



Battery Monitoring System

Online Monitoring | Online Balancing | Real-time Alarm



DFUN (ZHUHAI) CO., LTD. was established in April 2013, located in Zhuhai. Regional offices are distributed in Beijing, Nanjing, Chengdu, Xian, Ganzhou, Shaoguan, and Guangzhou. With 6,000 sqm production line and annual 500,000+pcs battery sensor production ability. DFUN Technology inherits the concept of quality oriented & service prioritized, we provide hardware & software solutions for Battery Monitoring System, lithium battery pack and battery capacity tester to our esteemed customers all over the world.



DFUN TECH >>>

With an international professional sales network, DFUN products have been widely used in international markets, such as Germany, Turkey, Russia, Thailand, Malaysia, Vietnam, India, Indonesia, Israel, Saudi Arabia, Mexico, Canada, Chile, Peru, Colombia, Brazil, Morocco, Africa...

To ensure the quality of products, services, safety and environmental protection requirements, DFUN Technology implements the criteria of ISO9001, ISO14001, ISO45001, CE, FCC, Rohs, UL etc.

DFUN Technology will keep following with the new solutions & offer the best solutions for our customers. We listen carefully to our partners and strive to offer a diverse, comprehensive and effective BMS solution.



ISO9001



ISO14001



ISO45001



CE



ROHS

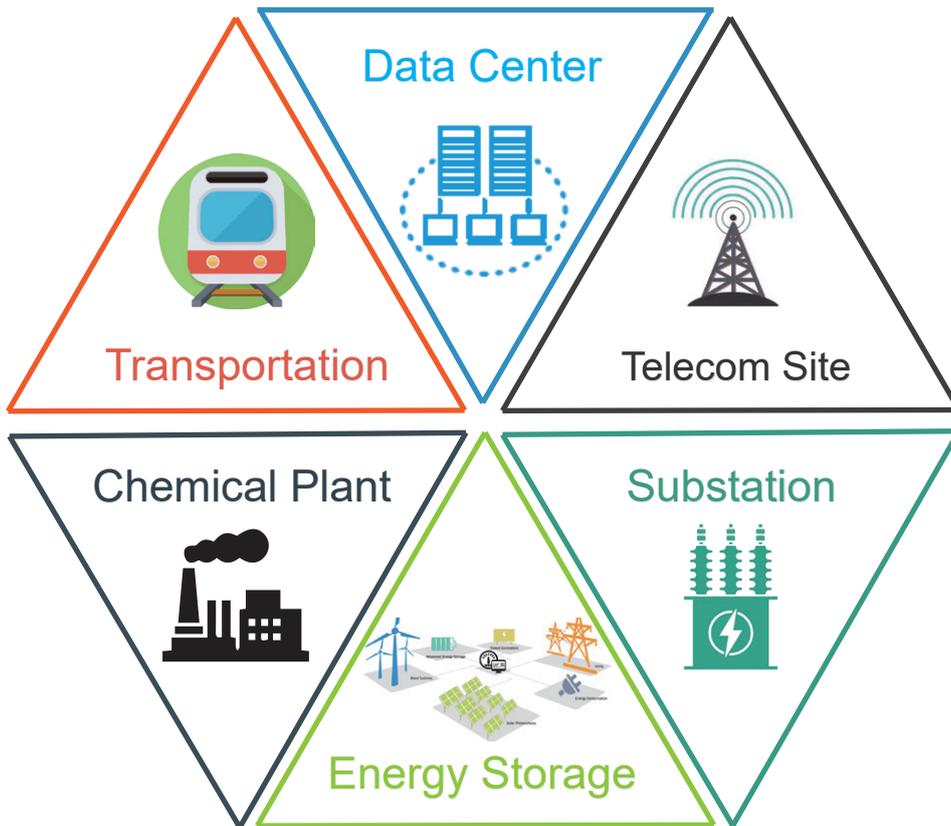


TTL

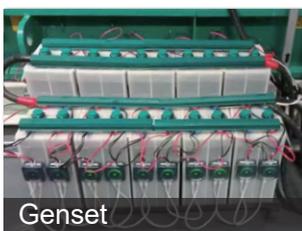
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Application



Application



Our Feature



Online monitoring

24/7 on-line monitoring battery voltage, charge and discharge current, impedance and internal temperature, SOC, SOH etc. Accurate data report and real-time alarm, allowing to respond quickly to potential battery accidents. Reduce cost on human maintenance.



Data inquiry

Provides historical data storage, data access and data management for a large number of batteries and multiple sites projects, support to export .CSV format data reports.



Online balancing

Real-time online balancing for battery. The system will analyse the uploaded data and auto-judge. When the battery voltage is unbalancing, system will send a command to balance the battery voltage.



SOC

Support to calculate individual battery SOC and battery string SOC. The SOC is mainly calculated based on the characteristic parameters of the battery.



Online alarm

Customer can set the alarm threshold for different projects. When the battery real-time data is abnormal, the system will send out real-time alarm to maintenance through SMS or Email. What's more, we also provide mobile APP for customer to better maintain the battery at site.



Breathing LED

With unique LED breathing light design of the hardware, the system indicates battery health by different color. When the battery is running normal, the LED light will keep on green. When the battery is in an abnormal status, the LED light turn to red.



Data analysis

Built-in storage function. Automatically store the real-time data of batteries. Helping users to know the battery status and health condition at any time.



Auto-searching S/N

Support auto-searching for battery sensor's ID address. It can read the individual battery address at one time. Customer don't need to set one-by-one manually, which helps to save a lot of time for site engineering and labor costs.



System Management Layer

Chapter 1

DFCS4100 Battery Monitoring System

DFCS4100 Battery Monitoring System



Mobile APP
SMS / Email Alarm

ONE IS ALL

Application

- Data center
- UPS cabinets
- Telecommunications
- Energy storage system
- Substation & power utility
- Oil, gas & fuel, generator
- Railway station & metro
- Financial institutions, like bank
- Hospital
- Government back up power supply
- ...



24/7 hours online monitoring / balancing Real-time alarm for VRLA / Ni-Cd battery

- Online monitoring: voltage, internal temperature, ambient temperature & humidity, impedance, charge & discharge current, ripple current & voltage, SOC, SOH
- Battery leakage & liquid level



All-in-one real-time monitoring Batteries + Mobile APP + SMS & Email Alerts

- System with mobile APP to remote manage the system
- Multiple contacts by SMS / Email alerts



Centralized monitoring

- Multi-site and large quantity battery centralized management
- Monitor Max. 50,000 batteries



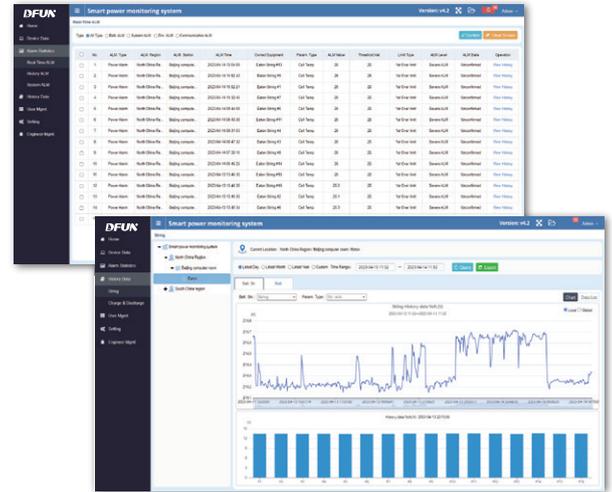
B/S structure Easy set-up, easy operation

- B/S structure, no more messy set-up
- Friendly user interface design

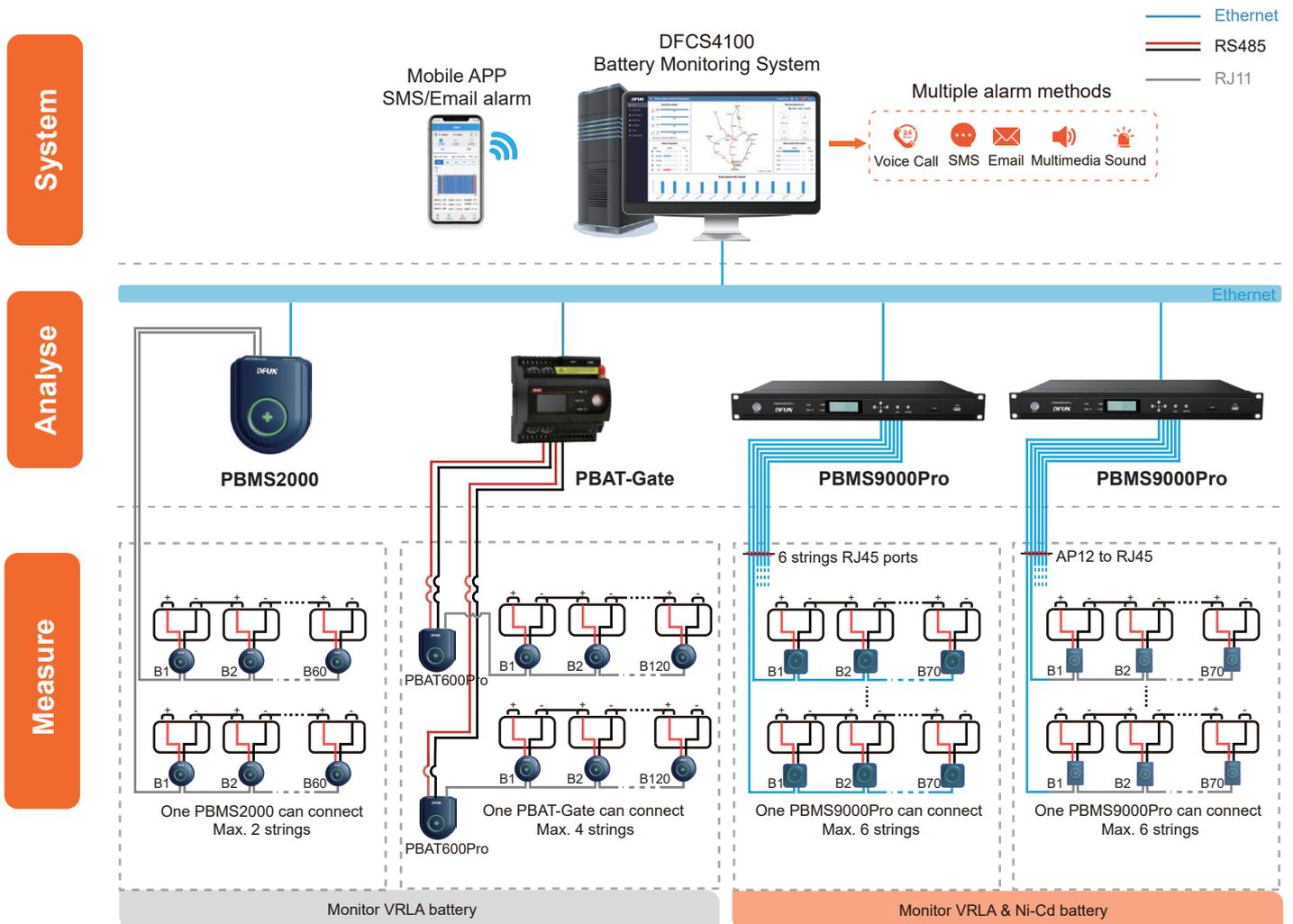
DFCS4100 Battery Monitoring System

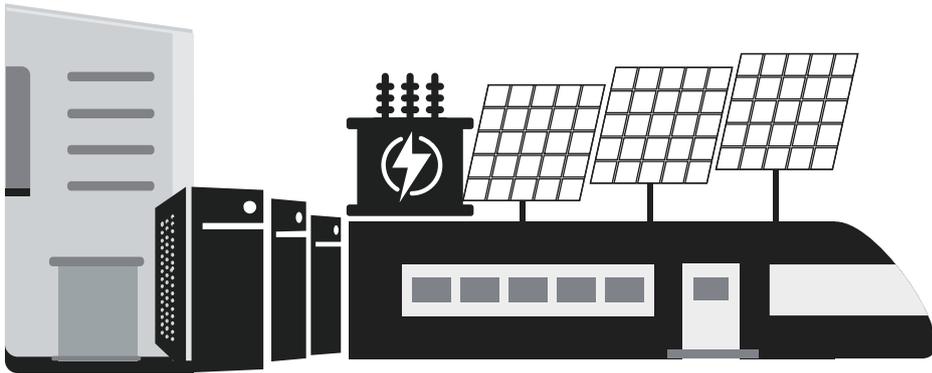
System Feature

- 24/7/365 real-time monitoring $\leq 50,000$ pcs batteries
- B/S structure with simple and UI set-up
- Realize all data display at one location, suitable for a project by large number of batteries or batteries located at different site
- Sent out timely alarm notifications for abnormal battery via SMS & Email alerts (support multiple contacts)
- Setpoint multi-level alarm
- Graphical and visual display of battery trends and faults
- Provides centralized data storage, data access and data management, export .csv format reports for data analysis
- Monitor ambient temperature & humidity
- Support monitoring thermal runaway
- Support to connect with 3rd party systems (EMS, EPC, SCADA, DCIM...)



