BM31N Battery Monitoring System

for Lead Acid & NiCad batteries

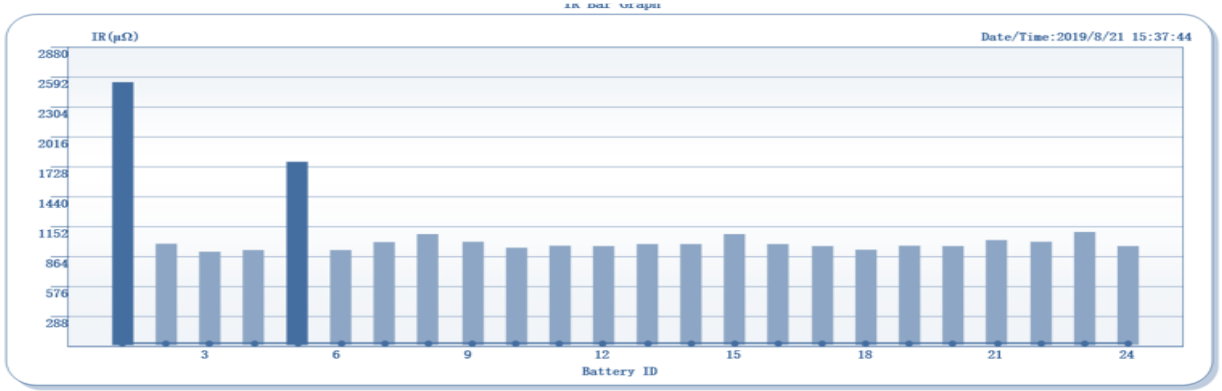
Rectronic Technologies

A System Solutions Provider

System Introduction

BM31N battery monitoring system is designed to monitor and analyze the state of health of up to (960) cells by measuring and recording:
String: Voltage & DC Current
Cell: Voltage, Internal/Connection Resistance, & Temperature

All Rectronic solutions come complete with battery management software which allows all battery systems to be monitored 24 hours by 7 via remote computer(s). This software offers comprehensive battery diagnosis and reporting capabilities to ensure the integrity of your critical backup power system.



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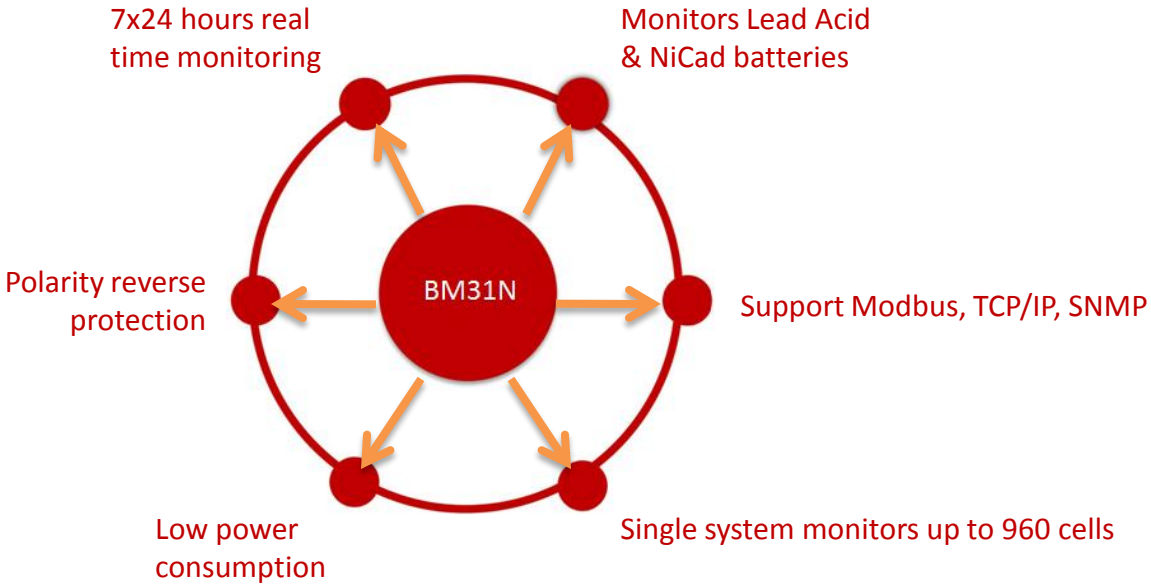
Key Features

BM31N battery monitoring system has its unique features and simple to use.



