

ZTT GROUP

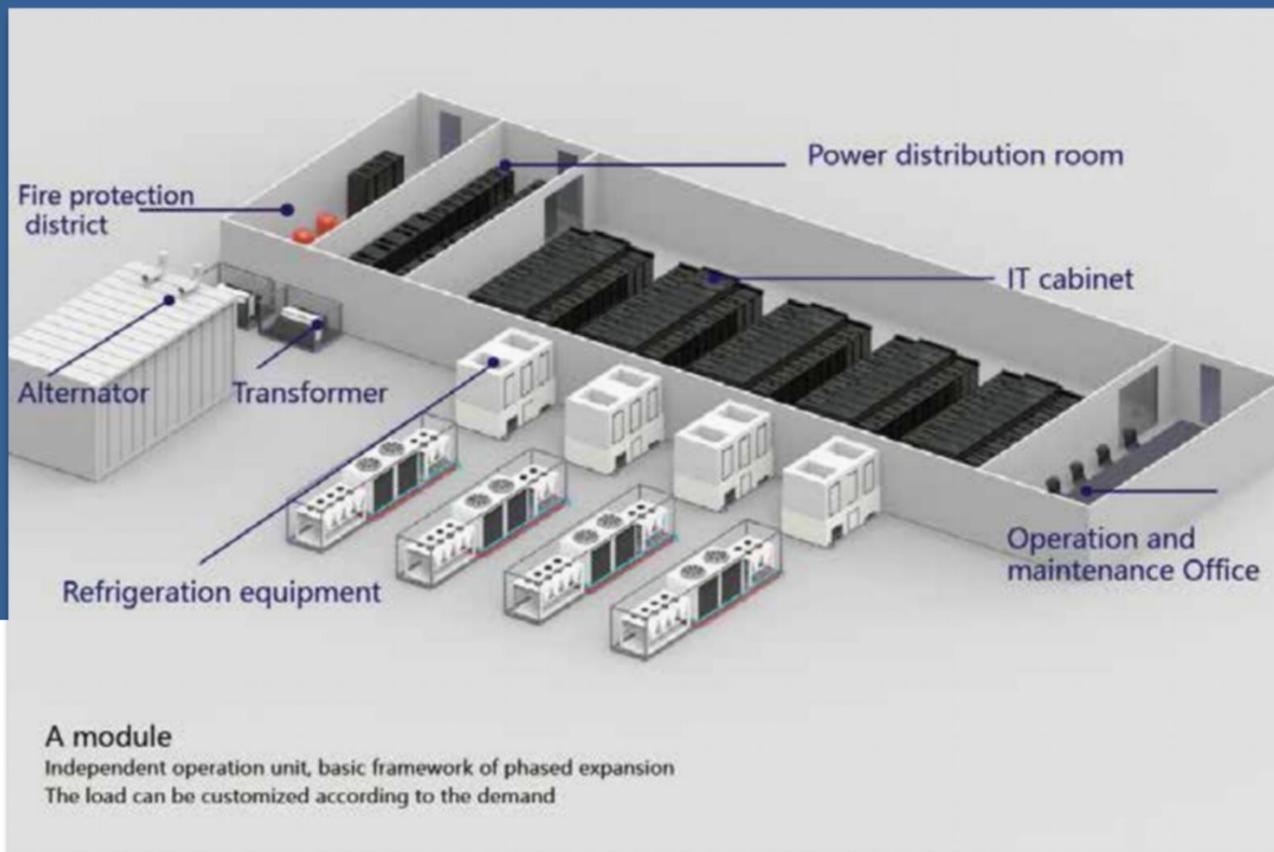
Established in 1992, ZTT started from optical fiber communications and was listed on Shanghai Stock Exchange (SSE) in 2002 (Stock Code in SSE: 600522). ZTT has pictured a diversified industrial portfolio for marine equipment, renewable energy, new materials, smart grid, optical communications and other diversified industrial products. ZTT Group is now hosting 80 subsidiary companies and over 16,000 employees, operating 5 overseas plants located in India, Brazil, Indonesia, Morocco and Turkey. ZTT owns more than 2500 patents with independent intellectual property rights, presided over or participated in more than 500 international and national industry standards. The products of ZTT are exported to 160 countries and regions. The company has ranked among the top 500 Chinese enterprises for consecutive years and broke through \$ 12.5 billion in sales revenue in 2021. ZTT follows the new economic model of fostering cleaner production and accelerating green and low-carbon development, works hard to serve as the pioneer of persistent endeavor to achieve national goal involving carbon dioxide emissions peaking by 2030 and carbon neutrality by 2060, emerging as a green manufacturing technology group assuming regional economy.



Smart Modular Data Center Solution



ZTT Micromodule data center is a new generation smart modular data center solution, which dedicated to providing customers with simple, efficient, and reliable data center solutions. It's a modular designed, highly integrated solution which comprises power supply system, cooling system, rack & structure system, cabling system, management system within a module, meeting the requirements for quick delivery and on-demand deployment. Furthermore, the ZTT smart module uses the intelligent management system to comprehensively improve the reliability and efficiency of power supply and cooling systems. This significantly improves data center availability, and O&M efficiency.



