



Battery Monitoring System

Data Center Solution

PBMS9000 Battery Monitoring Solution



DFUN (ZHUHAI) CO., LTD.



Established in
2013



High-Tech
Enterprise



Turnover
15 Million



Delivery
200,000+



Wide Range
Solutions



Our Customer



Certificate



Company



ISO9001



ISO14001



ISO45001

Product



10+ invention patent
20+ software copyright



CE



High-tech Enterprise Certification



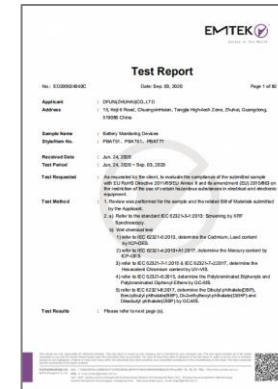
UPS User Satisfaction Certification



Certification of Gold Supplier for property



SGS



ROHS



Software NeoCertify
www.dfuntech.com

Certificate



● CE / ROHS / TTL Certificate



EMTEK(Shenzhen)CO.,LTD
Bldg 68,MaJialiang Industry Zone, Nanshan District, Shenzhen, Guangdong, China
www.emtek.com.cn Tel:+86-755-2995 4280 Fax:+86-755-2995 4282

Certificate of Conformity

NO.: ESI90304003E01

The following product has been tested by us with the listed standards and found in conformity with the council EMC directive 2014/30/EU. It is possible to use CE marking to demonstrate the conformity with this EMC Directive.

Applicant : DFUN(ZHUHAI)CO.,LTD.
Address : NO.15,Keji 6 Road, Chuangxin Haian, Tangjia High-tech Zone, Zhuhai, Guangdong,China
Manufacturer : DFUN(ZHUHAI)CO.,LTD.
Address : NO.15, Keji 6 Road, Chuangxin Haian, Tangjia High-tech Zone, Zhuhai, Guangdong,China
Trademark : N/A
EUT : Battery String Monitoring Device
M/N : PBMS9000
Test Standards : EN 61326-1: 2013
EN 61000-3-2:2014
EN 61000-3-3:2013


CE



(Manager)
August 30, 2019

The certificate is based on a single evaluation of one sample of above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab. logo.

Ver2.0



EMTEK
Access to the World

Test Report

No.: ED200624039CDate: Sep. 03, 2020Page 1 of 114

Applicant : DFUN(ZHUHAI)CO.,LTD
Address : 15, Keji 6 Road, ChuangxinHaian, Tangjia High-tech Zone, Zhuhai, Guangdong, 519085 China

Sample Name : Battery String Monitoring Device
Style/Item No. : PBMS9000, PBMS7000

Received Date : Sep. 25, 2020
Test Period : Sep. 25, 2020 ~ Sep. 03, 2020


Test Requested : As requested by the client, to evaluate the compliance of the submitted sample with EU RoHS Directive 2011/65/EU Annex II and its amendment (EU) 2015/863 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.


Test Method : 1. Review was performed for the sample and the related Bill of Materials submitted by the Applicant.
2. a) Refer to the standard IEC 62321-3-1:2013; Screening by XRF Spectroscopy.
b) Wet chemical test
1) refer to IEC 62321-5:2013, determine the Cadmium, Lead content by ICP-OES.
2) refer to IEC 62321-4:2013+A1:2017, determine the Mercury content by ICP-OES.
3) refer to IEC 62321-7-1:2015 & IEC 62321-7-2:2017, determine the Hexavalent Chromium content by UV-VIS.
4) refer to IEC 62321-6:2015, determine the Polybrominated Biphenyls and Polybrominated Diphenyl Ethers by GC-MS.
5) refer to IEC 62321-8:2017, determine the Dibutyl phthalate(DBP), Benzylbutyl phthalate(BBP), Di-2-ethylhexyl phthalate(DEHP) and Diisobutyl phthalate(DIBP) by GC-MS.

Test Results : Please refer to next page (s).

Test results are only responsible for delivered samples. This test report is issued by the company and is intended for your exclusive use. This test report includes all of the tests requested by you and the results thereof based upon the information that you provided. You have 30 days from date of issuance of this test report to notify us of any error or omission claimed by our negligence. A failure to raise such issue within the prescribed time shall constitute your assumed acceptance of the completeness of the report, the test conducted and the correctness of the report contents.

EMTEK(Shenzhen)CO.,LTD 地址: 中国广东省珠海市唐家湾镇金海岸大道15号 邮编: 519085 网址: http://www.emtek.com.cn
EMTEK(Shenzhen)CO.,LTD 邮箱: E-mail: emtek@emtek.com.cn
EMTEK(Shenzhen)CO.,LTD 地址: 中国广东省珠海市唐家湾镇金海岸大道15号 邮编: 519085 网址: http://www.emtek.com.cn
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EMTEK(Shenzhen)CO.,LTD 地址: 中国广东省珠海市唐家湾镇金海岸大道15号 邮编: 519085 网址: http://www.emtek.com.cn





SAFETY TEST REPORT

No. B21N04161-REL
for
DFUN(ZHUHAI) CO.,LTD.
Battery Management System
Model Name:HMI-PBMS
with
Hardware Version:V2.0
Software Version:V3.5
Issued Date: 2022-04-18

Note:
The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of SAICT.