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Key Features

N0.	Features
1	One battery sensor to one battery cell, simple installation without special training
2	Blocks ripple interference from UPS
3	Measures internal resistance by small test current (about 5A)
4	Low power consumptions, minimum operating current of battery sensor is about 3mA
5	Battery sensor has reverse connection protection
6	Monitors battery voltage, internal resistance and temperature, comply with the standard ANSI/TIA - 942 and GB50174-2008
7	Flexible configuration, supports MODBUS, TCP/IP and SNMP protocol

Applications

BM31N battery monitoring system can be used in many fields.

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Measurement Range & Accuracy

Item	Range	Accuracy	Resolution
String voltage	20 ~ 800V	±0.5%	0.1V
Cell voltage	1.2V，2V，6V，12V	±0.1%	0.001V
Internal resistance	50 ~ 65535μΩ	±1%	1μΩ
Battery temperature	-5 ~ +99.9℃	±1℃	0.1℃
String current	0 ~ 1000A	±0.5%	0.1A
Ambient temperature	-5 ~ +99.9℃	±1%	0.1℃

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Product Components

Appearance	Name	Description
	Control Module CM31N	CM31N controller can manage up to six battery strings or 960 batteries, and max manage up to 400 batteries per string
	Battery Sensor BS01	One module can monitor one battery's voltage, resistance and temperature
	Current Sensor CS01	Battery string current measurement and ambient Temperature measurement. One for each string
	COM Converter BC01	Convert UART port to RS485/232 port
	Earth Fault Detection BC01	To detect battery bank earthing status, 80-300V and 300-700V version optional

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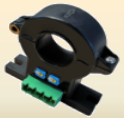
Accessories

Appearance	Name	Description
	Battery sensor cables	Connecting the battery to battery sensors, including internal resistance cable, voltage cable, temperature cable and temperature probe
	Current transformer (CT)	500A and 1000A optional, measure the battery charging and discharging current, power can be fed from control module (DC12V Output)
	Current sensor cables	Connect CT and temperature sensor to CS module
	Communication cable	Loops BS module or CS module

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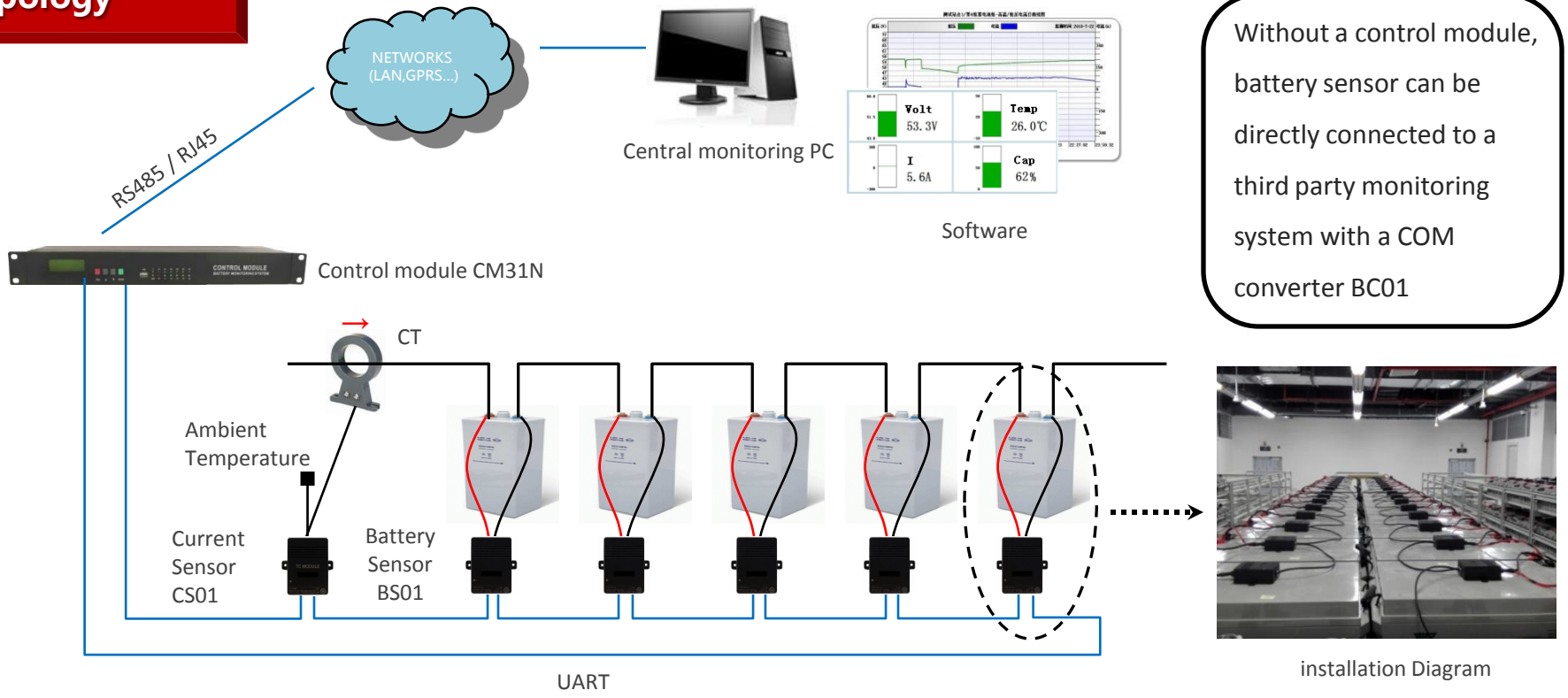
Topology



