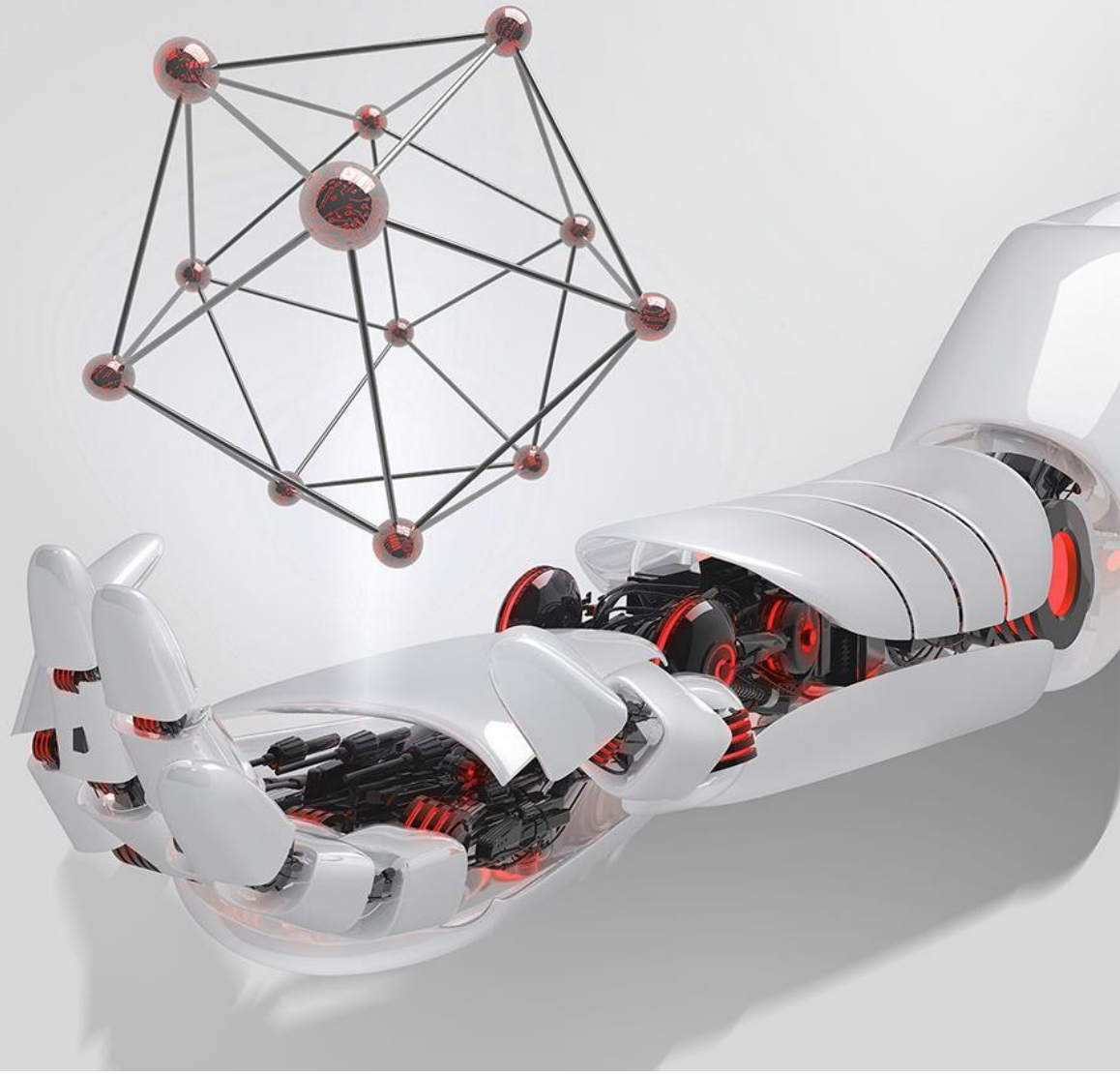
Решения Huawei для построения ЦОД и бесперебойного питания



Алексей Кудрявцев

Менеджер по группе продукции Digital Power

Обзор Huawei Digital Power

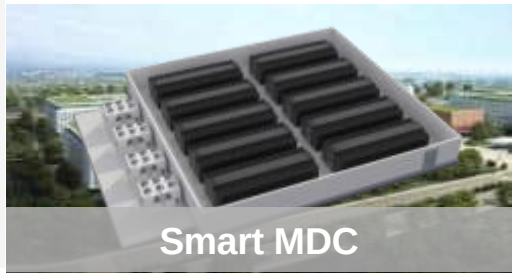
ИБП с литий-ионной АКБ SmartLi

Модульный ЦОД FusionModule

Новинки 2021

Huawei Smart DC Are Adaptable for All Scenarios

"DCIM+" NetEco6000 Management System

	Building scenario (indoor)		No building (outdoor)	
Scenario -based Solution	Medium & large data center	Small Smart modular DC	Medium & large data center	Smart modular DC
	 Smart MDC	 AIO Small MDC	 FusionDC	 AIO
Core Product	 UPS2000-A/G (1-20kVA)  UPS5000-E (30-800kVA)  UPS5000-S 50~800kVA  UPS5000-S-FP 990~1600kVA  Smart Li		 NetCol5000-A 11~46kW  NetCol5000-C 30~80kW  NetCol8000-A 13~120kW  NetCol8000-C 62~253kW  NetCol8000-E 220~440kW	
	Power Supply		**Cooling**	

HUAWEI

Обзор Huawei Digital Power

ИБП с литий-ионной АКБ SmartLi

Модульный ЦОД FusionModule

Новинки 2021

Huawei Intelligent Power Solution Meets Customers' All-Scenario Requirements

Headquarters data center

10KV

New

Solid state transformer

New

Power POD
(1.2/1.6/2.0/2.4MW)

UPS5000-S/E
(50~800kVA)

SmartLi

New

UPS5000-H-
400-1.6MW

Regional data center

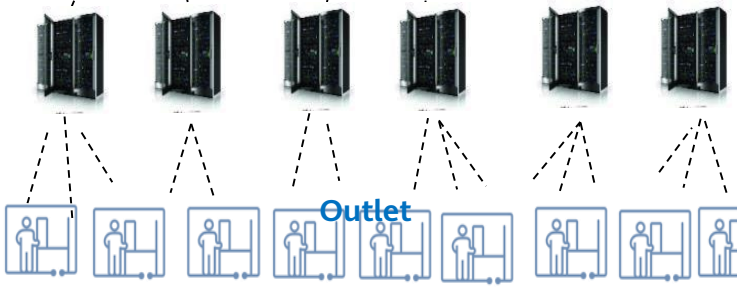
UPS5000-A
(30-120kVA)
(400/500/600k)

PDU

UPS5000-E
(30-120kVA)

UPS5000-E
(25-75kVA)

Branch equipment room



Outlet

UPS2000-G-1-20k

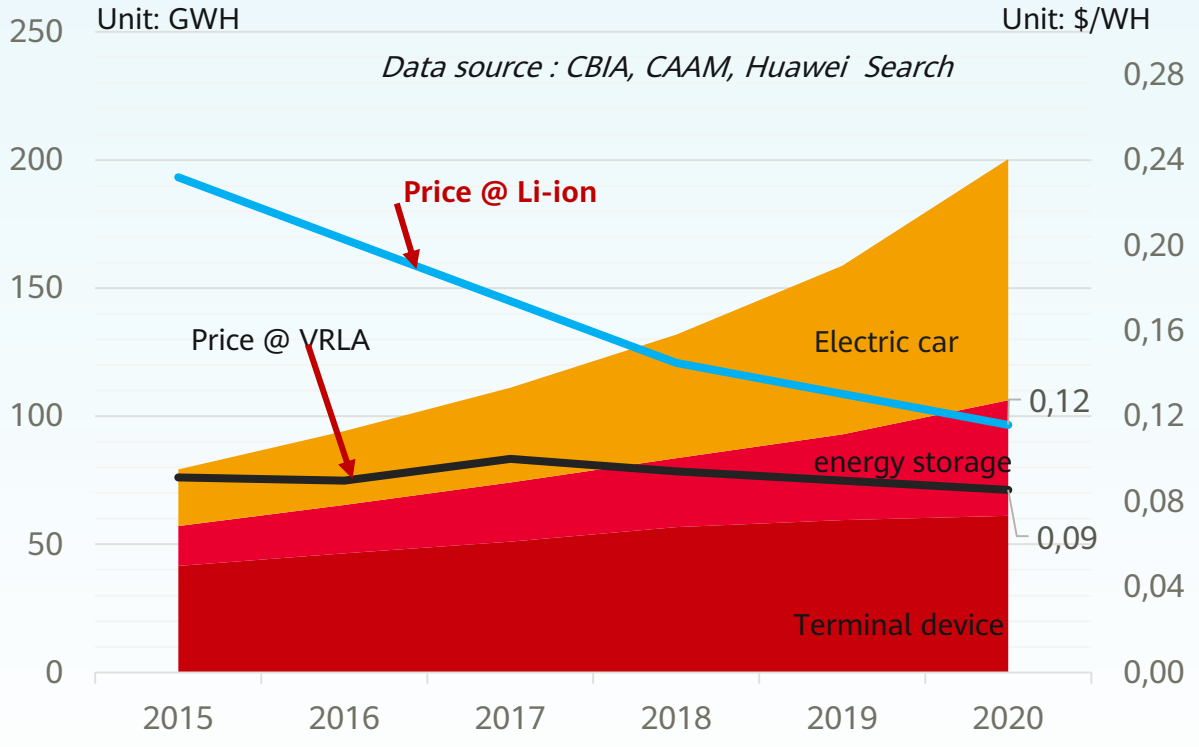
UPS2000-A-1-3k

SmartLi 50/100AH

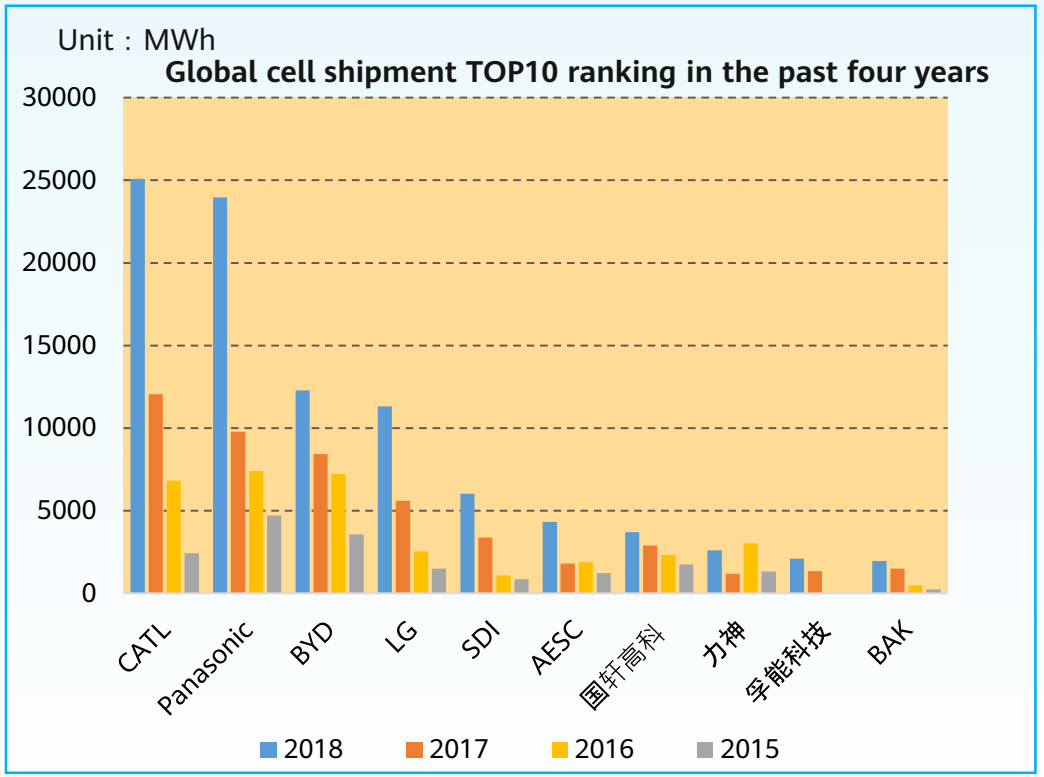
UPS2000-H-3/6/10/20

The lithium battery has been used in a large scale and the cost is continuously reduced

Cost continuously reduced



Large-scale application



Data source: South China Lithium Battery Forum

HUAWEI

A new generation of UPS2000: performance enhancement, full lithium battery, and advancement of SmartLi UPS process

Small-capacity Intelligent Lithium Battery UPS Solution--UPS2000-G + SmartLi

UPS2000-G

2020 Q3 Official Launch

SmartLi UPS2000-G-3K(2U)

2021 Q1 Official Launch

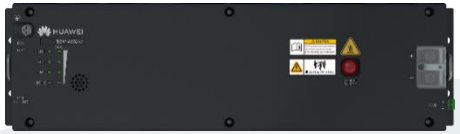
SmartLi UPS2000-G-6K(1U)

SmartLi UPS2000-G-10K(2U)

2021 Q3 Official Launch

SmartLi UPS2000-G-20K(3U)

SmartLi



50Ah SmartLi(3U)

100Ah SmartLi(3U)

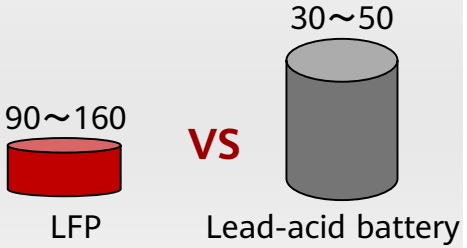
150Ah SmartLi(3.66U)

48 V Lithium Battery, LFP

High energy density design, saving about 65% footprint

High energy density design

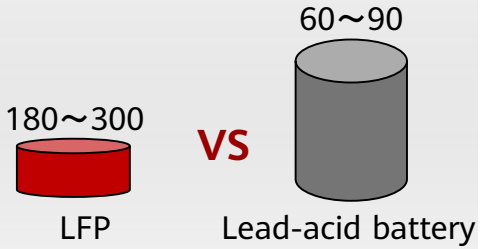
Energy density (Wh／kg)：



Energy density

LFP: Lead-acid battery = 1 : 3

Energy density by volume(Wh／L)：



Volume Comparison

LFP: Lead-acid battery = 1 : 3

Save footprint and more service devices in the same space

Load:6kVA

Backup-time>4hours

Lithium Battery

150Ah×4 pcs

Hight: 3.6U × 4 = 28.8U

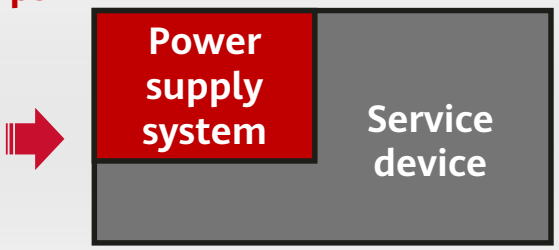
Footprint: 850 depth standard 19” rack ≈ 0.51 ㎡

