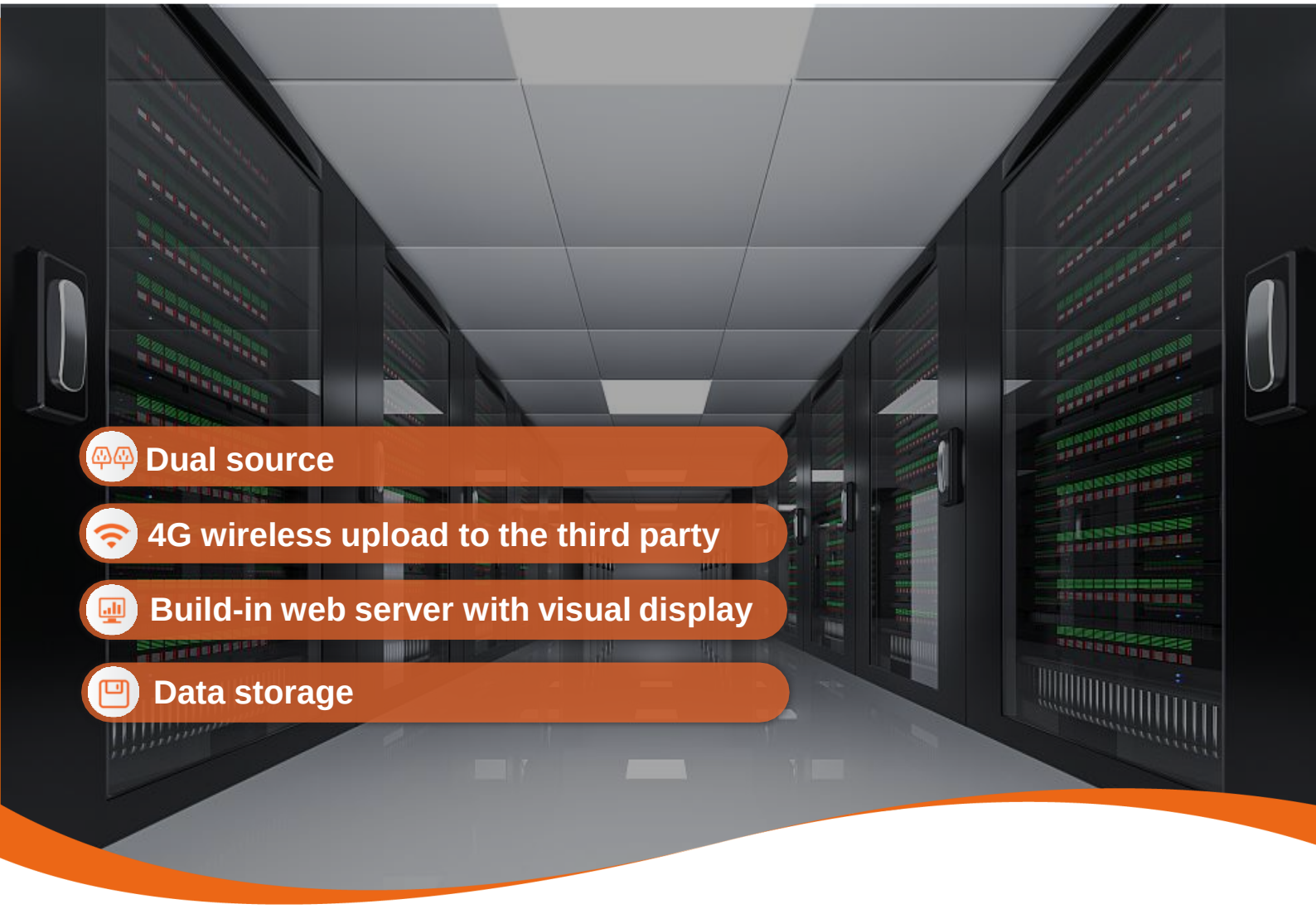
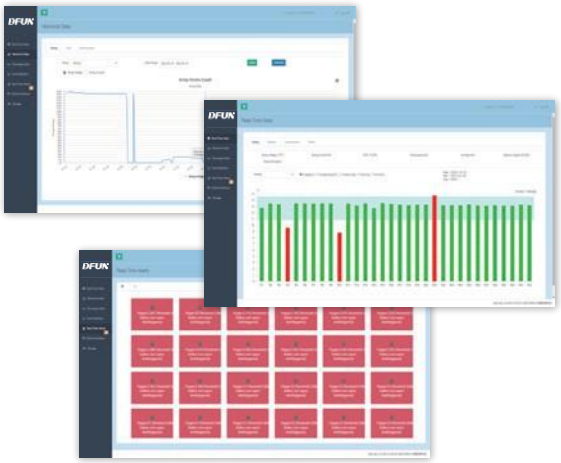
PBMS9000
Battery Monitoring Solution