Without a control module, battery sensor can be directly connected to a third party monitoring system with a COM converter BC01

installation Diagram

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Main Functions

Item	With a control module CM31N	Without a COM converter
Monitoring items	Cell internal resistance, battery temperature, cell voltage, string voltage, ambient temperature, charge & discharge current.	Cell internal resistance, battery temperature, cell voltage, ambient temperature, charge & discharge current.
Record the process of charging & discharging	√	X
Alarm	√	X
Dry contact	√	X
LCD display	√	X
Communication port	RS485 , LAN	RS485 or RS232
Communication protocol	MODBUS /RTU, MODBUS /TCP, SNMP	MODBUS /RTU

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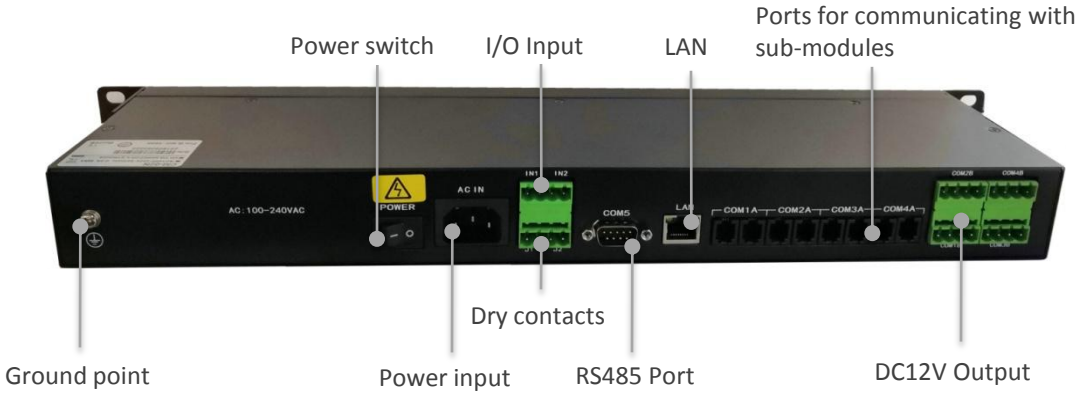
CM module Interface



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CM key specifications

Item	Parameters
Power requirements	AC85 ~ 264V or DC110 ~ 370V (Optional), 15W
Usage	1.2V，2V，6V，12V，capacity up to 3000Ah
Measurement Range & Accuracy	String voltage: 20~800V, ±(0.5%+0.2V) Cell voltage: 0.9~2.5V, ±(0.1%+1mV) 3.5-7.5V, ±(0.1%+10mV) 9~15V, ±(0.1%+10mV) Internal resistance: 50~65535uΩ (±1%) Battery temperature: -5oC~99.9oC, ±1oC String current: 0~1000A, ±1% (Full scale)
Communications Interfaces	RS485, Ethernet Port, meets Modbus/RTU, Modbus/TCP and SNMP protocols Insulation: 2000VAC
Standards	CE, ROHS, UL61010-1
Dry Contact	Dry contacts, DC220V/1A