Test Laboratory:
SAICT, Shenzhen Academy of Information and Communications Technology
Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China 518000.
Tel:+86(0)755-33322000, Fax:+86(0)755-33322001
Email:yeyu@caict.ac.cn www.saict.ac.cn

Importance of UPS in Data Center

UPS is the key component in Data Center to make sure the data safety. When the electricity cuts off, UPS is the only power supply for all servers, computers etc...

Battery failure will directly lead to UPS powered down, then key business will be affected and cause big economic and political damage/lose.

It is said that the one hour powered shut down in data center will cause a loss:

Financial Industry : \$1,495,134 loss

Telecommunication: \$2,066,245 loss

Nowadays, more and more clients put battery monitoring safety as the top priority.



Importance of Battery



Grid



UPS



Generator



Battery Bank is
the ONLY emergency power supply
to UPS when powered off

It is necessary to use BMS in UPS power system!!!



High operation costs

- Lifespan shortening
- Replace the entire string battery due to individual battery failure



Maintenance difficulties

- Difficult to collect the battery parameters
- Lack of professional monitoring system



Security risk

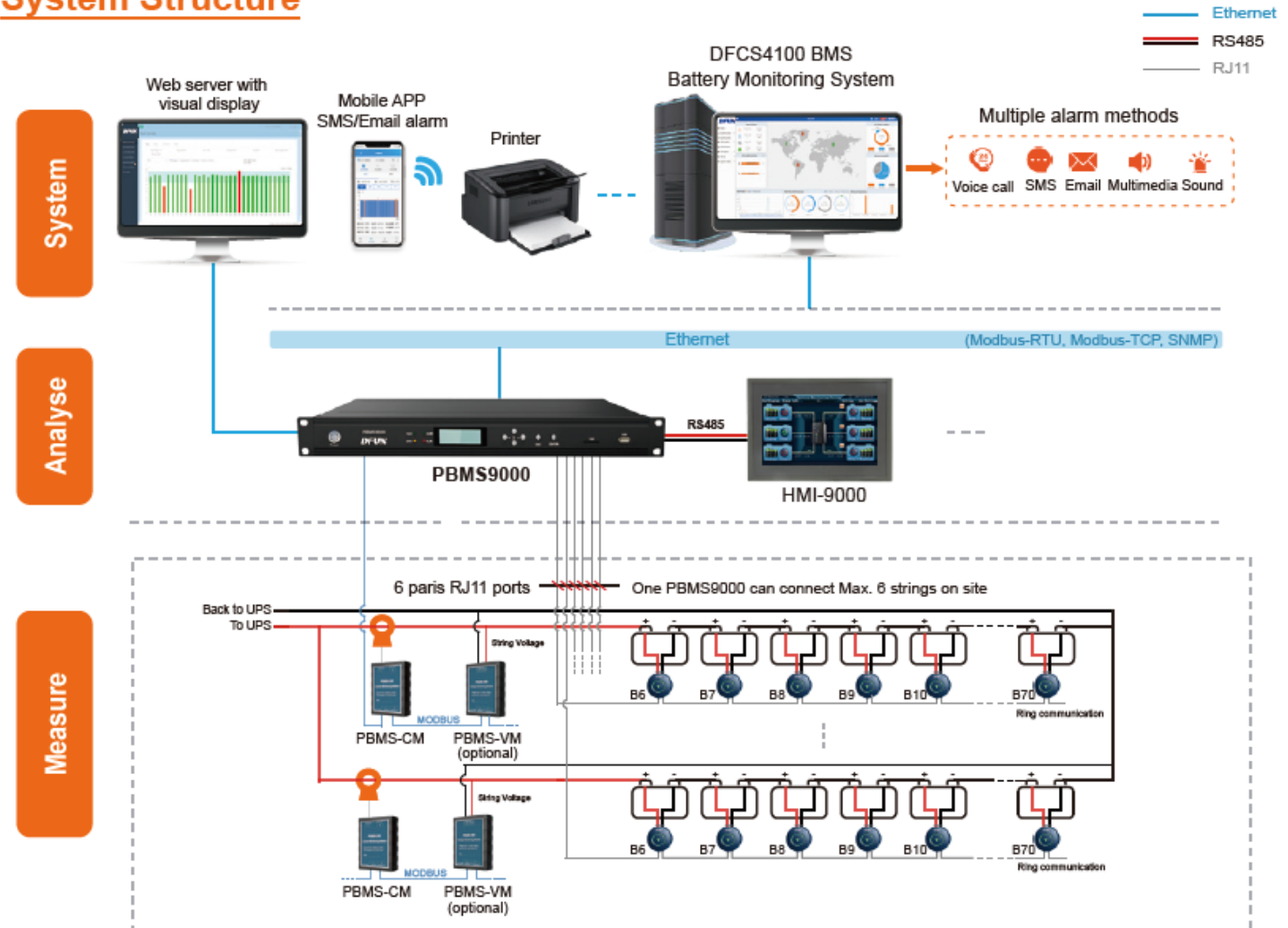
- Failure battery occurs fire
- Insufficient capacity