A micromodule is a complete data center that can stand alone on computing or storage resources. Adoption of modular components and unified interface standards to achieve rapid, flexible deployment and later expansion of data centers, greatly reduce the construction cost, while shortening the construction and deployment cycle of data centers, and enhance the flexibility and mobility of data center deployment. It has advanced refrigeration and power supply technology, effectively solve the air-conditioning refrigeration problem of high-density rack, improve the operation efficiency of internal equipment in the data center, reduce PUE value, and it has greatly promoted the greening of data centers. Components can be prefabricated in the factory, so the site installation is simple and quick.



Scope of Application Suitable for medium, large and super large data rooms, flexible configuration of the number of cabinets.

Application Scenarios Cloud host in the park, information center of state organs and public institutions, core data center of government institutions, etc.

Installation Component factory standardized pre-installation, on-site rapid installation and deployment, equipment room to the direction of productization, standardization.

Integration Cabinet, ups, air conditioning, power distribution cabinet, intelligent monitoring, etc.

Monitoring Monitoring equipment voltage, current, power, temperature and humidity, etc.; PUE real-time display, and provide historical PUE query function.

| Item | Specifications | |
|-----------------------------------|------------------------|---|
| Micro Module | Dimensions | Single row (with aisle containment) (L×W×H): L×2400×2000mm/2200mm ; (L ≤ 15m) |
| | | Dual row (with aisle containment) (L×W×H): L×3600×2000mm/2200mm (L ≤ 15m) |
| | Cabinets per module | Single row ≤ 24 cabinets; dual row: ≤ 48 cabinets |
| | Power supply | 380/400/415Vac, 50/60Hz, 3Ph+N+PE |
| | Max IT load per module | 125kW (with integrated UPS)/145kW(with integrated PDC)/310kW (with New main way)/ 235kW(with precision PDC) |
| | Operation condition | Ultra low temperature condition: -30°C to 45°C (Need low-temp kit) Working environment humidity: 5%~95% |
| | Cable routing | Routed in/out through the top of cabinets |
| | Installation | Installing on concrete floor or raised floor |
| | Cabinet | Dimensions (H × W × D) |
| Space available | | 42U/47U |
| Cabinet Porosity | | Front and rear doors: hexagonal mesh door design, porosity rate ≥ 75% |
| Protection level | | IP20 |
| Air-cooled In-row air conditioner | Cooling capacity | 25kW~45kW |
| | Dimensions (H × W × D) | 2000mm × 300mm × 1200mm; 2000mm × 600mm × 1200mm; 2200mm × 600mm × 1200mm ; |
| | Refrigeration mode | Air cooling/Water cooling |
| | Refrigerant | R410A |

| Item | Specifications | |
|---------------------------------------|----------------------|---|
| Integrated UPS | Input voltage | 380/400/415Vac, 50/60Hz, 3Ph+N+PE |
| | Input | 250/400AMCCB (single input); 250A/400A ATS (dual input) |
| | Input power factor | Full load > 0.99, Half load > 0.98 |
| | Output power factor | 1.0 |
| | Rated capacity | 30~125kVA: IT Load ≤ 120 kW, power modules ≤ 4, the capacity of a single power module is 30kVA IT Load > 120 kW, power modules ≥ 5, the capacity of a single power module is derated to 25kVA |
| | Output | IT: 40A/1P × 24 × 2; A/C: 40A or 63A/3P × 8; lighting: 10A/1P × 3 |
| | Efficiency | ≥ 96% (Linear Load) |
| | AC SPD | 5kA, 8/20μs |
| Integrated power distribution cabinet | Input voltage | 380/400/415Vac, 50/60Hz, 3Ph+N+PE |
| | Input | IT: 160/250AMCCB; A/C: 160/250AMCCB (single/dual input) |
| | Rated input current | IT: 160A/250A, Air conditioner: 160A/250A |
| | Output | IT: 40A/1P × 24 × 2; A/C: 63A/3P × 16; lighting: 10A/1P × 3 |
| Precision power distribution cabinet | AC SPD | 20kA, 8/20μs |
| | Input voltage | 380/400/415Vac, 50/60Hz, 3Ph+N+PE |
| | Input | 160/250/400AMCCB (single/dual input) |
| Smart busway | Output | 40A/1P, max 144 routes |
| | Input voltage | 380/400/415Vac, 50/60Hz, 3Ph+N+PE |
| Enclosed aisles | Input | 250/400AMCCB (single input) |
| | Output | 40/63A 1P (6 branches in one Power Distribution Unit, can be expanded with the length of cabinet) |
| | entrance guard | Support for passwords, IC cards, fingerprints, etc. (optional) |
| illuminating | Anti-static flooring | Calcium sulfate anti-static floor |
| | illuminating | LED Energy-saving lamps |



Skylight



lighting system



Camera



Smoke sensor



Temperature and humidity sensor



Leakage detection



Skylight components



Inter-row precision air conditioner



Cabinet



UPS

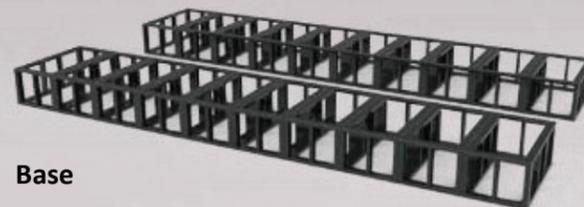


PDU



Monitoring management

Door magnetism



Base

Cabinet Overview

According to the demand of high density and efficient modular data center, we have developed a high-end multi-function cabinet suitable for large, medium and small data center. The cabinet is composed of cabinet frame, front and rear mesh door, upper and lower cover plate, brush and blind board, side plate, L bracket, square hole bar. It can be widely used in computer data, network systems, banking, securities, transportation, communications, education and other industries.



