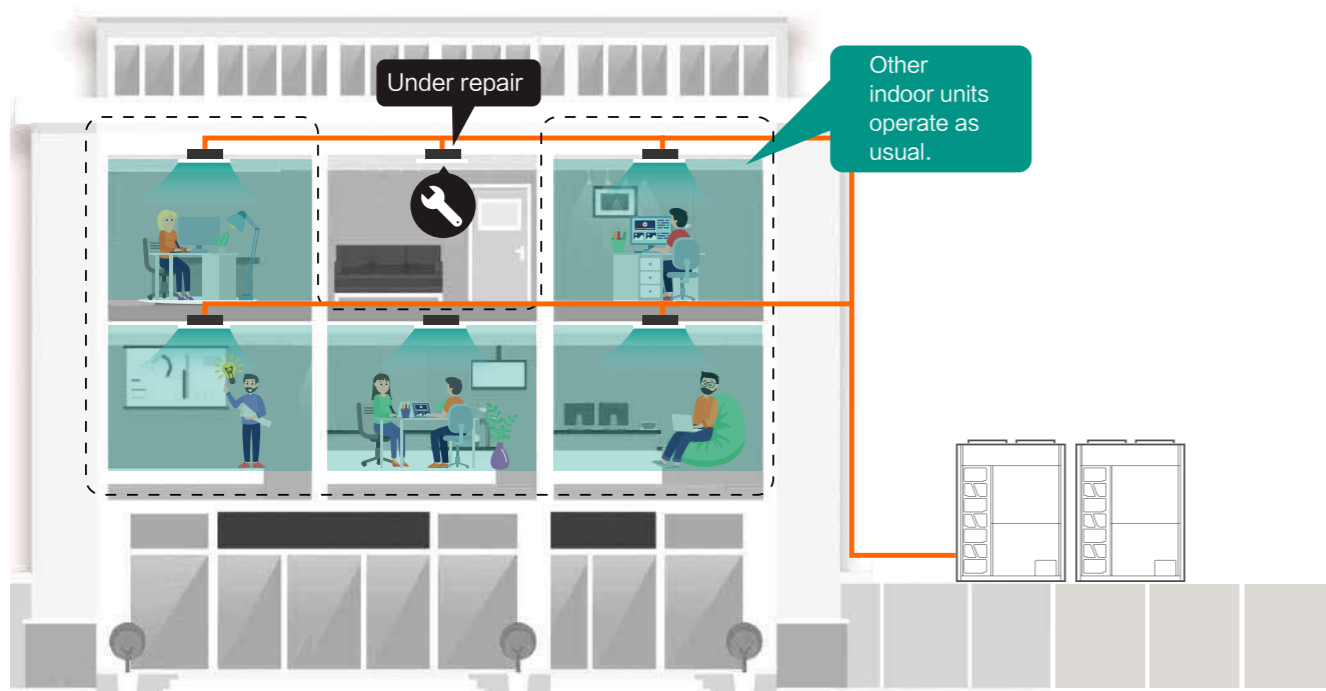


# Indoor Unit Reliability



## Independent maintenance of indoor unit

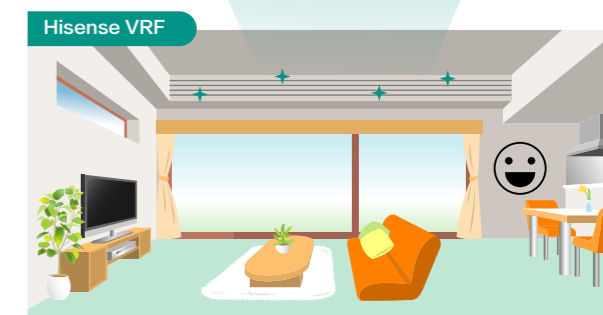
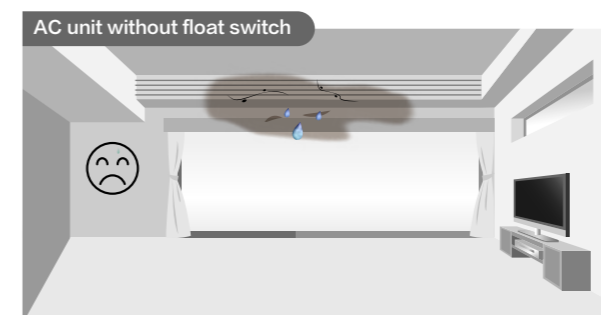
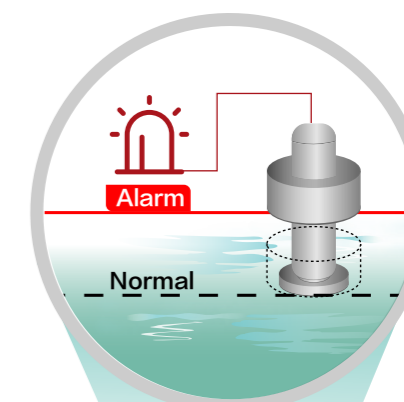
To maintain the whole system's continual operation even when there is a breakdown occur within a system, Hisense VRF is capable to isolate the malfunction unit from the others while conducting restoration and maintaining continuous operation of other units simultaneously. Especially practical for retail shops or offices where multiple indoor units share the same system, there is a breakdown or powered cut-off during renovation of a shop does not affect shops of the same system from routine business operation.



