Battery Monitoring Solution for High Protection Applications



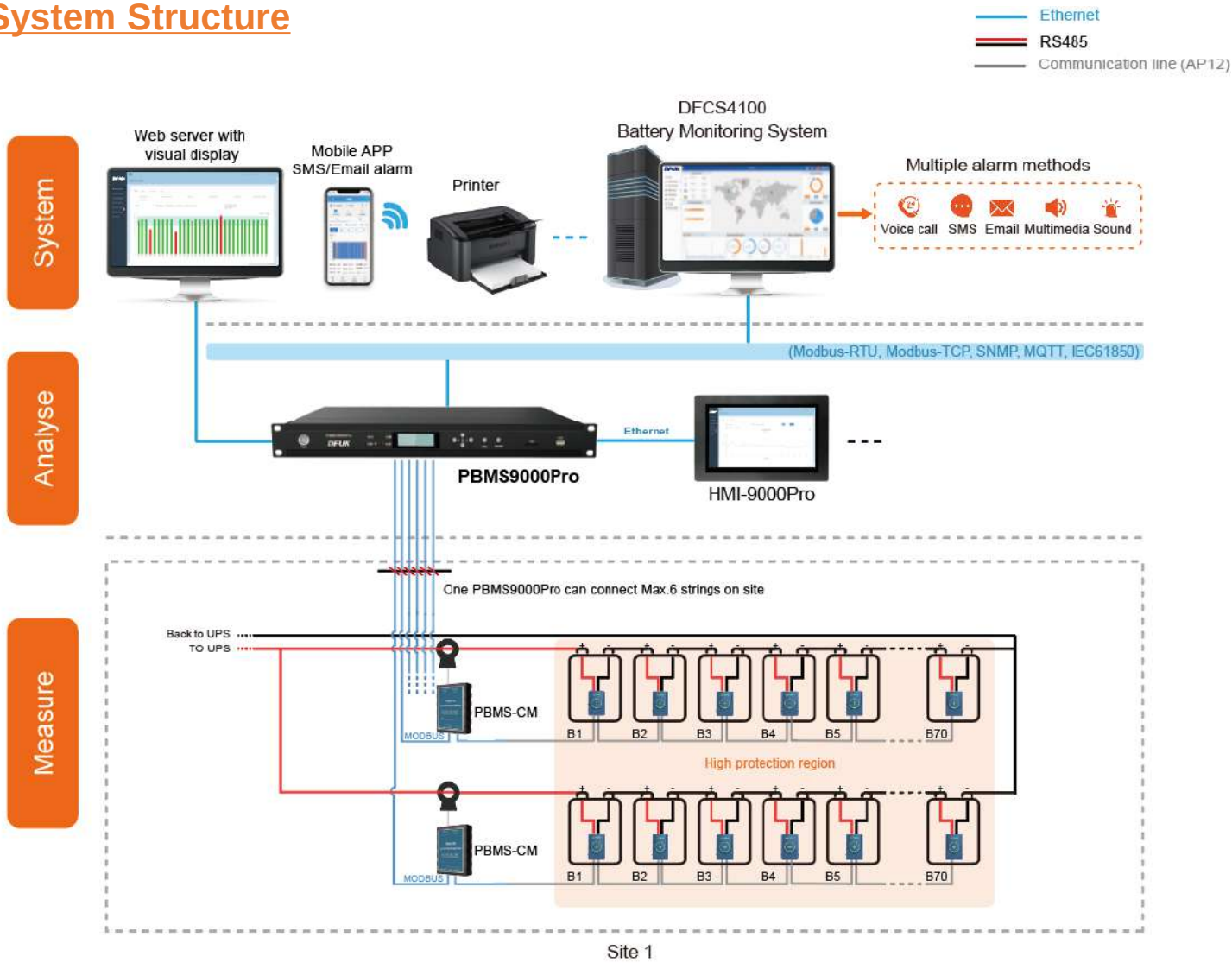
Feature

- 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 muti-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