| Index | Parameters |
|-------------------------|---|
| STANDARD | 19 inches , IEC 60297-2 , ANSI/EIA RS-3 10-D |
| IP code | IP20 |
| Main materials | high quality cold steeling rolling plate |
| Main material thickness | Skeleton part ≥ 2.0 mm Bearing layer ≥ 1.5 mm Other parts ≥ 1.0 mm Material thickness can be customized |
| load-bearing | Dynamic bearing capacity ≥ 600 KG Statie bearing capacity ≥ 1500 KG |
| surface treatment | degrease, acid washing, phosphating, static spraying plastic. |

Design criteria

19-inch standard design, meet IEC 60297-2,ANSI/EIA RS-310-D standard.

The solution

Cabinet cable management solution

We have four schemes to meet the wiring requirements of different scenes; cabinet cooling management solution cabinet we have three solutions to meet the air supply requirements of different scenes power management.

Solution

optional module distribution unit , rack PDU, vertical PDU, distribution scene to meet the different needs of customers.

Product property

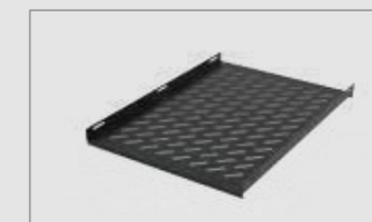
- The cabinet with load of 500kg was continuously tested for earthquake resistance, and passed the earthquake resistance assessment of the structure with intensity of 8 and 9.
- The effective bearing space inside the cabinet is ≥ 42 U. Different specifications of equipment trays can be configured according to requirements.
- The door and side plate are detachable structure, which can be flexibly and quickly loaded and unloaded.
- The mesh door adopts high density honeycomb mesh, opening rate $\geq 75\%$, which is good for air inlet and heat dissipation.
- It uses external hinge, and its opening angle is greater than 130° .
- Front and back doors are equipped with locks and special keys to open, which can improve the operation safety of the internal equipment of the cabinet.
- Multiple cable management channels are reserved at the top and bottom of the cabinet, and the wiring holes at the bottom can be adjusted as needed.
- The front and rear columns of the cabinet are equipped with parallel cabinets, which can be conveniently and quickly combined.



Front (rear) sides of cabinet with vertical PDU and wire trimmers



Blind plate clasp, removable.



Device tray of different specifications



Cold rolled sheet ring, strong and beautiful



Reserve multiple cable management channels



Bottom line holes adjusted on demand

The closed cold channel system in the machine room is a technology used to reduce the temperature of the equipment heated by work. It is mainly composed of three parts: cabinet assembly, channel door assembly and channel skylight assembly.

With the increasing power consumption of server equipment, the heat dissipation capacity of cabinet will need to be greatly strengthened. Reasonable use of cold channel scheme can greatly improve the heat dissipation ability of data center and make full and effective use of cabinet and computer room space. Therefore, closed cold channel products came into being. It is mainly used in the data center computer room.

Closed cold channel system is based on the principle of separation and orderly flow of hot and cold air , cold air is blown under the elevated floor or refrigeration in the column nearby , into the closed cold pool channel , the equipment at the front end of the cabinet inhaled cold air , by cooling the equipment , forming hot air from the back end of the cabinet to the hot channel , the gas of the hot channel quickly returns to the air conditioner

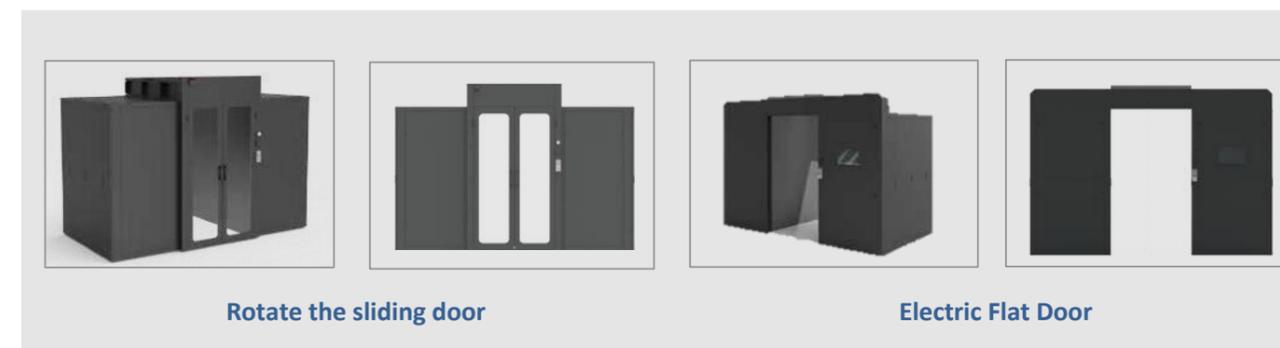


| serial number | Part name | quantity | remarks |
|---------------|------------------------|----------|--|
| ① | Cabinet component | N | Composition of several cabinets |
| ② | Channel door component | 2 | Channel Door and Channel Door Support Plate |
| ③ | skylight component | N/2 | Made of sun roof , sun roof cushion height , sun roof decorative panel |

Product performance

Channel end door

- The door body is made of high quality cold rolled steel plate, equipped with 8mm thick sightseeing toughened glass, you can directly observe the internal situation.
- The edge of the door body and the connection of the parts are sealed with sealing strips or brush strips to ensure the sealing effect.
- End door can be configured according to customer requirements of rotary sliding door, manual translation door or electric translation door.