PBMS9000 BMS Solution

Key Features

- Suit for 2V / 4V / 6V / 12V Lead Acid battery
- Build-in Web Server, easy installation & monitoring
- Maxim 420pcs battery and up to 6 banks per UPS
- 24/7/365 online monitoring
- Support Modbus, SNMP, Modbus, MQTT and IEC61850
- Send alarm by E-mail, SMS
- 8G Memory for data saving
- Dual-Source power supply for backup & safety
- Ring communication, any communication failure will not affect other sensors communication
- 4G wireless upload to the third party

System Structure



PBAT61 Battery Sensor

- Cell Voltage
- Cell Internal Temperature
- Cell Impedence
- Cell SOC/ SOH



PBMS-CM Battery String

- String Voltage
- String Current
- String SOC
- Ripple Current
- Pipple Voltage
- String Temperature

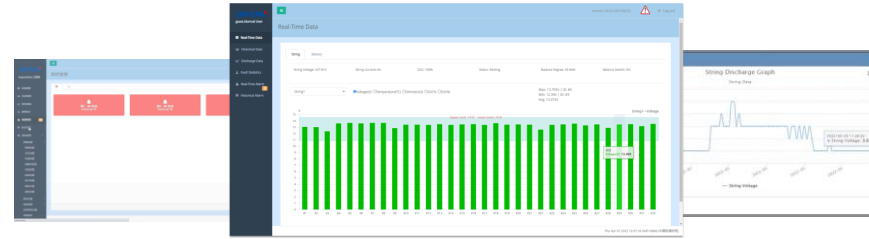


PBMS9000 Main Module

- MODBUS-RTU
- MODBUS-TCP
- SNMP
- IEC64850
- MQTT / JSON
- 4G for wireless communication



Hardware of PBMS9000 Solution



**Battery Monitoring Master
PBMS9000**



**String Current Sensor
PBMS-CM**

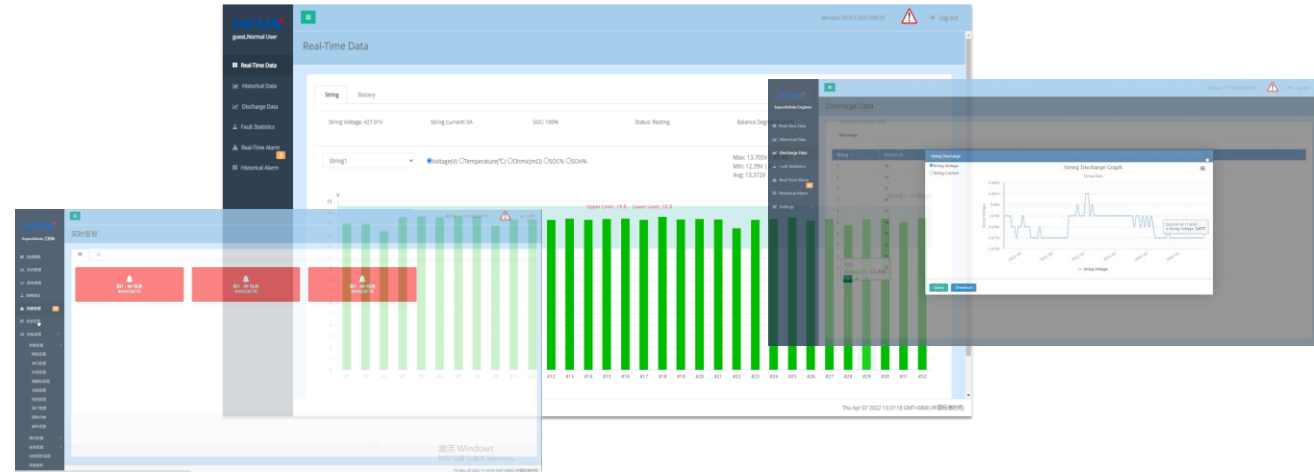


**Cell Sensor
PBAT61 Series**

PBMS9000 Main Module

Features

- 1U design for Electric distribution cabinet
- One UPS configure with one PBMS9000
- Monitor Max. 6 Strings and 420pcs batteries in total
- Dual-Source power supply
- 8GB TF card memory