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BS module Interface

Test port (J1), connect to battery

UART communication port(COM1, 2), for module looped

The green light is power light, and red light is communication light

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BS module key specifications

Item	Parameters
Power requirements	Power fed from the monitored battery，less than 60mA(1.2V , 2V) or 25mA(12V)
Usage	1.2V，2V，6V，12V , capacity up to 3000Ah
Measurement Range & Accuracy	Cell voltage: 1.2V: 0.9 ~ 1.4 ，±(0.1%+1mV) 2V: 1.5 ~ 2.5V ，±(0.1%+1mV) 12V: 9 ~ 15V ，±(0.1%+10mV) Internal resistance: 50 ~ 65535uΩ±1% Battery temperature: -5℃ ~ +99.9℃, ±1℃ Ambient temperature: -5℃ ~ +99.9℃ ，±1℃
Communications Interfaces	UART port, support MODBUS protocol
Standards	CE, ROHS, UL61010-1
Environmental	Operating temperature:-5℃ ~ 50℃,5% ~ 90%RH Storage temperature: -10℃ ~ 70℃,5% ~ 90%RH

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CS module Interface

Test port (J1), connect to current transformer and temperature sensor

Power input port (VIN), DC8 ~ 13 V

UART communication port(COM1, 2), for module looped

The green light is power light, and red light is communication light

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CS module key specifications

Item	Parameters
Power requirements	Power fed from the CM module or separate DC power supply DC 8 ~ 13V, 2W
Usage	1.2V，2V，6V，12V，capacity up to 3000Ah
Measurement Range & Accuracy	String current：0 ~ 1000A, ±0.5%（Full scale）
Communications Interfaces	UART port, support MODBUS protocol
Standards	CE, ROHS, UL61010-1
Environmental	Operating temperature:-5℃ ~ 50℃,5% ~ 90%RH Storage temperature: -10℃ ~ 70℃,5% ~ 90%RH

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Earth Fault Detection Module EF01

	Features
1	Battery string grounding and leakage analysis
2	Real-time online monitor battery string insulation resistance and intelligent leakage analysis
3	Early warn battery string leakage and grounding risks, timely find potential safety hazards
4	With two-level and photoelectric isolation protection
5	Support MODBUD and other protocols
6	Easy installation, excellent performance, reliable and stable

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Earth Fault Detection Functions

Insulation monitoring
Real-time online monitor total positive and negative battery string insulation resistance to ground, early warn insulation failure

Leakage analysis
Intelligently analyze battery leakage and leakage battery location

High stability
Reliable and stable product operation for a long time, has been applied and verified on millions of batteries

High interference resistance
Built-in filter circuit can block the ripple interference of high-power high-frequency UPS

Self-check function
The module has the function of self-checking, and can alarm automatically when it breaks down.

Installation
In-line negative pole installation, using hot-swappable connection cable, easy and convenient installation, support for online maintenance

Application
Suitable for battery monitoring in various fields

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EF module Interface

Collecting port (J1), connect to total **Positive +**, **Negative -** and PE terminals

Power input port

Communication port

The green light is power light, and red light is communication light

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EF module key specifications

Item	Parameters
Performance	One module monitors a string batteries or several battery strings in parallel
Power requirements	DC power supply DC 10.8 ~ 13V, 35mA max.
Usage	1.2V，2V，6V，12V, capacity up to 3000Ah
Measurement Range & Accuracy	0 ~ 1MΩ, ±5%, resolution 1KΩ
Communications Interfaces	RJ11 interface, UART port, support MODBUS protocol
Protection	Two-level protection design, with photoelectric isolation protection between acquisition and communication ends
Standards	EMC:EN61326-1:2013 EN61326-2-1:2013 Safety:EN61010-1:2010 UL61010-1:2013 UL、CE、ROHS
Environmental	Operating temperature:-5℃ ~ 50℃,5% ~ 90%RH Storage temperature: -10℃ ~ 70℃,5% ~ 90%RH