Channel skylight

- The skylight is divided into fixed skylight and rotary skylight.
- The skylight glass is made of tempered glass with thickness $\geq 5\text{mm}$ and light transmittance $\geq 90\%$. It can also be customized according to requirements.
- The top skylight is linked to the fire control, and the induction opening time is no more than 5s.
- Under fire condition, the skylight will turn over automatically, and the maximum opening Angle is 90° .
- After the skylight is opened, the clear height of the passageway is not less than 2 meters, which does not affect the daily maintenance work and the safety of maintenance personnel.
- The skylight adopts modular design, and the supporting cabinet is installed in a modular way.
- LED energy-saving lamps are used for lighting in the passageways, the illumination is $\geq 300\text{LX}$, and atmosphere lights can be added according to requirements.



Channel base

- The base of the cabinet is made of bending and welding of 2mm thick cold-rolled steel plate, with a bearing capacity of more than 1500kg.
- The bottom of the base is equipped with adjustable casters.
- The base can be reliably connected with the ground.



Electrical system

A perfect power supply and distribution system is the basic condition to ensure the safety and reliability of the service equipment, key network equipment, site equipment and auxiliary equipment in the computer room. The main components of the micro module distribution system include: high and low voltage distribution system, emergency power supply system, uninterruptible power supply system, precision head cabinet and PDU system, lighting and emergency lighting system, lightning protection grounding system, wiring system, etc.

Scheme one: Modular ups



Modular/ rack UPS

It supports a variety of capacity UPS in the range of 20KVA to 320KVA. According to the need to deploy.

Modular distribution cabinet

It adopts integrated power distribution cabinet, integrated IT power distribution unit, air conditioning power distribution unit, UPS power distribution unit, truly integrated power distribution, can greatly save space. In addition, it has an intelligent electric quantity tester, which can measure the voltage, current, power factors of the input power supply and the output current of each road, so as to realize 7*24 uninterrupted monitoring.

Scheme two: DPS distributed power supply



DPS power distribution system

Single cabinet can adapt to 6KVA, 10KVA and other power, can be deployed on demand.

Advantages of DPS power supply

Take the cabinet as the unit for configuration, flexible and convenient; it is an uninterruptible power supply product designed and developed for the new generation of green data center. It has the characteristics of small size, light weight, high intelligence and easy deployment. It is widely used in distributed data center, load-bearing limited data center, phased deployment data center, rapid deployment data center and integrated cabinet and other power supply application scenarios.

Air conditioning refrigeration system

With the strong development of the Internet and big data, the energy consumption of data centers also increases year by year. The energy consumption of IT equipment, refrigeration system, power supply and distribution system, lighting and other energy consumption accounts for about 50%, 35%, 10% and 5% respectively.

Among them, refrigeration system has great energy saving potential.

In order to reduce the energy consumption of air conditioning, the cooling systems commonly used for micro modules at present include "room-level air conditioning + underfloor air supply + cold channel closure" and "room-level air conditioning + cold channel closure".



Features of air conditioning products

Safe and reliable

- Constant temperature, constant humidity, clean precision environment control to ensure the normal and efficient operation of the main equipment
- All-weather continuous and stable operation structure and function design to ensure the safe operation environment of the main equipment.
- Automatic alarm and diagnosis function, effectively prevent failure, prolong the service life of air conditioning unit.
- CFD simulation design and professional sub-module calculation to ensure reasonable matching of core components and high reliability of system scheme.

Energy- efficient

- High heat, high energy efficiency.
- Adopt high efficiency EC fan and high efficiency scroll compressor, save more than 5% energy.
- Standard electronic expansion valve to achieve accurate control of refrigerant flow, refrigeration effect to the best state.

Intelligent Control

- Support rotation, backup and stack functions to avoid competing runs.
- Support RS485 communication methods and MODBUS protocols.