\*Preliminary setting is unnecessary

## Condensate water leakage protection

Indoor units have build-in water-leakage float switches. Alarming warnings will be displayed on controllers when condensate reaches a certain level. Save your ceiling and carpet from being soaked in time when drain pipe is clogged or drain pump breakdowns.



## Effective drainage solution

### High quality seals

Water could seep through anywhere as long as there is a void. Thus, Hisense utilizes the best quality sealing material to seal up gaps between the heat exchanger and drain pan, which effectively prevents condensate leakage.

### Transparent drain pipe

To ease drainage inspection, Hisense indoor units adopt transparent drain hose connection. It enhances installation and maintenance, making sure drain hoses are connected securely and make blockage inspections much easier.

# EFFICIENCY

Efficient Heat Exchanger

Intelligent Defrosting Logic

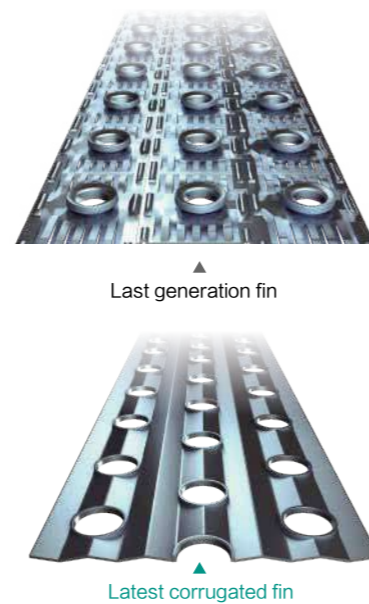
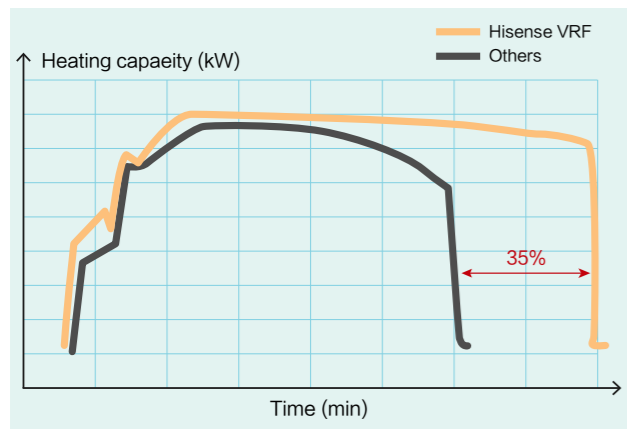
Steady Air Discharge

# Efficient Heat Exchanger

## New advanced corrugated fin design

The heat exchanger of Hisense VRF adopts the new advanced corrugated fin design. With this new design, larger amount of fins can be allocated into the heat exchanger, increasing 20% heat exchange surface area maximally compared with the last generation fin and the heating capability increase 10% averagely.