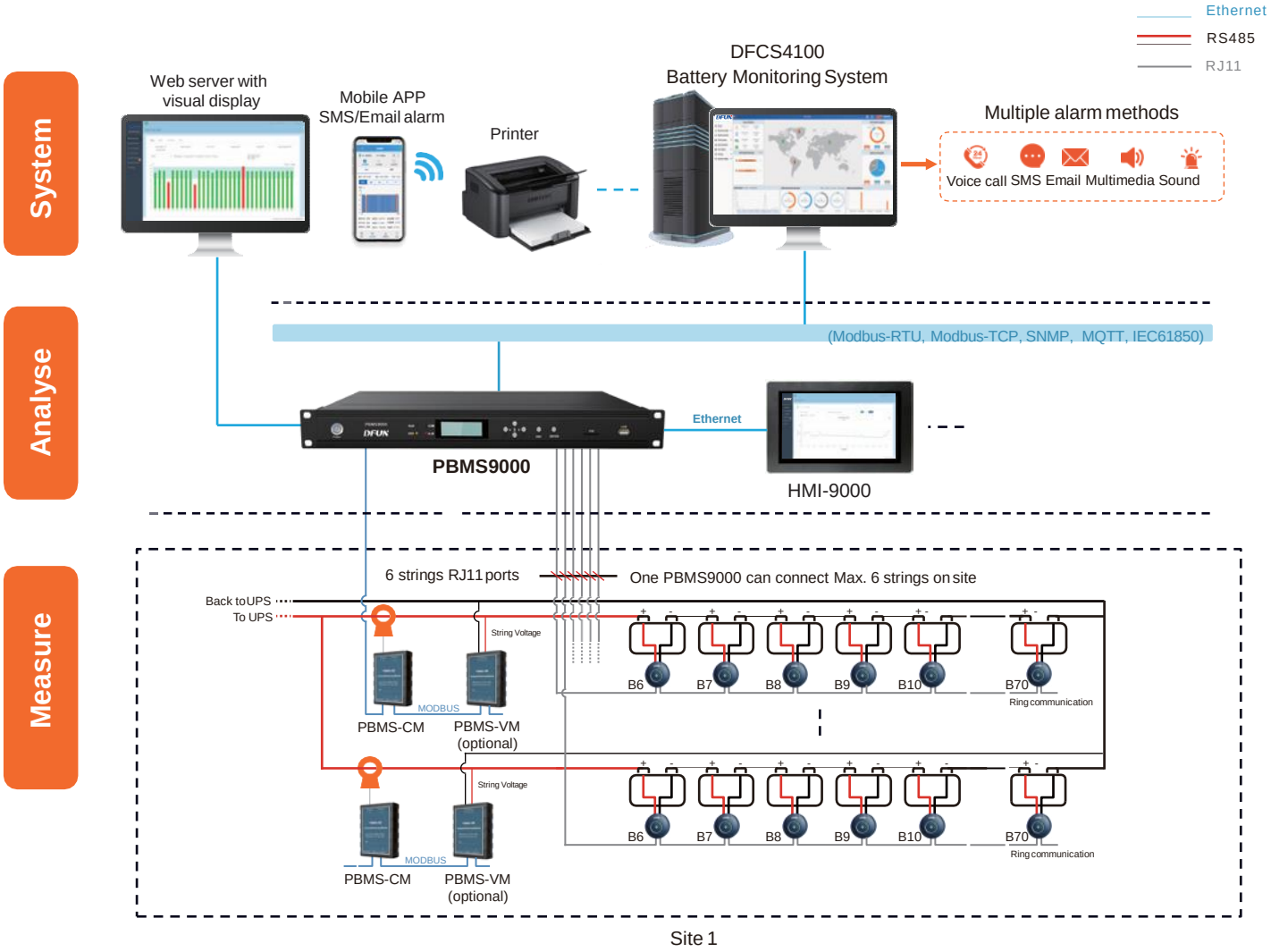
Feature

- 24/7 hours on-line monitoring & remote alarms notification
- 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