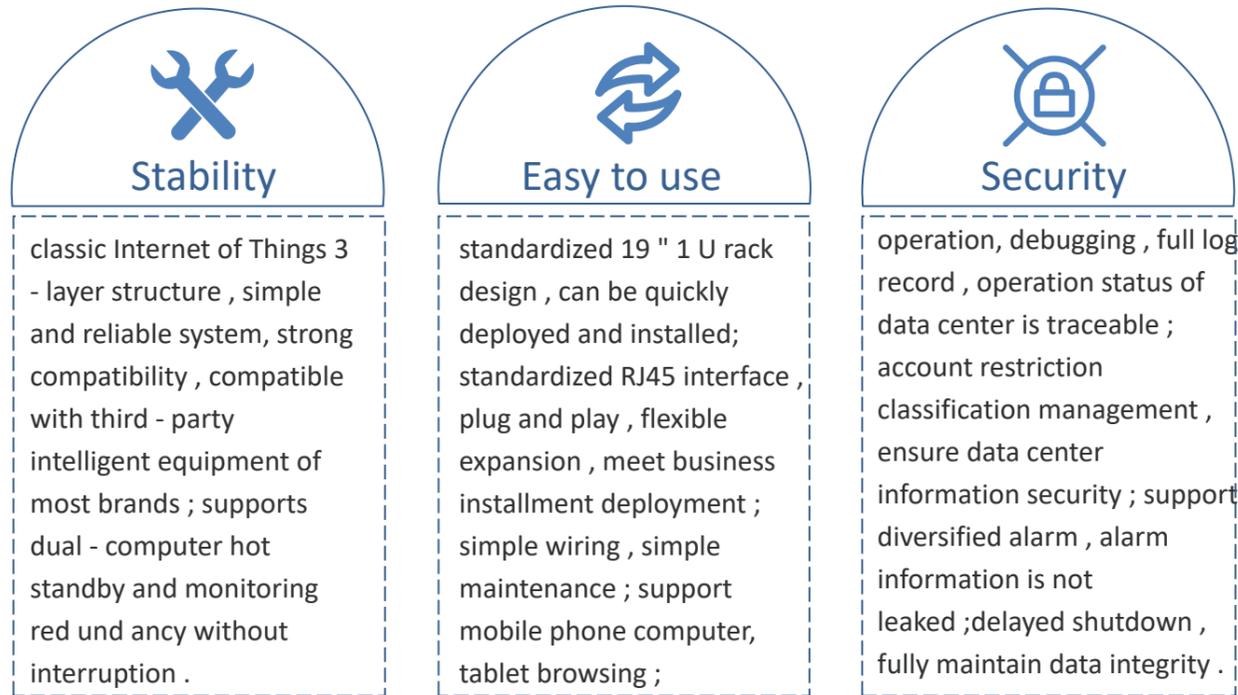
Customizable

- Cooling mode: Air cooled and chilled water type are available
- Air cooled and chilled water type are available
- Outdoor temperature range: Standard (-15°C~45°C), low temperature (-35°C~30°C) optional.
- Professional energy saving team gives users the most reasonable energy saving scheme design plan.

Monitoring system

Product superiority

Monitoring system has the advantages of stability, easy to use and security, can centrally manage all power, environment, refrigeration equipment in the data center, integrate mainstream brand access control, video and other security system, through distributed collection, high concurrent processing ability to meet the needs of multiple room interconnection monitoring and management, let the data center operation personnel control the room in real time.