Battery Weight: 65kg × 4 = 260kg

VS

Lead-acid Battery

65Ah×20pcs ×2 groups



Size(L*W*H)(mm): (975×806×640)×2

Battery Footprint : >1.57 ㎡

Battery Weight: 30.5 kg × 80 = 2440kg

Floor Area

$$\frac{\text{LFP}}{\text{Lead-acid battery}} = \frac{1}{3}$$

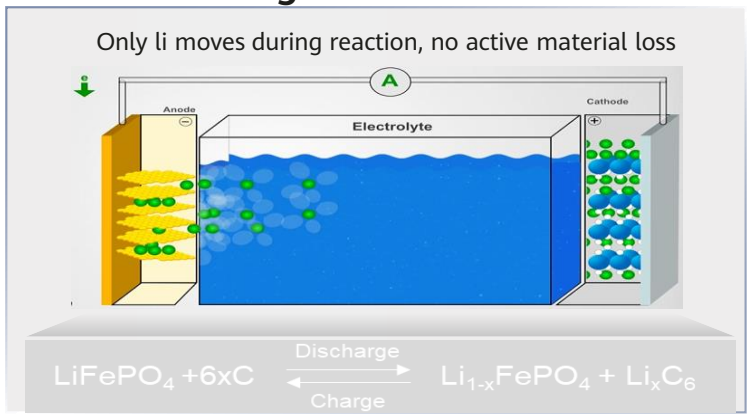
Saving about 65% footprint

HUAWEI

Long life of lithium battery, cost-effective drive

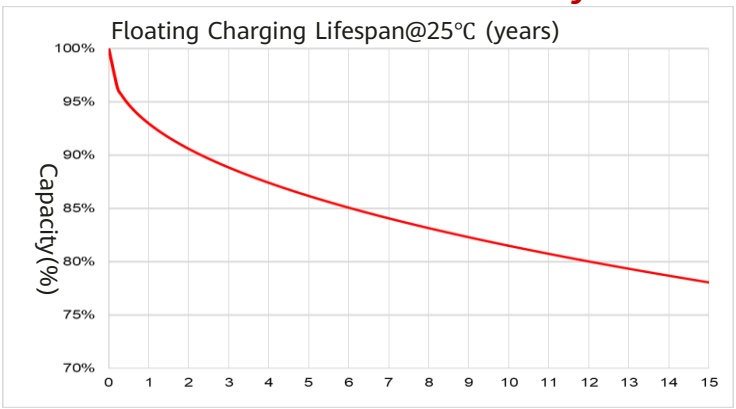
Long life of lithium battery, the total investment is the same as that of lead-acid batteries, and the lifespan cost is lower.

LFP : No active material loss, Long service life

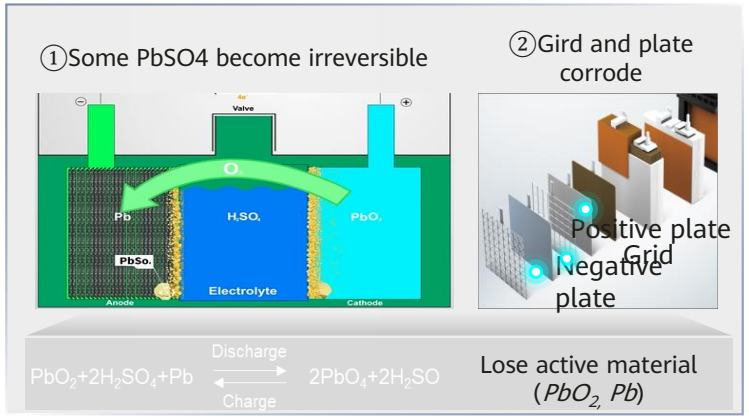


3 times

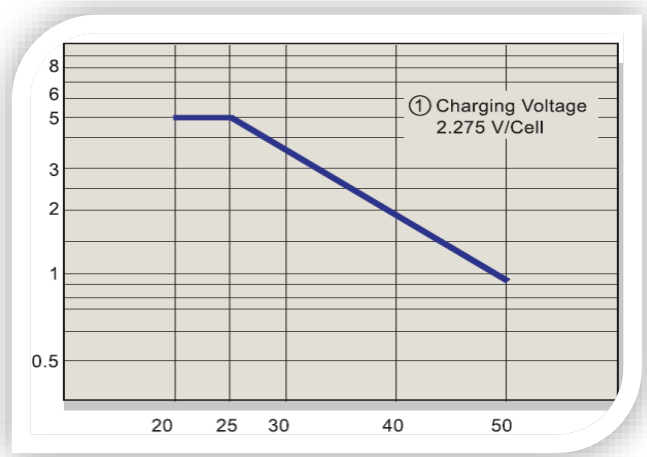
Lithium battery



Lead-acid : Lose active material (PbO2, Pb), Short service life



Lead-acid battery



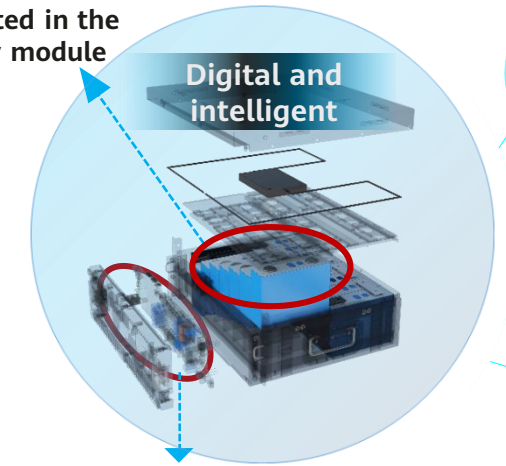
HUAWEI

Lithium battery support intelligent BMS

Intelligent BMS, safer than basic management

SmartLi = power electronics + Digitalization + Energy storage + Thermal management

8 temperature sensors are distributed in the battery module



- module/cell SOC/SOH
- module/cell temperature
- module/cell voltage/current

Detection

- Single cell voltage high-precision detection
- Electrochemical cell disconnection detection
- Busbar voltage detection
- Battery pack voltage detection
- Current detection
- Temperature detection
- Reverse port connection detection

Exception judgment

- Overvoltage/Undervoltage protection for a single electrochemical cell
- Overvoltage/Undervoltage protection for battery packs
- Charge/Discharge overcurrent protection
- Charge/Discharge high temperature protection
- Charge/Discharge low temperature protection
- Board hardware fault protection
- Electrochemical cell fault protection

Data storage and analysis

- Data storage
- Data positioning
- High-precision battery SOC calculation
- High-precision battery SOH calculation

Intelligent management

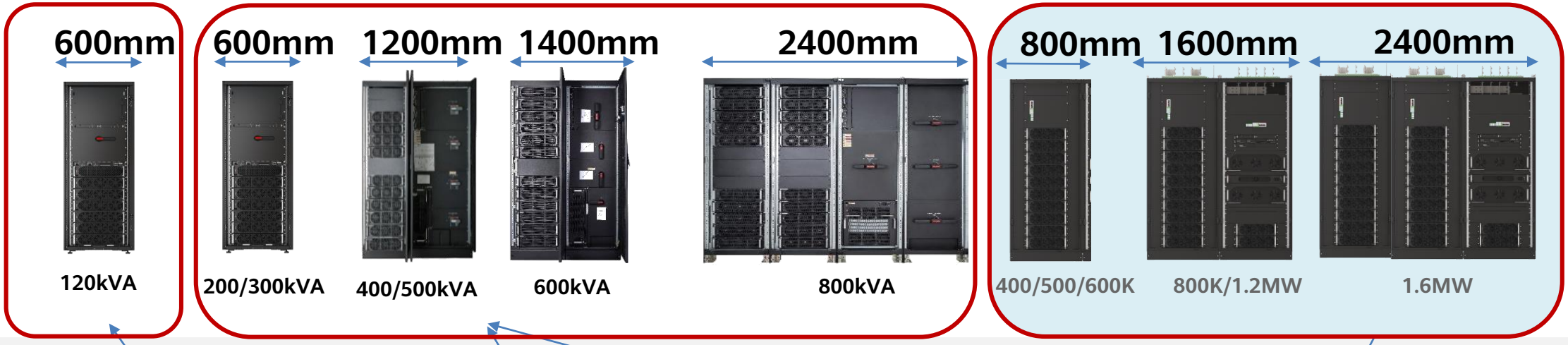
- High-precision electrochemical cell balancing
- Intelligent voltage regulation and current limiting
- Intelligent self-recovery

Note: Content in blue indicates Huawei's leading items. Content in red indicates Huawei's unique advantages.

HUAWEI

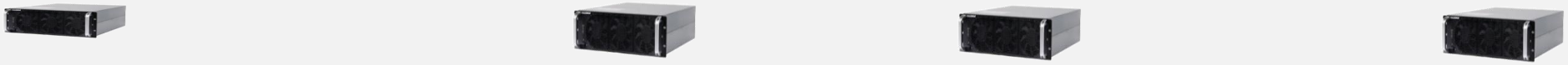
Focus on modularization and high power density(Major Products to Be Sold in 2021)

- Promote the UPS5000-H first in 2021, make breakthroughs in high-end projects with technical and commercial advantages, set up showcases, and gradually change to high-density tracks.
- The UPS5000-E/S/H will coexist in 2021 and will be gradually replaced by the UPS5000-H in 2022.
- **200 kVA/300 kVA capacity strategy: The UPS5000-E-200/300 kVA is recommended in China. The UPS5000-S-200/300 is recommended outside China.**



Power density development

30kW@2 U System efficiency 96%	50kW@3 U System efficiency: 96%	50kW@3 U System efficiency: 97.1%	**100kW@3 U System efficiency: 97%**
UPS5000-E	UPS5000-E	UPS5000-S	UPS5000-H



FusionPower 2.0
1600K Solution

UPS5000-H Basic Features and Specifications

UPS5000-H-400/500/600kVA

800*2000*1000

UPS5000-H-800kVA

1600*2000*1000

UPS5000-H-1200kVA

1600*2000*1000

UPS5000-H-1600kVA

2400*2000*1000

W x H x D (mm)

Capacity range: 400–1600 kVA

- Frame: 400，500，600, 800, 1200, 1600 kVA
- Double conversion online UPS, IGBT rectifier, no built-in transformer
- Full redundancy design, hot swappable power modules, control modules, and bypass modules
- High system efficiency: up to 97%;
- High density: 100 kVA/3U
- Output power factor: 1
- Centralized static bypass
- Optional accessories: against the wall, bottom entry, three-phase three-wire, cable connection, intelligent detection card, and surge protection box, 100kA Icw

SmartLi is ON

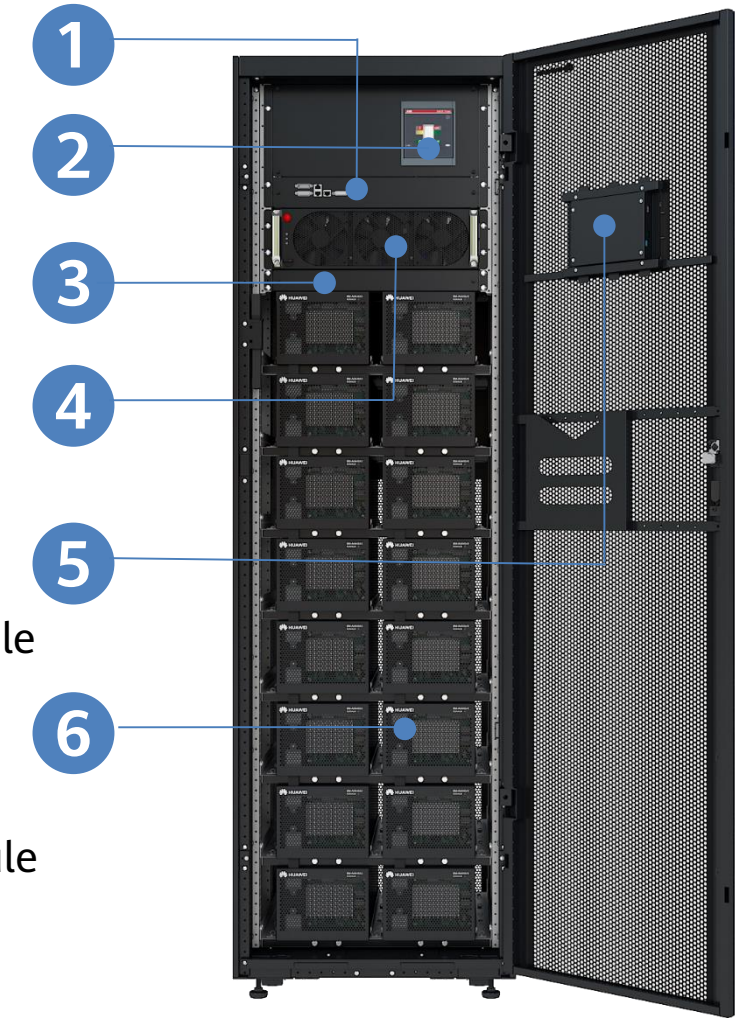
Same Investment

More Value

< 10 years warranty >

Huawei UPS Li-ion Battery Cabinet Overview

1. Monitoring module
2. Battery breaker
3. Fuse
4. Intelligent battery management module
5. Monitoring unit
6. Li-ion battery module



SmartLi

- Battery cell: LFP ($LiFePO_4$)
- Nominal voltage: 512Vdc
- Discharge rate: 6C
- Nominal capacity: 80Ah/40.96kWh
- Operation voltage range: 400 - 544Vdc
- Charging current：0.1 - 1C (Default value 0.5 C)
- Backup time: 10min/15min
- Maximum discharge current: 480A continuous
- Cycle life: 5000 cycles @ 50% DOD, 25°C
- Cable Entry: top entry
- Maximum number of cabinets: 15

Remark:
Quick calculation: (200 kW@10 min, 167 kW@15 min)

SmartLi UPS Competition Strategy: Transform Lead-Acid UPSs to Lithium-ion Battery UPSs to Improve E2E Competitiveness

Why Lithium Battery?