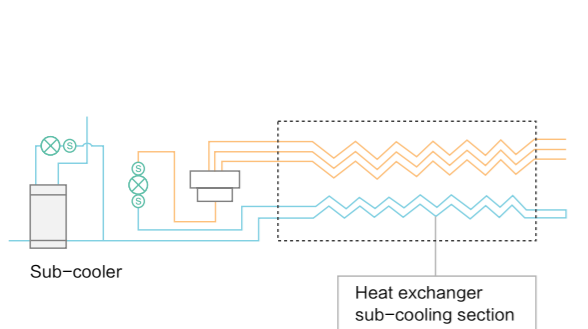
### Long-time stable heating performance



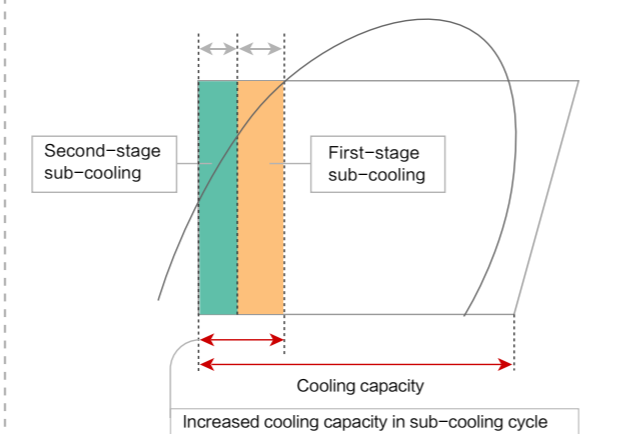
## Two-stage subcooling

For the conventional VRF systems without the sub-coolers, the subcooling temperature is about 12.5°C with one-stage subcooling. However, Hisense VRF's 2-stage subcooling technology can realize the subcooling temperature up to 27°C, distinctly improving the cooling capacity by pushing refrigerant further beyond its condensing temperature.

Two-stage sub-cooling cycle diagram



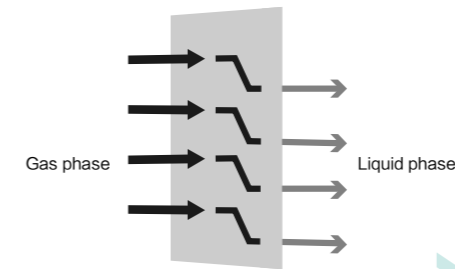
Two-stage sub-cooling pressure enthalpy diagram



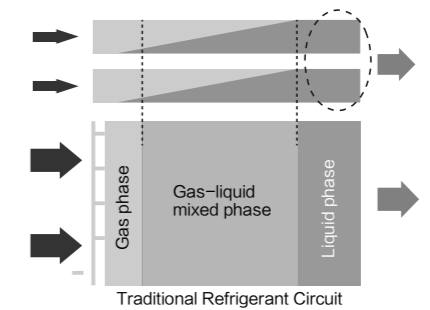
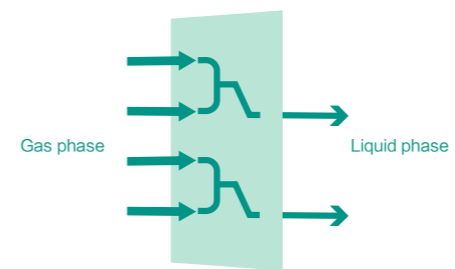
## Optimized refrigerant circuit

As refrigerant flows in the system, energy will be lost due to friction and other factors naturally especially when refrigerant change phase, latent heat are lost when gas turns to liquid. Whereby, as more heat is dissipated out, higher the heat exchanger efficiency is. By making full use of heat dissipation, refrigerant flow layout is maneuvered into 2 to 1 refrigerant flow path extends liquid refrigerant's occupancy and eventually the efficiency too.

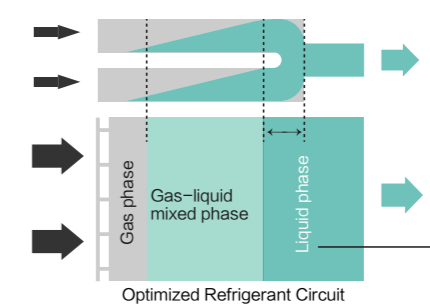
### Conventional technology



### 2-to-1 refrigerant flow path



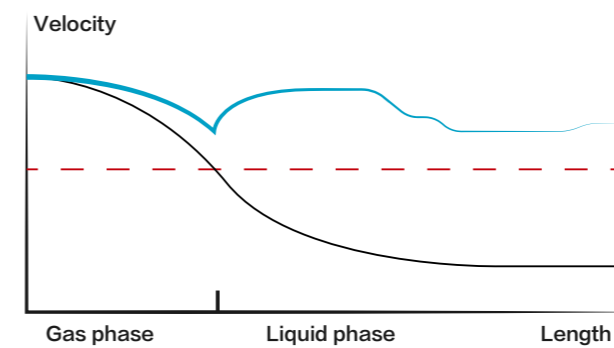
Traditional Refrigerant Circuit



Increase the proportion of liquid refrigerant in the heat exchanger to improve heat transfer efficiency