System Structure





BMS for Different Applications

Chapter 2

For Monitoring VRLA Battery

- PBMS2000 for Telecom Site
- PBAT-Gate for Small-scale Data Center
- PBMS9000 for Large-scale Data Center

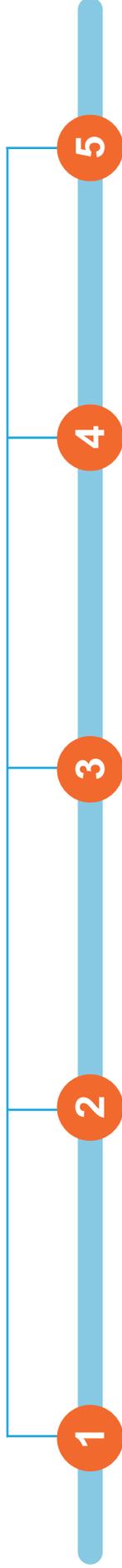
For Monitoring Ni-Cd / VRLA Battery

- PBMS9000Pro for Substation / Chemical Plant

DFCT48 Battery Capacity Tester

DFCS4100
Battery Monitoring System

Mobile APP
SMS/Email Alarm



1



PBMS2000



BTS Station

2



PBAT-Gate

PBMS9000



Data Center

3



PBMS9000



Data Center

4



PBMS9000 PRO



Substation

5



Chemical Plant



 Online monitoring & balancing

 Cost competitive solution

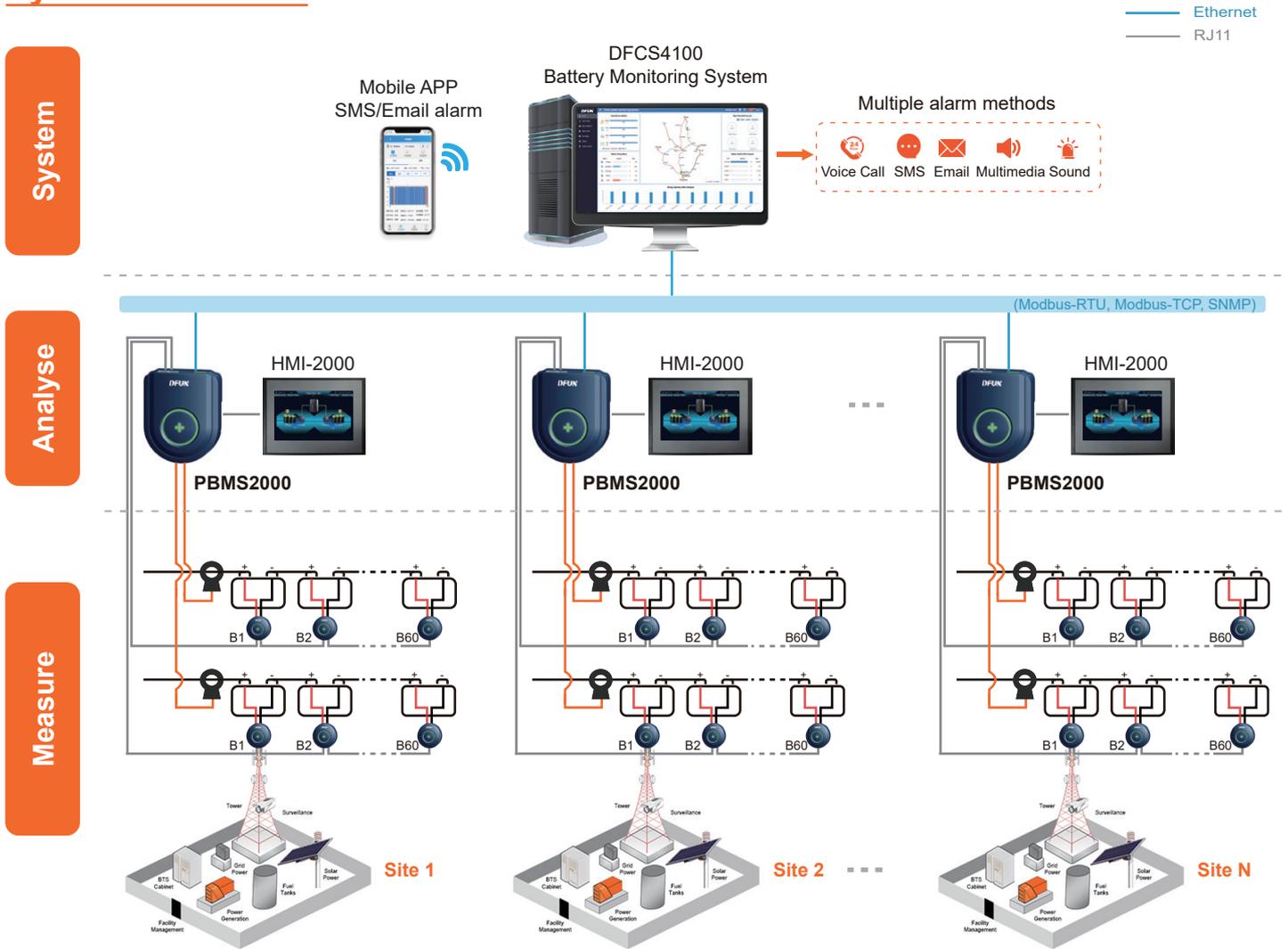
 Real-time alarm

Feature

- Dedicated design for telecommunication 24V or -48V system
- 24/7 hours on-line monitoring & remote alarm
- Cost competitive solution, support Max. 1 string, total 120pcs batteries, or Max. 2 strings, Max. 60pcs batteries each string
- Measure Lead-Acid battery
- Multi communication protocol (Modbus-RTU, MODBUS-TCP, SNMP)
- Comply with IEEE 1188-2005

PBMS2000 for Telecom Site

System Structure



Management Layer

PBMS2000 Battery Monitoring System Main Controller

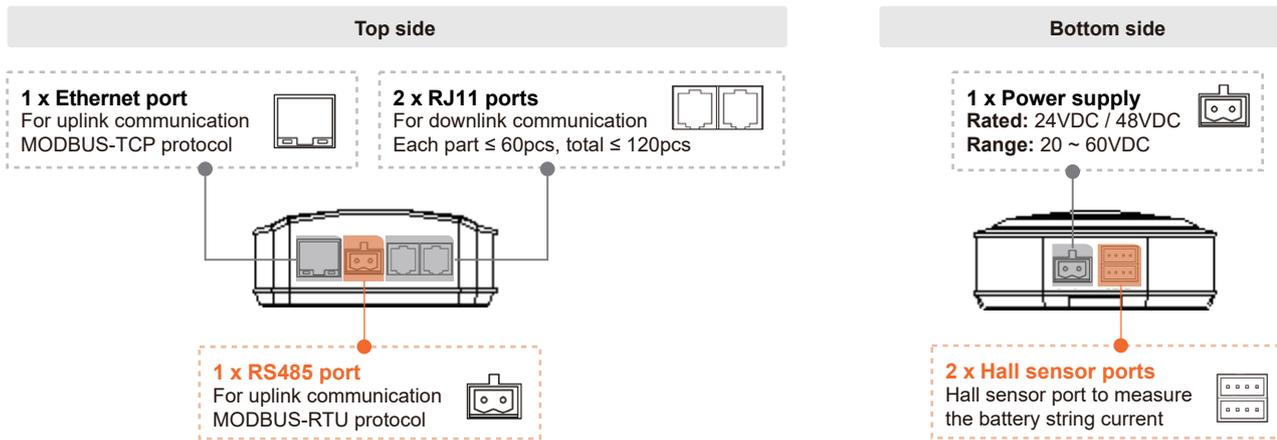
- Monitor battery string voltage, charge and discharge current
- Calculate battery string SOC
- Auto-balancing
- Auto-sensing for the battery sensor's ID address
- Setpoint alarm (upper limit / lower limit)
- Data collecting
- Data uploading function via build-in RS485 (Modbus-RTU) & Ethernet (Modbus-TCP or SNMP)
- Support 3rd party system
- Local display via HMI
- Accessories:
 - 1) Hall sensor and cable: range from 0 ~ ±1000A with 2m cable
 - 2) Communication cable : 5m with RJ11 port



Technical Specification

Application		DC power system (telecom site)
Rated input voltage		24VDC or 48VDC range: 20 ~ 60VDC
Measuring	voltage	0 ~ 800V (accuracy: $\pm 0.5\%$)
	current	-1000 ~ 1000A (by hall sensor, accuracy: $\pm 2.0\%$)
Power consumption		< 2W
Up-link communication		1 Ethernet port (10/100M), Modbus-TCP / SNMP protocol
		1 RS485 port, Modbus-RTU protocol, baudrate: 9600bps, 19200bps, 38400bps (optional)
Down-link communication		2 RJ11 ports, each port connect Max. 60pcs batteries, total Max. 120pcs batteries

Terminal Introduction



Battery Cell Sensor

PBAT61-02/PBAT61-06/PBAT61-12 Battery Cell Sensor

- PBAT61-02 for 2V battery, PBAT61-06 for 6V battery, PBAT61-12 for 12V battery
- Monitor individual battery voltage, internal temperature (negative pole), Impedance(ohmic value)
- Auto-balancing



Running status

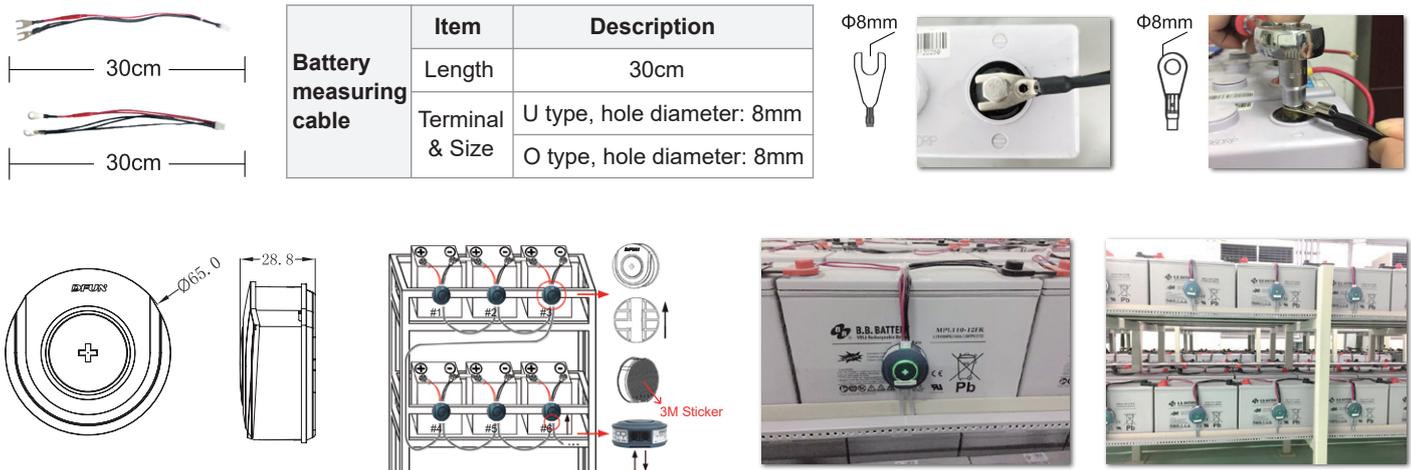


Abnormal status

Item	Rated input voltage	Measuring range			
		Voltage	Internal temperature	Impedance	Power consumption
PBAT61-02	02V	1.6 ~ 2.6V ($\pm 0.2\%$)	-20°C ~ 85°C ($\pm 0.5\%$)	Range: 0.1m Ω ~50m Ω Repeatability error: 1.0% $\pm 25\mu\Omega$ Conformity error: 1.5% $\pm 25\mu\Omega$	Running: <70mW Sleeping: <8mW
PBAT61-06	06V	4.8 ~ 10V ($\pm 0.2\%$)			
PBAT61-12	12V	7.5 ~ 15.6V ($\pm 0.2\%$)			

PBMS2000 for Telecom Site

➤ Dimension and Installation



Order Information

System structure		Model	Description	Remark
Management layer		PBMS2000	Battery monitoring system main controller	One PBMS2000 can monitor Max. 1 string, total 120pcs batteries or Max. 2 strings, each string Max. 60pcs batteries. Hall sensor and cable: range from 0 ~ ±1000A with 2m cable. Communication cable: 5m with RJ11 port
Battery cell sensor		PBAT 61-02	02V battery cell sensor	One per battery cell
		PBAT 61-12	12V battery cell sensor	One per battery cell
Accessory	Cell sensor communication cable	PBAT-COM-40	Cable terminal: RJ11 port, length: 40cm (standard)	
		PBAT-COM-70	Cable terminal: RJ11 port, length: 70cm	
	Battery measuring cable	PBAT-C1-U-M8-30	Cable terminal: U type  , hole diameter: 8mm, length: 30cm (standard)	
		PBAT-C1-O-M8-30	Cable terminal: O type  , hole diameter: 8mm, length: 30cm	
	Hall sensor for PBMS2000	CS050EK1T5	Rated input: 50A	Measure range: 0 ~ ±100A, Φ20mm
		CS100EK2T5	Rated input: 100A	Measure range: 0 ~ ±200A, Φ40mm
CS200EK2T5		Rated input: 200A	Measure range: 0 ~ ±400A, Φ40mm	
CS300EK2T5		Rated input: 300A	Measure range: 0 ~ ±600A, Φ40mm	
Optional module	Local display & operation	CS400EK2T5	Rated input: 400A	Measure range: 0 ~ ±800A, Φ40mm
		CS500EK2T5	Rated input: 500A	Measure range: 0 ~ ±1000A, Φ40mm
		HMI-2000	7-inch touch-screen HMI for local display & operation	One per PBMS2000 Communication with PBMS2000 via RS485

Note: If battery terminal is M5, M6, M10, M12, M16, please contact our sales for customize requirements before placing the order.