Lithium-ion battery vs. VRLA: beautiful appearance, long service life, low load bearing capacity, small footprint, and superior performance

Smart Li

VS

Lead-Acid battery

	Appearance	lifespan	Cycle life	Load bearing capacity	volume weight densities	Footprint	BMS
VRLA	congruence poorness	3-5 years	A	A	1A	3A	None
Li-ion battery	beauty	10-15 years	>10A	0.6-0.8A	3A	1A	Layer 3 BMS

Why Huawei SmartLi ?

Huawei smartLi vs. Industry li-ion battery: Hybrid Use of Old and New battery, Intelligent Voltage Equalization, and Highly Stable Electrochemical Cells, All Competitive Power System

Huawei smartLi

VS

Industry lithium-ion battery

	Proactive current equalization	Old and new mixed	Intelligent pressure equalization	Cell	Cabinet-level firefighting	branding
industry Lithium-ion battery	Current imbalance > 15%	None	None	NCM, LMO	None	Three-party Lithium battery
Huawei SmartLi	Current imbalance ≤ 2%	Yes.	Yes.	LFP, no fire	Yes.	Same brand as UPS

1. Warranty: 1 year for standard configuration, 5 years or 10 years for expansion warranty. The 1+4 and 1+9 quotation modes are used.

2. If the backup time is less than 10 minutes, use the 10-minute configuration because the discharge rate of the cell is a only 6C.

3. In a single cabinet scenario, 7+7 or 7+0 can be flexibly configured to improve the price competitiveness (optional on the configurator). In the case of light load or short backup time, 7+7 or 7+0 can be used.

4. In 10-minute configuration, the capacity of a single cabinet varies according to the temperature range: 230 kW@0–27°C; 200 kW@0–40°C. For example, if the load is 450 kW at 10 minutes, only two cabinets are required when the 230 kW@0–27°C is used, but, 2.5 cabinets are required when the 200 kW@0–40°C is used.

Обзор Huawei Digital Power

ИБП с литий-ионной АКБ SmartLi

Модульный ЦОД FusionModule

Новинки 2021

Indoor Data Center Solutions And Typical Scenarios


HQ data center

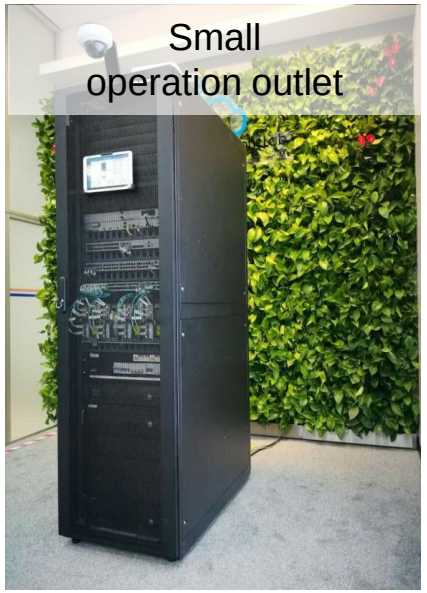
FusionModule5000
Large & medium modular DC
(Chilled Water)


Province branch

FusionModule2000
Medium & small modular DC
(Air Cooled)


Secondary branch,
Large outlet

FusionModule800
Small Modular DC


Small
operation outlet

FusionModule500
Integrated Mini DC

HUAWEI

Medium Modular DC Solution

TGG PUE Certification

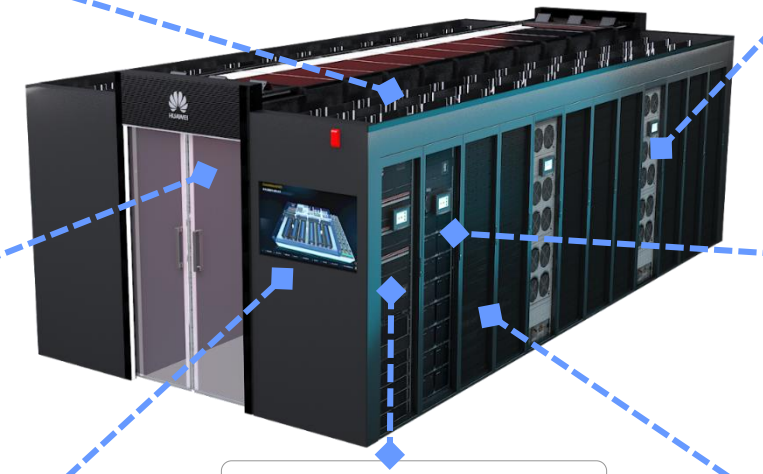
All-In-**One** Structure, **One**-Stop Delivery, On-Demand Expansion

NetEco6000 Management System

Cable Trough

Contained Aisle

Local Mgmt. System



Cooling

30/35/46kW

SmartLi Inside

80Ah/40.9kWh

Integrated UPS / PDC

60K/125K

1~125KW

IT Cabinet

42/47U

600/800mm

Customer Benefits

- **One-stop delivery,** lower the requirements for design, delivery and management;
- **On-demand deployment & expansion,** lower the initial investment;
- **Adaptable for higher power density,** saving 40%+ space;
- **No raise floor design** and only 2.6m needed for the height of computer room;

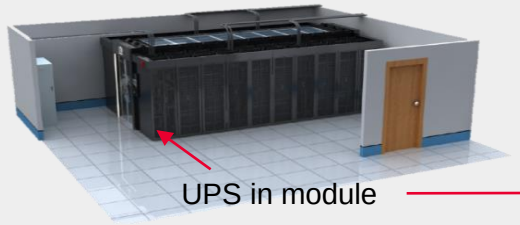
HUAWEI

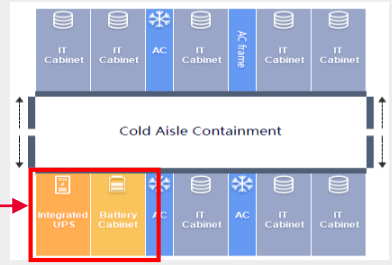
- Cross-column scenario (A Column Located in ending of module), sliding doors are not available.
- Single-row module can only support double revolving door. Only dual-row module &sliding doors can support the smart screen.

Specification	Single Row	Dual Row
Rack QTY (IT and Network)	**6~24**	**6~48**
Rack Height	2000mm / 2200mm	2000mm / 2200mm
Door Type	**Double-Revolving Door**	**Sliding / Revolving / Auto**
Aisle Form	Cold / Hot Aisle	Cold / Hot Aisle
Aisle Width	1200mm	
Module Height (Floor to Ceiling)	2600mm	

Typical Scenarios, Configuration and Layout (One Module)

Solution 1
Integrated UPS
Max. 125kW IT Load
(One Module)





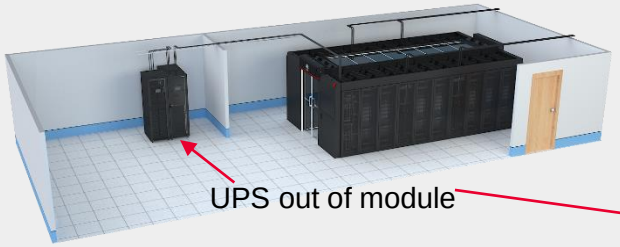
Integrated UPS

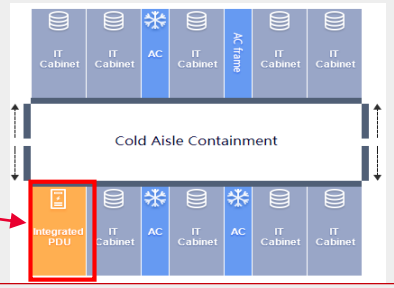
One cabinet integrates:

- UPS Input/ Output
- IT Power Supply*48
- A/C Power Supply*8
- Lighting Power Supply*3

Saving 1~2 Cabinets

Solution 2
UPS + Integrated PDC
Max. 145kW IT Load
(One Module)





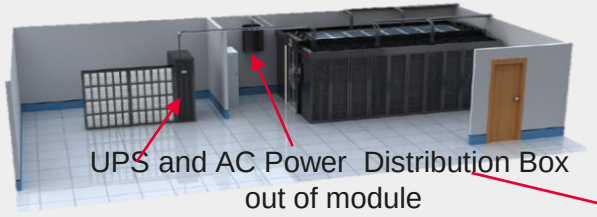
UPS Integrated PDC

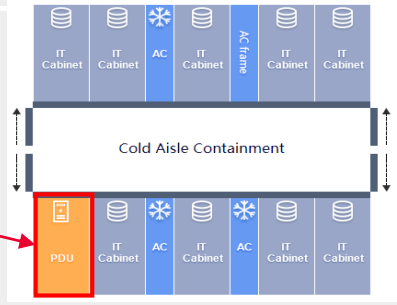
The PDC integrates:

- IT Power Supply*48
- A/C Power Supply*8
- Lighting Power Supply*3

Saving A/C PDB

Solution 3
UPS+ PDC
Max. 235kW IT Load
(One Module)





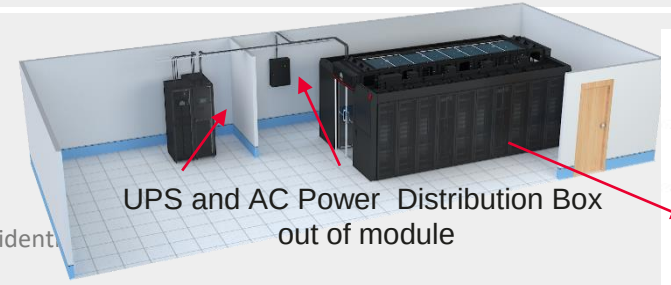
UPS PDC

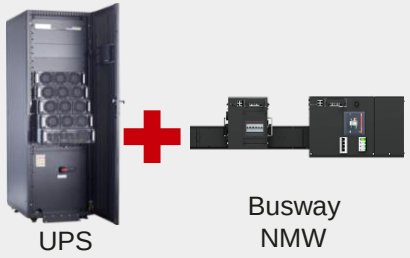
The PDC just includes:

- IT Power Supply*144 (Max.)

Need extra A/C PDB

Solution 4
UPS+ NMW
Max. 198kW IT Load
(One Module)





UPS Busway NMW

Intelligent busway:

IT distribution: each plug box has 6*40A/1P

Need extra A/C PDB

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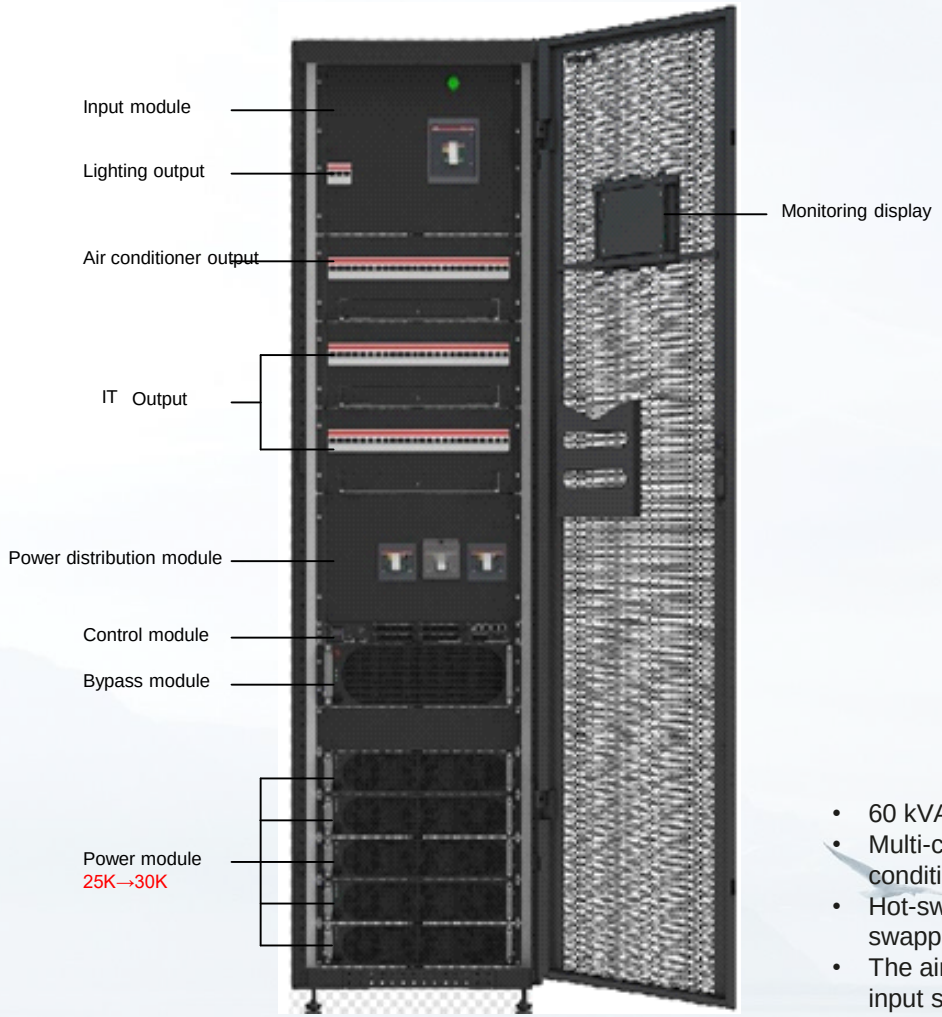
UPS Inside the module: integrated UPS (25 kVA → 30 kVA power module)

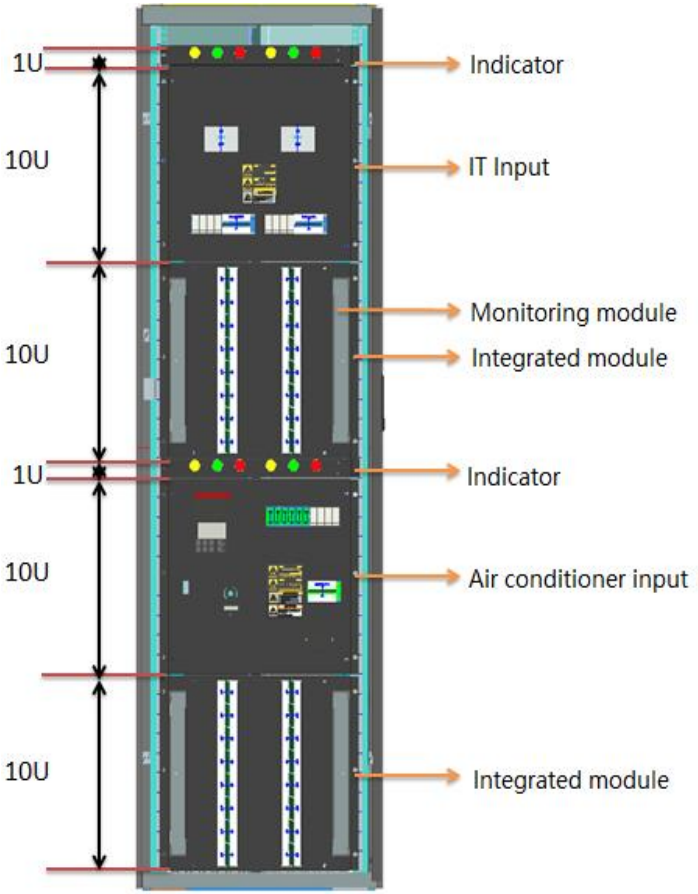


Function Configuration

Function	Configuration	60K	125K
Total input	Input Capacity	250A	400A
	Input Mode	Single MCCB; Dual ATSs	
UPS power distribution	Input	MCCB 160A	MCCB 250A
	Output		
	Maintenance bypass		
Precision power distribution	Air conditioner power distribution	40A/3P×8 or 63A/3Px8	40A/3P×8 or 63A/3Px8
	Lighting power distribution	10A/1P×3	
	IT power distribution	40A/1Px48	40A/1Px48
Mechanical specifications (H x W x D)		2000mm×600mm×1100mm 2000 mm x 600 mm x 1200 mm (with an enclosure frame) 2200 mm x 600 mm x 1200 mm (with a top frame)	

- 60 kVA/125 kVA models, supporting 60 kW/125 kW IT loads, module 2+1/5+1
- Multi-cabinet integration: 4 cabinets (UPS input cabinet, output cabinet, UPS cabinet, and precision PDC) + 2 containers (lighting PDB and air conditioner PDB)
- Hot-swappable maintenance: The power module, control module, bypass module, and power distribution monitoring module are hot-swappable.
- The air conditioner and lighting are directly connected to the main input switch. There is no independent switch. The UPS has an independent input switch.
- Cables can only be routed in and out from the top.
- Unique branch terminal temperature detection function, which can be used as the bidding-decisive item
- No parallel system is supported, and therefore battery strings cannot be shared.
- Do not manually modify the lower-layer code in the configurator. Otherwise, ATO cannot be assembled and shipment cannot be delivered.