Gas Refrigerant Liquid Refrigerant

### Why does 2 to 1 refrigerant circuit is higher in efficiency?



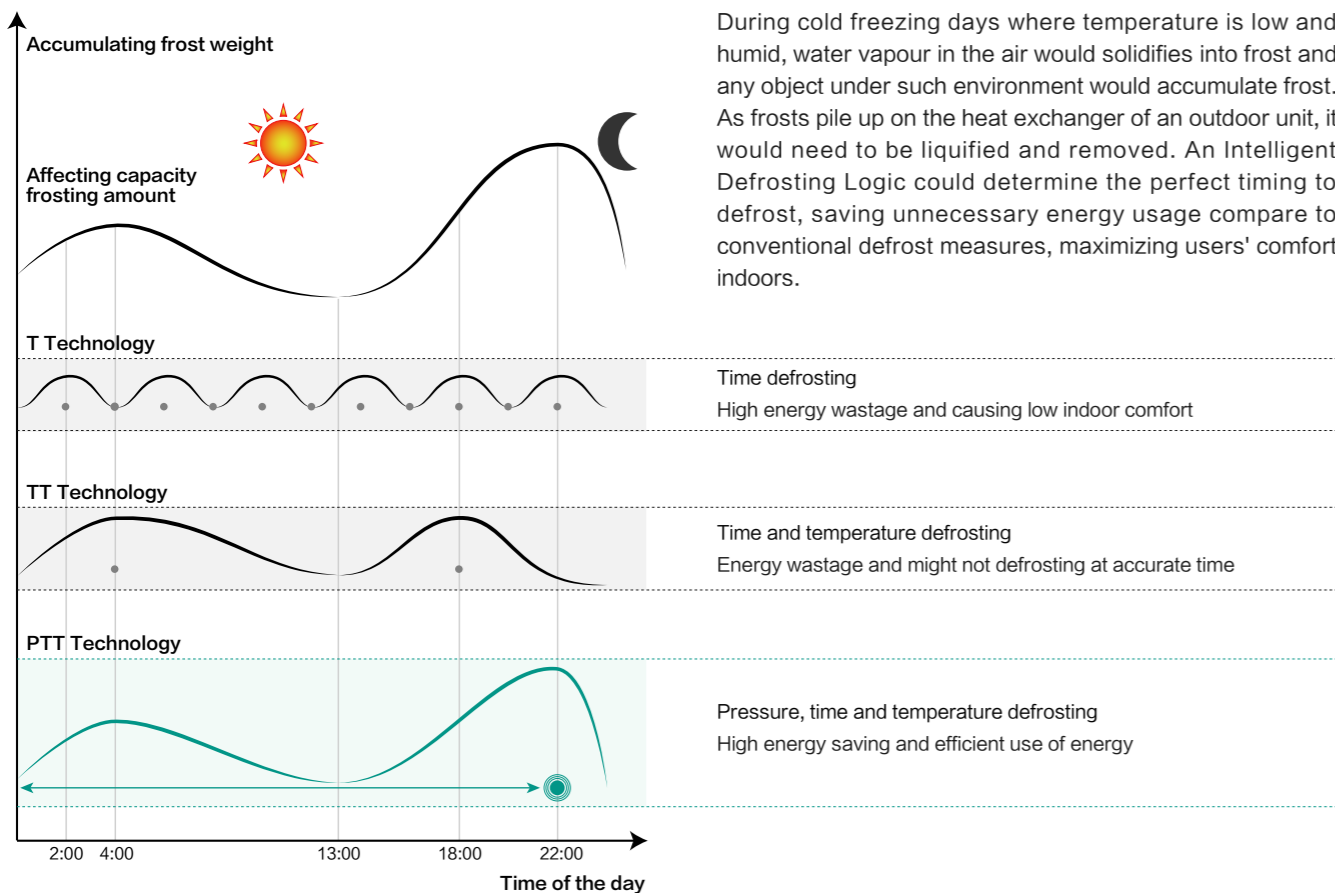
2 to 1 refrigerant circuit: velocity is maintained same goes to the efficiency of refrigerant heat exchange.