Port Information	2 x Ethernet Ports	6 x DI for Switch Sensor
	1 x RS485 port for Ambient Temperature and humidity	6 x DO for sound / light alarm sensor
	1 x 4G Antenna Port	



PBMS9000 Main module

PBMS-CM String Current Sensor

Feature

- One String Need One PBMS-CM
- Measure Battery String Charge and Discharge Current, Ripple Current

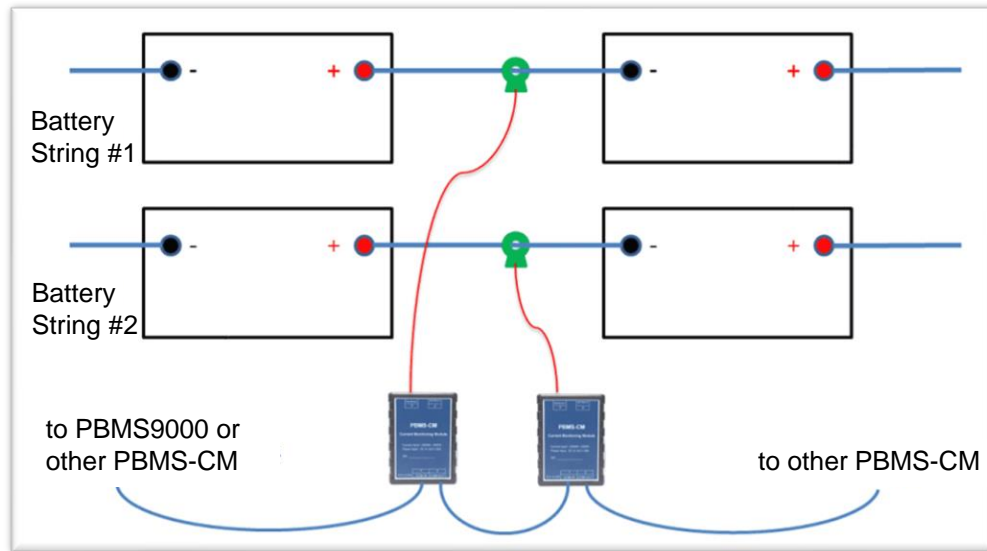
String Current Monitoring	With 2 Hall Sensor Ports Each Hall Sensor: -1000A ~ +1000A
Ripple current	Range: 20% of Hall sensor rated current, 50Hz~1KHz



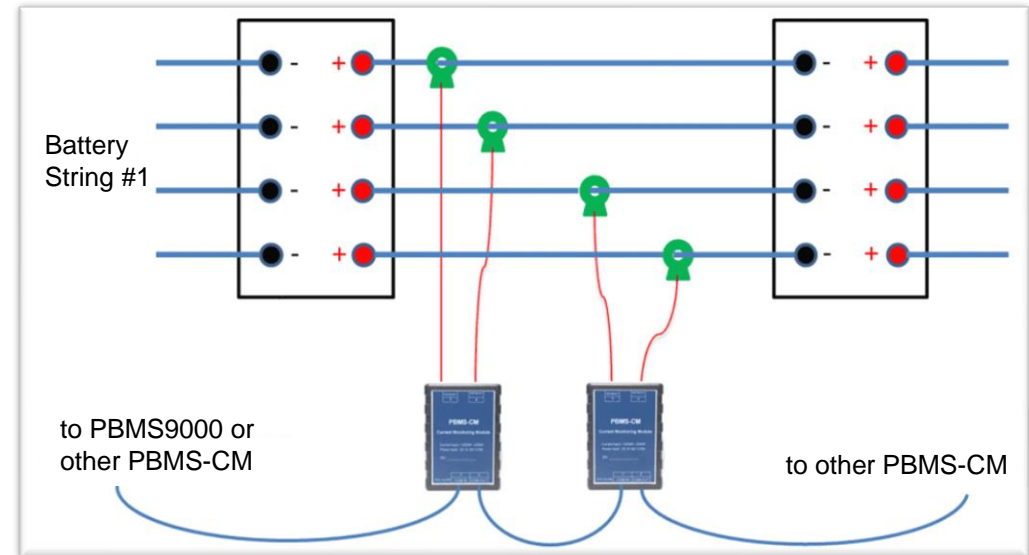
**PBMS-CM
String Current Sensor**

PBMS-CM String Current Sensor Advantage

- Support Measure Multi Pole Battery



For Normal Battery



For Multi Pole Battery

PBAT61 Battery Sensor

Feature

- Monitor Battery Cell Voltage, Internal Temperature (Negative pole), Impedance(Ohmic Value), SOC, SOH
- Auto-balancing

Voltage	PBAT61-02: 0.5V ~ 3V ($\pm 0.2\%$) PBAT61-06 : 4.8V~10V ($\pm 0.2\%$) PBAT61-12 : 5V ~ 18V ($\pm 0.2\%$)
Internal Temperature	-20°C~ 85°C ($\pm 0.5^\circ\text{C}$)
Impedance	Range: 0.1mΩ-50mΩ Repeatability Accuracy: 1.0%±25uΩ Conformity Accuracy: 1.5%±25μΩ