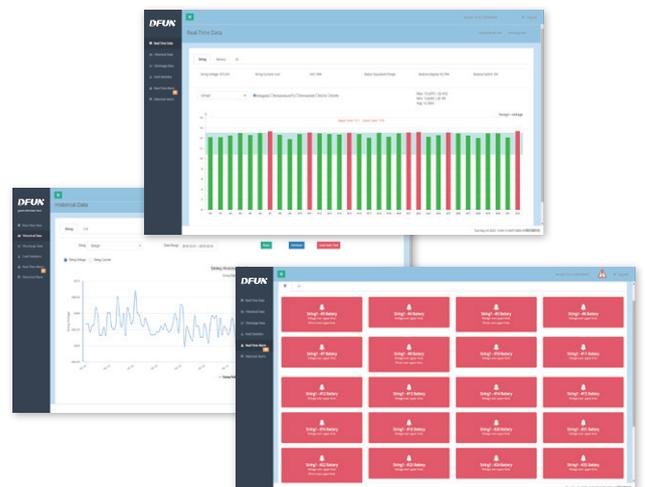
 Build-in Webpage monitoring software

 1 year history data storage

 4G wireless upload to the third party

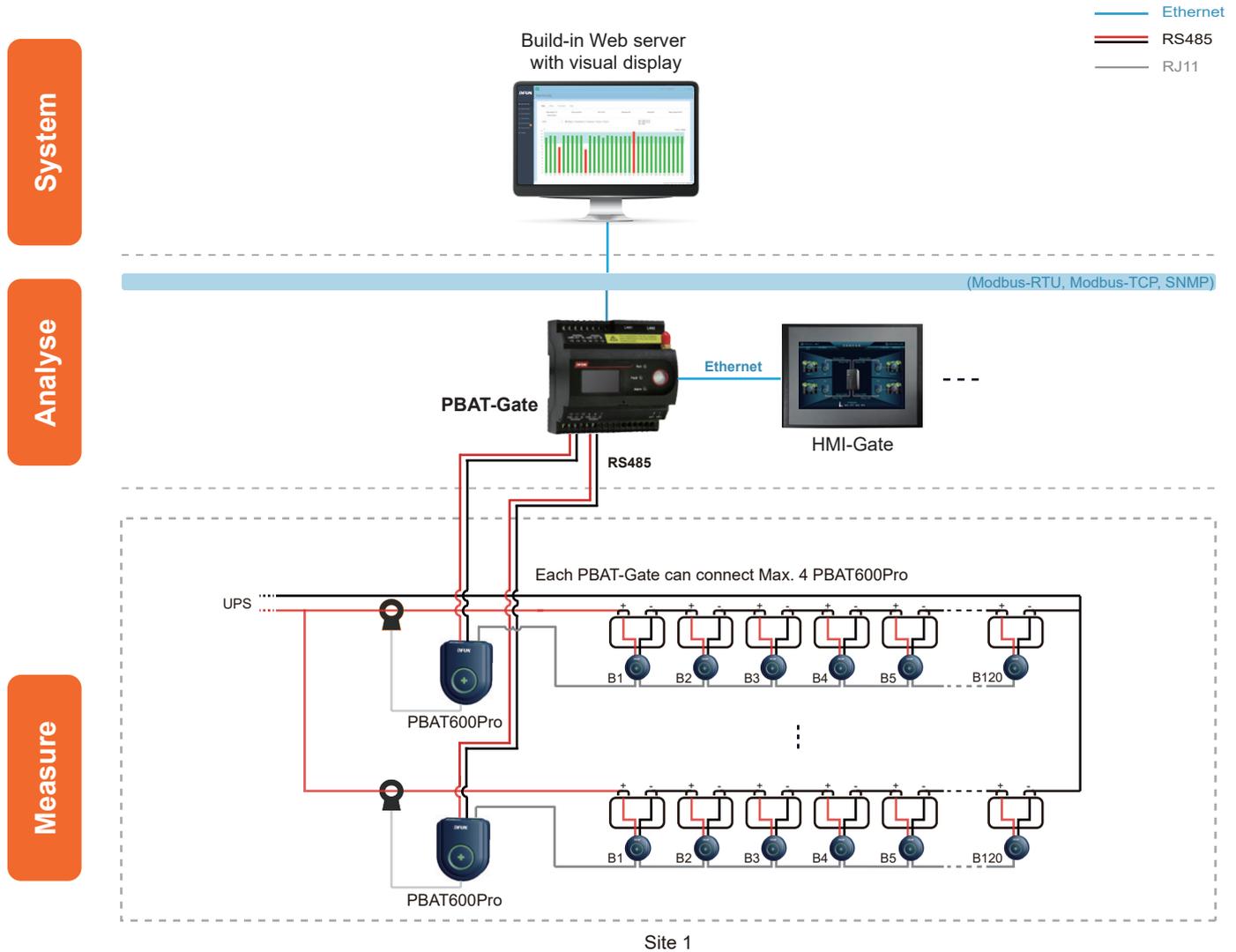
Feature

- Apply to UPS and data center
- 24/7 hours on-line monitoring & remote alarms notification
- Monitor Max. 4 strings, in total of 480 batteries
- Measure Lead-Acid battery
- Anti-interference design, support to connect with high-frequency UPS
- Auto-sensing for the battery sensor's ID address
- Multi-communication protocol (MODBUS-TCP, SNMP)
- Support 4G sending SMS alarm or wireless upload to cloud
- Comply with IEEE 1188-2005



PBAT-Gate for Small-scale Data Center

System Structure



Management Layer

PBAT-Gate Battery Monitoring System Main Controller

- Real-time monitoring 1 set UPS with Max. 480 batteries
- Data logging for all measuring data for 12 months
- Build-in web server with bar chart and trend curve analysis for voltage, charge and discharge current, internal temperature, impedance
- Report for battery string voltage & current, individual battery voltage, temperature, impedance, support export PDF, CSV etc. document
- Setpoint alarm for cell voltage, internal temperature, impedance, SOC, SOH (upper limit / lower limit) and string voltage, current, SOC (upper limit / lower limit)
- Optional sensor for 2 AI ports for ambient temperature & humidity sensor, 1 DO port for sound and light alarm, 4DI ports for digital input connecting
- Support SNMP, Modbus TCP protocol
- Support HTTP protocol (RESTful API, JSON, XML format)
- Support SMS/Email alarm
- Support 4G data upload to the 3rd party



PBAT-Gate

All-in-one

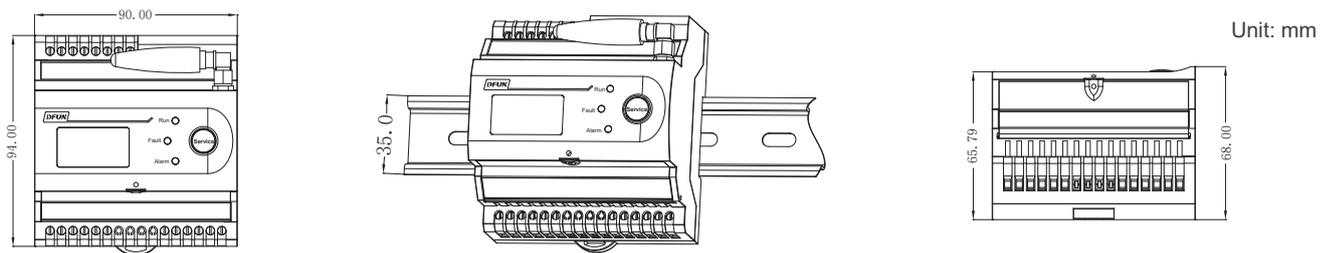


Pre-install & pre-wiring for PBAT-Gate, PBAT600Pro and HMI-Gate (optional)

Technical Specification

CPU	ARM cortex-A8 800MHz	Dimension	90mm x 94mm x 68mm	
Memory	512MB flash, 8G TF memory card	Operating system	Embedded linux	
Flash	Nand flash 512MB	Communication	4CL	4 RS485 serial ports, 2 Ethernet ports
MTBF	≥ 50,000 hours		2ZL	2 RS485 serial ports, 2 Ethernet ports
Display	OLED	Power consumption	< 5W	
Weight	650g	Optional function	4 DI, 2 AI, 1 DO (only for PBAT-GATE-2ZL)	
Baudrate	1200 ~ 115200bps	Operation temperature	-15°C ~ 55°C	
Power supply	18 ~ 36VDC	Operation humidity	10% ~ 95% Non-condensing	

Dimension and Installation



Battery String Sensor

PBAT600Pro Battery String Sensor

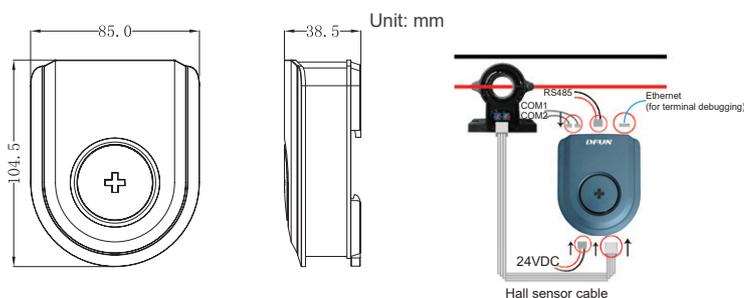
- Monitor battery string voltage, charge and discharge current
- Calculate battery status of charge (SOC)
- Auto-balancing
- Data acquisition
- Auto-sensing for whole battery string sensor's ID address
- Accessories:

- 1) Hall sensor and cable: range from 0 ~ ±1000A with 2m cable
- 2) Communication cable : 5m with RJ11 port



Item	Measuring range		External power supply	Power consumption
	Voltage	String current		
PBAT600Pro	0 ~ 800VDC (±0.5%)	-1000 ~ 1000A by hall sensor (±2.0%)	12 ~ 36VDC	1W

> Dimension and Installation



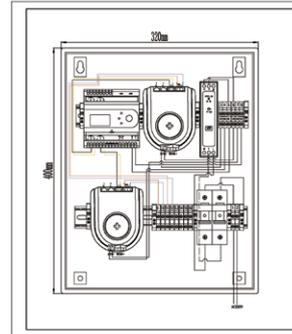
PBAT-Gate for Small-scale Data Center

Cabinet for Pre-wiring in Factory

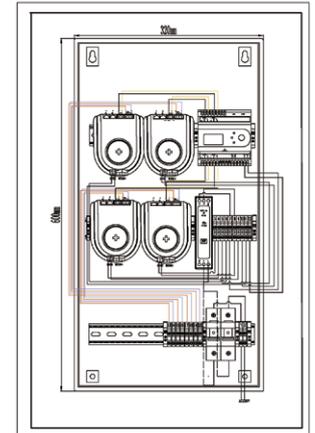
PBAT-BOX

- Pre-install & pre-wiring for PBAT-Gate, PBAT600Pro and power supply converter inside
- Pre-mount HMI-Gate if selected
- Provide wiring drawing

Hardware		
Dimension	For 1 ~ 2 battery strings	PBAT-BOX-400: 400*320*138.5mm (H*W*D)
	For 3 ~ 4 battery strings	PBAT-BOX-600: 600*320*138.5mm (H*W*D)
Installation	Wall-mount, hang on the battery rack	
Material	Steel plate, with rock	



PBAT-BOX-400



PBAT-BOX-600

Order Information

System structure	Model	Description	Remark	
Management layer	PBAT-GATE-4CL	Battery monitoring system main controller with 4 RS485 ports, SMS/Email alarm, 4G data upload	One per UPS Max. 4 strings × 120 batteries = 480 batteries	
	PBAT-GATE-2ZL	Battery monitoring system main controller with 2 RS485 ports, 4DI, 2AI, 1DO, SMS/Email alarm, 4G data upload	One per UPS Max. 2 strings × 120 batteries = 240 batteries	
Battery string sensor	PBAT600Pro	Battery string sensor	One per string 1 RS485 port, one PBAT600Pro can connect Max. 120pcs PBAT61 series battery sensor, Max. 2 Hall sensor and cable: range from 0 ~ ±1000A with 2m cable. Communication cable: 5m with RJ11 port	
Battery cell sensor	PBAT61-02	02V battery cell sensor	One per battery cell	
	PBAT61-06	06V battery cell sensor	One per battery cell	
	PBAT61-12	12V battery cell sensor	One per battery cell	
Accessory	Cell sensor communication cable	PBAT-COM-40	Cable terminal: RJ11 port, length: 40cm (standard)	
		PBAT-COM-70	Cable terminal: RJ11 port, length: 70cm	
	Battery measuring cable	PBAT-C1-U-M8-30	Cable terminal: U type  , hole diameter, 8mm, length: 30cm (standard)	
		PBAT-C1-O-M8-30	Cable terminal: O type  , hole diameter, 8mm, length: 30cm	
	PBAT-C2-S	Small capacity battery measuring cable Includes connecting cables (11AWG, length: 20cm) and measuring cables (length: 10 + 20cm)		
	Hall sensor for PBAT600Pro	CS050EK1T5	Rated input: 50A	Measure range: 0 ~ ± 100A, Φ20mm
		CS100EK2T5	Rated input: 100A	Measure range: 0 ~ ± 200A, Φ40mm
		CS200EK2T5	Rated input: 200A	Measure range: 0 ~ ± 400A, Φ40mm
		CS300EK2T5	Rated input: 300A	Measure range: 0 ~ ± 600A, Φ40mm
		CS400EK2T5	Rated input: 400A	Measure range: 0 ~ ± 800A, Φ40mm
CS500EK2T5		Rated input: 500A	Measure range: 0 ~ ± 1000A, Φ40mm	
Power supply	HDR-30-24	24VDC power source, 220VAC to 24VDC		
Optional module	HMI for local display & operation	HMI-Gate	7-inch touch-screen HMI for local display & operation One per PBAT-Gate communication with PBAT-Gate via Ethernet	
	Cabinet for pre-wiring in factory	PBAT-BOX-400	Dimension: 400*320*138.5mm (H*W*D) Pre-install & pre-wiring for PBAT-Gate, PBAT600Pro and power supply converter, pre-mount HMI-Gate if customer selected	
		PBAT-BOX-600	Dimension: 600*320*138.5mm (H*W*D)	

Note: If battery terminal is M5, M6, M10, M12, M16, please contact our sales for customize requirements before placing the order.



Dual source



4G wireless upload to the third party



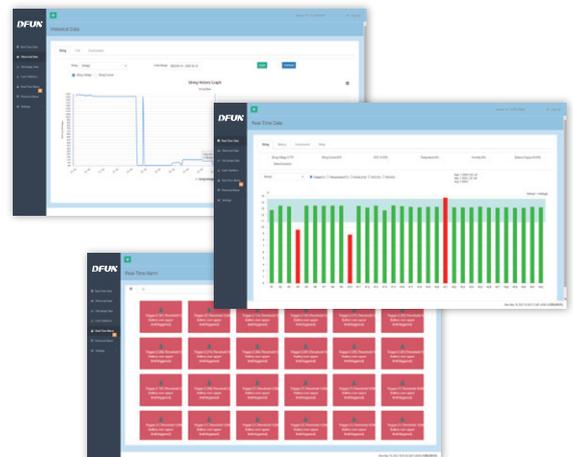
Build-in Webpage monitoring software



5 years history Data storage

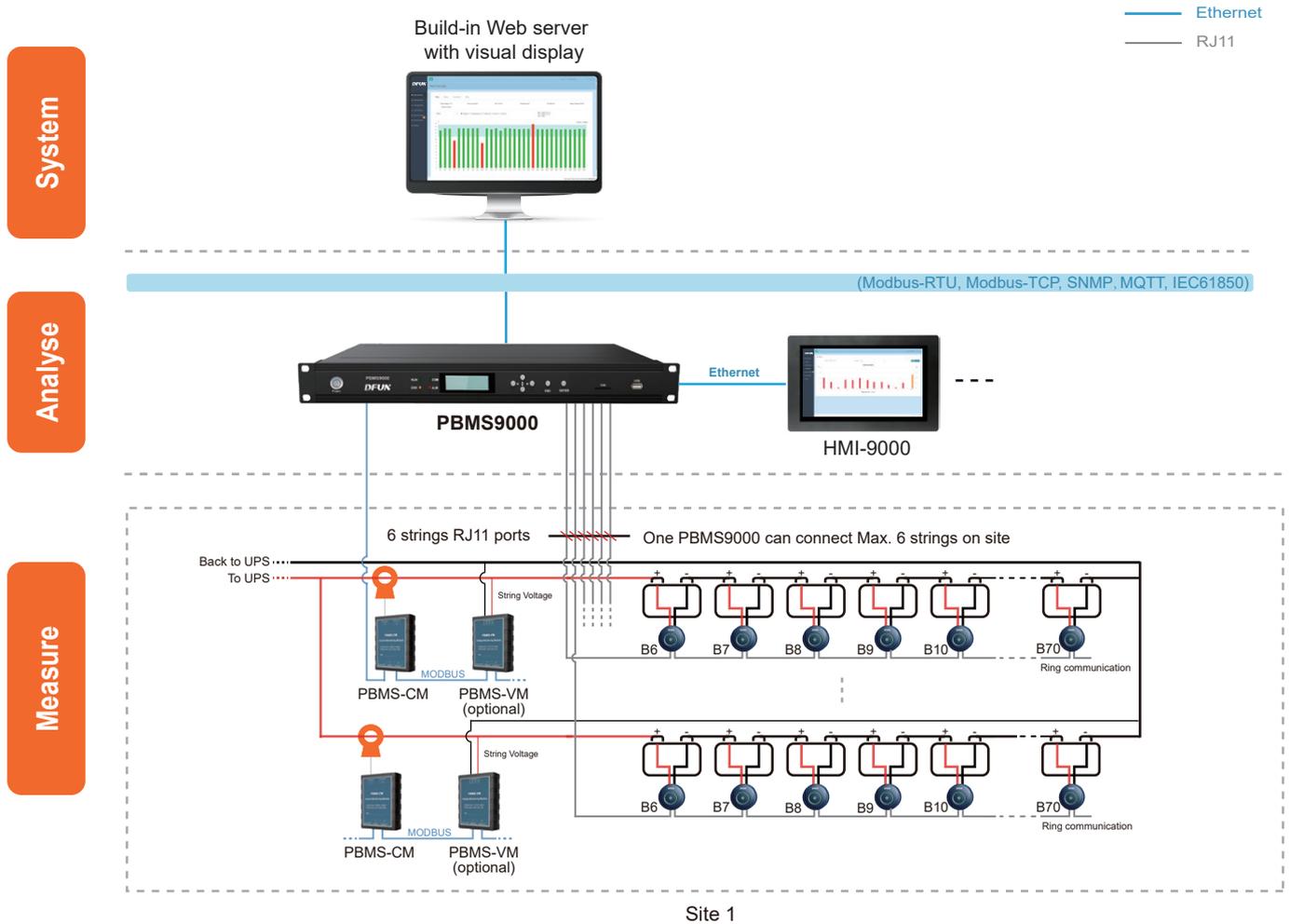
Feature

- Apply to UPS and data center application
- Measure lead-acid or multi-pole battery
- Ring communication, any communication failure will not affect other sensors communication
- Monitor battery voltage, current, impedance, insulation resistance, ripple current & voltage, SOC, SOH, etc.
- Support Modbus, SNMP, MQTT and IEC61850 protocols
- Auto-sensing for the battery sensor's ID address
- Dual-source to avoid power shutdown
- Anti-interference design, support to connect with high-frequency UPS
- Comply with IEEE 1188-2005
- Thermal runaway management(Optional temperature and humidity sensor)
- The product has obtained CE, FCC, Rohs, UL certification