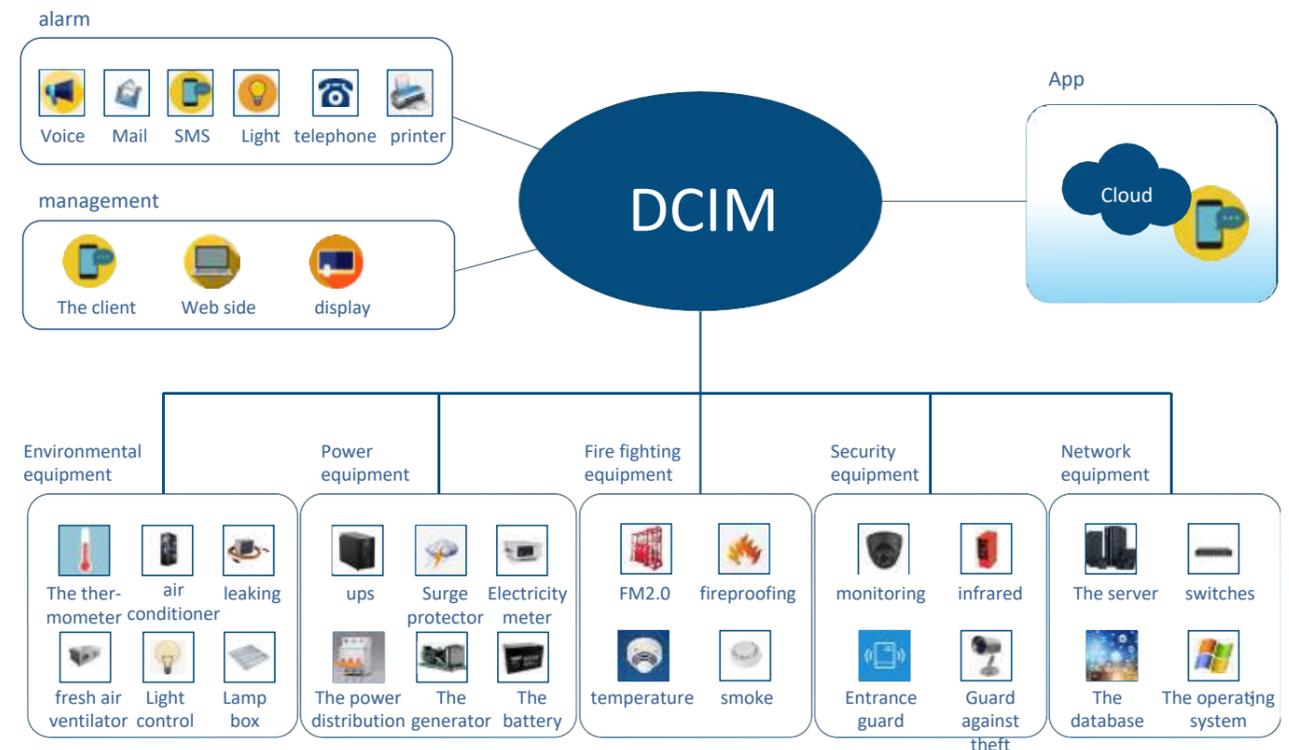


Features

- | | |
|---|--|
| <p>Comprehensive monitoring The monitoring content is extensive; It can meet different monitoring needs.</p> <p>Easy to use Simple installation, convenient operation; Can reduce the burden of operation and maintenance.</p> <p>The remote access The client, browser and APP can access the system at any time to obtain the monitoring status of the computer room.</p> <p>Beautiful interface The platform interface is simple and beautiful; Monitoring data at a glance.</p> | <p>The statistics of energy efficiency Real-time statistics of room energy consumption; The data is translated into intuitive KPI.</p> <p>Practical reports Powerful report visualization; Provide professional data report according to operation and maintenance needs. protection.</p> <p>Energy conservation and environmental protection Analyze monitoring data to provide health reports; Reduce energy consumption and promote environmental.</p> <p>Alarm in time Multi-channel warning notice, sound and light message; A flexible combination of phone and email notifications.</p> |
|---|--|

system framework

Micro module power environment monitoring system is mainly to monitor its micro environment, which mainly includes environment (temperature and humidity, leakage, air conditioning, etc.) power (distribution cabinet, ups, battery, switch, generator, etc.), security (access control, video, infrared, etc.), fire (fire control linkage, smoke probe, etc.), alarm (SMS, telephone, mail, acousto-optic, etc.) and other systems.



Application scenario

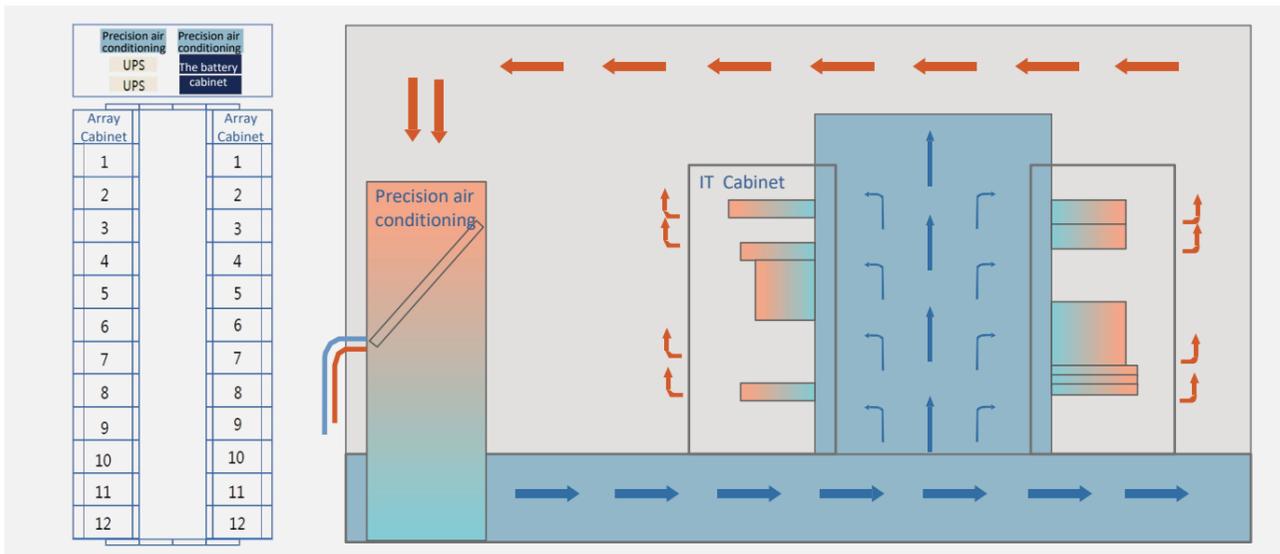
Suitable for green energy — saving data center with fast, flexible deployment, long channel, small single cabinet load and high height of computer room.

Scenario1: Air conditioning is external

Advantages

-  The modular structure can realize rapid deployment and save construction cycle.
-  The strong and weak electric system is independent of the synthesis room, and the strong and weak electric system is separated to make the operation more reliable.
-  External air conditioning can be selected to reduce noise and vibration, adapt to the long installation distance, and ensure the stability and reliability of the computer room.
-  N + 1 redundant design of supporting facilities ensures stable operation to the maximum extent.
-  The air conditioning flow direction is consistent with the air characteristics, so the air supply is uniform and the refrigeration effect is better.

Take the 24 cabinets in two rows as an example



Application scenario

Suitable for the green energy saving data center with fast, flexible deployment, small number of cabinets, large single cabinet load and limited height of the computer room.

Scenario2: Battery External

Advantages

-  The modular structure can realize rapid deployment and save construction cycle.
-  Unified monitoring, intelligent management, through the fire linkage to ensure the safety of people and equipment.
-  The strong power system is separated from the weak power system to make the operation more reliable.
-  The battery pack is isolated from the computer room, so the backup time can be changed flexibly and the security is higher.
-  The air conditioning between the columns is placed inside the cold channel, close to the heat source, to reduce the cold loss.

Take the 24 cabinets in two rows as an example



Application scenario

It is suitable for green energy-saving data center which needs to realize fast, flexible deployment, long channel, small single cabinet load and high machine room floor height.

Scenario3: The battery is built in

Advantages



The modular structure can realize rapid deployment and save construction cycle.



Unified monitoring, intelligent management, through the fire linkage to ensure the safety of people and equipment.



The air conditioning between the columns is placed inside the cold channel, close to the heat source, to reduce the cold loss.