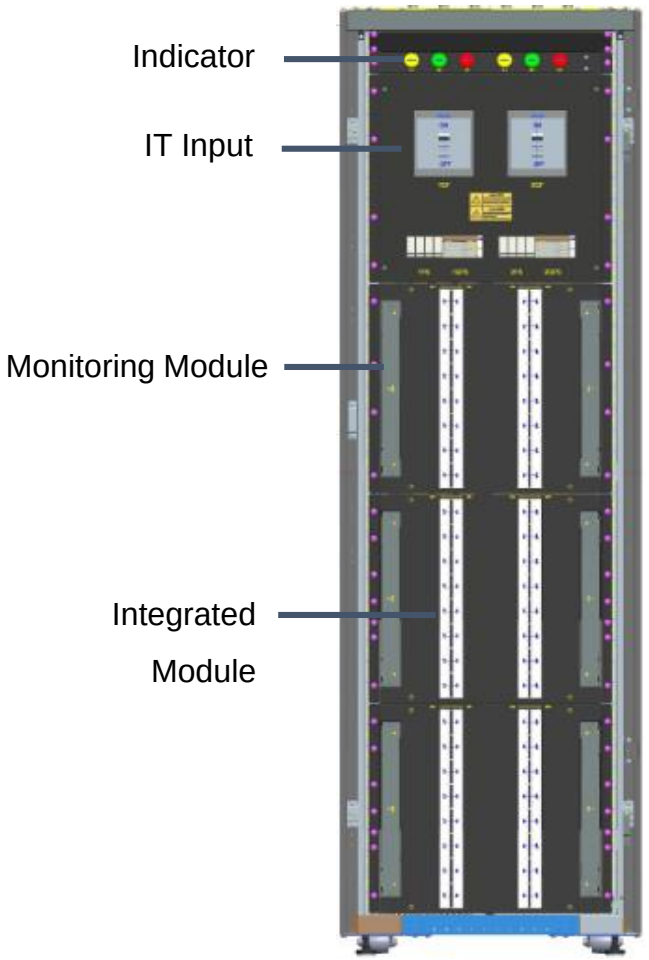
Power Supply and Distribution—Integrated PDC



Configuration	Model 1	Model 2
Air Conditioner Input Mode	Single input MCCB 160A/3P、250A/3P	Dual input MCCB 160A/3P、250A/3P
IT Input Mode	Single inputMCCB 160A/3P、250A/3P	Dual input MCCB 160A/3P、250A/3P
IT Power Distribution	Maximum 40A/1P×48	
AC Power Distribution	40A/3P×16; 63A/3P×16	40A/3P×8×2; 63A/3P×8×2
Lighting Power Distribution	10A/1P×6	10A/1P×3×2
Rated Operating Voltage	380V/400V/415V AC	
Rated Frequency	50Hz/60Hz	
Rated Input Current	• IT：160A/250A • AC：160A/250A	
Surge Protection	Class C	
IP Level	IP20	
Cable routing	Routed in and out from top or bottom	
Maintenance Mode	Front maintenance	
Dimensions (H x W x D)	• Basic dimensions：2000mm×600mm×1100mm • Extended dimensions：2200mm（Add top frame）×600mm×1200mm（Add back frame）	

- The air conditioner and IT power distribution are separated.
- The air conditioner and lighting are directly connected to the mains input, and the IT is connected to the UPS output.

Power Supply and Distribution—Modular PDC



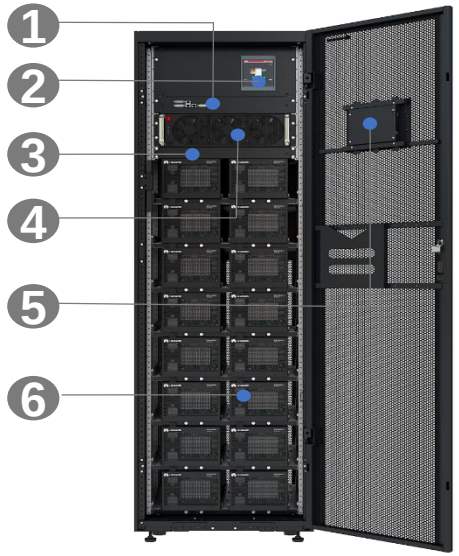
Model	Item	C03
Precision PDC	Cabinet dimensions	600*1100*2000(Other dimensions are supplemented by enclosure frames or top frames.)
	Maximum power	N+1/2N：235kW
	IT Main Input	Single/Dual input：400A（235kW）
		Single/Dual input：250A（145kW）
		Single/Dual input：160A（95kW）
	IT Branch Output	2*24*40A/1P ,support branch terminal temperature detection

Power Supply and Distribution—Smart Busway

Item	Under development	Existing Specifications
Input switch	630A	400/250A
Output switch	Standard configuration: 1-pole 40 A (6 switches per connector box) Optional: 1-pole 16 A, 1-pole 40 A, 1-pole 63 A, 3-pole 40 A, and 3-pole 63 A	Standard configuration: 1-pole 40 A (6 switches per connector box) Optional: 1-pole 16 A, 1-pole 40 A, 1-pole 63 A, 3-pole 16 A, 3-pole 40 A
rated voltage	380/400/415V AC	380/400/415V AC
Cable Inlet Mode	Cable routing from the end	Cable routing from the end
Access capability	Cable connection capability: 4 x 2 x 150 mm2 + 1 x 150 mm2	Cable connection capability: 4 x 185 mm2 + 1 x 95 mm2
Operation and Maintenance	Front-operated circuit breaker, left-side cable connection/front maintenance	Front-operated circuit breaker, left-side cable connection/front maintenance
Intelligent	Mains: voltage, current, active power, reactive power, power factor, electric energy, harmonic, and temperature detection at key nodes; Branch: branch current, load percentage, active power, apparent power, electric energy, and key node temperature detection	Mains: voltage, current, active power, reactive power, power factor, electric energy, harmonic, and temperature detection at key nodes; Branch: branch current, load percentage, active power, apparent power, electric energy, and key node temperature detection
standard	EN 61439-6; GB/T 7251.6,GB/T 7251.8	EN 61439-6; GB/T 7251.6,GB/T 7251.8

PS: In version 21B, the derating problem will be solved from the report.

Power Supply and Distribution—Power Backup



1. Monitoring Unit
2. Battery Breaker
3. Fuse
4. BMS Module
5. Monitoring Screen
6. Lithium Battery Module

- Typical backup time: 15 min/30 min/60 min
- Electrochemical cell: LFP (lithium iron phosphate)
- Nominal voltage: 512 V DC
- Nominal capacity: 80 Ah/40.9 kWh
- Discharge rate: 6 C
- Operating voltage range: 400–544 V DC
- Charging current: 0.1–1C (default: 0.5C)
- Cycle life: 5000 times @ 50% DOD
- Cabling mode: overhead cabling
- Firefighting: standard cabinet-level firefighting

SmartLi Inside, hybrid use of old and new batteries, and smooth capacity expansion

SmartLi Inside

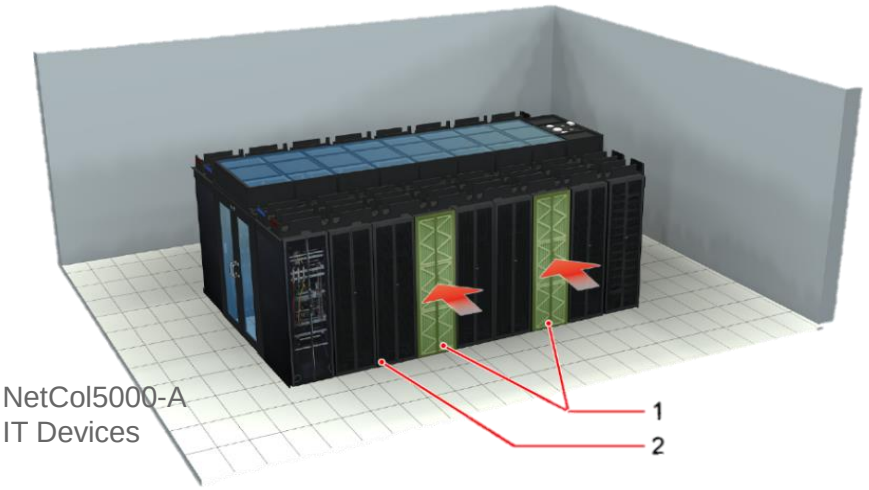
Phase 1 (Blue)

Phase 2 (Yellow)

HUAWEI

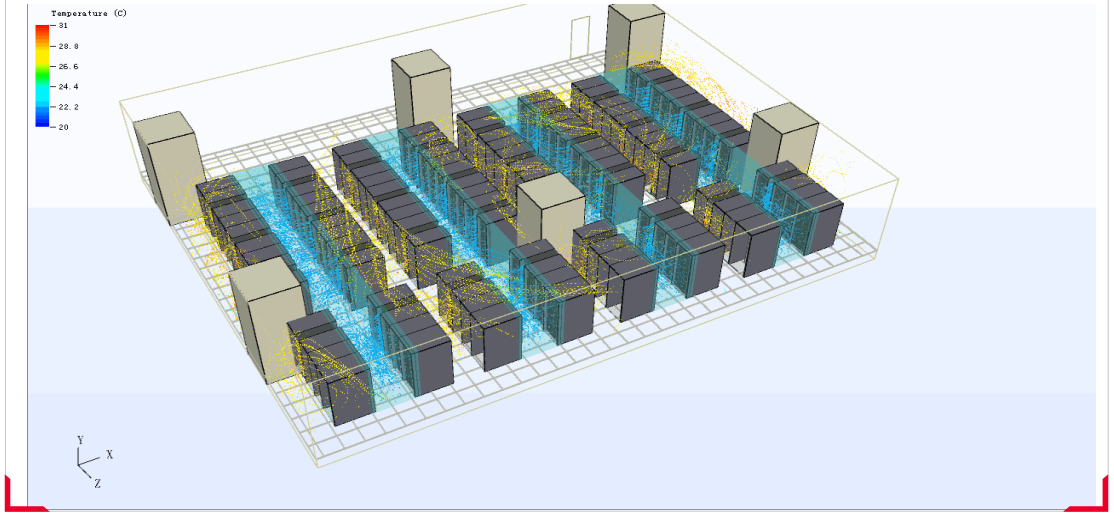
In-row Cooling System Adaptable for Higher Power Density

Cold Aisle Containment



1. NetCol5000-A
2. IT Devices

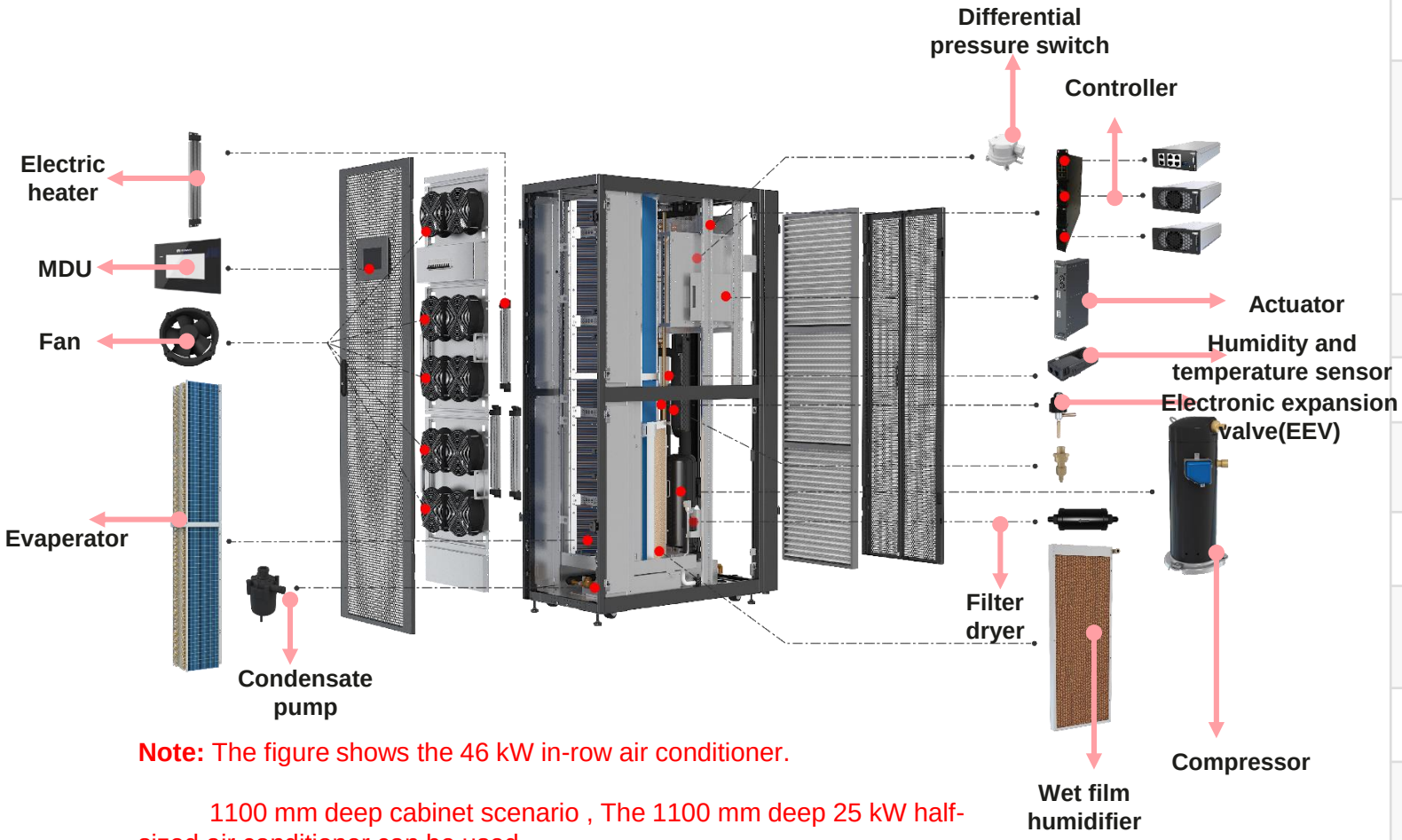
CFD Simulation Airflow in the Cold Aisle Containment