Conventional refrigerant circuit: Heat exchange slows down with decreased velocity. Efficiency is greatly reduced.



# Intelligent Defrosting Logic

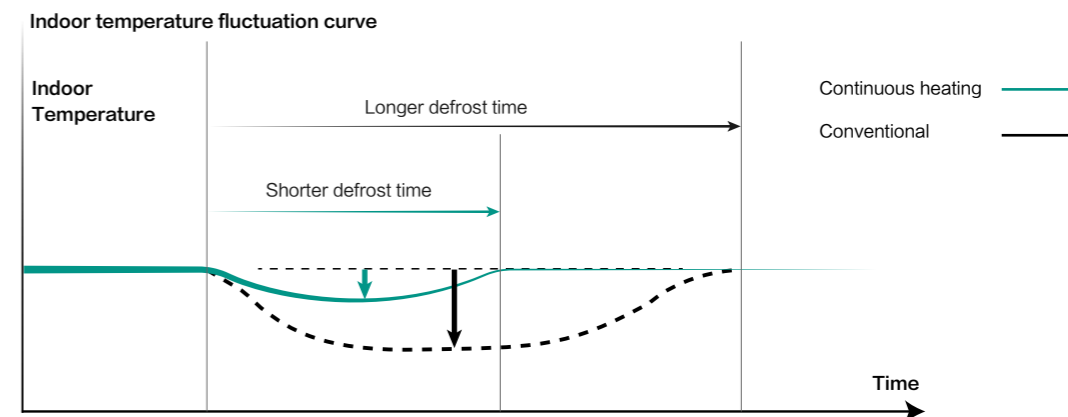
## PTT defrosting mode



During cold freezing days where temperature is low and humid, water vapour in the air would solidifies into frost and any object under such environment would accumulate frost. As frosts pile up on the heat exchanger of an outdoor unit, it would need to be liquified and removed. An Intelligent Defrosting Logic could determine the perfect timing to defrost, saving unnecessary energy usage compare to conventional defrost measures, maximizing users' comfort indoors.

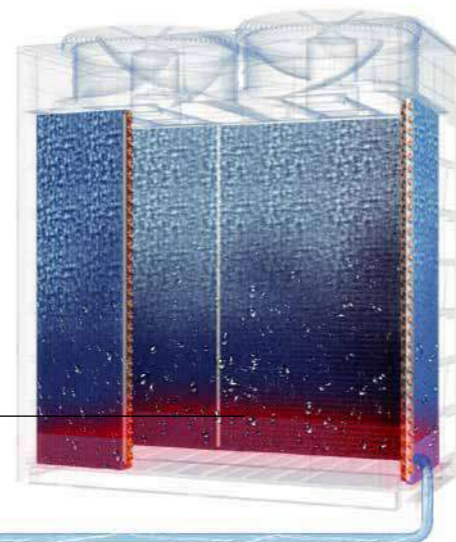
## Continuous heating during defrost

Considering user's ultimate comfort in cold unbearable times, indoor heating can now be supplied continuously to prevent periodic idle intervals.



