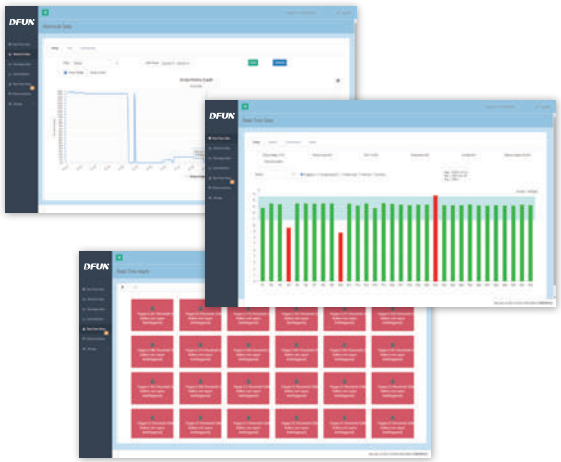
PBMS9000Pro

Battery Monitoring Solution



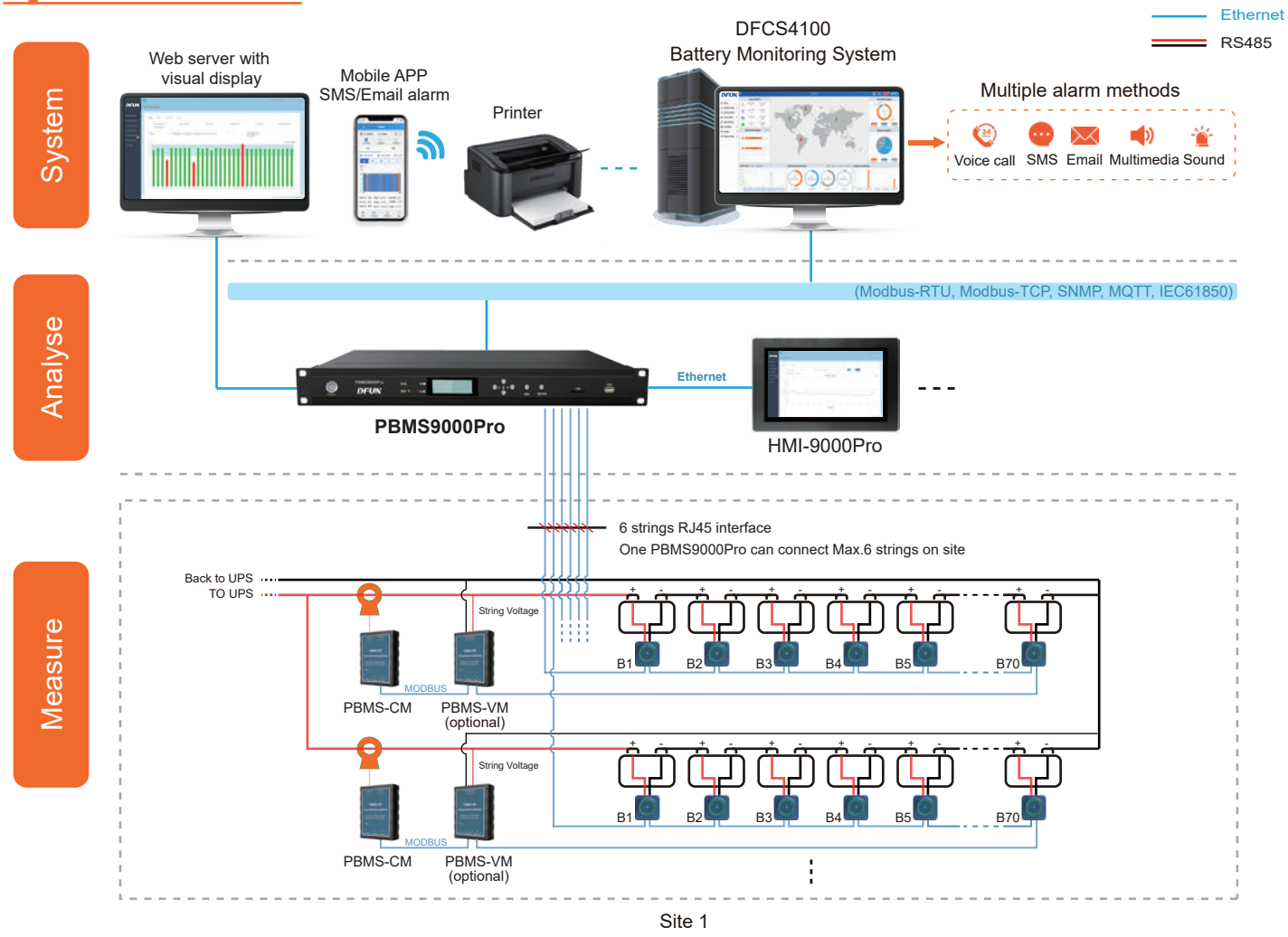
Feature

- 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
- 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