- Supports cold or hot aisle containment modes, allowing flexible deployment based on onsite conditions.
- FusionMosule 2000 supports cold or hot aisle containment, and isolates cold air from hot air. The PUE is as low as 1.245 @ Beijing.
- Precise cooling, supporting high-density scenarios and eliminating potential risks of local hot spots

Local In-row Cooling: 35 kW and 46 kW Variable-frequency Air-cooled In-row Air Conditioners

In-row Air Conditioner



Note: The figure shows the 46 kW in-row air conditioner.

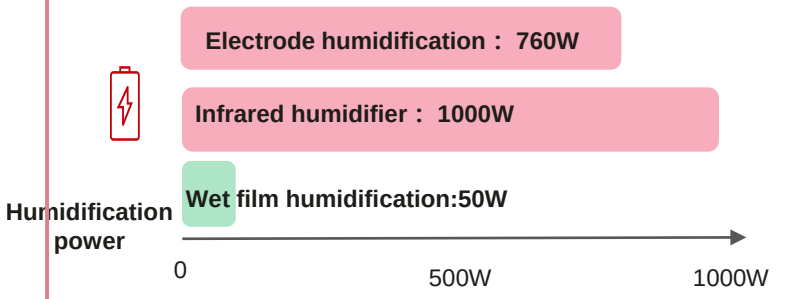
1100 mm deep cabinet scenario , The 1100 mm deep 25 kW half-sized air conditioner can be used.

Item	35kW	46kW
Cooling Mode	Air-cooled	Air-cooled
Input Voltage V/ph/Hz	380-415/3/50,380~415/3/60	380-415/3/50,380~415/3/60
Compressor type	DC variable frequency vortex	DC variable frequency vortex
Air supply mode	Horizontal air supply	Horizontal air supply
Fan type	EC fans	EC fans
Cooling Capacity	35kW	46kW
Heat capacity (kW)	4	6
humidification capacity kg/h	1.5	3
Air volume m3/h	6000	9000
Dimensions (H×W×D) mm	2000×300×1200	2000×600×1200

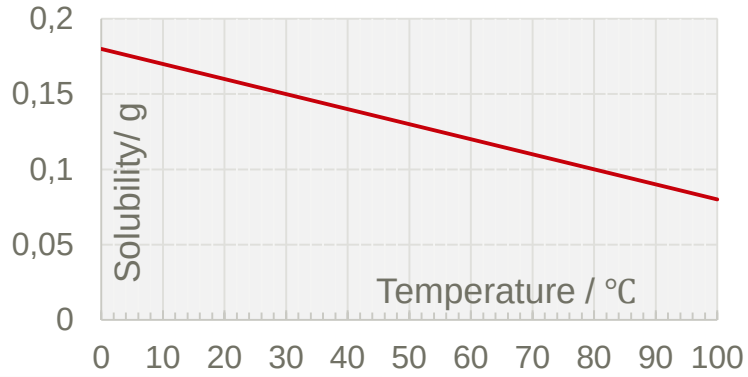
Wet-film Humidifier: Save 95%+ Energy

Comparison of different humidification modes

Comparison of humidification energy consumption in different humidification modes

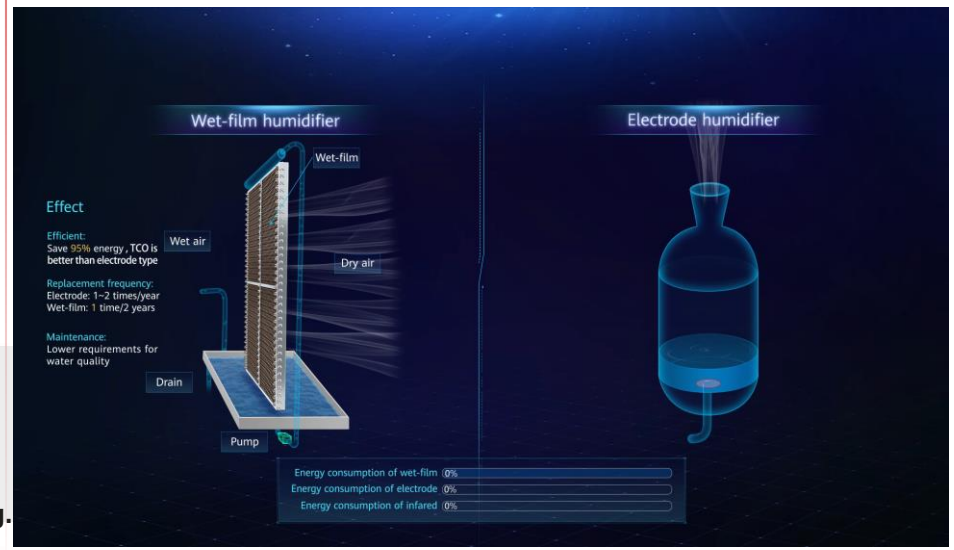


Ca⁺ solubility curve



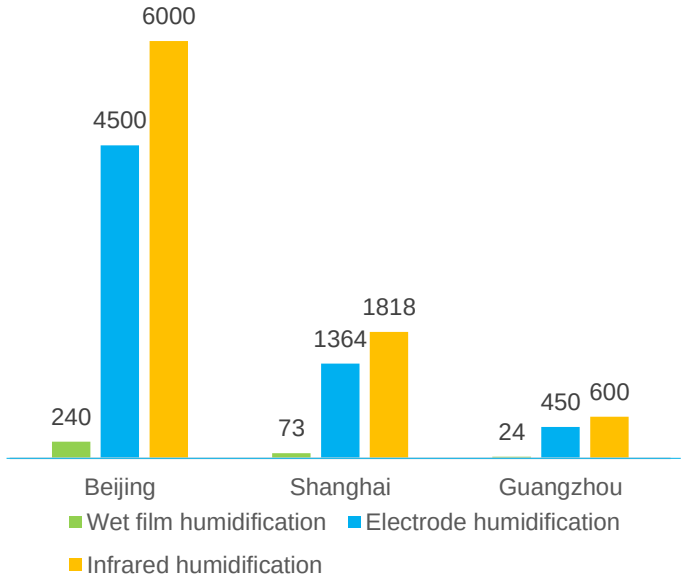
The precipitation of calcium and magnesium ions is the main reason for the formation of water scale when the water temperature rises. The infrared humidifier or electrode humidifier heats the water to 100°C, which is prone to scaling.

Principle of wet film humidification



Advantages of Wet film humidification

Annual energy consumption comparison of different humidifiers



Equal-enthalpy humidification, no need for heating, lower power consumption, 10 years of life cycle saving RMB 40,000 @ Beijing

The replacement frequency is low (Once per year) compared with the traditional humidifier (Four times per year).

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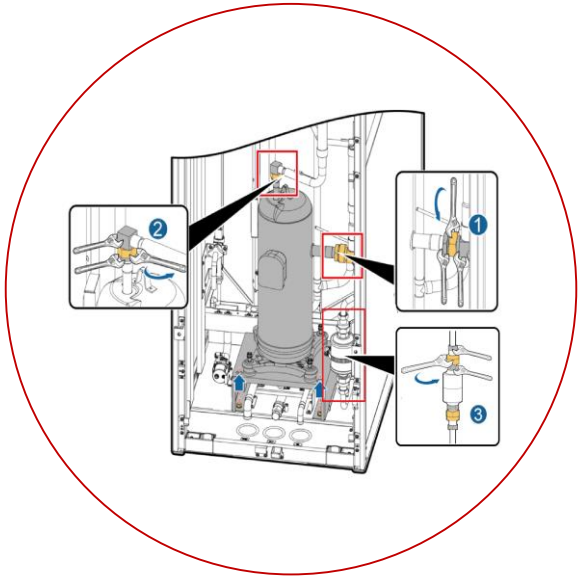
Modular Design Components, Simplifying O&M

Modular controller

Modular controller, replaced in one minutes



Welding-free

Welding-free compressor and dry filter. Saving 80%+ time.

Easy fan maint.

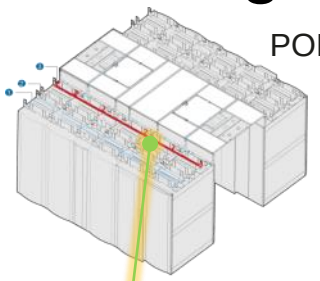
Smaller fan size, independent power supply, replaced in 5min
Continuous cooling during maintenance

The “Brain” of Modular DC—Local Monitoring System

PAD Mobile APP

Dual power supply
POE/Zigbee redundance

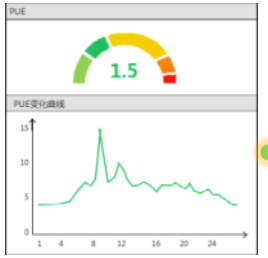
POE Bus

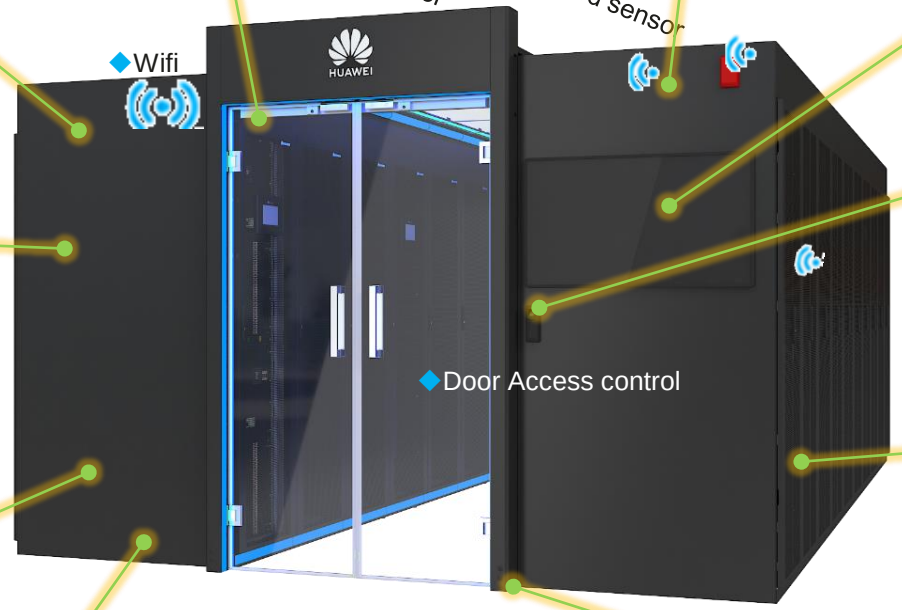


Smart big screen-43 inches

- Oversea version will be released after January 30, 2021.

Modular DC PUE





Access Control

Aisle Access

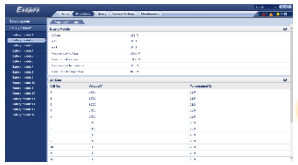
- fingerprint & card reader & password & face recognition

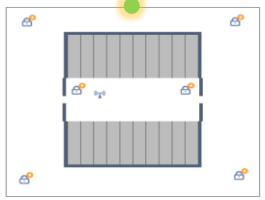
Cabinet Access

- Cabinet Electronic Lock(The standard solution supports only 600 mm x 1200 mm x 2000 mm cabinets.)