PBMS9000 Battery Monitoring Solution

System Structure



Management Layer

PBMS9000 Battery Monitoring Module

- 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, 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)

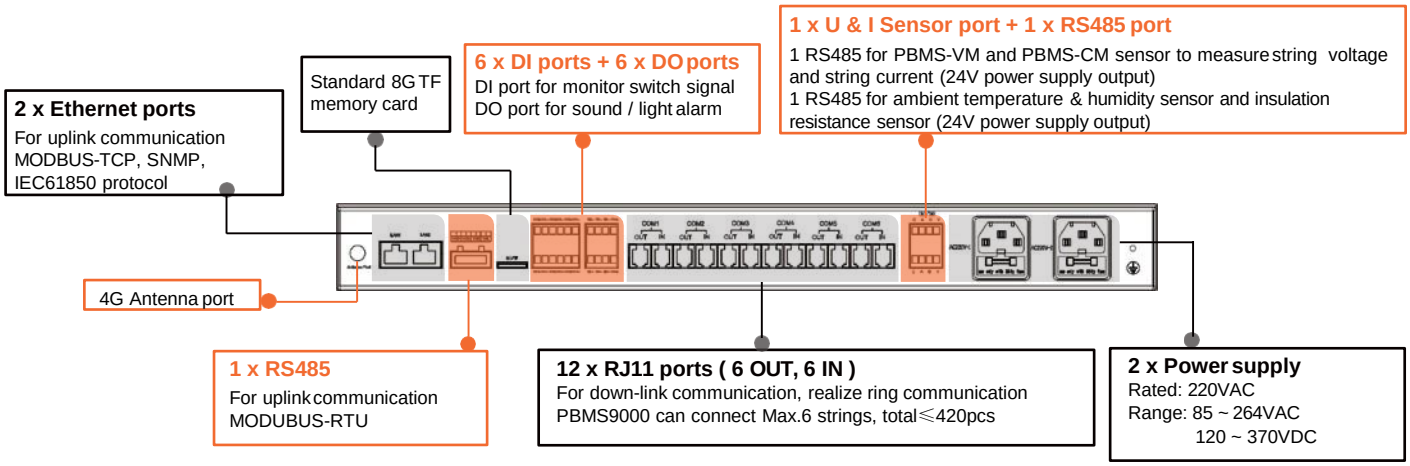


Pre-install & pre-wiring for PBMS9000 and HMI-9000 (optional)



PBMS9000 Battery Monitoring Solution

Dimension and Installation



Technical Speciation

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 ≤ 70pcs batteries, total Max. 420pcs	
Display	2-inch LCD with backlight	**Measure range**	Voltage	1~6 strings, range: 8 ~ 1000VDC (±0.5%), resolution：0.01V
MTBF	≥ 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 (±2.0%, under 15°C ~ 35°C), resolution：0.01A
Dimension	Standard 19-inch 1 U device 483mm × 206mm × 44.5mm Open hole: 440mm×46mm (L*H)		Ripple current	1~6 strings, according to the rated current of the hall sensor, range: DC 0 ~ 0.4*I (peak), resolution：0.01A
Power consumption	< 15W (only module)	**Ambient temperature & humidity**	1 ~ 6 in series Temperature: -20°C ~ 60°C (±0.4°C), resolution: 0.1°C Humidity: 0 ~ 100%RH (±3%RH), resolution: 0.1%RH	
Additional port	1 x RS485 (ambient temperature & humidity) 6 x DI dry contact 6 x DO relay output, 250VAC/5A or 30VDC/5A	**Operation environment**	Working temperature: -15°C ~ 55°C Storage temperature: -40°C ~ 70°C Humidity: 5% ~ 95% non-condensing	