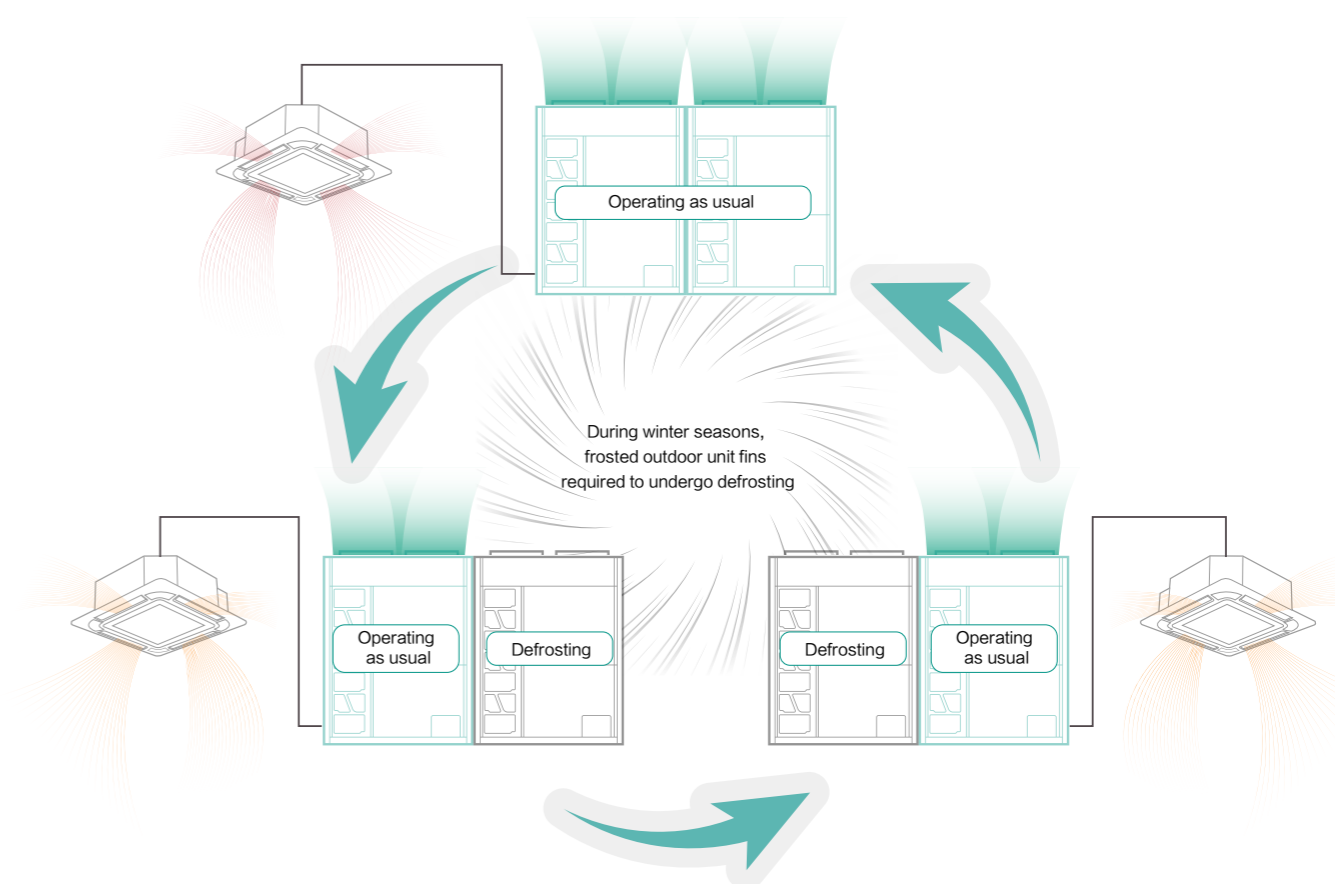
## Bottom anti-frosting structure

To ensure effective frost removal, heat exchanger circuit is extended to the bottom to make sure melted frost from the top does not solidify as it reaches to the condensate drain and hence enhances smooth discharge. In the meantime, the heat also extends frost formation periods whereby prolongs defrost interval.



