

PBAT-61 Cell Sensor

Installation & Operation Manual

V1.0



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PILOT (HENGQIN) CO., LTD.



Danger and warning!

This device can be installed only by professionals.

The manufacturer shall not be held responsible for any accident caused by the failure to comply with the instructions in this manual.



Risks of electric shocks, burning, or explosion

- This device can be installed and maintained only by qualified people.
- Before operating the device, isolate the voltage input and power supply and short-circuit the secondary windings of all current transformers.
- Use appropriate voltage tester to make sure the voltage has been cut-off.
- Put all mechanical parts, doors, or covers in their original positions before energizing the device.
- Always supply the device with the correct working voltage during its operation.

Failure to take these preventive measures could cause damage to equipment or injuries to people.

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Chapter 1 Product Overview

PBAT61 battery cell sensor is specially designed as highly integrated smart sensor module for VRLA batteries, can quickly and accurately measure the VRLA's voltage, resistance and negative pole temperature. Cell sensors use specified isolated communication bus, and multiple sensors can be very easily cascaded to realize the real-time monitoring of the entire strings of batteries.

The cell sensor can fulfill following functions:

- ◆ Measurement of real-time voltage
- ◆ Measurement of Internal resistance on line
- ◆ Measurement of negative pole temperature
- ◆ Sleep mode to achieve ultra-low standby power consumption
- ◆ Built-in anti-reverse in put circuit aims to protect the sensor and battery away from damage even if the power supply is connected conversely.
- ◆ Built-in fuse with high reliability and safety
- ◆ Communication interface's isolation voltage is AC 3750V
- ◆ Wiring easily with distributed installation
- ◆ One PBAT-Gate can support up to 240 cell sensors by cascade
- ◆ Passive balancing function, the balancing current up to 200mA

Chapter 2 Installation and Wiring

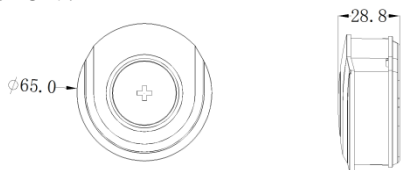
2.1 Environment

2.1.1 Environmental requirements

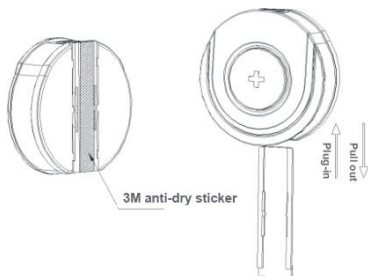
- ◇ Standard operating temperature : 0°C ~ +45°C
- ◇ Operating temperature limit : -10°C ~ +55°C
- ◇ Storage temperature : -40°C ~ +70°C
- ◇ Working humidity : 5% ~ 95%RH , Non-condensing

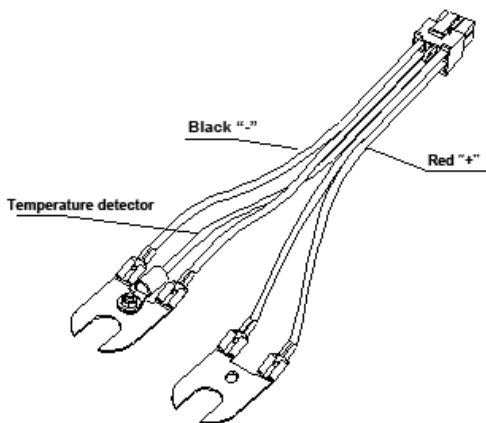
2.1.2 Installation and Dimensions

(1) Dimensions Unit : mm



(2) Structure and Terminals Unit : mm





Note: wire length 30cm

2.1.3 The main terminal definitions

NO	Symbol	Definition
1	V- Bat	Negative power supply, connected directly with the battery negative pole.
2	V- Sense ^a	Measuring input of the voltage, connected directly with the battery negative pole. It contacts with V-Bat.
3	PTC	Temperature sensor input
4	PTC	Temperature sensor input
5	V+ Sense ^a	Measuring input of the voltage, connected directly with the battery positive pole. It contacts with V+ Bat.

6	V+ Bat	Positive power supply, connected directly with the battery positive pole.
7	COM1 ^b	DL-BUS communication , RJ11 interface
8	COM2 ^b	DL-BUS communication , RJ11 interface

Note:

- a. The cell sensor uses four-line method to measure the internal resistance of VRLA. 'V+ Sense' and 'V- Sense' need to be connected directly with the battery pole. In order to obtain proper measurement accuracy described in this document, the users should use the standard factory wire especially for measurement.
- b. COM1 connect to the previous node, COM2 connect to the next node.

2.2 Order Information

Model : PBAT61		
PBAT61-02	For 2V battery	<ul style="list-style-type: none"> ✓ Real-time cell voltage measurement ✓ Internal resistance measurement on line ✓ Negative pole temperature measurement ✓ DL-BUS Communication
PBAT61-12	For 12V battery	<ul style="list-style-type: none"> ✓ Real-time cell voltage measurement ✓ Internal resistance measurement on line ✓ Negative pole temperature measurement ✓ DL-BUS Communication
PBAT61-02-B	For 2V battery	<ul style="list-style-type: none"> ✓ Real-time cell voltage measurement ✓ Internal resistance measurement on line ✓ Negative pole temperature measurement ✓ DL-BUS Communication ✓ Balancing function