PBMS9000 for Large-scale Data Center

System Structure



Management Layer

PBMS9000 Battery Monitoring System Main Controller

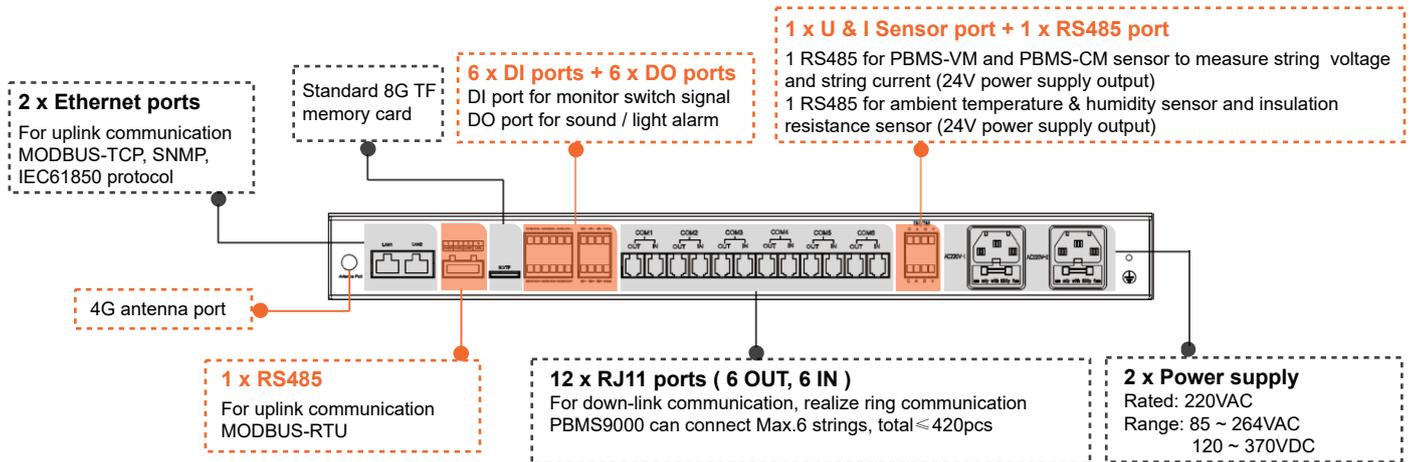
- Standard 1 U design for distribution cabinet
- Dual-source to avoid power shutdown
- Built-in web server with visual display
- Monitor Max. 6 strings battery, in a total of 420 batteries
- Measure battery string current & voltage, ripple voltage & current, charge & discharge current, internal temperature, impedance, insulation resistance, ambient temperature & humidity, SOC and SOH
- Alarm message by SMS or Email
- Support Modbus-TCP, Modbus-RTU, SNMP and IEC61850 protocols
- Support MQTT for JSON format to data upload
- 1 RS485 port, 2 Ethernet ports and 1 4G Antenna port to data upload
- 6 DI ports (digital Input connecting)
- 6 DO ports (sound and light alarm)



Pre-install & pre-wiring for PBMS9000 and HMI-9000 (optional)



Dimension and Installation



Technical Specification

CPU	ARM cortex A7 528MHz	Up-link communication	2 Ethernet ports (10/100M), MODBUS-TCP, SNMP, IEC61850 1 RS485 port, MODBUS-RTU, baudrate: 9600bps, 19200bps, 38400bps (optional)	
Memory	512MB flash, 4G EMMC + 8G TF memory card		Down-link communication	6 Channels RJ11 ports, each port Max. connect \leq 70pcs batteries, total Max. 420pcs
Display	2-inch LCD with backlight	Measure range		Voltage
MTBF	\geq 100,000 hours		Ripple voltage	1 ~ 6 strings, range: 2 ~ 100V (peak), resolution: 0.01V
Power supply	Rated: 220VAC Range: 85 ~ 264VAC 120 ~ 370VDC		Current	1 ~ 6 strings, range: -2000 ~ 2000ADC ($\pm 2.0\%$, under 15°C ~ 35°C), resolution: 0.01A
Dimension	Standard 19-inch 1 U device 483mm \times 206mm \times 44.5mm (W*D*H) Open hole: 440mm \times 46mm (L*H)		Ripple current	1 ~ 6 strings, according to the rated current of the hall sensor, range: 0 ~ 0.4*I (peak), resolution: 0.01A
Power consumption	< 15W (only main controller)	Operation environment	Working temperature: -15°C ~ 55°C Storage temperature: -40°C ~ 70°C Humidity: 5% ~ 95% non-condensing	
Additional port	6 x DI dry contact 6 x DO relay output, 250VAC/5A or 30VDC/5A	Extension sensor (optional)	- RS485 for 1~6 strings string voltage & current measuring - RS485 for Max. 6 strings ambient temperature & humidity measuring - RS485 for 1~6 strings DC insulation resistance measuring	

String Measuring Sensor

PBMS-CM String Current Measuring Sensor & Hall Sensor

- One string needs 1 PBMS-CM, each PBMS-CM with 2 hall sensor ports
- Measure battery string charge and discharge current, ripple current
- Measure multi-pole battery's string charge and discharge current and ripple current with flexible module and hall sensor
- Accessories:
 - 1) Hall sensor and cable: range from 0~ \pm 1000A with 2m cable
 - 2) Communication cable : 5m with RJ45 port



PBMS-CM



Hall Sensor

PBMS9000 for Large-scale Data Center

Item	Power supply	Measuring range		Environment
		String current	Ripple current	
PBMS-CM	24VDC (range: 9 ~ 32VDC) Power consumption: <0.5W	1 Hall sensor: -1000 ~ 1000A 2 Hall sensor: -2000 ~ 2000A (±2.0%, 15°C ~ 35°C)	20% of Hall sensor Rated current (peak value) Frequency: 50Hz ~ 1KHz	Working temperature: 0°C ~ 45°C Working temperature limit: -15°C ~ 55°C Humidity: 5% ~ 95%RH, non-condensing Storage temperature: -40°C ~ 70°C

PBMS-VM String Voltage Measuring Sensor (Optional)

- One PBMS-VM can measure 1 string's voltage
- Measure battery string voltage and ripple voltage



PBMS-VM

Item	Power supply	Measuring range		Environment
		String voltage	Ripple voltage	
PBMS-VM	24VDC (range: 9 ~ 32VDC) Power consumption: <1W	8 ~ 1000VDC (±0.5%)	2 ~ 100VDC (peak value)	Working temperature: 0°C ~ +45°C Working temp limit: -15°C ~ +55°C Humidity: 5% ~ 95%RH, non-condensing Storage temperature: -40°C ~ +70°C

Extension Sensor (Optional)



Ambient temperature & humidity sensor

- Dual RJ45 interface, fast wiring, support cascade use
- Adsorption by magnet
- Temperature: -20°C ~ 60°C (±0.4°C), resolution: 0.1°C. Humidity: 0 ~ 100%RH (±3%RH), resolution: 0.1%RH
- Cable: 5 meter RJ45 convert to 4P terminal wire



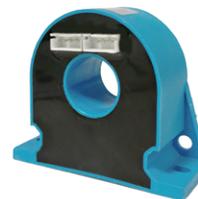
DC insulation resistance sensor

- Measuring range: 1KΩ ~ 30MΩ
- Measurement accuracy: 10% (100KΩ ~ 50KΩ)
- Cable: 2 meter 4P port to 4P terminal wire



Hydrogen (H₂) sensor

- Class of protection: IP65
- 10 ~ 30VDC, power consumption: 0.9W
- Communication: RS485, Modbus
- Measuring range: 0 ~ 1000ppm
Accuracy: ±5%FS
Resolution: 1ppm
- Cable: 2 meter Aviation port to 4P terminal wire



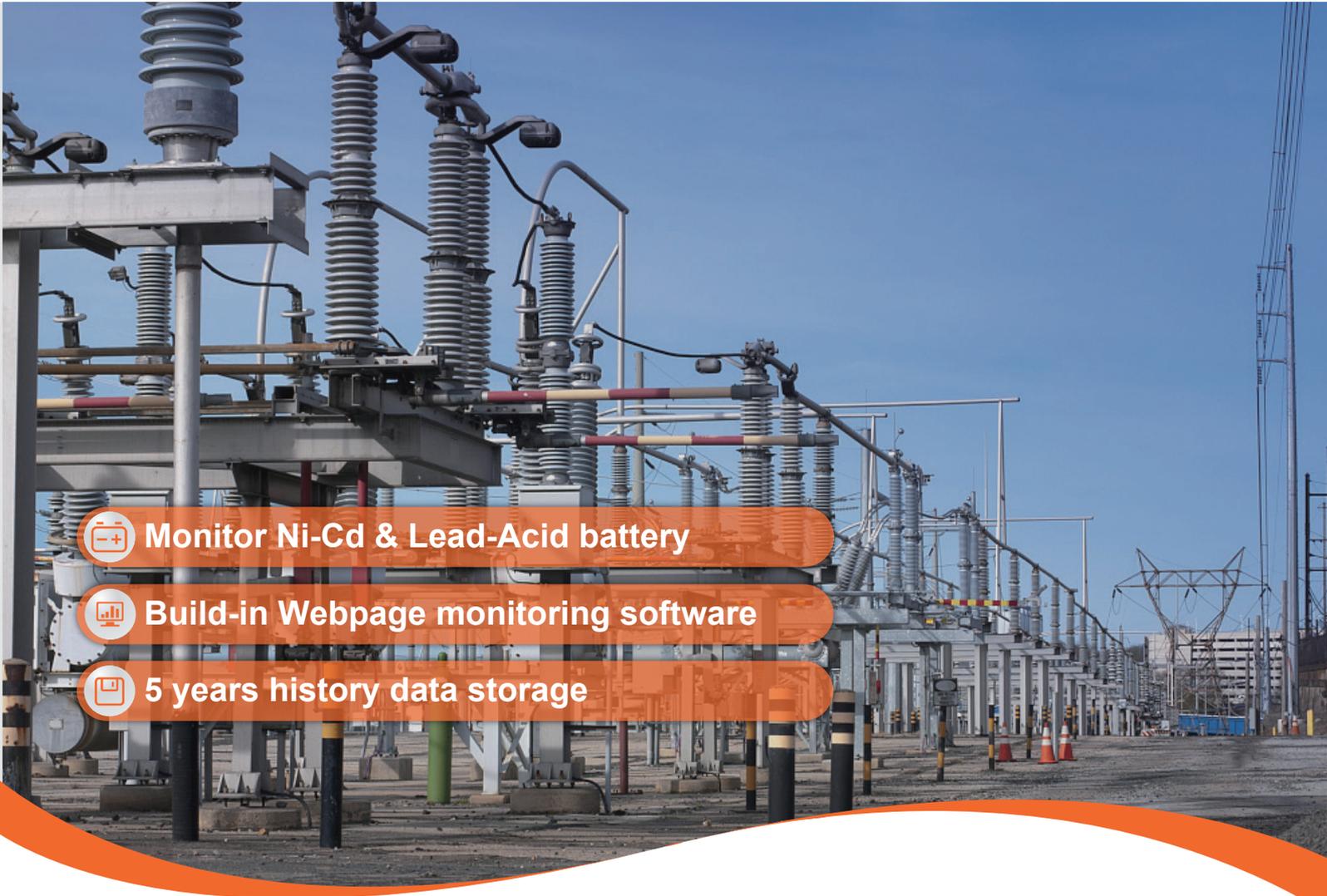
DC leakage current sensor

- Measurement accuracy: ±1%FS
- Monitoring string leakage current to prevent fire caused
- Cable: 2 meter hall sensor port to 4P terminal wire

Order Information

System Structure		Model	Description	Remark
Management layer	BMS Main Controller	PBMS9000	Battery monitoring system main controller	One per each UPS One PBMS9000 can monitor Max. 6 strings, Max. 420pcs batteries
		PBMS9000-L	Battery monitoring system main controller with 4G antenna port (standard)	
	Protocol (optional)	-CP	IEC61850 protocol(Monitor Max.108pcs batteries)	Please contact our sales before placing the order
String measuring sensor		PBMS-CM	String current measuring sensor	One per each string, each has 2 hall sensor ports, can connect Max. 2 hall sensor. If use for multi-pole battery, then we can configure PBMS-CM according to the number of pole. Hall sensor and cable: range from 0 ~ ±1000A with 2m cable. Communication cable: 5m with RJ45 port
		PBMS-VM	String voltage measuring sensor	One per each string (optional)
Battery cell sensor		PBAT 61-02	02V battery cell sensor	One per battery cell
		PBAT 61-06	06V battery cell sensor	One per battery cell
		PBAT 61-12	12V battery cell sensor	One per battery cell
Accessory	Cell sensor communication cable	PBAT-COM-40	Cable terminal: RJ11 port, length: 40cm (standard)	
		PBAT-COM-70	Cable terminal: RJ11 port, length: 70cm	
	Battery measuring cable	PBAT-C1-U-M8-30	Cable terminal: U type  , hole diameter: 8mm, length: 30cm (standard)	
		PBAT-C1-O-M8-30	Cable terminal: O type  , hole diameter: 8mm, length: 30cm	
	Hall sensor for PBMS-CM	CS050EK1T5	Rated input: 50A	Measure range:0~±100A,Φ20mm
		CS100EK2T5	Rated input: 100A	Measure range:0~+200AΦ40mm
		CS200EK2T5	Rated input: 200A	Measure range:0 ~ ±400A,Φ40mm
		CS300EK2T5	Rated input: 300A	Measure range: 0 ~±600A,Φ40mm
		CS400EK2T5	Rated input: 400A	Measure range:0~ ±800A,Φ40mm
CS500EK2T5	Rated input: 500A	Measure range:0~±1000A,Φ40mm		
Optional module	HMI for local display & operation	HMI-9000	10-inch touch-screen HMI for local display & operation	One per six (max) PBMS9000 Communication with PBMS9000 via Ethernet If selected HMI-PBMS9000, then must select power supply converter
		HDR-30-12	12VDC power coverter (220VAC to 12VDC)	
	Ambient temperature & humidity	H-THDRJ45	Temperature: -20°C ~ 60°C (±0.4°C) Humidity: 0 ~ 100%RH (±3%RH)	1 PBMS9000 can connctet Max. 6pcs
	DC insulation resistance sensor	PBMS-IM	Measuring range: 1KΩ ~ 30MΩ	One per each string, 1 PBMS9000 can connect Max. 6pcs
	Hydrogen (H2) Sensor	PBMS-H2	Measuring range: 0 ~ 1000ppm	One per one PBMS9000
	Cabinet for pre-wiring in factory	PBAT-BOX-260	Dimension: 535*260*350mm (W*H*D)	Pre-install & pre-wiring for PBMS9000 and HMI-9000
		PBAT-BOX-730	Dimension: 535*730*335mm (W*H*D)	Pre-install & pre-wiring for Max.4 PBMS9000 and one HMI-9000
	Ethernet switch	IES318	1. Power supply: 24VDC (12~48VDC) 2. 8 x 10/100M Ethernet ports	If selected PBAT-BOX-730, then must select IES318

Note: If battery terminal is M5, M6, M10, M12, M16, please contact our sales for customize requirements before placing the order.