PBAT61 Cell Sensor

Optional Modules



HMI-9000
Touch Screen HMI
Local Display Module



PBAT-BOX-350
Cabinet for pre-wiring in
factory



PBMS-VM
Measurement Layer
String Voltage Sensor



H-THDRJ45
Ambient Temperature &
Humidity Sensor



PBMS-IM
DC Insulation Resistance
Sensor

Optional Module 1

HMI-9000 Touch Screen HMI

Feature

- 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



HMI-9000
Local Display and Operation

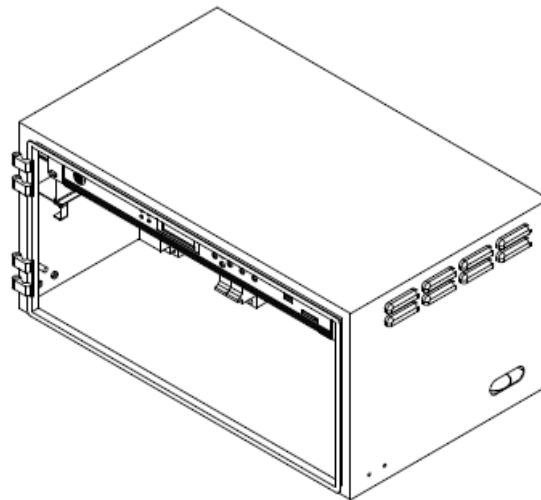
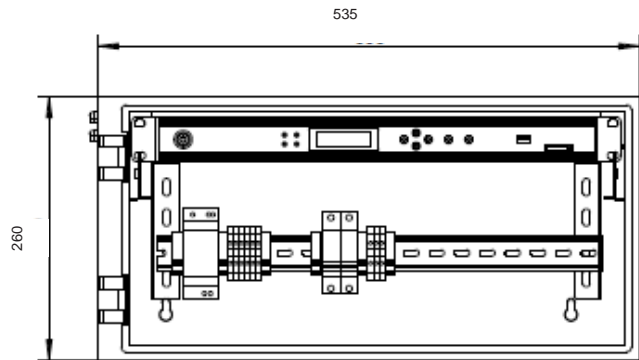


Optional Module 2

PBAT-BOX-350 Cabinet for pre-wiring in factory

Feature

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



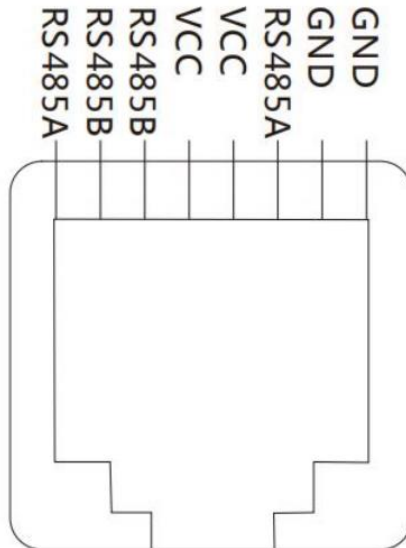
PBAT-BOX-350
Cabinet for pre-wiring in factory

Optional Module 3

H-THDRJ45 Ambient Temperature & Humidity Sensor

Feature

- LCD display for data reading
- 1 unit PBMS9000 can connect Max. 6 Temperature sensor (one battery bank one unit)
- RJ45 connection



**H-THDRJ45
Temp & Humidity sensor**

Optional Module 4

PBMS-IM DC Insulation Resistance Sensor

Feature

- Measuring range: $1\text{K}\Omega \sim 30\text{M}\Omega$
- Measurement accuracy: 10%
- ($100\text{K}\Omega \sim 50\text{K}\Omega$)



PBMS-IM
DC Insulation Resistance Sensor

Optional Module 5

PBMS-VM String Voltage Sensor

Feature

- Measure Battery String Voltage
- Measure Battery String Ripple Voltage

String Voltage Monitoring	0 ~ 1000VDC
Ripple Voltage	Range: 2V ~ 100V (peak value) Resolution: 0.01V



**PBMS-VM
String Voltage Sensor**



04

PART 4

Our BMS Advantages

Our Advantages

- Data Storage



8GB TF Card



- Dual-Source



Ensure the data safety



Our Advantages

- **Pre-wired Cabinet**



All you need to do is just Plug-in !!!