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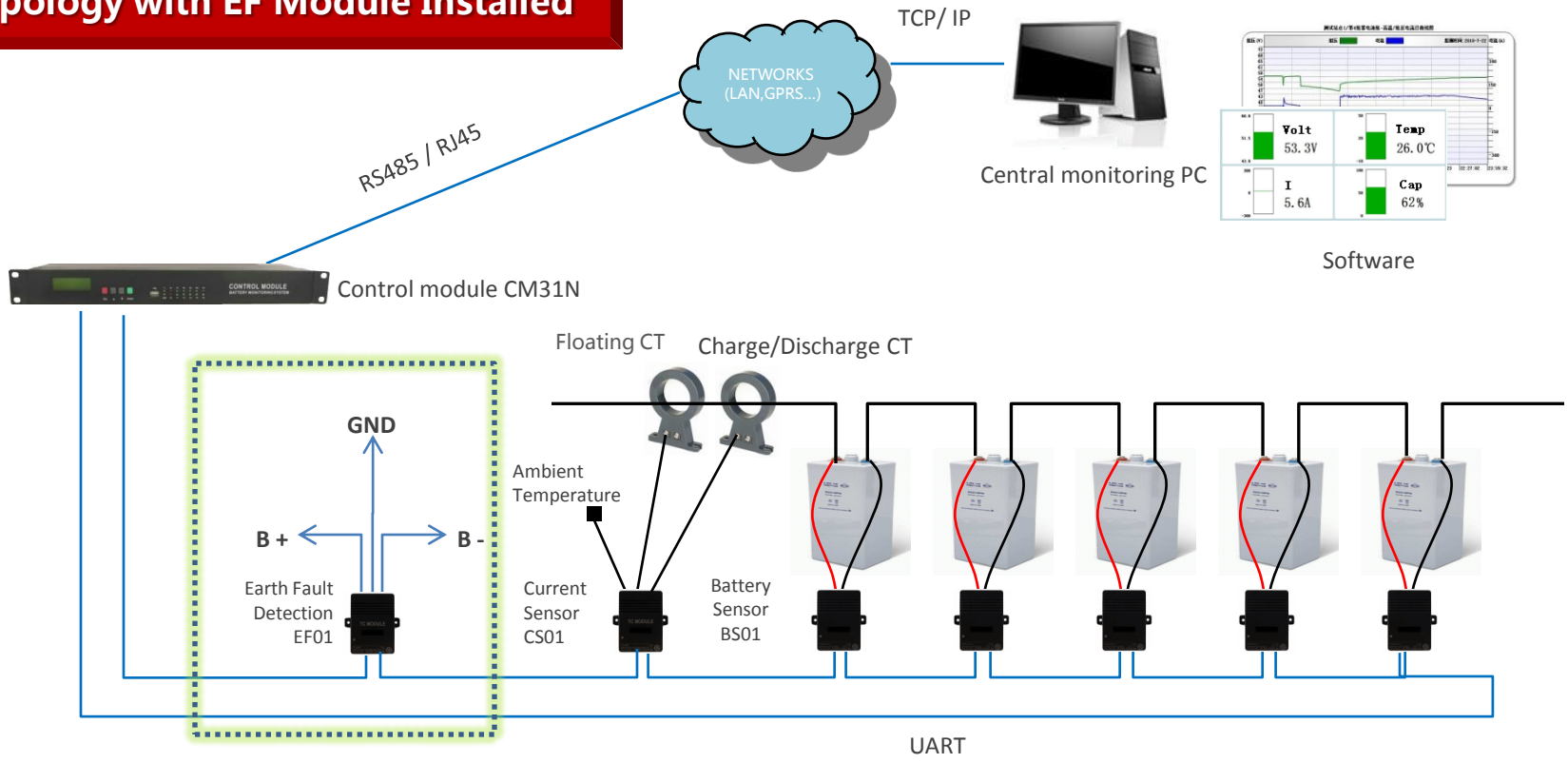
Topology with EF Module Installed