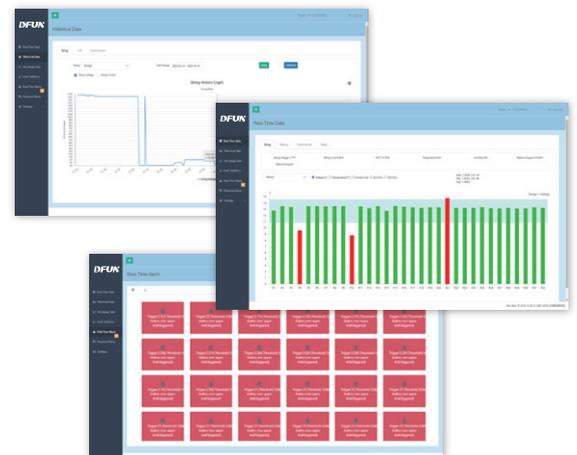
Monitor Ni-Cd & Lead-Acid battery

Build-in Webpage monitoring software

5 years history data storage

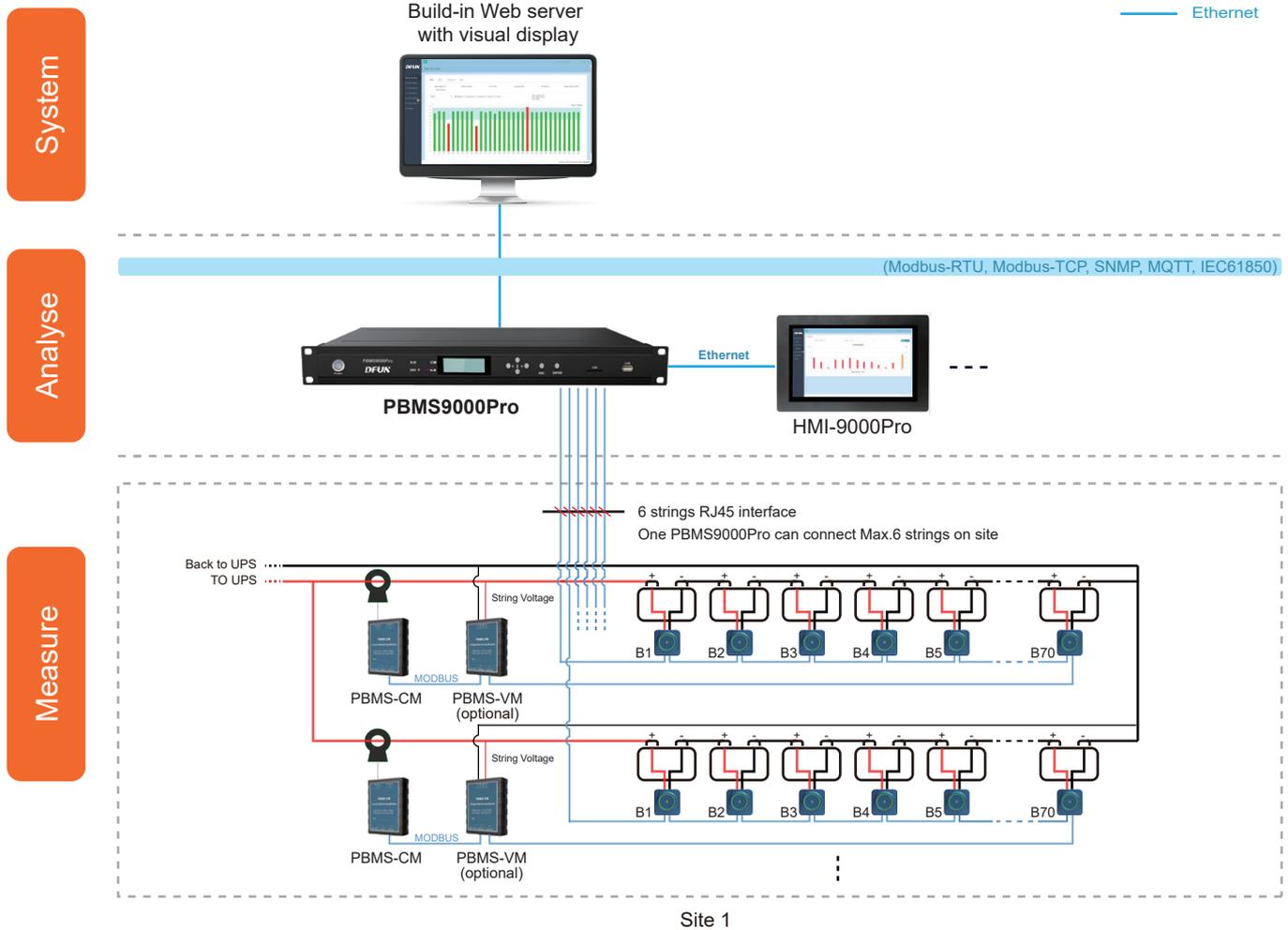
Feature

- Apply to DC power systems like substation, power plants, etc
- 24/7 online monitoring & remote alarm notifications
- Monitor Max. 6 strings and 420pcs batteries in total
- Measure Ni-Cd, Lead-Acid, and multi-pole battery
- Powered by communication bus, no consuming battery power
- Anti-interference design, support to connect with high-frequency UPS
- Anti-reverse protection, no damaging the cell sensor and battery
- Auto-sensing for the battery sensor's ID address
- Support Modbus, SNMP, MQTT and IEC61850 protocols
- Support monitoring battery leakage and liquid level (optional)
- Support extension sensor for measuring ambient temperature & humidity, leakage current, insulation resistance (optional)
- Comply with IEEE 1188-2005
- Thermal runaway management(Optional temperature and humidity sensor)



PBMS9000Pro for Substation

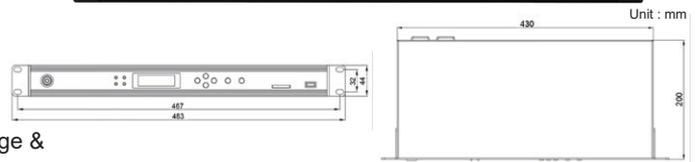
System Structure



Management Layer

PBMS9000Pro Battery Monitoring System Main Controller

- Standard 1 U design for distribution cabinet
- Built-in web server with visual display
- Monitor Max. 6 strings battery, in a total of 420 batteries
- Measure battery string current & voltage, ripple voltage & current, charge & discharge current, internal temperature, impedance, insulation resistance, leakage current, ambient temperature & humidity, SOC and SOH
- Alarm message by SMS or Email
- Support Modbus-TCP, Modbus-RTU, SNMP and IEC61850 protocols
- Support MQTT for JSON format to data upload
- 1 RS485 port, 2 Ethernet ports and 1 4G Antenna port to data upload
- 6 DI ports (digital Input connecting)
- 6 DO ports (sound and light alarm)

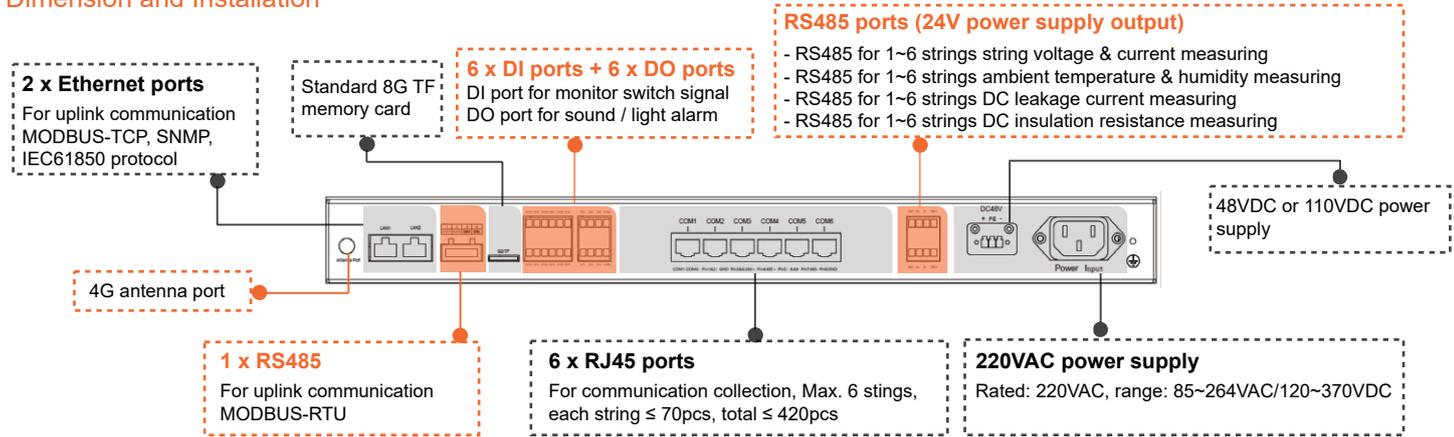


Pre-install & pre-wiring for PBMS9000Pro and HMI-9000Pro (optional)



PBMS9000Pro for Substation

Dimension and Installation



Technical Specification

CPU	ARM cortex A7 528MHz	Up-link communication	2 Ethernet ports(10/100M),MODBUS-TCP,SNMP, 1RS485 portMODBUS-RTU,baudrate: 9600bps, 19200bps, 38400bps(optional)	
Memory	512MB DDR3, 4G EMMC + 8G TF memory card		Down-link communication	6 channels RJ45 ports,each port Max. connect 70pcs batteries
MTBF	≥ 100,000 hours	Measure range		Voltage
Display	2-inch LCD with backlight		Current	1 ~ 6 strings, range: -1100 ~ 1100ADC (±1.0%fs, under 20°C ~ 30°C), resolution: 0.01A
Dimension	Standard 19-inch 1 U device 483mmx206mmx44.5mm(W*D*H Openhole:440mmx46mm(L*H)	Operation environment	Operating temperature: -15°C ~ 55°C Storage temperature: -40°C ~ 70°C Humidity: 10 ~ 95% RH, non-condensing	
Power consumption	<15W(only main controller)		Extension sensor (optional)	-RS485 for 1~6 strings string voltage & current measuring -RS485 for Max. 6 strings ambient temperature & humidity measuring -RS485 for 1~6 strings DC leakage current measuring -RS485 for 1~6 strings DC insulation resistance measuring
Additional port	6 x DI dry contact 6 x DOrelayoutput,250VAC/5A or 30VDC/5A			
Power supply	V1:220VAC,range:85~264VAC/120~370VDC V2: 48VDC, range:18~72VDC V3:110VDC,range:43~160VDC			

String Measuring Sensor

PBMS-CM String Current Measuring Sensor & Hall Sensor

- One string need 1 PBMS-CM, each PBMS-CM with 2 hall sensor ports
- Measure battery string charge and discharge current, ripple current
- Measure multi-pole battery's string charge and discharge current and ripple current with flexiable module and hall sensor
- Accessories:

- 1) Hall sensor and cable: range from 0~±1000A with 2m cable
- 2) Communication cable : 5m with RJ45 port



PBMS-CM



Hall Sensor

Item	Power supply	Measuring range		Environment
		String current	Ripple current	
PBMS-CM	24VDC (range: 9 ~ 32VDC) Power consumption: <0.5W	1 Hall sensor: -1000 ~ 1000A 2 Hall sensor: -2000 ~ 2000A (±2.0%, 15°C ~ 35°C)	20% of Hall sensor Rated current (peak value) Frequency: 50Hz ~ 1KHz	Working temperature: 0°C ~ 45°C Working temperature limit: -15°C ~ 55°C Humidity: 5% ~ 95%RH, non-condensing Storage temperature: -40°C ~ 70°C

PBMS-VM String Voltage Measuring Sensor (Optional)

- One PBMS-VM can measure 1 string's voltage
- Measure battery string voltage and ripple voltage



PBMS-VM

Item	Power supply	Measuring range		Environment
		String voltage	Ripple voltage	
PBMS-VM	24VDC (range: 9 ~ 32VDC) Power consumption: < 1W	8 ~ 1000VDC (±0.5%)	2 ~ 100VDC (peak value)	Working temperature: 0°C ~ +45°C Working temp limit: -15°C ~ +55°C Humidity: 5% ~ 95%RH, non-condensing Storage temperature: -40°C ~ +70°C

Extension Sensor (Optional)



DC leakage current sensor

- Measurement accuracy: ±1%FS
- Monitoring string leakage current to prevent fire caused
- Cable: 2 meter hall sensor port to 4P terminal wire



Ambient temperature & humidity sensor

- Dual RJ45 interface, fast wiring support cascade use
- Adsorption by magnet
- Cable: 5 meter RJ45 convert to 4P terminal wire



DC insulation resistance sensor

- Measuring range: 1KΩ ~ 30MΩ
- Measurement accuracy: 10% (100KΩ ~ 50KΩ)
- Cable: 2 meter 4P port to 4P terminal wire



Hydrogen (H₂) sensor

- Class of protection: IP65
- Measuring range: 0~1000ppm
- Accuracy: ±5%FS
- Resolution: 1ppm
- Cable: 2 meter Aviation port to 4P terminal wire

Battery Cell Sensor

PBAT71-02 / PBAT71-12 Battery Cell Sensor

- PBAT71-02 for 2V Lead-Acid battery or 1.2V Ni-Cd battery
PBAT71-12 for 12V Lead-Acid battery
- Monitor individual battery voltage, internal temperature (negative pole), impedance(ohmic value)
- Calculate individual battery state of charge (SOC), state of health (SOH)
- Support battery leakage and liquid level monitoring (optional)
- Powered by communication bus, no consuming battery power
- Auto-balancing