The UPS scheme eliminates the need to deploy power batteries and saves room space.

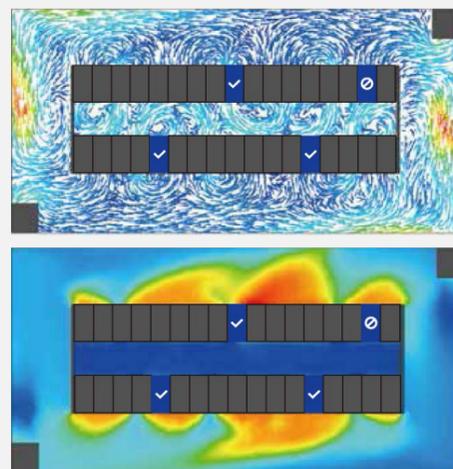


Modular UPS can reliably achieve N+1 redundancy and improve the reliability of the system.

Take the 24 cabinets in two rows as an example

| Array Cabinet | Array Cabinet |
|---------------------|---------------------|
| UPS | UPS |
| The battery cabinet | The battery cabinet |
| 1 | 1 |
| air conditioning | 2 |
| 2 | 3 |
| 3 | 4 |
| 4 | 5 |
| 5 | air conditioning |
| 6 | 6 |
| 7 | 7 |
| 8 | 8 |
| 9 | 9 |
| 10 | 10 |
| 11 | 11 |
| 12 | air conditioning |
| | 12 |

CFD



Application scenario

It is suitable for green and energy efficient data centers where fast and flexible deployment is required, room space is limited, or the power battery room cannot be expanded.

Scenario4: DPS Power supply

Advantages



The modular structure can realize rapid deployment and save construction cycle.



The air conditioning between the columns is placed inside the cold channel, close to the heat source, to reduce the cold loss.



Unified monitoring, intelligent management, through the fire linkage to ensure the safety of people and equipment.



DPS power supply is adopted, which eliminates the deployment between batteries and saves room space.



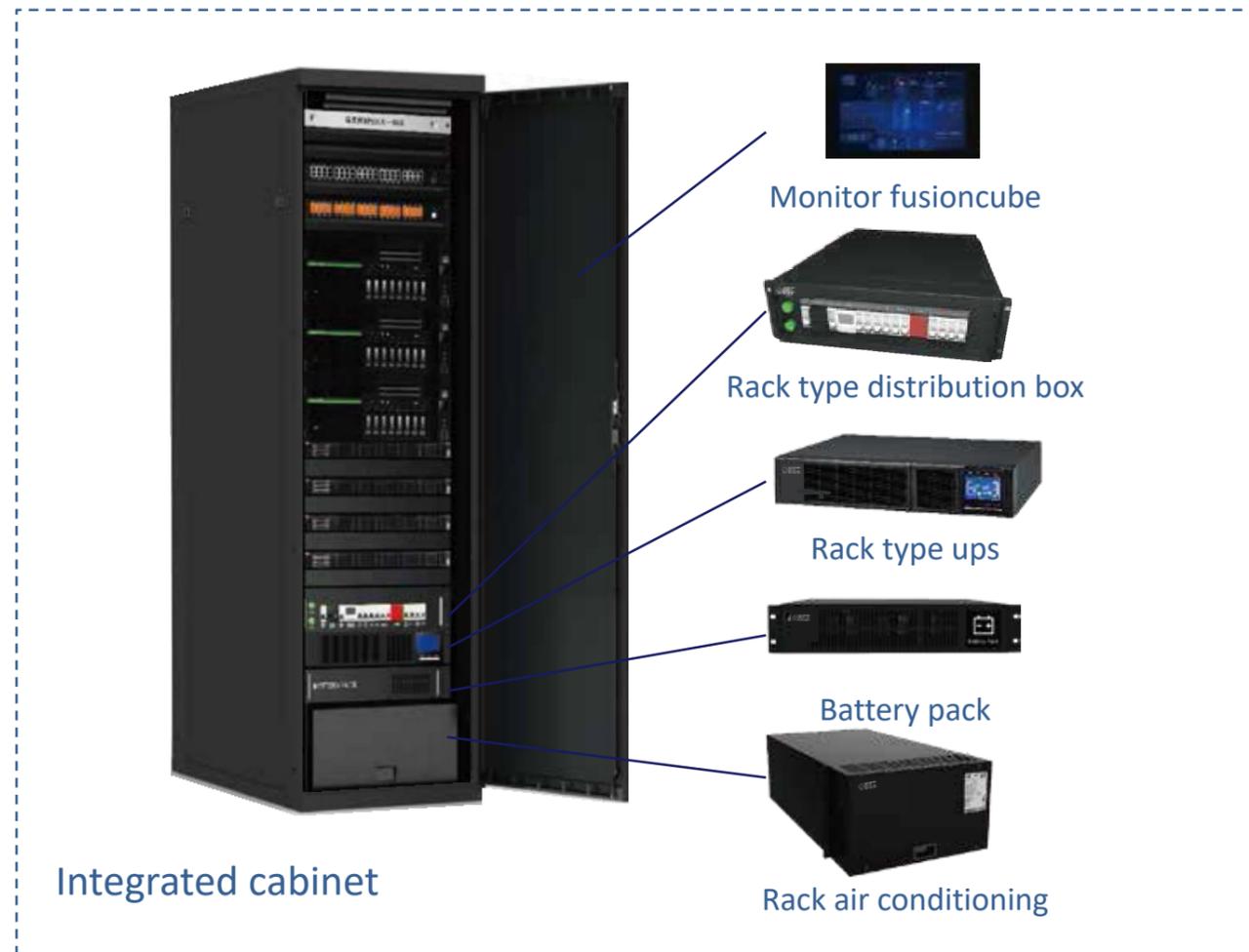
DPS is easy to deploy and flexible to expand.