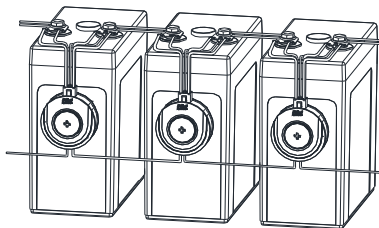
PBAT61-02-B	For 12V battery	<ul style="list-style-type: none">✓ Real-time cell voltage measurement✓ Internal resistance measurement on line✓ Negative pole temperature measurement✓ DL-BUS Communication✓ Balancing function
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2.3 Power Supply

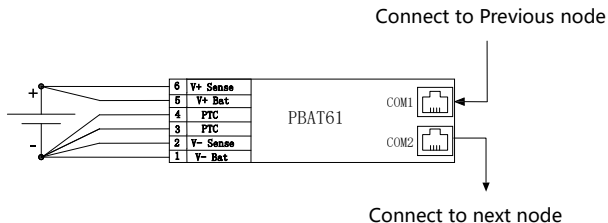
PBAT61-2 is supplied by the battery with the range from DC 1.6~2.6V, Power loss when working is less than $< 200\text{mW}$, and power loss when dormancy is less than $< 12\text{mW}$.

PBAT61-12 is supplied by the battery with the range from DC 7.5~15.6V , Power loss when working is less than $< 125\text{mW}$, and power loss when dormancy is less than $< 10\text{mW}$.

2.4 Wiring



PBAT61 could be pasted on the battery surface, and connected with the battery poles by the standard 6pin cable securely, and cascaded with another sensor through RJ11.



Chapter 3 Measuring Parameters

3.1 Voltage

PBAT61 could measure the real-time voltage of VRLA battery cell. The measuring range of PBAT61-2 is from DC 1.6~2.6V , and PBAT61-12 is form DC 7.5~15.6V.

3.2 Internal resistance

PBAT61 could measure the internal resistance of VRLA battery cell. The measuring range of PBAT61 is from 0.1 to 100mΩ.

Note: The interval between two internal resistance measurements should not be less than two minutes, otherwise the sensor will be damaged because of overheat.

3.2 Negative pole temperature

PBAT61 could measure the negative pole temperature of VRLA battery cell with the range from -20°C~+85°C.

Chapter 4 Accessibility Features

4.1 Communication

PBAT61 communicates with other sensors by the DL-BUS, One PBAT-Gate can support maximum 240 PBAT61 sensors.

In order to ensure communication quality, the distance between two PBAT61 should no longer than 1m, and the total distance of one DL-BUS line should no longer than 70m.

4.2 Dormancy

If the communication bus is idle for more than 20 minutes, the sensor will go into sleep mode, and could be woken up by the waking command sent from PBAT-Gate or other master station.

Chapter 5 Indicate Light Description

IndicatedLED	Status	
Running LED L1 (Green)	Normal working	Breathing mode
	Alarm	OFF
Alarm LED L2 (Red)	Normal working	OFF
	Alarm	Flash

Chapter 6 Maintenance and Trouble shooting

Problems	Causes	Solutions
Running LED is not ON after power on.	Power can not input in the device	Check whether the proper power is supplied on the V+ Bat and V- Bat terminal
Master device can't communicate with the sensor.	Unit ID of the sensor is wrong	Check whether Unit ID of the sensor is the same as the master.
	Baud rate is not match.	Check whether the baud rate of both sides is same.
	Communication line is disturbed.	Check whether the communication line bus is too long
	Communication is interrupted.	Check whether the communication cable is disconnected.

Chapter 7 Technical Specifications

Dimension	Main-body : 65mm (L) ×65mm (W) ×28.8mm (H)		
Power Supply	PBAT61-2 rated voltage is DC 2V with the range from DC 1.6 to DC 2.6V. Power loss : 200mW(working mode)/12mW(sleep mode) PBAT61-12 rated voltage is DC 12Vwith the range from DC 7.5V ~ 15.6V Power loss : 125mW(working mode)/10mW(sleep mode)		
Item	Range	Accuracy	Note
Voltage	2V battery : 1.6V~2.6V 12V battery : 7.5V~15.6V	±0.2%	Resolution : 0.001V
Resistance	2V battery : 0.1~100mΩ 12V battery : 0.1~100mΩ	Consistency : ±(1.5%+25μΩ) Repeatability : ±(1.0%+25μΩ)	Resolution : 0.001mΩ
Item	Test Conditions		
Insulation	Insulation voltage:DC1000V, Insulation resistance>550MΩ		
Dielectric strength	Test voltage AC 3750V, Test time 1minute, leakage current< 1mA		
Impulse withstand voltage	Test voltage 6kV, 1.2/50us, ± 3 times each		

Item	Reference Standard	Class
Electrostatic discharge immunity	GB/T17626.2-2006 (IEC61000-4-2:2001)	IV
RFEMS	GB/T17626.3-2006 (IEC61000-4-3:1998)	IV
Electrical fast transient burst immunity	GB/T17626.4-2008 (IEC61000-4-4:1998)	III
Surge Immunity	GB/T17626.5-2008 (IEC61000-4-5:2005)	III
RF conducted immunity	GB/T17626.6-2008 (IEC61000-4-6:1998)	III
Power frequency magnetic field immunity	GB/T17626.8-2008 (IEC61000-4-6:2001)	IV
Electromagnetic emission limits	GB/T14598.16-2002 (IEC60255-25:2000)	OK
Sasser immunity	GB/T17626.12-1998 (IEC61000-4-12:1995)	III

Notice:

- PILOT reserves the right to modify this manual without prior notice in view of continued improvement.
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