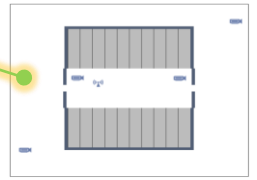
iCooling AI auto-optimizing

Battery Monitoring





Maximum 4 access controllers connected



Maximum 4 IP cameras connected

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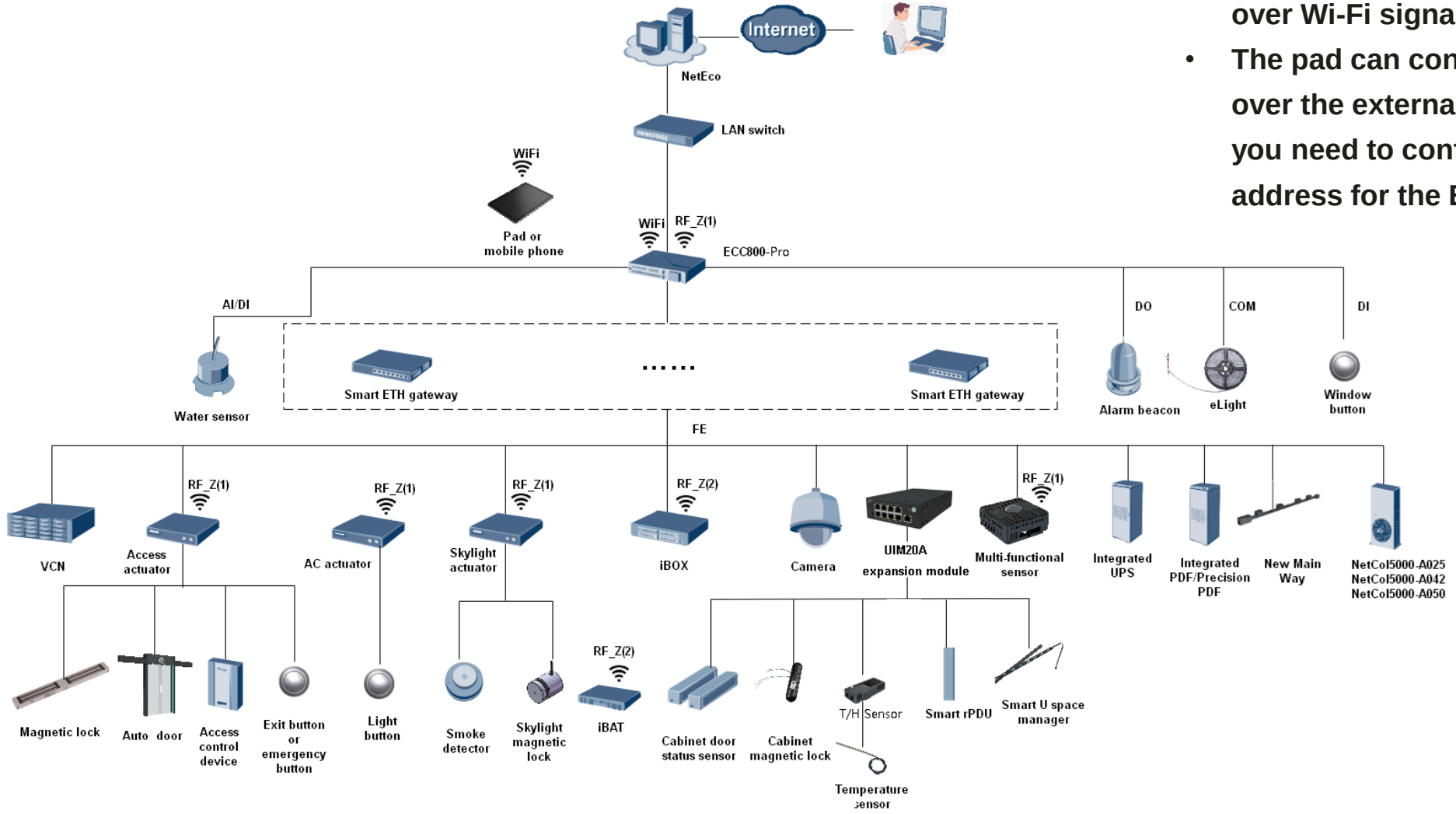
ECC Networking of Management System

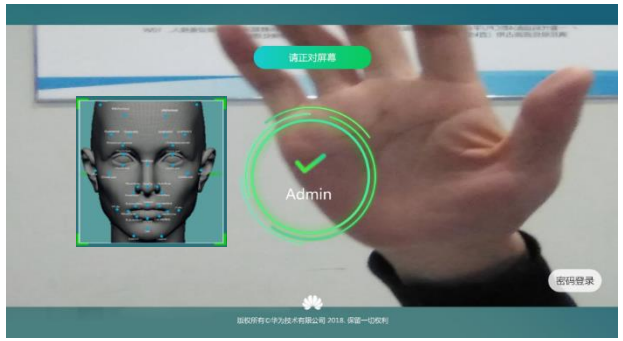


- The PAD can connect to the ECC800 Pro over Wi-Fi signals of the WiFi converter.
- The pad can connect to the ECC800 Pro over the external IP address. Therefore, you need to configure an external IP address for the ECC800 Pro.

Local Management: Facial Recognition Login Using a PAD

Login using a password:

- Manually enter the password to log in to the system.
- Password or card swiping



Facial recognition:

- Logging In to the Management System Using a PAD
- Facial recognition and aisle access control

Ultra-wide-angle and ultra-long-distance recognition

- Angle > 120°
- Maximum recognition distance: 3 m
- Accuracy > 99.6%

Recording and viewing facial data

- Allows a maximum of 16 persons to record and manage facial data.
- Historical facial recognition photos can be viewed to implement traceability management of access records.

High security

3D depth of field camera, liveness detection, effectively preventing video or photo unlock, and allowing users to view historical login information

Efficient identification

Quickly compares facial features and recognizes facial features even when wearing glasses or make-up. The recognition time is less than 1s.

01100
10110
11110

Industry-leading algorithm

The algorithm ranks No. 1 in the global FRVT test, supporting global race feature recognition with an accuracy rate of over 99%.

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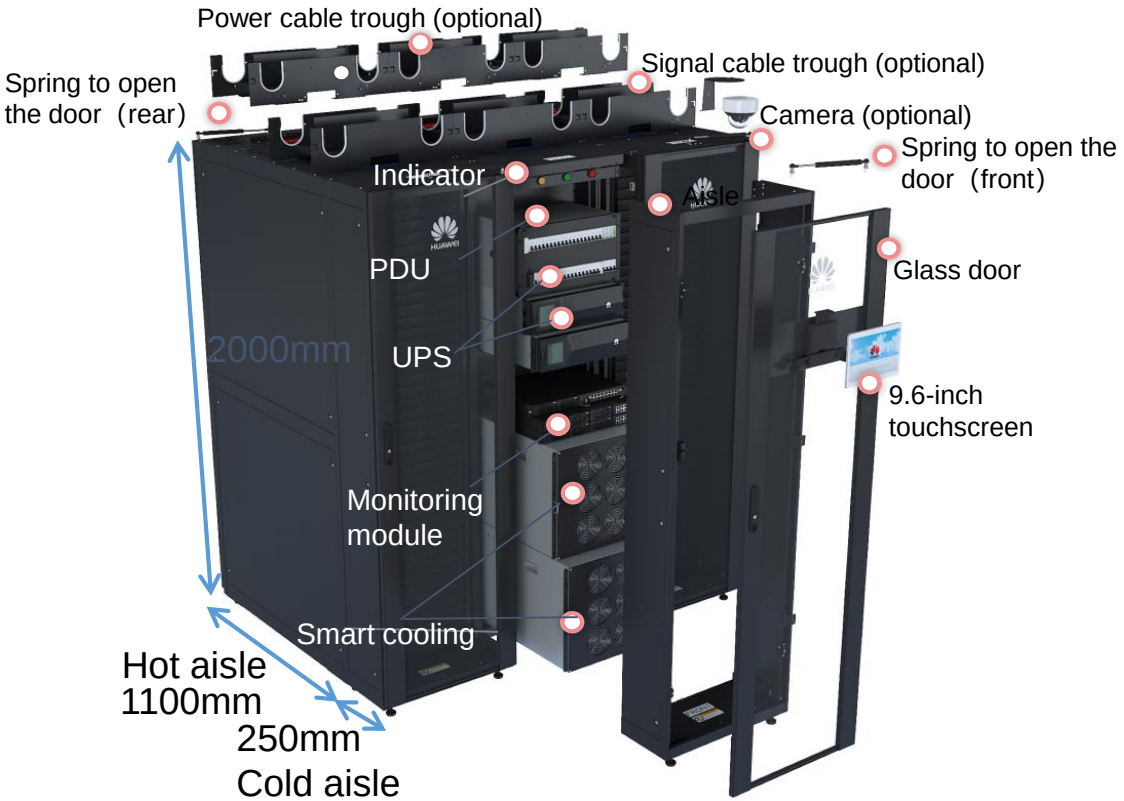
Indoor Small DC Solution

Mini Modular Data Center Solution: FusionModule800/500

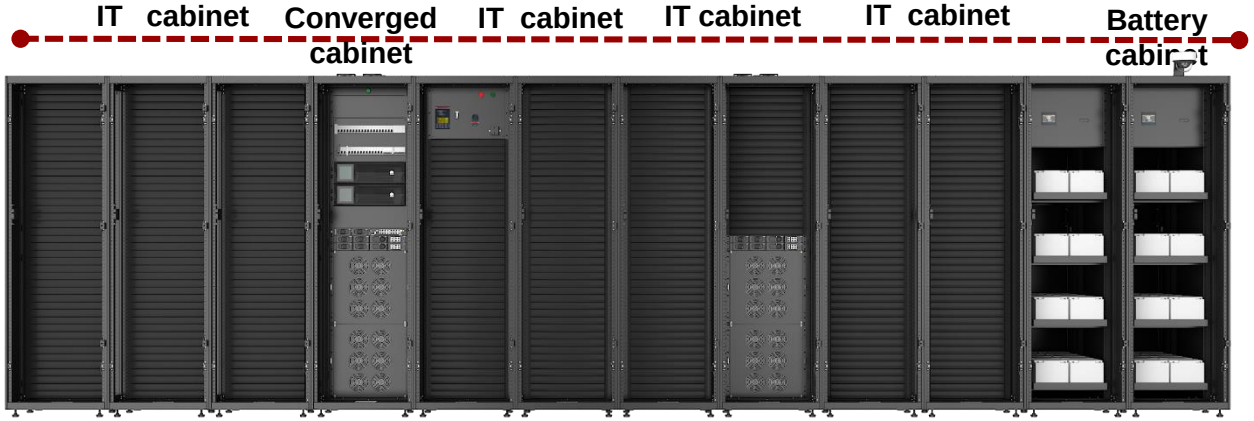
HUAWEI

FusionModule800: Integrated Solution for DC of 1–10 ICT Racks

Integrated architecture



- **Total IT racks: 1-10 (Total cabinets 1~12)**
- **Cooling: Rack Smart Cooling** (12.5kW/pcs)
- Single row, **Cold & Hot sealed(**250mm cold aisle+1100mm cabinet hot aisle, the cabinet without side panel, module total depth 1350mm)
- Total IT load**≤25kW (T1 and LT),**Total IT load**≤21kW (T3)**
- Rack power density≤7kW
- Components of UPS, indoor units, PDU, etc. will be shipped after installation in integrated cabinet



(Maximum cabinet configuration,1≤N≤12 racks)

Notes:
T1-normal temperature(-20℃~45℃) ;**LT-**low temperature (-40℃~45℃) ;**T3-**high temperature (-10℃~55℃)

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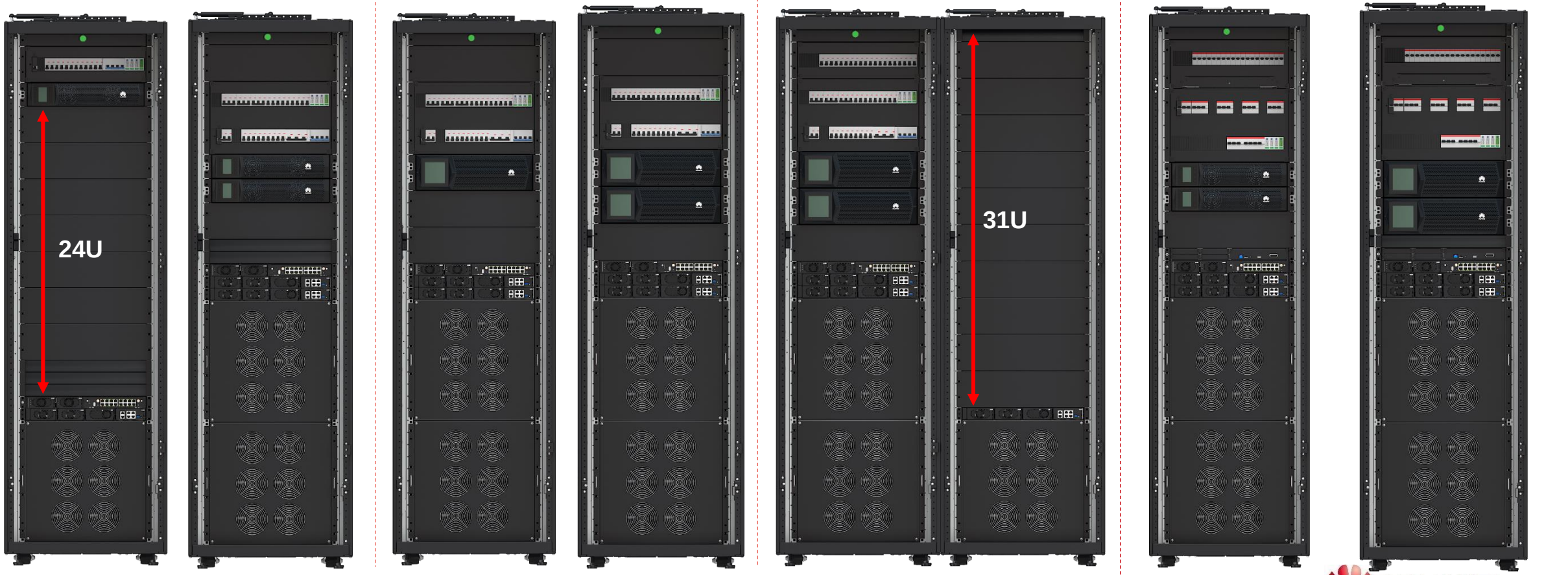
Standard solution, Simplified design

BC6/7 : Intelligent power distribution

IT load	≤8.5KW(T1&LT) ≤7kW（T3）	8.5kW~17KW（T1&LT） 7kW~14kW(T3)		17kW~25KW(T1&LT) 14kW~21kW(T3)	≤8.5KW(T1&LT) ≤7kW（T3）	8.5kW~17KW （T1&LT） 7kW~14kW(T3)
BC1	BC2	BC3	BC4	BC5	BC6	BC7



HUAWEI

Rack-mounted 95% High Efficiency UPS Ensures Reliable Power

Supports 3 kinds of back up types, 15min-30min back up time

Parameter	10kVA	20kVA
Maximum efficiency	94.5%	95%
Input voltage	138V AC~485V AC, 40~70HZ	
Surge protection	C-level SPD	
Height	2U	3U
Output power factor	0.9	0.9
Installation Mode	Rack-mounted	
Authentication	CE, CB, TUV efficiency test, RoHS, REACH, WEEE, ECA certification (UK)	

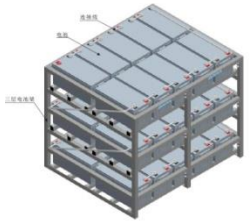
Battery pack 9AH

- Height：3U
- Voltage：240V
- Quantity：maximum 8 pcs

Battery cabinet

- Battery capacity：26AH/40AH/65AH/100AH
- Quantity：
  In the module1~2pcs
  Out of the module 1-4pcs
- Optional iBattery function