Take the 24 cabinets in two rows as an example

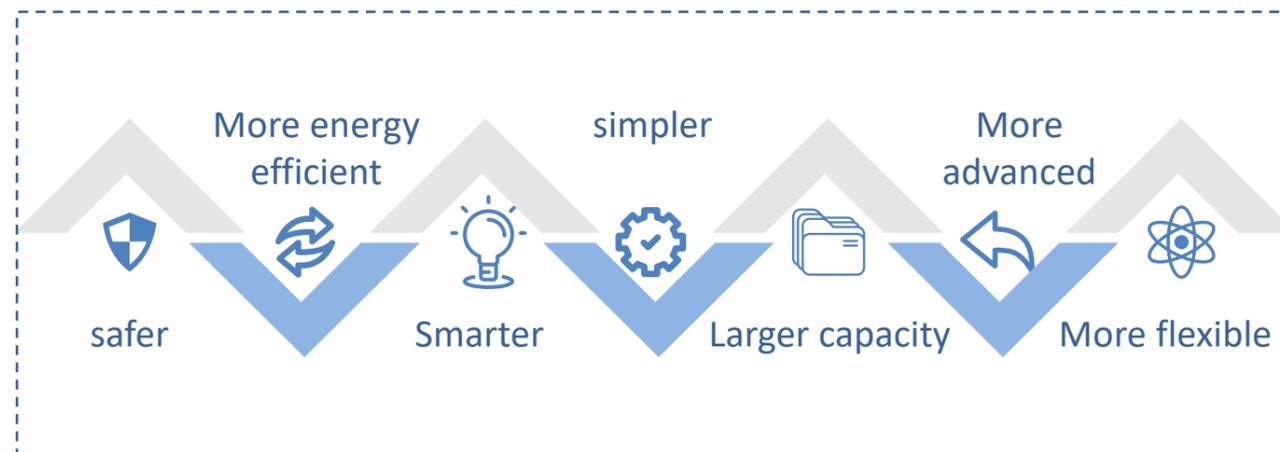
| Array Cabinet | Array Cabinet |
|------------------|------------------|
| S&D | 1 |
| S&D | 2 |
| air conditioning | 3 |
| S&D | 4 |
| S&D | 5 |
| S&D | air conditioning |
| S&D | 6 |
| S&D | 7 |
| S&D | 8 |
| | 9 |
| S&D | 10 |
| S&D | 11 |
| DPS | |
| DPS | 12 |

Products and Solutions of Integrative Cabinet

Integrated single cabinet includes distribution, refrigeration, cabinet, fire protection and other subsystems, It realizes the comprehensive management of all subsystems through the monitoring system. It is a highlyintegrated micro-module product.



Integrated cabinet



Suitable for small scenes



Multigang ark

Smart campuses, school rooms, small computer centers that require cabinet-level closed cooling. Edge node room, weak electrical room, building control room, financial outlets, community hospitals, intersection along the line site, energy site, etc.



* Picture from the network, only for decoration

China Project 1

Liaoning Daoyi Data Center Project 2018. This project adopts the construction scheme of "Distributed Power Source (DPS) + Micro-module Data Center" to meet the urgent needs of local businesses to go online.

- The scheme can realize fast design, fast supply and quick installation, greatly shorten the construction cycle, and effectively support customer demand.
- This scheme improves the utilization rate of space, solves the problem of insufficient space of distribution room and battery room, and can meet the demand of convenient expansion in the future.
- This scheme solves the problem of insufficient load-bearing of building without additional cost of load-bearing reinforcement.



China Project 2

This project includes 150 sets of cold channels and nearly 6000 cabinets. Each module deploys 34 IT cabinets, 2 precision strong current train head cabinets (double UPS), 5 typhoon cold column air conditioners (4+1 redundancy), 1 weak current cabinet, and the maximum power of a single cabinet is 5KW.



China Project 3

In 2020, Anqing Telecom will carry out the transformation of the micro-module data room.

In this project, 8 cabinets with high power density shall be added to the original machine room, and the power of each cabinet is 17KW. In the original project, room-level air conditioning and underfloor air supply mode are adopted.

- Other cabinets are empty (blind plate is blocked) to ensure the air volume demand in the cold channel area.
- Add closed channels to isolate the hot and cold channels to avoid heat exchange between most of the cold air and the environment, so as to realize the isolation of hot and cold air.
- The air supply floor in the area near the high-power cabinet is replaced by the intelligent temperature-controlled fan floor, which automatically matches the required cooling amount according to the cabinet load.



China Project 4

A7 and A8 data center machine room project of Guizhou Telecom Information Park.

A7 Phase I has a total of 42 sets of cold channels and 1500 cabinets (including the base). A7 phase 2 has a total of 18 sets of cold channels and 622 cabinets (including the base); A8 phase 1 has a total of 42 sets of cold channels and 1500 cabinets (including the base). A8 phase 2 has a total of 42 sets of cold channels and 622 cabinets (including the base).