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System Structure



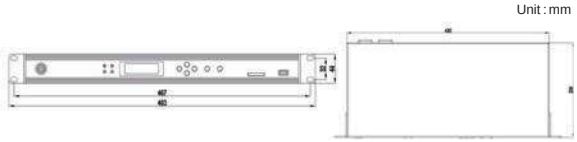
Management Layer

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)



Unit : mm

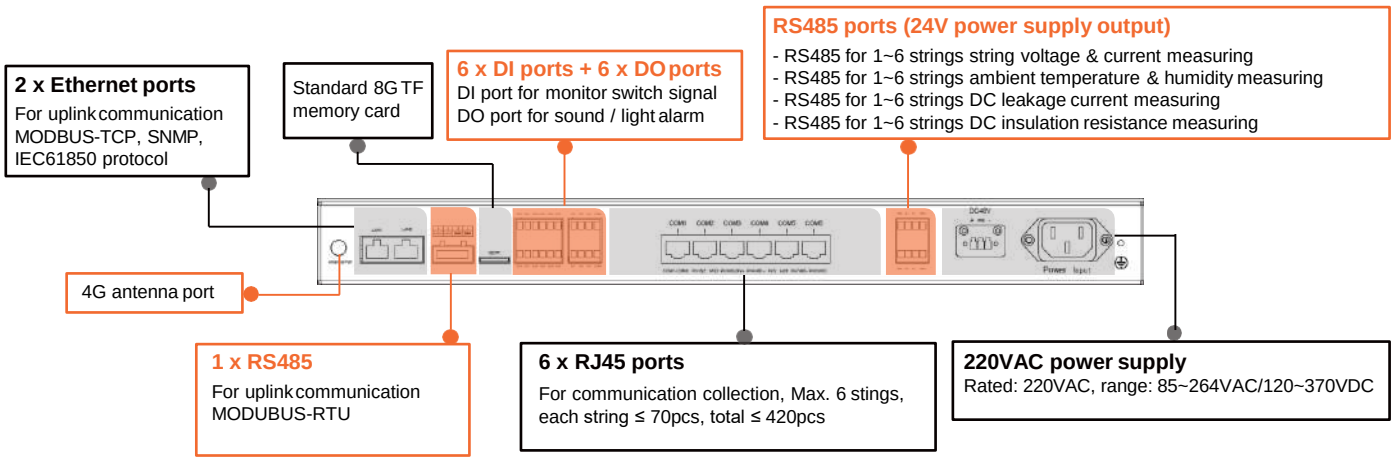


Pre-install & pre-wiring for PBMS9000Pro and HMI-9000Pro (optional)



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Dimension and Installation



Technical Specification

CPU	ARM cortex A7 528MHz	**Up-link communication**	2 Ethernet ports (10/100M), MODBUS-TCP, SNMP, 1 RS485 port, MODBUS-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	1 ~ 6 strings, range: 8 ~ 1000VDC (±0.5%), resolution：0.01V
Display	2-inch LCD with backlight		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 (W*D*H) 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 main controller)	**Operation environment**	Operating temperature: -15℃ ~ 55℃ Storage temperature: -40℃ ~ 70℃ Humidity: 10 ~ 95% RH, non-condensing	
Additional port	6 x DI dry contact 6 x DO relay output, 250VAC/5A or	**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	

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 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





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

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



PBAT81

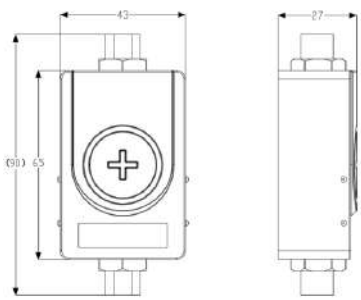


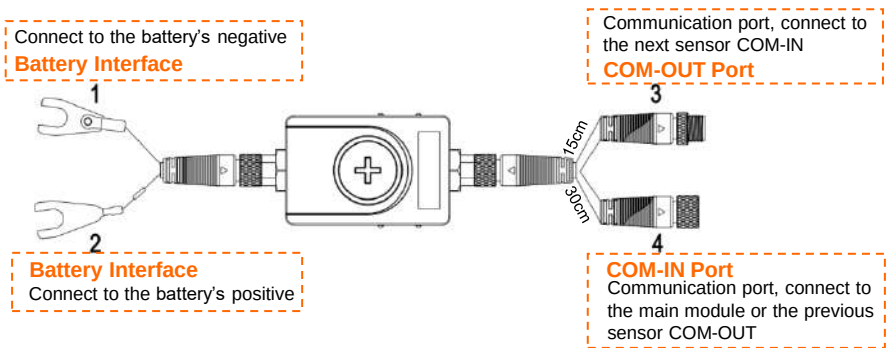
Base (Optional)
Snap-in DIN-rail installation