Extended heat exchange coils, keeping the bottom warm

Smooth continuous condensate drainage



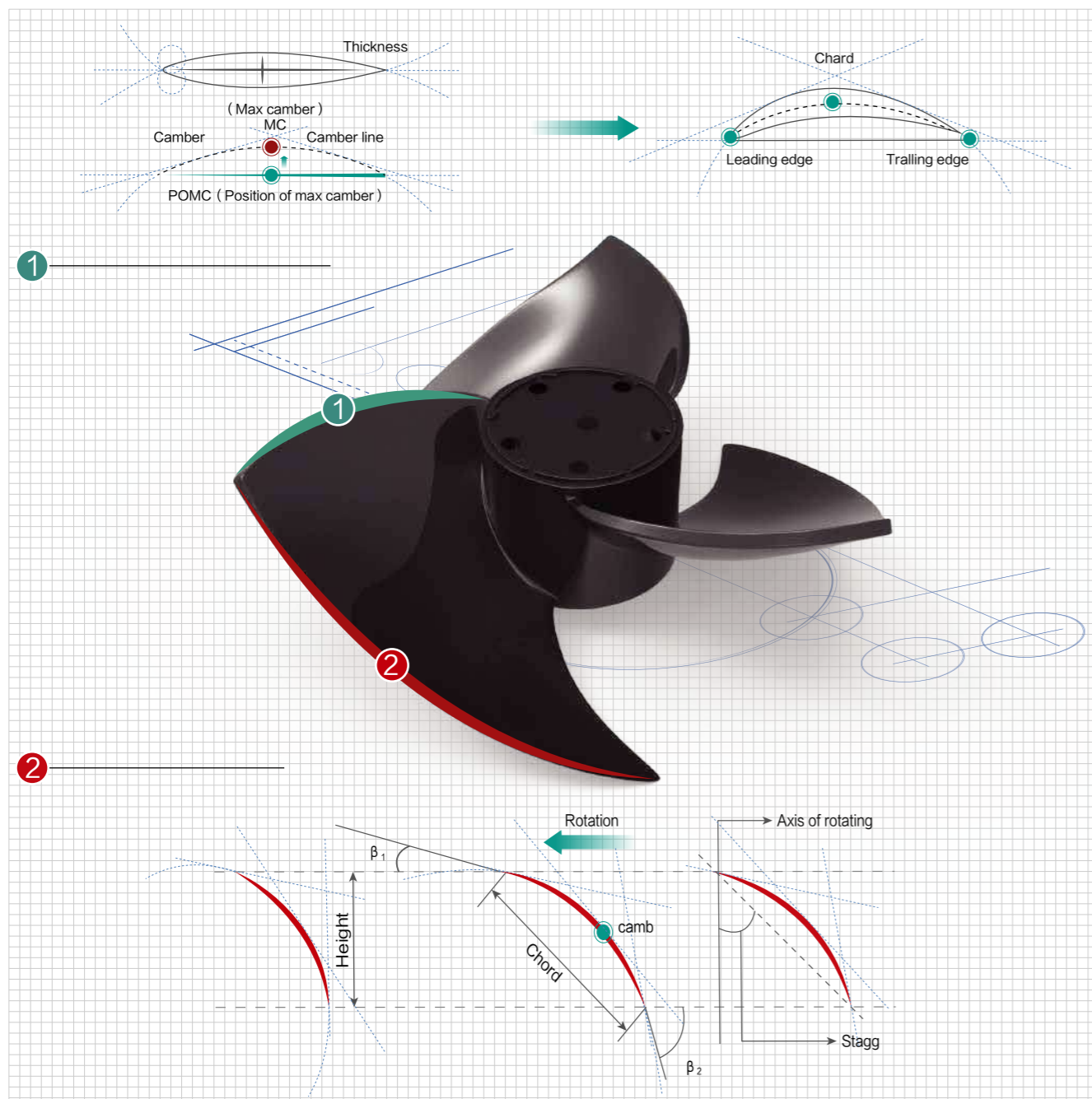
Note

Only available for module combinations of Hi-FLEXi S Heat Recovery.

# Steady Air Discharge

## High efficiency aerodynamic axial fan

The propeller bearing which acts as the joint connecting the propeller and motor are specially treated with anti-rain corrosion treatment and propeller made of fiber glass composite is now better corrosion resistance. Fan blades are aerodynamically designed to reduce energy wastage in converting power consumed to unnecessary noise energy, reserving the energy to improve on flowrate performance and static pressure. Integration with brushless DC fan motor further improves the efficiency and reduces noise of the propeller structure.



## Stepless-smooth fan speed control

Inverter fan motors are now commonly used, where efficiency increase by 40%. Whereas in Hisense VRF, brushless DC fan motors are used, as it could further reduce power consumption and noise production than normal inverter motors.



Efficient axial fan

## Auto Refrigerant Temperature Control (ART)

Hisense VRF system featured with ART technology can meet the indoor loads more accurately at a higher efficiency. The system adjusts the evaporating temperature (Et) according to actual indoor loads automatically in a wide range. The Et is raised to minimize the difference with the condensing temperature when the air-conditioning load is low, thus further improving the energy efficiency.

Features:

1. Energy efficiency is improved without sacrificing comfort.
2. ART is particularly efficient under low-load operation.
3. The initial evaporation temperature can be adjusted between 2–11°C, which is the widest in the market.
4. Realize rapid cooling with lower evaporating temperature.
5. Avoiding cold draft with higher evaporating temperature.

$E_t = E_{to} + K$   
 Et: Evaporation temperature  
 Eto: The initial evaporation temperature  
 $\Delta T$ : The temperature difference between air inlet and the setting temperature