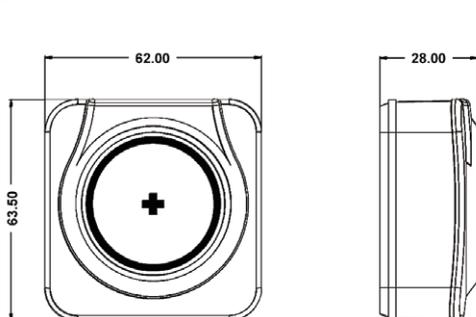
Running status



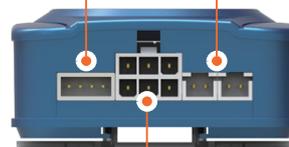
Alarm status

Item	Power supply	Rated input voltage	Measuring range		
			Voltage	Internal temperature	Impedance
PBAT71-02	24VDC Power consumption: < 0.25W	02V / 1.2V	0.5 ~ 3VDC (±0.2%)	-20°C ~ 85°C (±0.5°C)	Range: 0.1mΩ ~ 50mΩ Repeatability error: 1.0%±25μΩ Conformity error: 1.5% ±25μΩ
PBAT71-12		12V	5 ~ 18VDC (±0.2%)		

Dimension and Installation



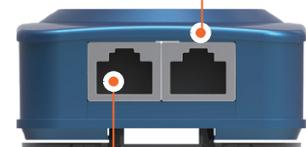
Liquid level sensor port (optional)
2 x Leakage sensor ports (optional)



Battery interface
Connect to the battery's positive & negative

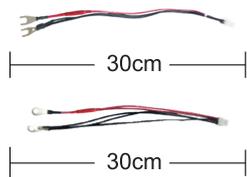
COM-OUT port

Communication port, connect to the next sensor COM-IN



COM-IN port
Communication port, connect to the main module or the previous sensor COM-OUT

PBMS9000Pro for Substation



Battery measuring cable	Item	Description
	Length	30cm
	Terminal & size	U Type, hole diameter: 8mm O Type, hole diameter: 8mm



Order Information

System Structure		Model	Description	Remark
Management layer	BMS Main Controller	PBMS9000Pro-V1	48VDC power supply Battery monitoring system main controller	One per each UPS One PBMS9000Pro can monitor Max.6 strings, Max.100pcs batteries
		PBMS9000Pro-V1-L	48VDC power supply, Battery monitoring system main controller with 4G antenna port	
		PBMS9000Pro-V2	220VAC power supply Battery monitoring system main controller	One per each UPS One PBMS9000Pro can monitor Max.6 strings, Max.420pcs batteries
		PBMS9000Pro-V2-L	220VAC power supply, Battery monitoring system main controller with 4G antenna port	
		PBMS9000Pro-V3	110VDC power supply Battery monitoring system main controller	One per each UPS One PBMS9000Pro can monitor Max.6 strings, Max.216pcs batteries
		PBMS9000Pro-V3-L	110VDC power supply, Battery monitoring system main controller with 4G antenna port	
	Protocol (optional)	-CP	IEC61850 protocol (Monitor Max.108pcs batteries)	Please contact our sales before placing the order
String measuring sensor		PBMS-CM	String current measuring sensor	One per each string, each has 2 hall sensor ports, can connect Max. 2 hall sensor for multi-pole battery. Hall sensor and cable: range from 0 ~ ±1000A with 2m cable. Communication cable : 5m with RJ45 port.
		PBMS-VM	String voltage measuring sensor	One per each string (optional)
Battery cell sensor		PBAT71-02	02V / 1.2V battery cell sensor	One per battery cell
		PBAT71-12	12V battery cell sensor	One per battery cell
Accessory	Cell sensor communication cable	PBAT-COM-RJ45-50	Cable terminal: RJ45 port, length: 50cm (standard)	
	Battery measuring cable	PBAT-C1-U-M8-30	Cable terminal: U type  , hole diameter: 8mm, length: 30cm (standard)	
		PBAT-C1-O-M8-30	Cable terminal: O type  , hole diameter: 8mm, length: 30cm	
	Hall sensor for PBMS-CM	CS050EK1T5	Rated input: 50A	Measure range: 0~±100A, Φ20mm
		CS0100EK1T5	Rated input 100A	Measure range: 0~±200A, Φ40mm
		CS0200EK1T5	Rated input: 200A	Measure range: 0~±400A, Φ40mm
		CS0300EK1T5	Rated input: 300A	Measure range: 0~ ±600A, Φ40mm
CS0400EK1T5		Rated input: 400A	Measure range: 0~±800A, Φ40mm	
CS0500EK1T5	Rated input: 500A	Measure range: 0~±1000A, Φ40mm		
Optional module	HMI for local display & operation	HMI-9000Pro	10-inch touch-screen HMI for local display	One Per 12(max) PBMS9000Pro Communication with PBMS9000Pro via Ethernet
		HDR-30-12	12VDC power converter(220VAC to 12VDC)	
		DDR-15L-12	12VDC power converter(48VDC to 12VDC)	If selected HMI-PBMS9000Pro, then must select power supply converter
		RSD-30H-12	12VDC power converter(110VDC to 12VDC)	
	DC leakage current sensor	STL8S-MT2-300mA-DF	Rated input: ±300mA	Measure range: 0~±360mA, Φ72mm
	Ambient temperature & humidity sensor	H-THDRJ45	Temperature: -20°C~60°C (±0.4C) Humidity: 0~100%RH (±3%RH)	1 PBMS9000Pro can connect Max.6pcs
	DC insulation resistance sensor	PBMS-IM	Measuring range: 1KΩ~30MQ	One per each string, 1PBMS9000Pro can connect Max.6pcs
	Hydrogen (H ₂) Sensor	PBMS-H ₂	Measuring range: 0~1000ppm	One per one PBMS9000Pro
	Liquid level sensor	PBMS-ELS	Monitor liquid level, for transparent battery	One per each battery, length: 30cm
		PBMS-Y26	Monitor liquid level, for non-transparent battery	One per each battery, length: 50cm
	Leakage sensor	PBMS-LS-O35	Monitor leakage with two ports (connect to the battery +/- port)	One/Two per each battery, length: 30cm Hole diameter: 35mm
		PBMS-LS-O41	Monitor leakage with two ports (connect to the battery +/- port)	One/Two per each battery, length: 30cm Hole diameter: 41mm
	Cabinet for pre-wiring in factory	PBAT-BOX-260	Dimension: 535*260*350mm (W*H*D)	Pre-install & pre-wiring for PBMS9000Pro and HMI-9000Pro
		PBAT-BOX-730	Dimension: 535*730*335mm (W*H*D)	Pre-install & pre-wiring for Max.4 PBMS9000Pro and one HMI-9000Pro
	Ethernet switch	IES318	1. Power supply : 24VDC (12~48VDC) 2. 8 x 10/100M Ethernet ports	If selected PBAT-BOX-730, then must select IES318

Note: If battery terminal is M5, M6, M10, M12, M16, please contact our sales for customize requirements before placing the order.



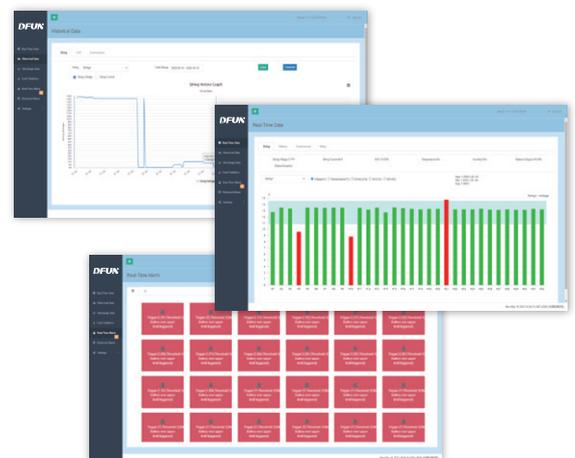
 Monitor Ni-Cd & Lead-Acid battery

 IP65 protection degree

 UL94-HB-V0 fire rating

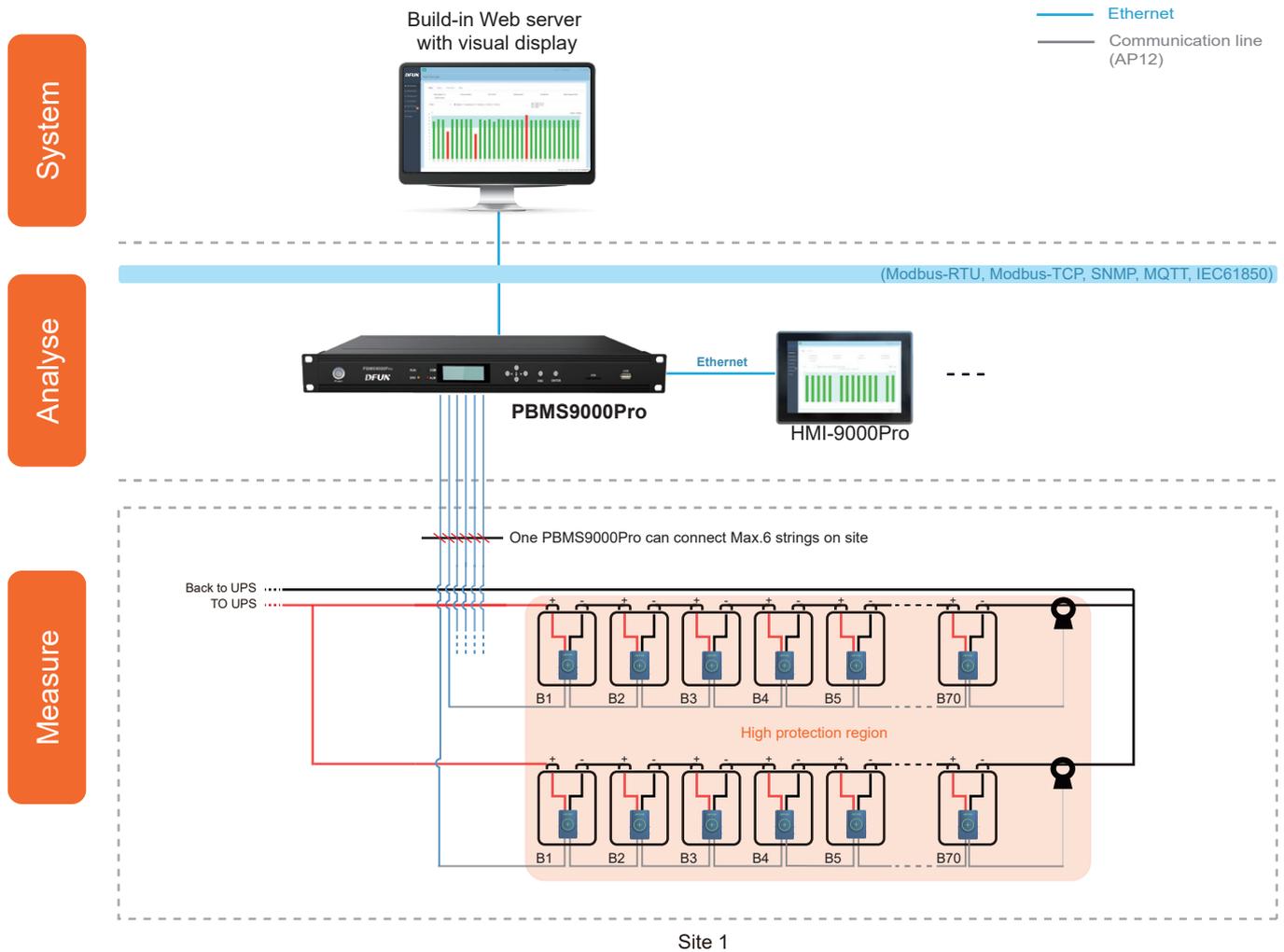
Feature

- Apply to DC power systems like oil & gas, chemical plants, power plants, etc
- Monitor Max. 6 strings and 420pcs batteries in total
- Measure Ni-Cd, Lead-Acid, and multi-pole battery
- Powered by communication bus, no consuming battery power
- Anti-interference design, support to connect with high-frequency UPS
- Auto-sensing for the battery sensor's ID address
- Support Modbus, SNMP, MQTT and IEC61850 protocols
- Support extension sensor for measuring ambient temperature & humidity, leakage current, insulation resistance (optional)
- Comply with IEEE 1188-2005
- Thermal runaway management(Optional temperature and humidity sensor)



PBMS9000Pro for Chemical Plant

System Structure



Management Layer

PBMS9000Pro Battery Monitoring System Main Controller

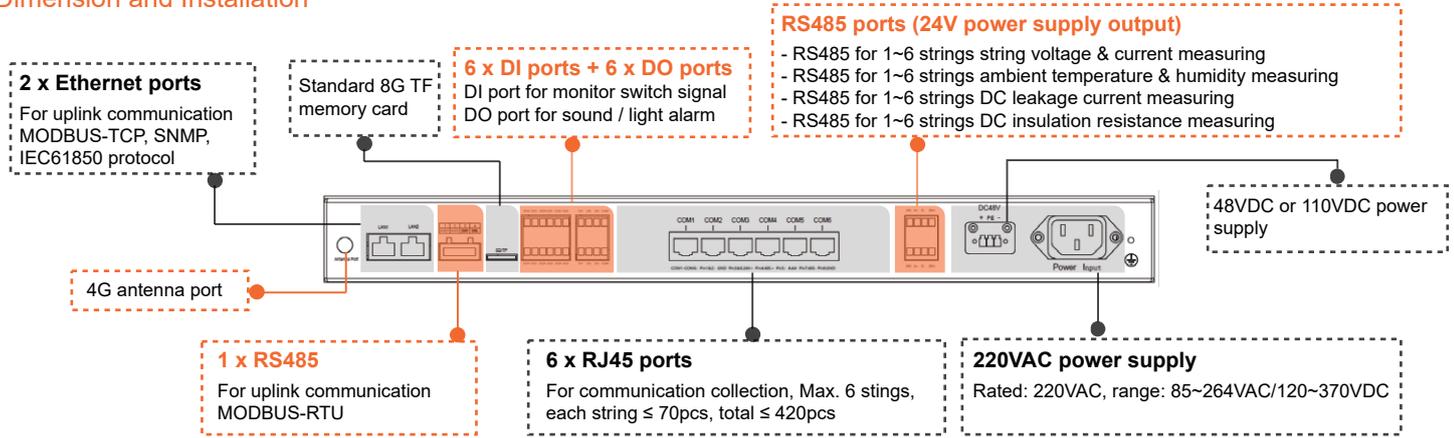
- Standard 1 U design for distribution cabinet
- Built-in web server with visual display
- Monitor Max. 6 strings battery, in a total of 420 batteries
- Measure battery string current & voltage, ripple voltage & current, charge & discharge current, internal temperature, impedance, insulation resistance, leakage current, SOC and SOH
- Setpoint alarm for cell voltage, internal temperature, impedance, SOC, SOH (upper / lower limit) and string voltage, current, SOC (upper / lower limit)
- Alarm message by SMS or Email
- Support Modbus-TCP, Modbus-RTU, SNMP and IEC61850 protocols
- Support MQTT for JSON format to data upload
- 1 RS485 port, 2 Ethernet ports and 1 4G Antenna port to data upload
- 6 DI ports (digital Input connecting)
- 6 DO ports (sound and light alarm)