- **Work & Sleeping Mode**



Switch to Sleeping mode
Protect the battery with low power consumption



RUN



Sleeping

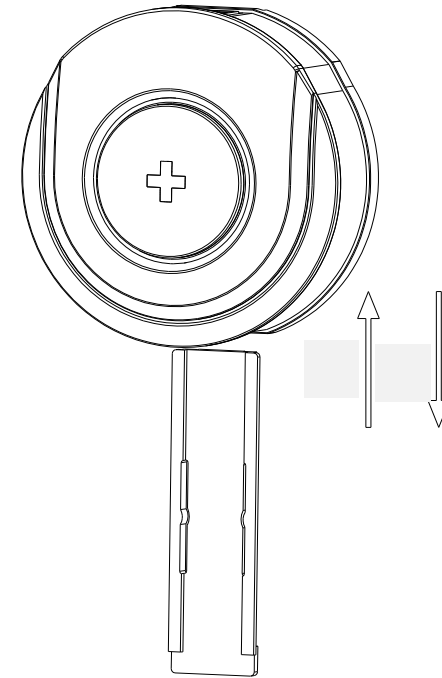
	Model	Power Consumption
Battery Cell Sensor	PBAT61-02	Running: 170mW Sleeping: 12mW
	PBAT61-12	Running: 120mW Sleeping: 10mW

Our Advantages

➤ Direct Measure Negative Temperature
(Apply with IEEE1184-2005 standard)

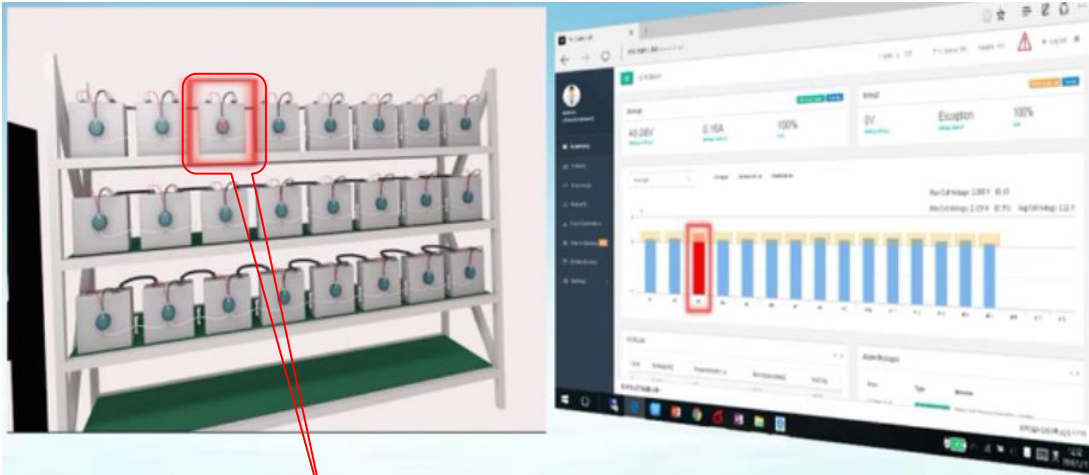


➤ Pluggable Installation for Easy replace Battery



Our Advantages

➤ Quickly , Timely Location for The Problem Battery



Different LED Light Easy to Find Problem Battery on Site

➤ Modbus Protocol, RJ11 Port for Easy Connection



Our Advantages

Cell PBAT

- 1. Temperature upper limit alarm
- 2. Resistance upper limit alarm
- 3. Voltage upper/lower limit alarm
- 4. SOC、SOH lower limit alarm

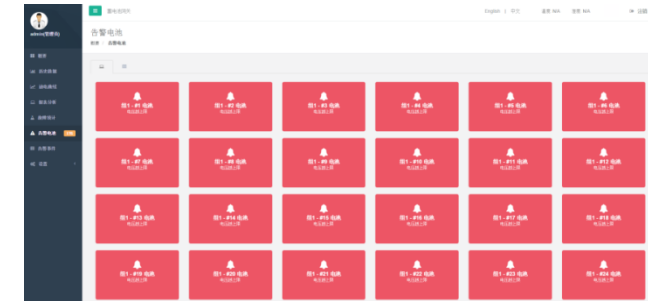
➤ Multiple alarm setting to know more clear about alarm reasons

String PBAT

- 5. String voltage upper/lower limit alarm
- 6. String current upper/lower limit alarm
- 7. String SOC lower limit alarm