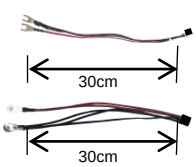


Item	Power supply	Rated input voltage	Measuring range		
			Voltage	Internal temperature	Impedance
PBAT81-02	24VDC Power consumption: <0.25W	02V / 1.2V	0.5 ~ 3VDC (±0.2%)	-20°C ~ 85°C (±0.5°C)	Range: 0.1mΩ ~ 50mΩ Repeatability error: 1.0%±25μΩ Conformity error: 1.5% ±25μΩ
PBAT81-12		12V	5 ~ 18VDC (±0.2%)		

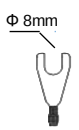
Dimension and Installation



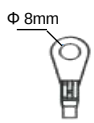




	Item	Description
Battery measuring cable	Length	30cm
	Terminal and size	U Type, hole diameter: 8mm
		O Type, hole diameter: 8mm





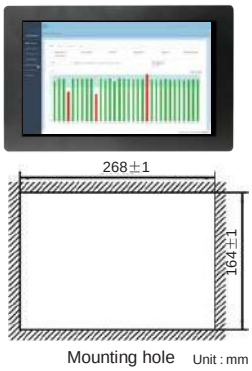




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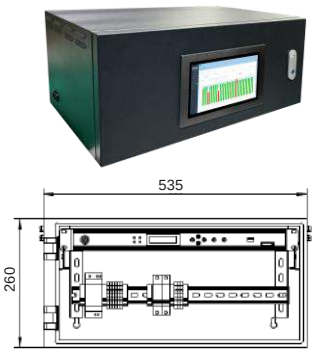
Optional Module

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



PBMS-VM String Voltage Measuring Sensor

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



DC leakage current sensor

- Measurement accuracy: ±1%FS
- Monitoring string leakage current to prevent fire caused



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)

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Order Information

System Structure		Model	Description	Remark
Management layer		PBMS9000Pro-L	Battery Monitoring System Main Controller with 4G antenna port (standard)	One per each UPS One PBMS9000Pro can monitor Max. 6 strings, Max. 420pcs batteries
		PBMS9000Pro-L-CP	Battery Monitoring System Main Controller 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.
Battery cell sensor		PBAT81-02-A	2V / 1.2V battery cell sensor	Terminal material: industrial plastic
		PBAT81-12-A	12V battery cell sensor	
		PBAT81-02-B	2V / 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	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 30cm,other side 15cm.	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	
	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	String measuring sensor	PBMS-VM	String voltage measuring sensor	One per each string (optional)
	HMI for local display & operation	HMI-9000Pro	10-inch touch-screen HMI for local display & operation	One Per PBMS9000Pro Communication with PBMS9000Pro via Ethernet
	DC leakage current sensor	STL3S-MT2-DF -300mA/RS485	Rated input: ±300mA	Measure range: 0 ~ ±350mA, Φ35mm
		STL3S-MT2-DF -1A/RS485	Rated input: ±1A	Measure range: 0 ~ ±1.2A, Φ35mm
		STL5S-MT2-DF -10mA/RS485	Rated input: ±10mA	Measure range: 0 ~ ±300mA, Φ55mm
		STL8S-MT2-DF -10mA/RS485	Rated input: ±10mA	Measure range: 0 ~ ±300mA, Φ72mm
	Ambient temperature & humidity sensor	H-THDRJ45	Temperature: -20°C ~ 60°C (±0.4°C) Humidity: 0 ~ 100%RH (±3%RH)	1 PBMS9000Pro can connect 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 PBMS9000Pro and HMI-9000Pro

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