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~±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

PBMS9000 Battery Monitoring Solution

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



DC insulation resistance sensor

- Measuring range: 1KΩ ~ 30MΩ
- Measurement accuracy: 10% (100KΩ ~ 50KΩ)

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



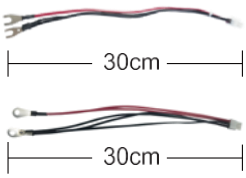
Running status



Abnormal status

Item	Rated input voltage	Measuring range			
		Voltage	Internal temperature	Impedance	Power consumption
PBAT61-02	02V	1.6 ~ 2.6V (±0.2%)	-20°C ~ 85°C (±0.5%)	Range: 0.1mΩ~50mΩ Repeatability error: 1.0%±25μΩ Conformity error: 1.5%±25μΩ	Running: <110mW Sleeping: <12mW
PBAT61-06	06V	4.8 ~ 10V (±0.2%)			Running: <90mW Sleeping: <10mW
PBAT61-12	12V	7.5 ~ 15.6V (±0.2%)			Running: <90mW Sleeping: <10mW

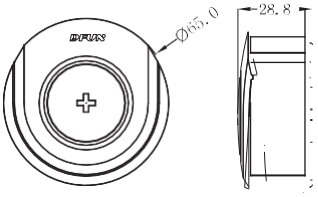
➢ Dimension and Installation

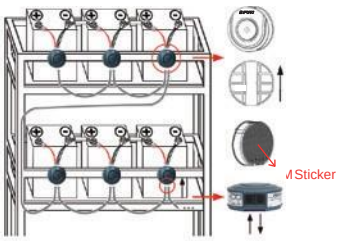


Battery measuring cable	Item	Description
	Length	30cm
	Terminal & Size	U type, hole diameter: 8mm
		O type, hole diameter: 8mm









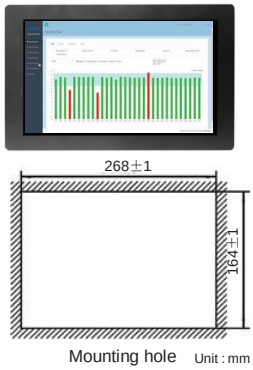




PBMS9000 Battery Monitoring Solution

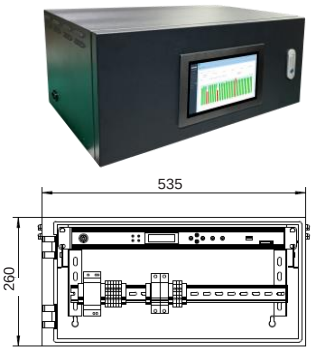
Optional Module

HMI-9000 for Local Display and Operation



- 10.1- inch touch-screen HMI
- Dimension: 183*280*27mm (H*W*D)
- Open hole: 165* 269±1mm(H*W*D)
- OS: Android 10.0
- Support the reading and configuration of all parameters of the system

PBAT-BOX-260



- Pre-install & pre-wiring for PBMS9000
- Pre-mount HMI-9000 if selected
- Provide wiring drawing
- Dimension: 535*260*350mm (W*H*D)
- Material: Aluminum alloy, with lock

Order Information

System Structure		Model	Description	Remark
Management layer		PBMS9000-L	Battery Monitoring Module with 4G antenna port (Standard)	One per each UPS One PBMS9000 can monitor Max. 6 strings, Max. 420pcs batteries
		PBMS9000-L-CP	Battery Monitoring Module with 4G antenna port, IEC61850 protocol	
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	6V 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 ~ ±200A, Φ40mm
		CS200EK2T5	Rated input: 200A	Measure range: 0 ~ ±400A, 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 one PBMS9000 Communication with PBMS9000 via Ethernet
	Ambient temperature & humidity	H-THDRJ45	LCD display	1 PBMS9000 can conncet Max. 6pcs
	DC insulation resistance sensor	PBMS-IM	Measuring range: 1KΩ ~ 30MΩ	One per each string, 1 PBMS9000 can connect Max. 6pcs
	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

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Your Representative