Pre-install & pre-wiring for PBMS9000Pro and HMI-9000Pro IP54 (optional)



Dimension and Installation



Technical Specification

CPU	ARM cortex A7 528MHz	Up-link communication	2 Ethernet ports(10/100M),MODBUS-TCP,SNMP, 1RS485 portMODBUS-RTU,baudrate: 9600bps, 19200bps, 38400bps(optional)	
Memory	512MB DDR3, 4G EMMC + 8G TF memory card		Down-link communication	6 channels RJ45 ports,each port Max. connect 70pcs batteries
MTBF	$\geq 100,000$ hours	Measure range		Voltage
Display	2-inch LCD with backlight		Current	1 ~ 6 strings, range: -1100 ~ 1100ADC ($\pm 1.0\%$ fs, under 20°C ~ 30°C), resolution: 0.01A
Dimension	Standard 19-inch 1 U device 483mmx206mmx44.5mm(W*D*H) Openhole:440mmx46mm(L*H)	Operation environment	Operating temperature: -15°C ~ 55°C Storage temperature: -40°C ~ 70°C Humidity: 10 ~ 95% RH, non-condensing	
Power consumption	<15W(only main controller)		Extension sensor (optional)	-RS485 for 1~6 strings string voltage & current measuring -RS485 for Max. 6 strings ambient temperature & humidity measuring -RS485 for 1~6 strings DC leakage current measuring -RS485 for 1~6 strings DC insulation resistance measuring
Additional port	6 x DI dry contact 6 x DORELAYoutput, 250VAC/5A or 30VDC/5A			
Power supply	V1:220VAC,range:85~264VAC/120~370VDC V2: 48VDC, range:18~72VDC V3: 110VDC,range:43~160VDC			

String Measuring Sensor

String Current Measuring Sensor - Hall Sensor

- Measure battery string charge and discharge current
- Measure multi-pole battery's string charge and discharge current and ripple current with flexible module and hall sensor
- Accessories:
 - 1) Hall sensor and cable: range from 0~ ± 1100 A with 2m cable
 - 2) Communication cable : 0.3m with AP12 port



Hall Sensor

Item	Power supply	Measuring range	Environment
		String current	
Hall Sensor	24VDC (range: 16 ~ 32VDC) Power consumption: <1W	1 Hall sensor: -1100 ~ 1100A	Working temperature: 0°C ~ 45°C Working temperature limit: -15°C ~ 55°C

PBMS9000Pro for Chemical Plant

Battery Cell Sensor

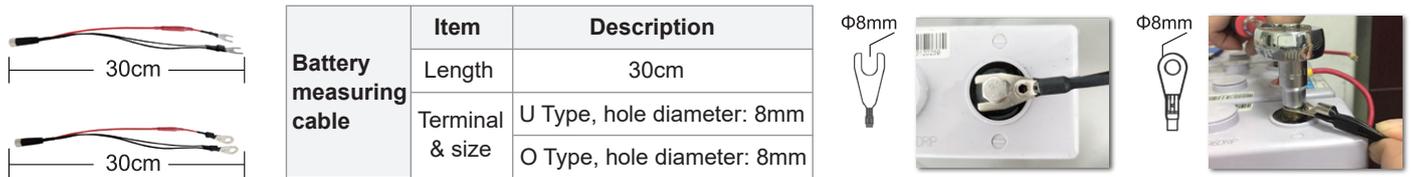
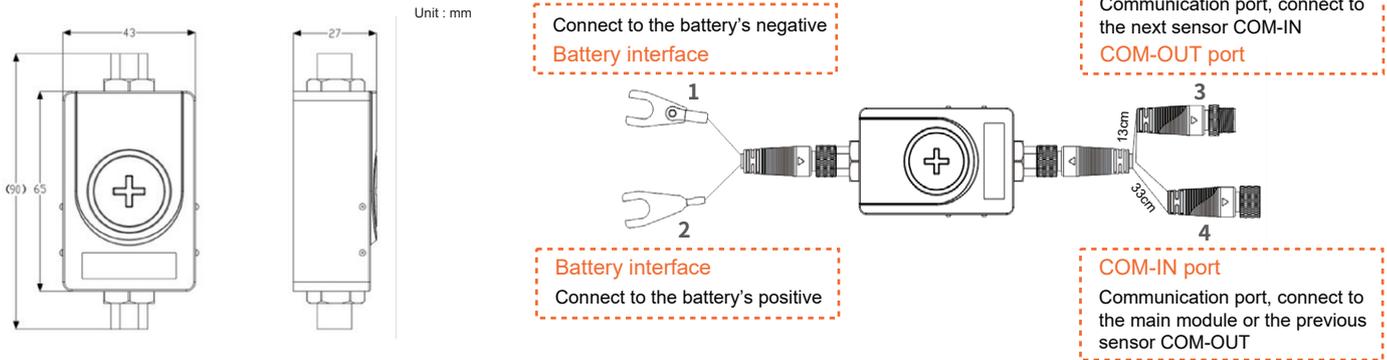
PBAT81-02 / PBAT81-12 Battery Cell Sensor

- PBAT81-02 for 2V Lead-Acid battery or 1.2V Ni-Cd battery
PBAT81-12 for 12V Lead-Acid battery
- Monitor individual battery voltage, internal temperature (negative pole), impedance(ohmic value)
- Auto-balancing
- IP65 protection degree
- UL94-HB-V0 fire rating
- Powered by communication bus, no draw any power from the batteries

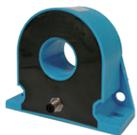


Item	Power supply	Rated input voltage	Measuring range		
			Voltage	Internal temperature	Impedance
PBAT81-02	24VDC Power consumption: <0.25W	02V / 1.2V	0.5 ~ 3VDC (±0.2%)	-20°C ~ 85°C (±0.5°C)	Range: 0.1mΩ ~ 50mΩ Repeatability error: 1.0%±25μΩ Conformity error: 1.5% ±25μΩ
PBAT81-12		12V	5 ~ 18VDC (±0.2%)		

Dimension



Extension Sensor (Optional)



- DC leakage current sensor**
- Measurement accuracy: ±1%FS
 - Monitoring string leakage current to prevent fire caused
 - Cable: 2 meter hall sensor port to 4P terminal wire



- Ambient temperature & humidity sensor**
- Dual RJ45 interface, fast wiring support cascade use
 - Adsorption by magnet
 - Cable: 5 meter RJ45 convert to 4P terminal wire



- DC insulation resistance sensor**
- Measuring range: 1KΩ ~ 30MΩ
 - Measurement accuracy: 10% (100KΩ ~ 50KΩ)
 - Cable: 2 meter 4P port to 4P terminal wire



- Hydrogen (H₂) sensor**
- Class of protection: IP65
 - Measuring range: 0~1000ppm
Accuracy: ±5%FS
Resolution: 1ppm
 - Cable: 2 meter Aviation port to 4P terminal wire

Order Information

System Structure		Model	Description	Remark
Management layer	BMS Main Controller	PBMS9000Pro-V1	48VDC power supply Battery monitoring system main controller	One per each UPS One PBMS9000Pro can monitor Max.6 strings, Max.100pcs batteries
		PBMS9000Pro-V1-L	48VDC power supply, Battery monitoring system main controller with 4G antenna port	
		PBMS9000Pro-V2	220VAC power supply Battery monitoring system main controller	One per each UPS One PBMS9000Pro can monitor Max.6 strings, Max.420pcs batteries
		PBMS9000Pro-V2-L	220VAC power supply, Battery monitoring system main controller with 4G antenna port	
		PBMS9000Pro-V3	110VDC power supply Battery monitoring system main controller	One per each UPS One PBMS9000Pro can monitor Max.6 strings, Max.218pcs batteries
		PBMS9000Pro-V3-L	110VDC power supply, Battery monitoring system main controller with 4G antenna port	
	Protocol (optional)	-CP	IEC61850 protocol (Monitor Max. 108pcs batteries)	Please contact our sales before placing the order
Battery cell sensor		PBAT81-02-A	02V / 1.2V battery cell sensor	Terminal material: industrial plastic
		PBAT81-12-A	12V battery cell sensor	
		PBAT81-02-B	02V / 1.2V battery cell sensor	Terminal material: industrial metal
		PBAT81-12-B	12V battery cell sensor	
		PBAT81-DZ	Base, snap-in DIN-rail installation	One per each cell sensor (optional)
Accessory	AP to RJ45 convert cable	PBAT-COM-AP12-RJ45	Length: 10m	If management layer choose PBMS9000Pro, one per each string
	Cell sensor communication cable	PBAT-COM-AP12-30	IP65 with aviation connectors, length: one side 33cm, other side 13cm	If PBAT81 is meta terminal, the aviation connectors of cable also is metal
	Battery measuring cable	PBAT-C1/AP12-U-M8	Cable terminal: U type  , hole diameter: 8mm, length: 30cm (standard)	
		PBAT-C1/AP12-O-M8	Cable terminal: O type  , hole diameter: 8mm, length: 30cm	
	Group current monitoring module sensor	ST50K2S-M-DF	Rated input: 50A	Measure range: 0~±55A, Φ20mm
		ST100K2S-M-DF	Rated input 100A	Measure range: 0~±110A, Φ40mm
		ST200K2S-M-DF	Rated input: 200A	Measure range: 0~±220A, Φ40mm
		ST300K2S-M-DF	Rated input: 300A	Measure range: 0~ ±330A, Φ40mm
		ST400K2S-M-DF	Rated input: 400A	Measure range: 0~±440A, Φ40mm
		ST500K2S-M-DF	Rated input: 500A	Measure range: 0~550A, Φ40mm
ST800K2S-M-DF		Rated input: 800A	Measure range: 0~±880A, Φ40mm	
	ST1000K2S-M-DF	Rated input: 1000A	Measure range: 0~±1100A, Φ40mm	
Optional module	HMI for local display & operation	HMI-9000Pro-IP54	10-inch touch-screen HMI for local display & operation IP54	One Per 12(max) PBMS9000Pro Communication with PBMS9000Pro via Ethernet
		HDR-30-12	12VDC power coverter (220VAC to 12VDC)	If selected HMI-PBMS9000Pro, then must select power supply converter
		DDR-15L-12	12VDC power coverter (48VDC to 12VDC)	
		RSD-30H-12	12VDC power coverter (110VDC to 12VDC)	
	DC leakage current sensor	STL8S-MT2-300mA-DF	Rated input: ±300mA	Measure range: 0~±360mA, Φ72mm
	Ambient temperature & humidity sensor	H-THDRJ45	Temperature: -20°C~60°C (±0.4C) Humidity: 0~100%RH (±3%RH)	1 PBMS9000Pro can connect Max.6pcs
	DC insulation resistance sensor	PBMS-IM	Measuring range: 1KΩ~30MQ	One per each string, 1PBMS9000Pro can connect Max.6pcs
	Hydrogen (H ₂) Sensor	PBMS-H ₂	Measuring range: 0~1000ppm	One per one PBMS9000Pro
	Cabinet for pre-wiring in factory	PBAT-BOX-260	Dimension: 535*260*350mm (W*H*D)	Pre-install & pre-wiring for PBMS9000Pro and HMI-9000Pro
		PBAT-BOX-730	Dimension: 535*730*335mm (W*H*D)	Pre-install & pre-wiring for Max.4 PBMS9000Pro and one HMI-9000Pro
Ethernet switch	IES318	1. Power supply: 24VDC (12~48VDC) 2. 8 x 10/100M Ethernet ports	If selected PBAT-BOX-730, then must select IES318	

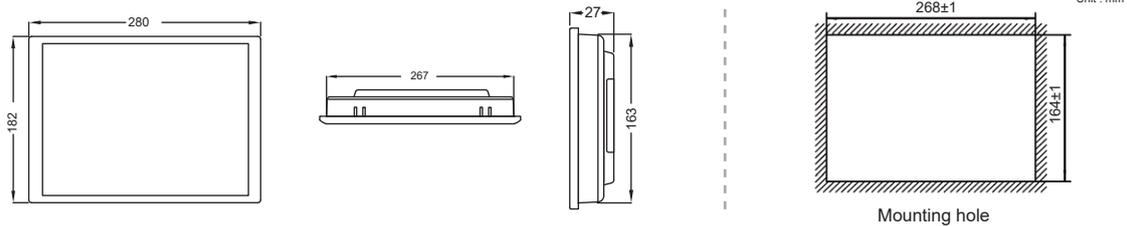
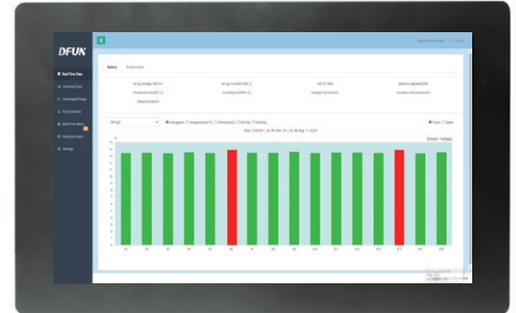
Note: If battery terminal is M5, M6, M10, M12, M16, please contact our sales for customize requirements before placing the order.

HMI (Optional)

Local Display & Operation for Different Main Controller

10.1-inch Android HMI

- 10.1" inch touch-screen HMI for local display and operation
- OS: Android 10.0
- CPU: R818 (4-core A53 1.6GHz)
- Running memory: 1GB,
- EMMC: 8GB
- Support the reading and configuration of all parameters of the system

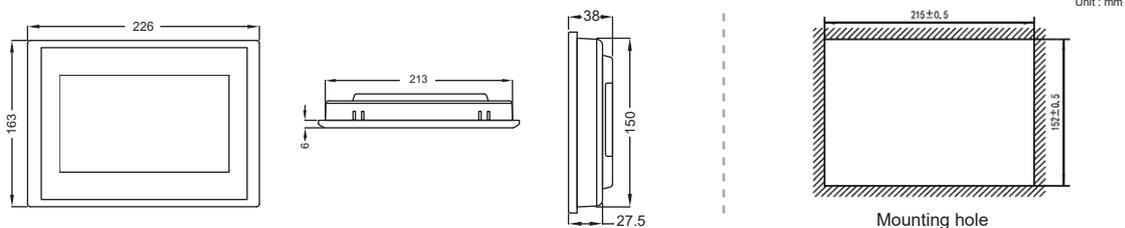


Order Information

Model	Description	Remark
HMI-9000	One per PBMS9000 main controller	One per 12 (max) PBMS9000, Communication with PBMS9000 via Ethernet
HMI-9000Pro	One per PBMS9000Pro main controller	One per 12 (max) PBMS9000Pro, Communication with PBMS9000Pro via Ethernet

7-inch Normal HMI

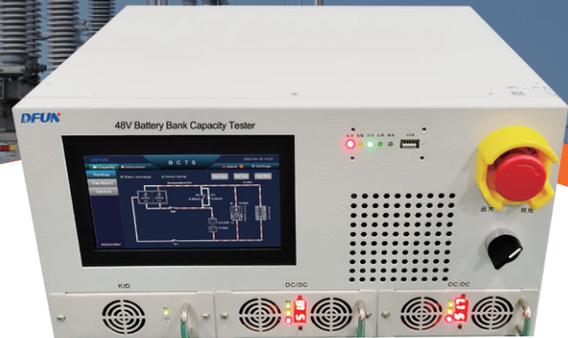
- 7-inch touch-screen HMI for display and operation
- **Real-time data inquiry:**
 - 1) Individual battery voltage, impedance, inner temperature, SOC, SOH
 - 2) String voltage, charge and discharge current, SOC, balance degree
- **Alarm data inquiry:**
 - 1) Real-time alarm status and related alarm information (faulty battery ID, date/time, alarm reason, communication status, etc.)
 - 2) 3000 alarm records for each string battery



Order Information

Model	Description	Remark
HMI-2000	One per PBMS2000 main controller	One per PBMS2000, communication with PBMS2000 via RS485
HMI-Gate	One per PBAT-Gate main controller	One per PBAT-Gate, communication with PBAT-Gate via Ethernet

DFCT48 48V Battery Bank Capacity Tester



Battery protection

Pre-charging to balance the voltage difference of the busbar, which can prevent the battery from being shocked by high voltage difference and large current.