Battery rack



- Battery capacity：26AH/40AH/65AH/100AH
- Quantity：1~2pcs

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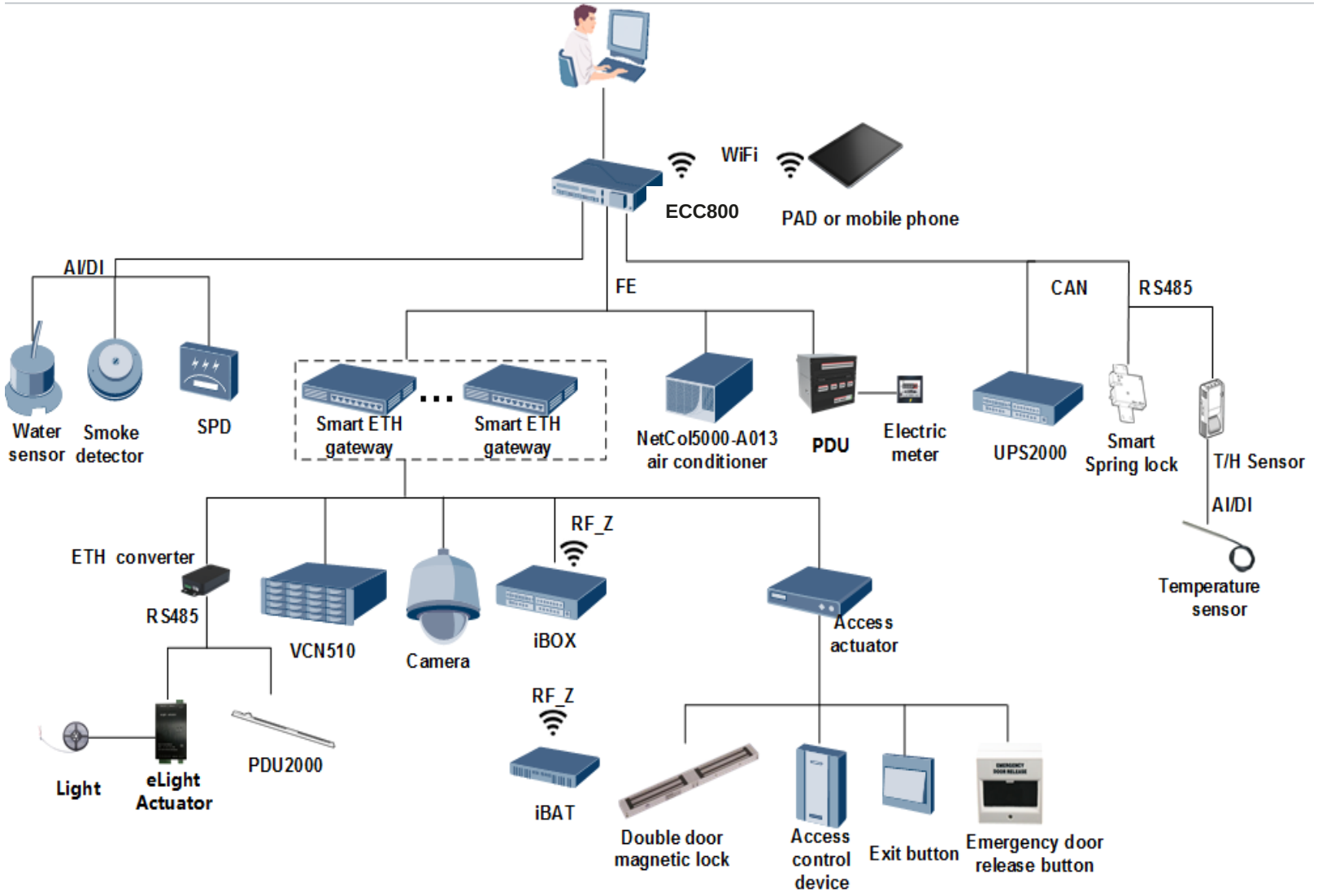
Rack-mounted Air Conditioner, DC Inverter Cooling

Overall	Parameter
Operating temperature of the outdoor unit	• T1：–20°C~45°C • LT:–40°C~45°C • T3：–10°C~55°C
The vertical distance betweenbetween indoor and outdoor unit	-8-30m
Maximum length of one-way pipe	≤80m
Cabling and Pipe mode	Upward and downward routing.
Certification	REACH、RoHS、CE、CB、EAC 、SASO
Item	**Indoor Unit**
Power system	220/230/240Vac, 50Hz, and 1Ph+N+PE
Maximum current	17.3A with heating and humidification 3.3A without heating and humidification
Cooling mode	Air-cooled (horizontal air flow)
Refrigerant	R410A
Cooling capacity	12.5kW
Fan Type	EC fan
Maximum airflow	2600m3/h
Installation Mode	Rack-mounted
Temperature control unit	**Outdoor unit**
Maximum working current	T1;24A. T3;30A. LT:30A
Number of fans	1 (T1&LT), 2 (T3)

Standard northbound interfaces, standardized construction



ECC800-pro: standard northbound interface

- Accommodates all devices , standardizes northbound interfaces.
- Standard SNMP protocol, which can be easily integrated by a third-party DCIM
- ECC800-pro standard Mib package can be provided to complete simple development .

ECC800-pro: standard capability:

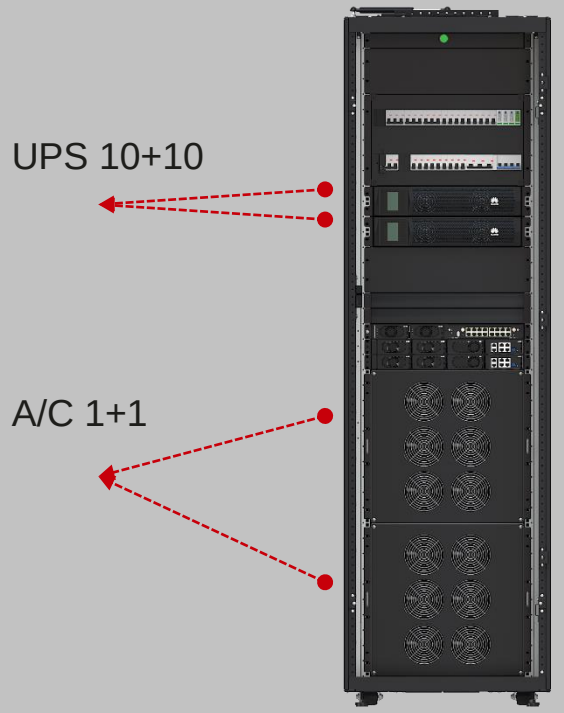
- 2 WAN ports and 2 LAN ports
- 4 RS485 ports are reserved.
- 5 AI/DI ports
- 1 Dry contact extended ports
- 1 USB port

ECC800-pro extension capability:

- The AI/DI port is modular expansion.
- Expanding the FE through ETH

3 Step VS 30 Step, Save at Least 90% Design Time

3 step



Confirm **3** variable :

1、Total load；2、Redundance;
3,others(IT rack, backuptime…)

VS

30 step

Confirm 30 variable ：

1、Brand Choice: UPS, air conditioners, cabinets, batteries, monitoring ... (10 step)
2、Model and capacity selection: UPS, air conditioners, cabinet, batteries…(15 step)
3、 Solution Design: Load, cooling capacity, part redundancy or not... (5 step)
4、Drawing design

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Quick Installation in 4 Hours， 2 Days business on line

Traditional construction mode

Design	Site integration equipment	Equipment installation	Commissioning acceptance	Run

10 days business on the line

FusionModule800

Typical configur-ation	Integration transport	Rack combination	Simple Commiss-ioning	Run

2 days business on line

Saving 80% of the installation time

Factory prefabricated, packed

Simple cabinet combination on

The construction is complete

Two days of service rollout

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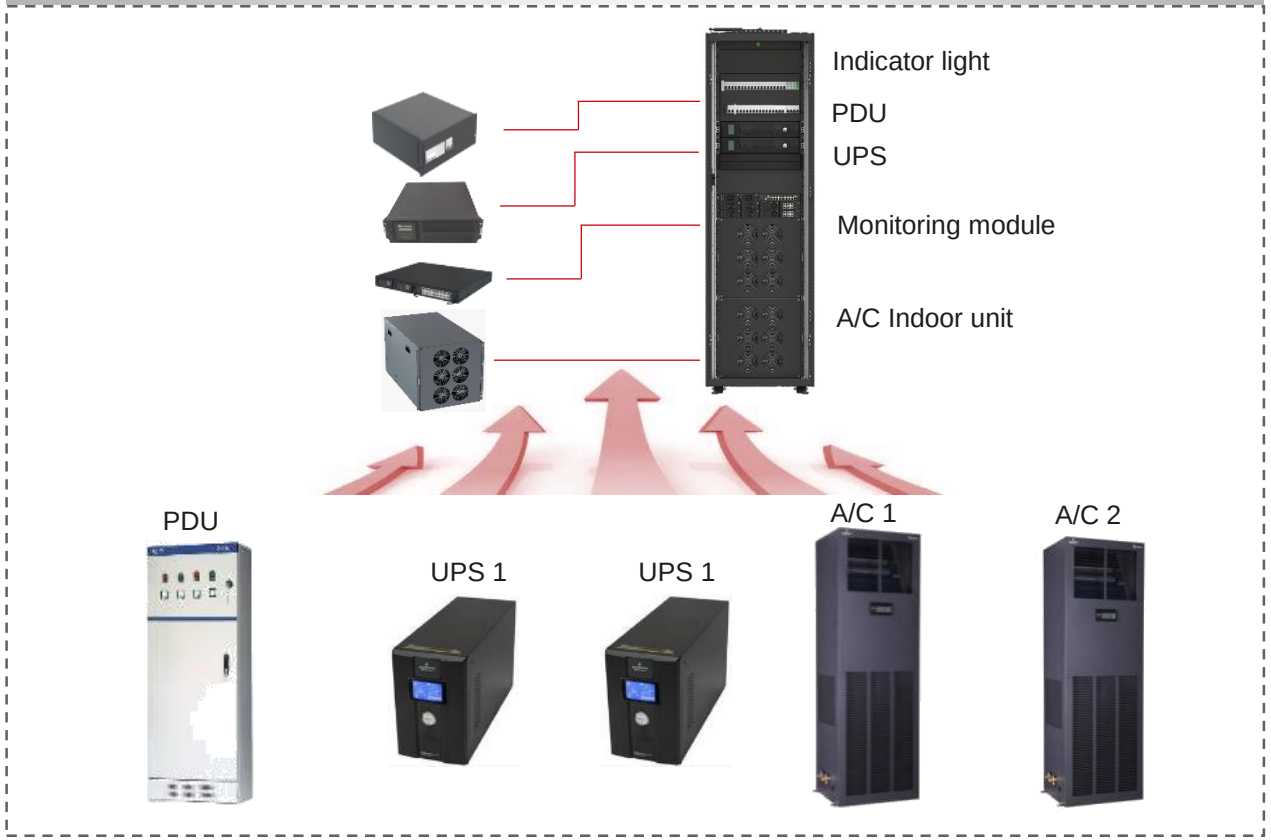
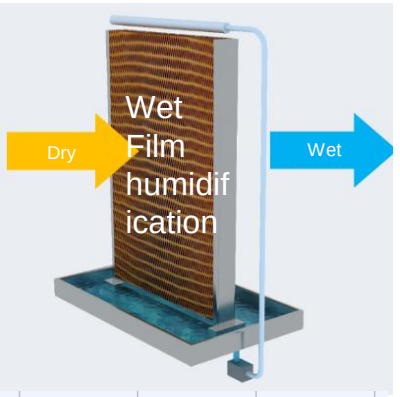
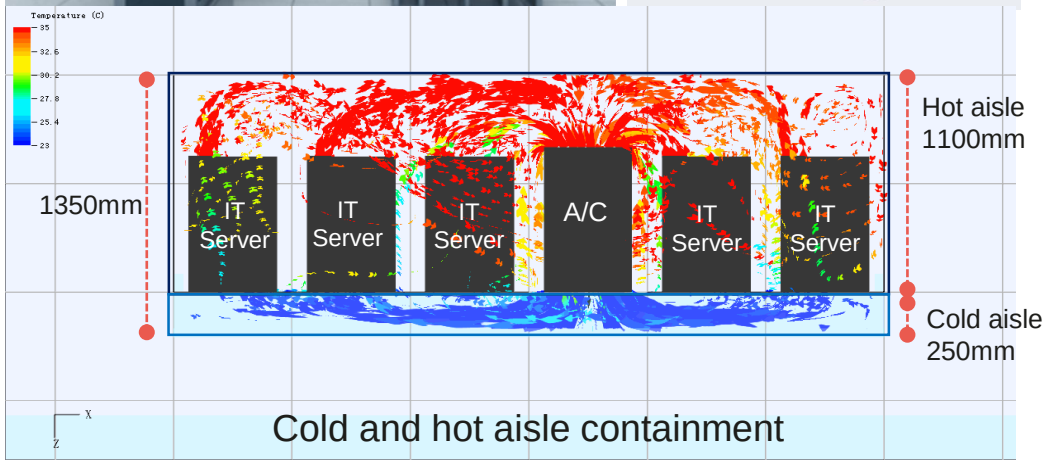
All-in-one design, Saving at Least 2 racks Footprint, Low PUE

All-in-one Design



Low PUE, Saving 8600 USD per year





Remarks: Saving 8600USD per year (IT load: 25KW , Load rate: 60%; Traditional solution: PUE 1.8)

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Automatically open the door to dissipation overheat and link with fire extinguishing system

Temperature exceeds the threshold.