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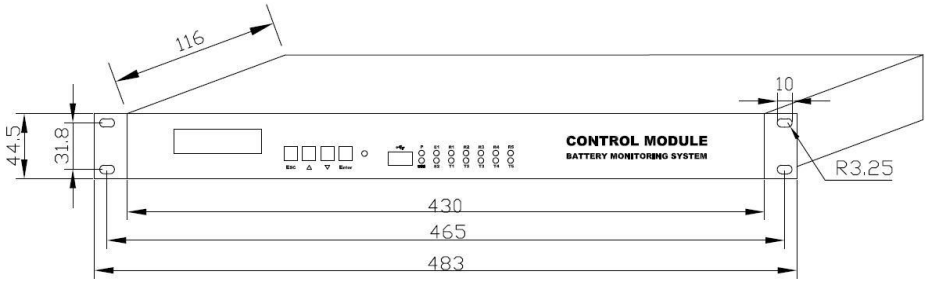
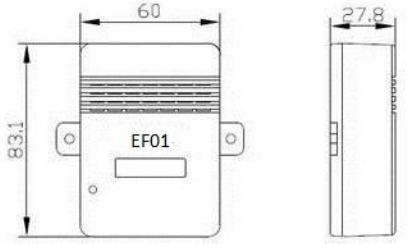
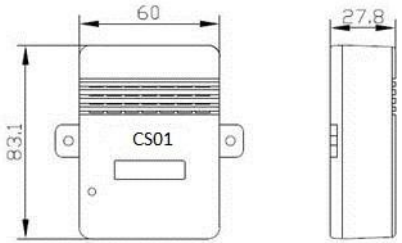
Mechanical



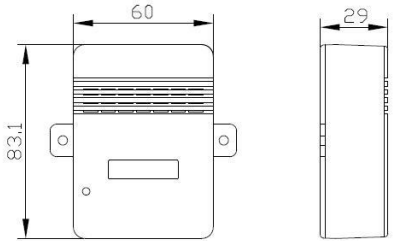
CM31N control module



EF module



CS module



Battery sensor-BS01 module

Weight	
CM31N	1.8kg
BS01	80g
CS01	75g

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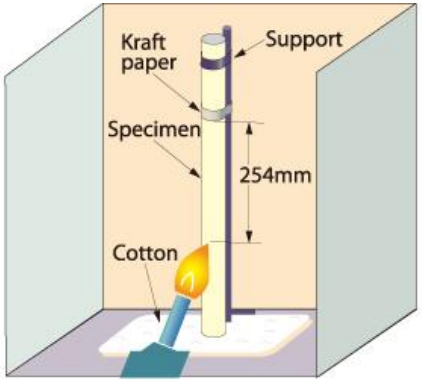
Flame retardancy

All cables and Non metallic shell are flame-retardant and meet the flame retardant requirements of UL VW-1, UL 94-V0, UL 1685 or GBT 18380.1 standards

UL VW-1 test method

The sample was kept vertical, and the test torch was fired at a flame height of 125 mm and a heat of 500 W. The flame was burned for 15 seconds and then stopped for 15 seconds, and repeated five times. Should not meet the remaining flame can not exceed 60 seconds, the sample can not burn more than 25%, the surgical cotton padded at the bottom can not be ignited by the falling object.



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Connectivity

Item	With CM module	Without CM module
Device name	CM module	COM Converter
Port type	serial port， Network port	serial port
Communication mode	RS485 ， RJ45	RS485 or RS232
Data format	1 start bit, 8 data bits, 1 stop bit, non parity	1 start bit, 8 data bits, 1 stop bit, non parity
Communication baud rate	19200BPS(Default)	9600BPS(Default)
Communication protocol	MODBUS /RTU, MODBUS /TCP,SNMP	MODBUS /RTU

- Can be directly connected to the third party monitoring system through the communication port of the CM module or BC01 COM converter.

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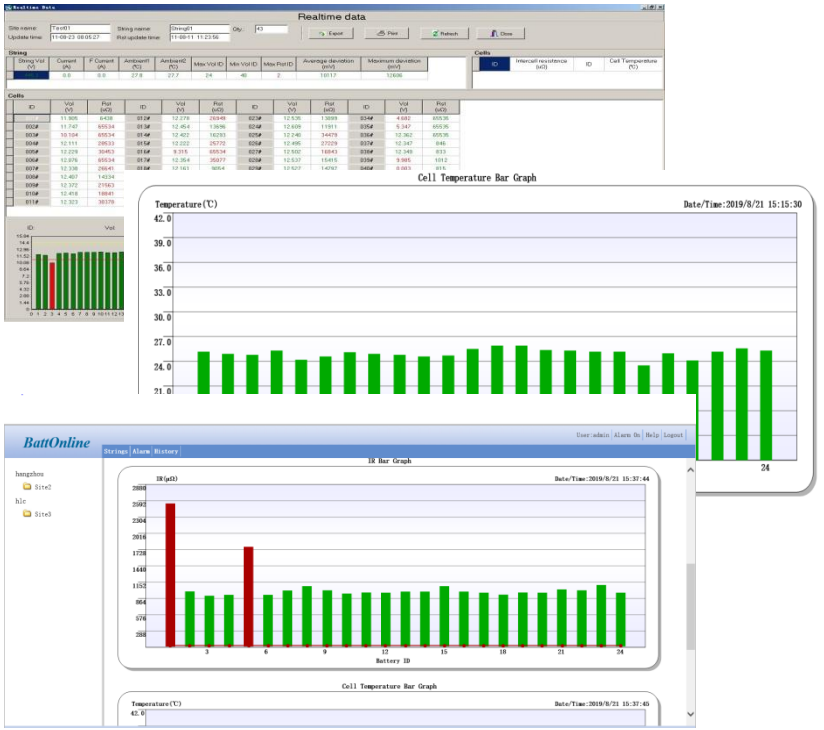
Battery management software