PBMS9000Pro Battery Monitoring Solution

System Structure



Site 1

Management Layer

PBMS9000Pro Battery Monitoring System Main Controller



Unit : mm

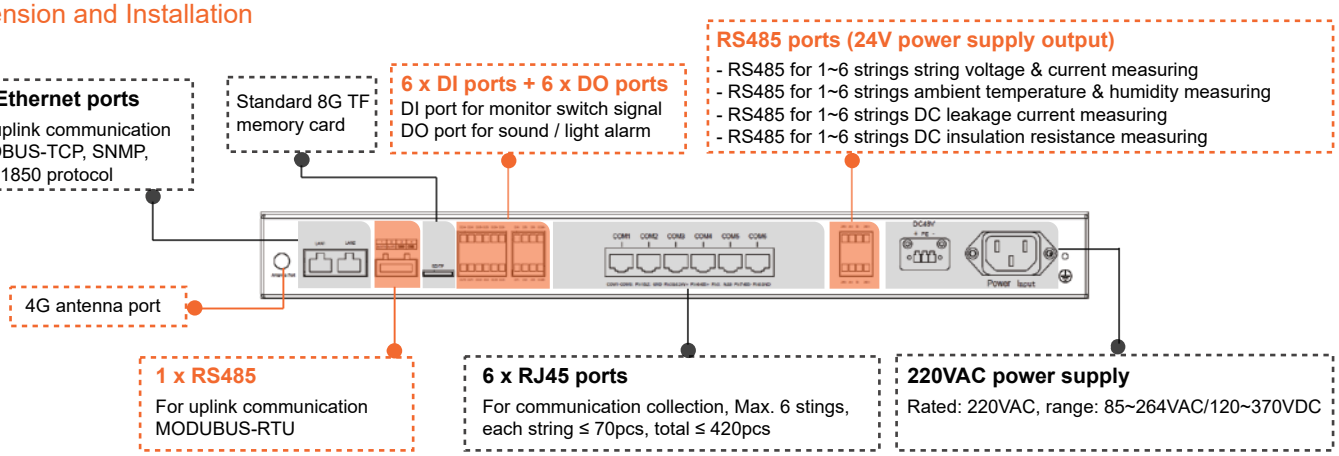
- Standard 1 U design for distribution cabinet
- Built-in web server with visual display
- Monitor Max. 6 strings battery, in a total of 420 batteries
- Measure battery string current & voltage, ripple voltage & current, charge & discharge current, internal temperature, impedance, insulation resistance, 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 Battery Monitoring Solution

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 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 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 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

PBMS9000Pro Battery Monitoring Solution

PBMS-VM String Voltage Measuring Sensor (Optional)

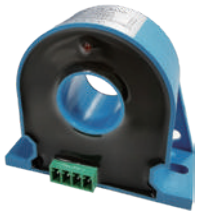
- One PBMS-VM can measure 1 string's voltage
- Measure battery string voltage and ripple voltage



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)



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)

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



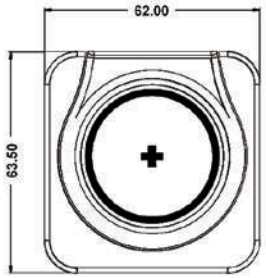
Alarm status

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%)		

PBMS9000Pro Battery Monitoring Solution

Dimension and Installation

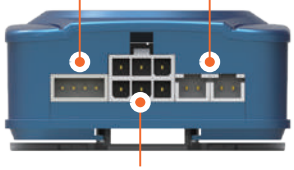
Unit : mm





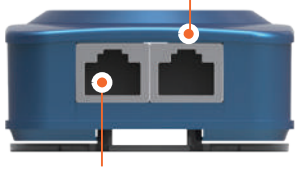
Liquid level sensor port (optional)

2 x Leakage sensor ports (optional)

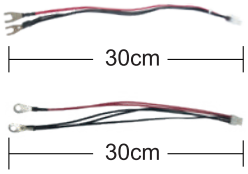


Battery interface
Connect to the battery's positive & negative

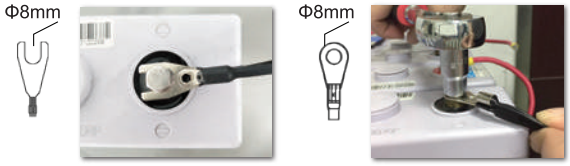
COM-OUT port
Communication port, connect to the next sensor COM-IN



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

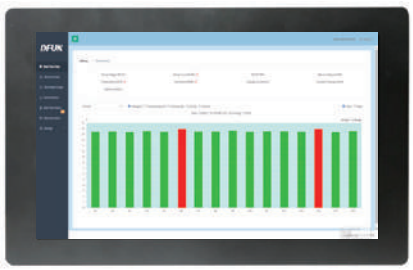


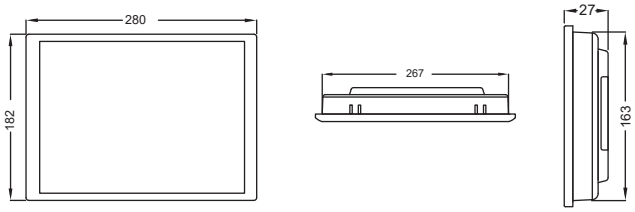
Battery measuring cable	Item	Description
	Length	30cm
	Terminal & size	U Type, hole diameter: 8mm
		O Type, hole diameter: 8mm



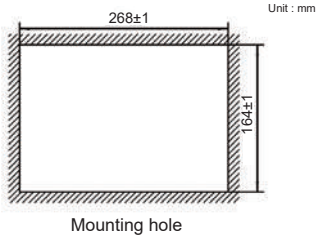
Local Display & Operation (Optional)

- 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





Unit : mm



Mounting hole

PBMS9000Pro Battery Monitoring Solution

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.
		PBMS-VM	String voltage measuring sensor	One per each string (optional)
Battery cell sensor		PBAT 71-02	02V / 1.2V battery cell sensor	One per battery cell
		PBAT 71-12	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
		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-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
	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
	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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