COM/Install

- 8. Cell/String sensor COM failure
- 9. Hall installation exception

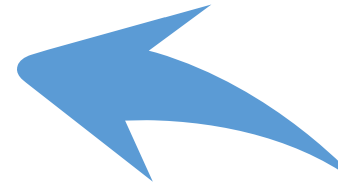


Our Advantages

- ONE second time to Auto-Searching each Battery Sensor ID



Save time and labor cost of configuration

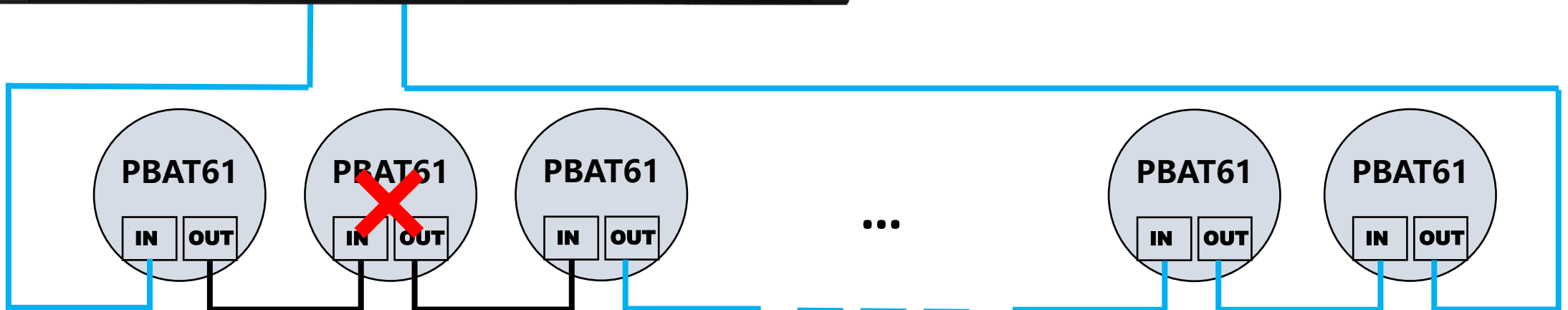


Our Advantages

- Ring Communication



Any communication failure will not affect other sensors communication



Our Advantages

- **Build-in Web Server**

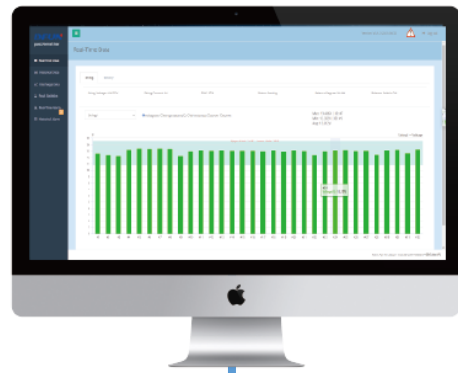


Easy checking data for small project or independent site

- **Support 4G upload data**



Wireless communication



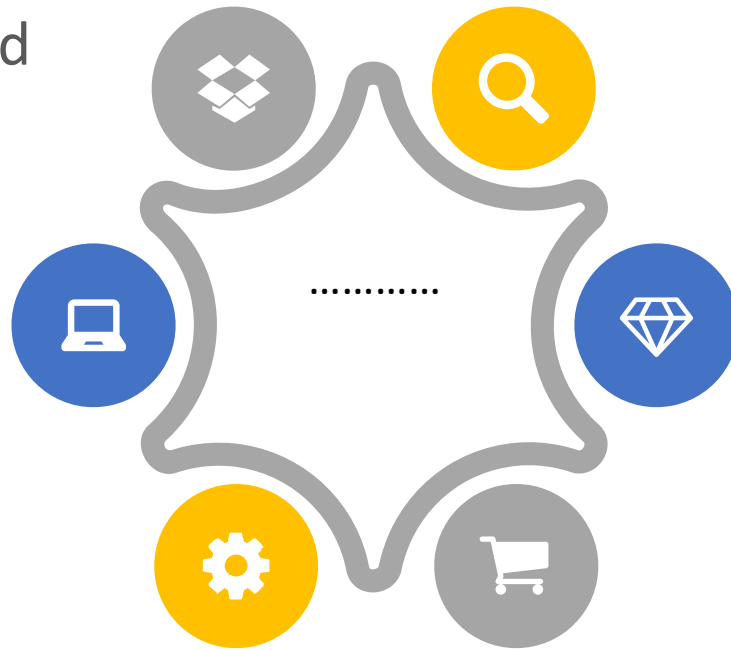
Internet



Value of BMS

A. Reduce the labor cost and increase efficiency on site

B. On-line monitoring battery quality status.



C. Accurately locate single battery failure

D. Maintain consistency of lead-acid battery packs

Our Advantages

- Centralize System with Mobile APP



Centralize real-time monitor multiple distributed site any time any where



DFCS4100 Multi-Site Power Management System

Mobile APP
SMS/Email Alarm

ONE IS ALL



Site 1#



Site 2#



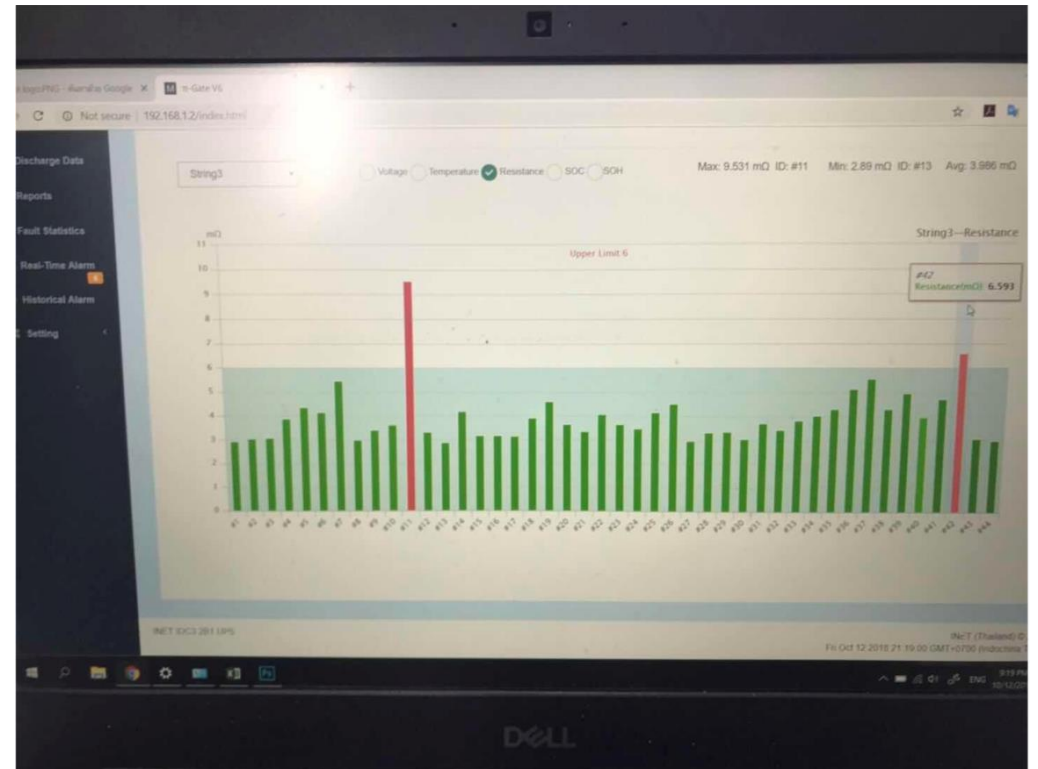
Site N#

Project Reference

● True IDC - Thailand Project

Phase 1: battery 960 nos (12V) Start time: 2016-02 to now
 Phase 2: battery 1132nos (12V) Start time: 2017-05 to now
 The system sends 2 alarm messages on October 12, 2018.

Alarm info: battery impedance upper limit(9.531mΩ, 6.593mΩ)
 We are easily to found out that #11 and #42 are the problem batteries.



Some Data Center Projects Reference



Data Center Projects

- Turkey Turkcell data center, 9272pcs
- Qatar Ooredoo Google data center, 2980pcs
- Thailand INET data center, 1056pcs
- Dubai GDH Data Center, 4980pcs