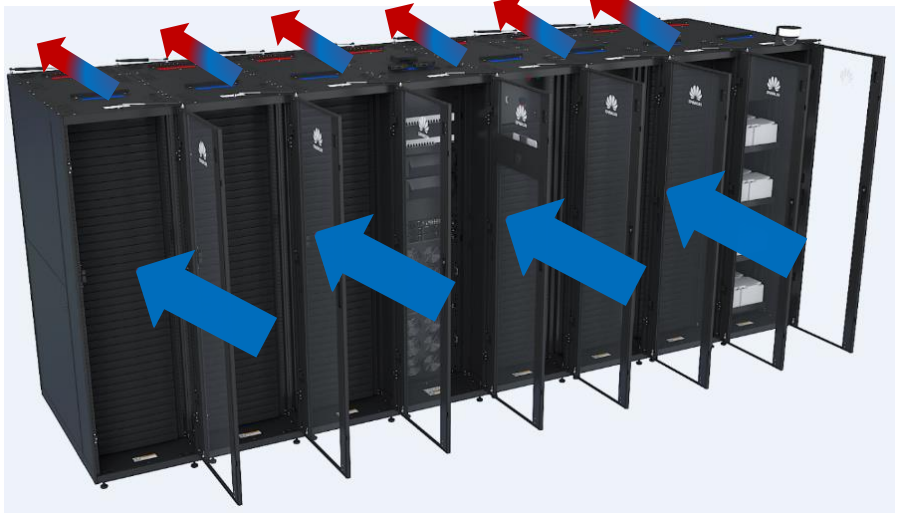
A/C failure

Smoke alarm

Emergency heat dissipation

Fire fighting linkage

Open the rear door firstly and then the front door



All doors will automatically open when fire alarm generation

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Branch offices and Edge DCs: Components are pieced together VS All-in-one design

Traditional construction mode

VS

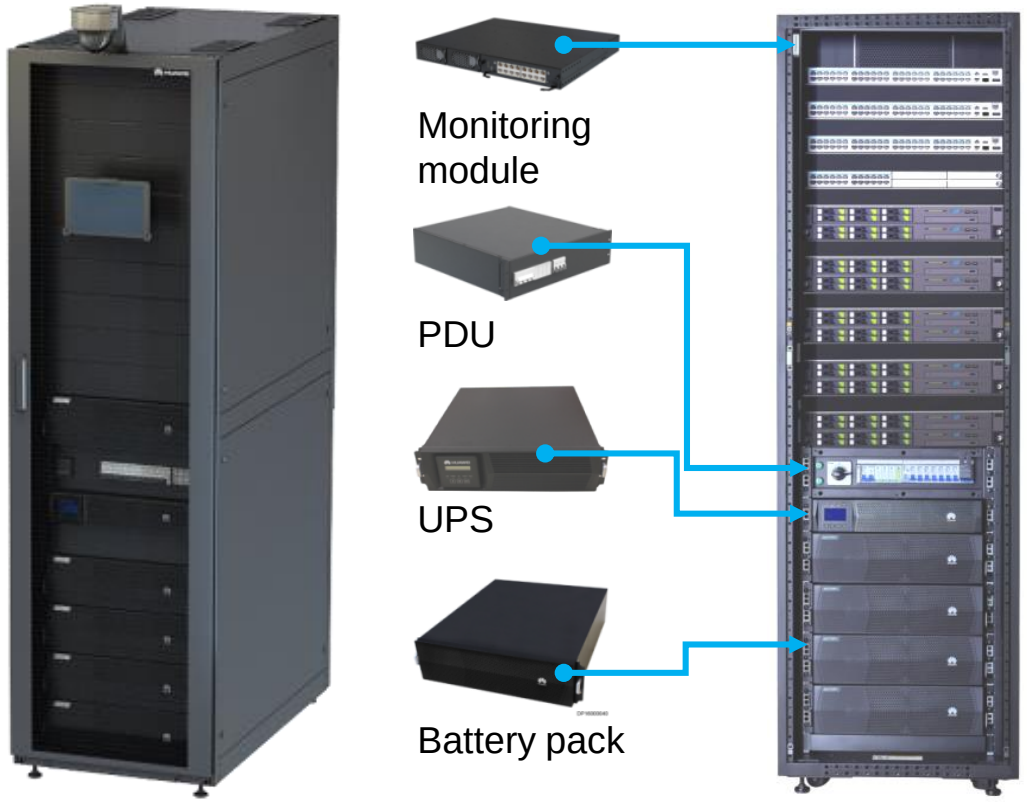
FusionModule800 : All-in-one design
Simple, Efficient, Reliable

HUAWEI

Small but Complete, Perfect for Mini DCs

FusionModule500

Integrated architecture



- 1~2 ICT racks
- Natural heat dissipation (no AC)
- Total IT load recommend less than 3 kW
- Power backup time: 15min~4hrs

Rack dimension(W x D x H):
600 x 850 x 1200 (24U); 600 x 1100 x 2000 (42U)

HUAWEI

Обзор Huawei Digital Power

ИБП с литий-ионной АКБ SmartLi

Модульный ЦОД FusionModule

Новинки 2021

Smart Screen: Digital Twins Makes O&M Easy and Highly Efficiency

- **Facial Recognition** Log in and enable access control
- **Voice Interaction Control**
- Global display of module **Layout, Power Distribution, and Cooling** system information

Digitalization

DC Overview

- Displays the **module layout**, **power distribution, and cooling** subsystem information.
- The module environment (lighting, access control, and skylight), **PUE, space, and alarm information** is clearly displayed.
- **Facial recognition** enable access control and system login.

Power Supply

- Mains input, UPS power distribution, and cabinet-level **power supply and distribution links are visible**.
- Displays the power consumption curve, IT load, and battery information.
- Alarm information of the power supply system can be viewed in one-click mode.

Cooling

- The cooling links (indoor, outdoor unit, fan, and compressor rotational speed) is visible.
- Refrigerant capacity real-time monitoring and **refrigerant insufficiency alarm**
- Monitors and displays the temperature in the aisle in real time to prevent equipment room overheat.

Plan: Q3 2021

AI-Robot Unattended Inspection

Intelligent Identification | **Temperature Nephogram** | **Remote Inspection**

Integrated UPS

- Identification of the status of the power distribution circuit breaker and indicator

SmartLi Inside

- Lithium battery module temperature identification

In-Row A/C Rack

- Identifying abnormal noises during fans running

IT Rack

- Automatic generation of temperature nephogram and detect hotspots in time.
- Asset identification.

- Robots replace manual inspection in data center, simplifying O&M
- **AI inside**, AI identification of abnormal fan noises and asset images, and no need to deploy additional assets and temperature monitoring hardware Report inspection information in real time based on the planned route and automatically generate inspection reports to implement **remote unattended inspection**.

HUAWEI

FusionModule2000 FusionModule800 FusionModule500

Single-Row HPC Modular DC, Simplified Delivery

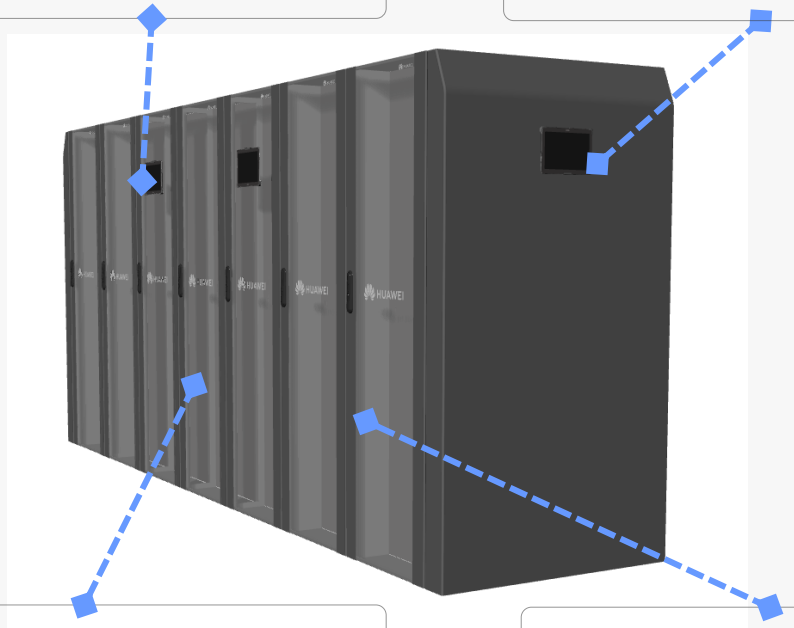
January 30, 2021.

Cooling System

In-row
variable frequency air cooling
46kW

Local Management System

Local ECC
Full monitoring



Aisle System

Automatic Door
Cold and hot aisles
Completely sealed

High-density HPC device

Power density can be up to
30 kW /R

Simplified Architecture

- ✓ **All-in-One :** Aisle-free, skylight, and access control, integrated cabinet aisle design, one-stop quick deployment ,one-stop fast deployment.
- ✓ No raise floor. The minimum deployment height is only **2.2 m**. The aisles are compact and 1600 mm deep, support hot and cold aisle containment.
- ✓ **Simplified Architecture**, Maximize and simplify overseas delivery.

Green & High-density

- ✓ Integrated design for cooling, power supply, and control, reducing footprint by **50%+** .
- ✓ Strong environment adaptability: hot and cold aisle containment. The cooling capacity of the equipment room is not occupied.
- ✓ Low PUE, **30%** lower than that of the traditional mode.
- ✓ A single cabinet supports a maximum of **30 kW/R**, providing a solid base for HPC.

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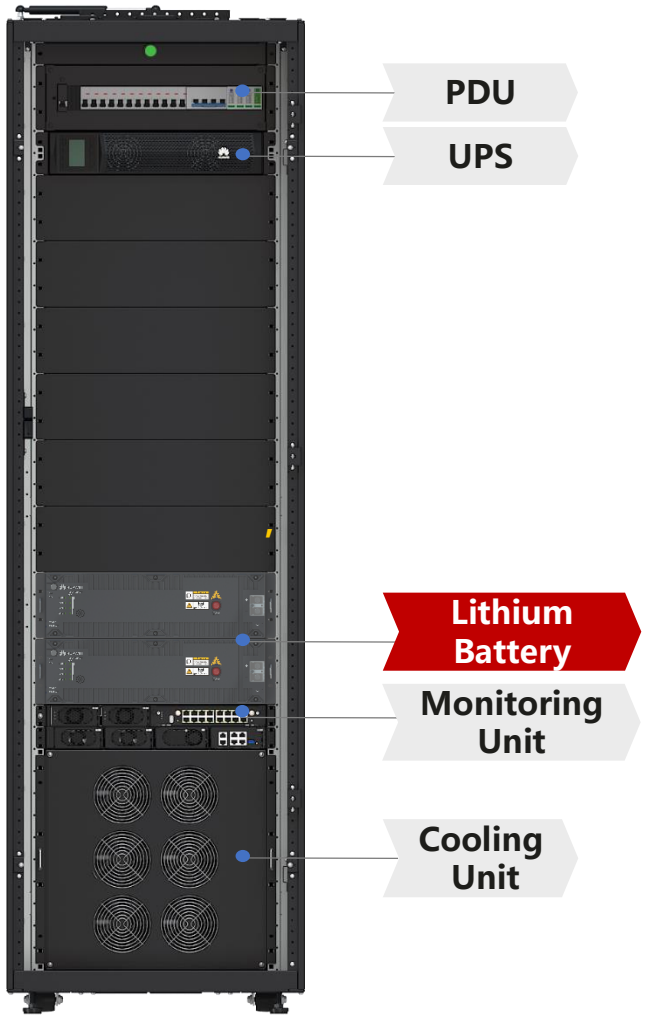
FusionModule800: Lithium battery, Fire extinguish inside



Rack-mounted Lithium battery
Only for BC1：IT≤8.5kW

- Backup time：1~4 hours
- Cathode material L:LiFePO4
- Nominal voltage: 48Vdc
- Nominal capacity: 100Ah/4.8kWh
- Max. charging / discharging current limited：100A @ 35℃
- Cycle life: 3500 @ 0.5C

Fire extinguish system inside

- Installation mode: rack-mounted
- Gas: Novec1230
- Occupied space: 5U(For 5 cabinets)

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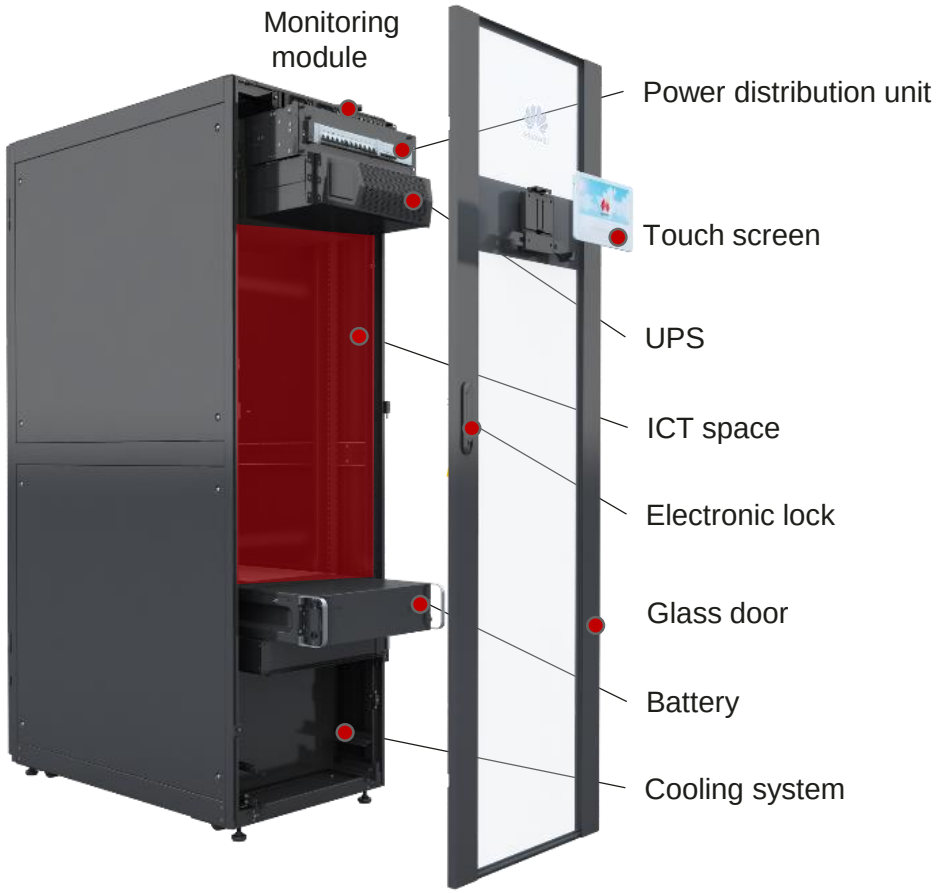
FusionModule500: 3 features inside

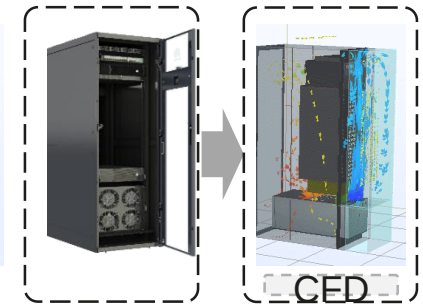


FusionModule500 Architecture

- **Max. charging / discharging current limited：100A @ 35ºC**

Lithium battery inside

- **UPS capacity：6kVA**
- **Backup time：1~4 hours**
- **Cathode material L:LiFePO4**
- **Nominal capacity: 100Ah/4.8kWh**



Integrated Cooling inside

- **Cooling capacity: 3.5kW**

Cold and hot aisle containment, dustproof and noise reduction, and Higher efficiency of cooling system
Built-in integrated air conditioner, plug-and-play, no pipe connection

Fire extinguish system inside

- **Installation mode: rack-mounted**
- **Gas: Novec1230**
- **Occupied space: 1U**

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Thank you.