Stable performance

Isolation design with primary side, secondary side structural, strong anti-interference and stable operation



Safety & Energy saving

Adopt real load discharge, boost constant current discharge, circuit physical isolation



Cost saving

Online discharge capacity tester, extend battery life & maintenance-free

Master Station

DFCS4100
Capacity Tester System

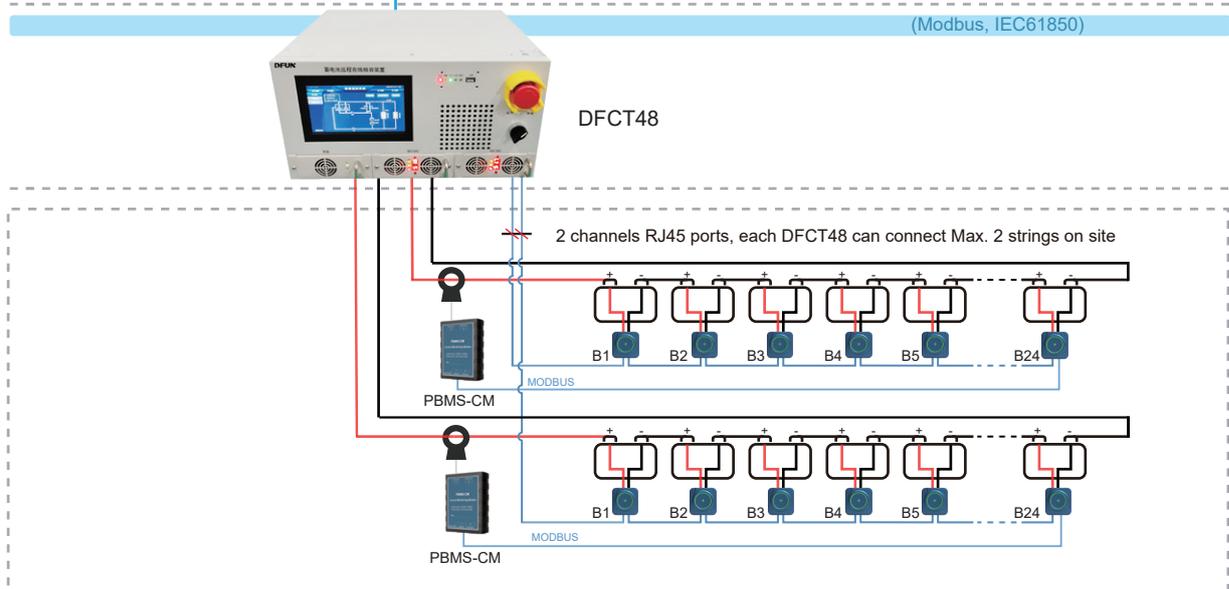


Multiple alarm methods



— Ethernet
— RS485
— RJ11

Site 1



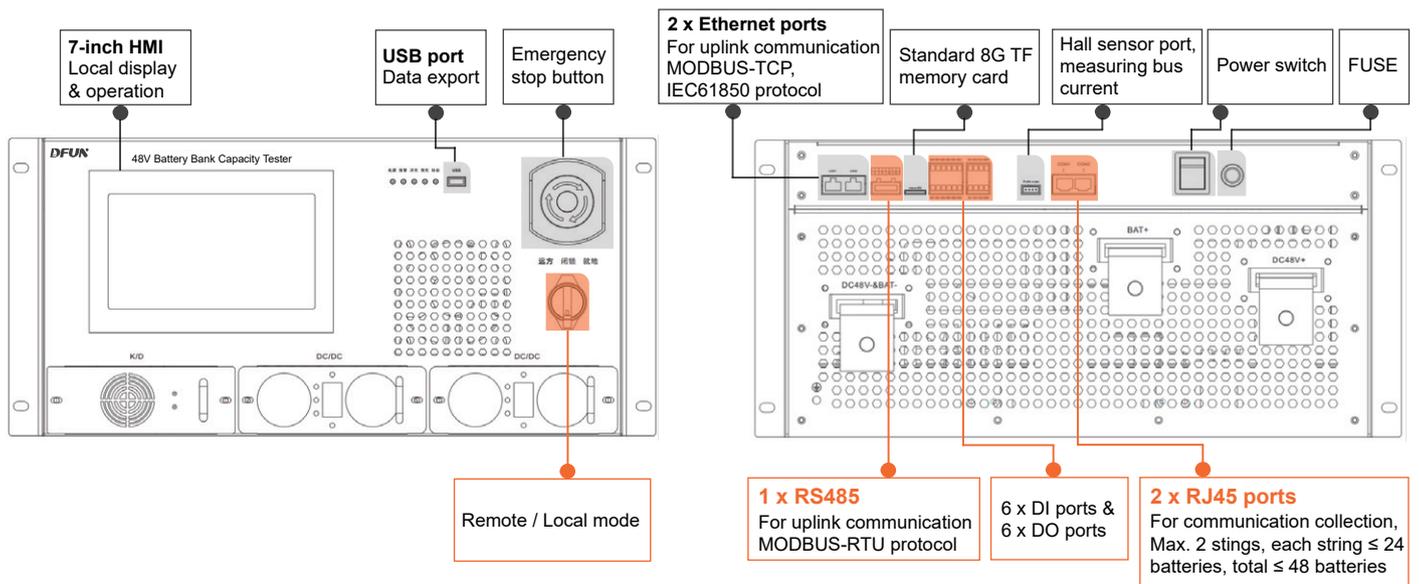
48V Battery Bank Capacity Tester

Feature

- Apply to 48V power systems, like substation, telecom site, railway transport
- Integrated battery bank capacity tester, battery monitoring
- Discharge the actual load by DC/DC voltage boost, without additional dummy load
- Build-in BMS : monitor battery voltage, charge and discharge current, impedance, internal temperature, environment temperature & humidity, voltage & current
- Historical data storage for 3 years, support query and export
- Shallow charging and discharging to activate the battery regularly, extended battery life
- Build-in touch screen HMI
- IEC61850, Modbus communication protocol



Terminal Introduction



7-inch HMI for local display & Optional



Capacity tester report



Battery parameters



History alarm

Technical Specification

CPU	ARM cortex A7 528MHz	Display	7-inch LCD for local display & operation	
Memory	512MB DDR3, 4G EMMC + 8G TF memory card			
MTBF	≥ 100,000 hours	Measure range	Current	1~2 strings, range: -2000 ~ 2000V (±2.0%, under 15 °C ~ 35 °C), resolution: 0.01A
Power supply	Rated: 48VDC Standby consumption: 45W		Ripple current	1~2 strings, according to the rated current of the hall sensor, range: 0 ~ 0.4*I (peak), resolution: 0.01A
Up-link communication	- 2 Ethernet ports (10/100M), (MODBUS-TCP, IEC61850) - 1 RS485 port (MODBUS-RTU)		Voltage	1~2 strings, range: 20 ~ 1000VDC (±0.5%), resolution: 0.01V
Down-link communication	2 channels RJ45 ports (connect 1~2 strings, each string ≤ 24 batteries, total Max. 48 batteries)	Operation environment	Working temperature: -15 °C ~ 60 °C Storage temperature: -40 °C ~ 70 °C Humidity: 10% ~ 95% non-condensing	
Oscillatory waves immunity test	GB/T17626.12-1998 (IEC61000-4-12:1995), Level 3			
Electrostatic discharge immunity test	GB/T17626.2-2006 (IEC61000-4-2:2008), Level 3			
RF electromagnetic field immunity test	GB/T17626.3-2006 (IEC61000-4-3:2006+A1:2007+A2:2010), Class A			
Electrical fast transient immunity test	GB/T17626.4-2008 (IEC61000-4-4:2012), Level 3			
Surge immunity test	GB/T17626.5-2008 (IEC61000-4-5:2014+A1:2017), Level 3			
RF conducted immunity test	GB/T17626.6-2008 (IEC61000-4-6:2013), Class A			
Power frequency magnetic field immunity test	GB/T17626.8-2008 (IEC61000-4-8:2009), V			
Electromagnetic emission limits test	GB/T14598.16-2002 (IEC60255-25:2000), Comply			

String Measuring Sensor

PBMS-CM String Current Measuring Sensor & Hall Sensor

- One string need 1 PBMS-CM, each PBMS-CM with 2 hall sensor ports
- Measure battery string charge and discharge current, ripple current
- Measure multi-pole battery's string charge and discharge current and ripple current with flexiable module and hall sensor
- Accessories:
 - 1) Hall sensor and cable: range from 0~±1000A with 2m cable
 - 2) Communication cable : 5m with RJ45 port



PBMS-CM



Hall Sensor

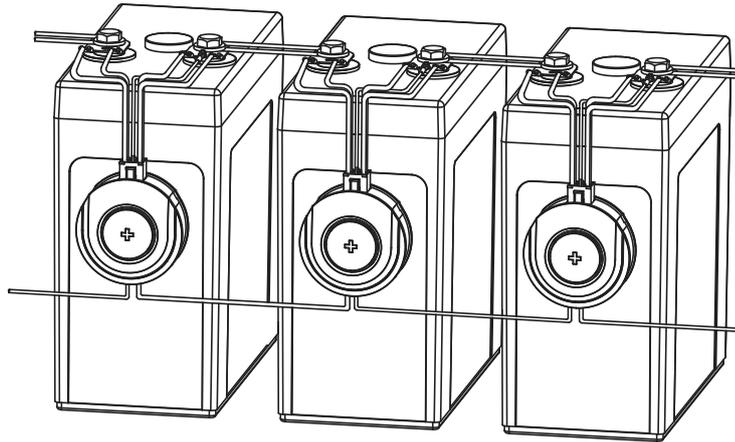
Item	Power supply	Measuring range		Environment
		String current	Ripple current	
PBMS-CM	24VDC (range: 9 ~ 32VDC) Power consumption: <0.5W	1 Hall sensor: -1000 ~ 1000A 2 Hall sensor: -2000 ~ 2000A (±2.0%, 15°C ~ 35°C)	20% of Hall sensor Rated current (peak value) Frequency: 50Hz ~ 1KHz	Working temperature: 0°C ~ 45°C Working temperature limit: -15°C ~ 55°C Humidity: 5% ~ 95%RH, non-condensing Storage temperature: -40°C ~ 70°C

48V Battery Bank Capacity Tester

Order Information

System Structure	Model	Description	Remark
Management layer	DFCT48-21	48V Battery Bank Capacity Tester	100A discharge,200A load for 1 string.
	DFCT48-22		100A discharge,200A load for 2 strings.
	DFCT48-41		100A discharge,400A load for 1 string.
	DFCT48-42		100A discharge,400A load for 2 strings.
	DFCT48-61		200A discharge,600A load for 1 string.
	DFCT48-62		200A discharge,600A load for 2 strings.
BMS layer	DFCT-BMS-02	Contents :24 x PBAT71-02 1 x PBMS-CM、 1 x Hall	Hall specifications Based on the host type DFCT48-21 and DFCT48-22 Hall select CS200EK2T5
	DFCT-BMS-12	Contents :4 x PBAT71-12 1 x PBMS-CM、 1 x Hall	DFCT48-41 and DFCT48-42 Hall select CS300EK2T5 DFCT48-61 and DFCT48-62 Hall select CS400EK2T5

Note: If battery terminal is M5, M6, M10, M12, M16, please contact our sales for customize requirements before placing the order.



Case Study & Our Clients

Chapter 3

Case Study

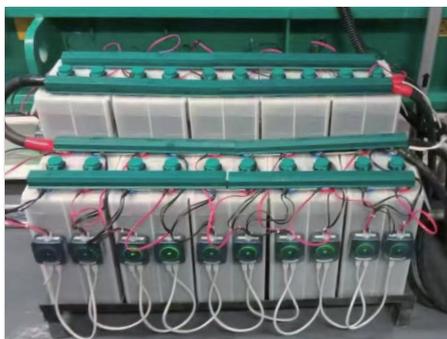
Data Center

Thailand True IDC Bangna Data Center
Thailand Suvarnabhumi Airport
Malaysia Intel Data Center
Malaysia Ekova Data Center
Qatar OOREDOO Google Data Center
Qatar Lusail Towers Data Center
Dubai Gulf Data Hub Data Center
Chile Entel Data Center
Chile Claro Telecommunication
Singapore Changi Airport
Indonesia TELKOMSEL Server Room
Indonesia PLN Island Energy Storage
South Africa MTN Data Center
Turkey Turkcell Date Center
Vietnam VIETEL Data Center
ChinDATA - ChinaNorth H02 Data Center
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Oil & Gas

BASF Chemical Factory International
Saudi Arabian Oil Company (Saudi Aramco)
Malaysia Petronas
Morocco O.C.P Phosphate Factory



Transportation

Russia Moscow Metro Station
Australia Northconnex Traffic
Sydney North Connex Rail
Thailand MRT Yellow line & Pink Line
XinJiang RailWay Station (Line 1)
HeFei RailWay Station (Line 2)
Chengdu Modern Tram (Line 2)
Changsha Metro Station (Line 4)
Harbin RailWay Station (Line 3)
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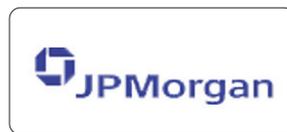


Bank & Substation

CHINA CITIC BANK (30 Branches)
Malaysia Bank of Negara
Thailand KTB BANK
Thailand GHB (Government Housing Bank)
Iran HREC Substation
Romania TRANSELECTRICA Substation
Romania Nama Raureni Substation
Singapore Panitan-Nanbas Substation Line 2
Greece IPTO Substation
.....



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