- Qatar Lusail Towers, 3600pcs
- Russia Research Institute of Technical Physics, 2400pcs
- Malaysia Lion Data Center, 1336pcs
- Thailand MRT Rama 9 Data Center, 1020pcs
- Vietnam VIETEL Data Center, 1864pcs
- Chile Entel Data Center, 768pcs
- Venezuela LUMEN Data Center, 760pcs
- Singapore PUB Government project Data Center, 656pcs
- Thailand KDDI Data Center, 4800pcs
- South Africa MTN Data Center, 23000pcs
- Thailand True IDC Muang Thong 7C Site, 566pcs
- Romania TRANSELECTRICA Substation, 525pcs
- Guangzhou Mobile Qirui IDC, 23421pcs
- Chengdu Qingbaijiang Big Data Ecological Park, 11680pcs
- Chongqing Tenglong Liangjiang Data Center, 6000pcs
- Mengwang Cloud Data Center, 3184pcs
- Chengdu Wanda E-commerce Cloud Base, 3168pcs
- ZTE Xili R & D Base, 1920pcs
- Shanghai Huacang Communication Data Center , 1500pcs
- China Mobile Telecom IDC Base, 1440pcs
- Shanghai Wanguo New Development Data Center, 1280pcs
- Nanjing Jiangbei Advanced Data Center, 1200pcs

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24/7 Monitoring Service

BATTERY MONITORING SYSTEM

The logo features the word "DFUN" in a bold, white, sans-serif font, centered within a circular graphic. The graphic consists of two concentric orange circles with several smaller orange dots of varying sizes scattered around them, resembling a stylized orbit or a network diagram. The background of the entire slide is a photograph of a server room with rows of server racks on both sides, receding into the distance towards a white door at the end of the aisle. The lighting is cool and blue-toned.

DFUN

THANK YOU!



DFUN (ZHUHAI) CO., LTD.

BULD 3, 2/F, NO1, KEJI 4 RD TANGJIA HI-TECH ZONE,
GUANGDONG, CHINA



Email: info@dfuntech.com

Web: www.dfuntech.com

Battery Monitoring System