BM31N-S01 Battery management software adopts SQL-SERVER database on the basis of WEB browsing and its kernel also adopts concurrent Multi-threaded data processing technology which has solved big data blockage and leakage problems when applying. In the aspect of data storage, it uses the wave filtering technology to eliminate useless history data and improving the effectiveness of the data. BM31N is capable to monitor up to 100,000 battery cells.

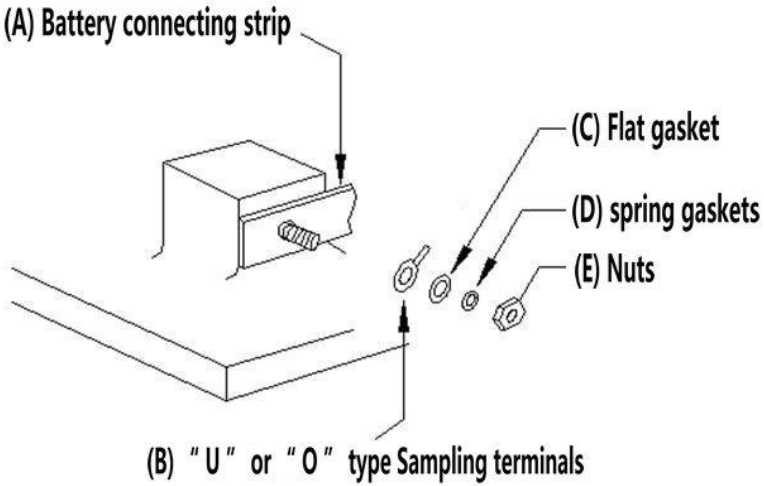
On user side, it adopts the visual interface design and using curve and histogram, etc to display every period variation trend of data intuitively. It can also record the discharge events and the discharge curve for both the string and also each battery completely.In terms of the alarm, it can record the alarm time of start and end clearly.

Software access authority can be divided into three levels: super user, senior user and ordinary user.

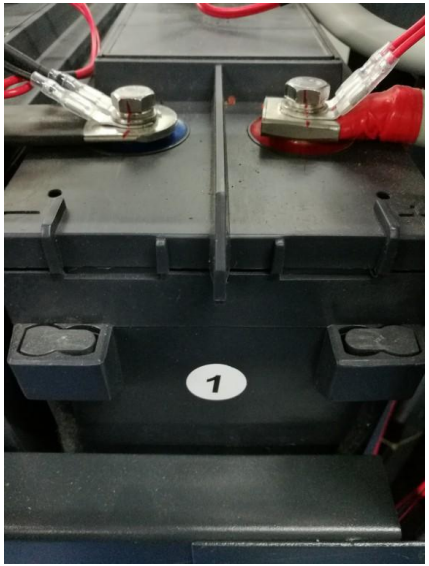


Sampling terminals Installation position

The sampling terminals is installed between the connecting strip and flat gasket.



After fastening, draw the identification line



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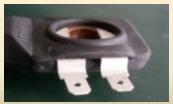
Sampling terminals type

Shape	Type	Applicable battery pole type
	Standard	
	Extended-A	
	Extended-B	
	Straight	
	Z type	

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BS module Installations

Pasted on battery directly

Pasted on battery directly

Fixed on the guide rail

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CM module Installation

Installed In 19 inch cabinet

Installed on the battery shelf

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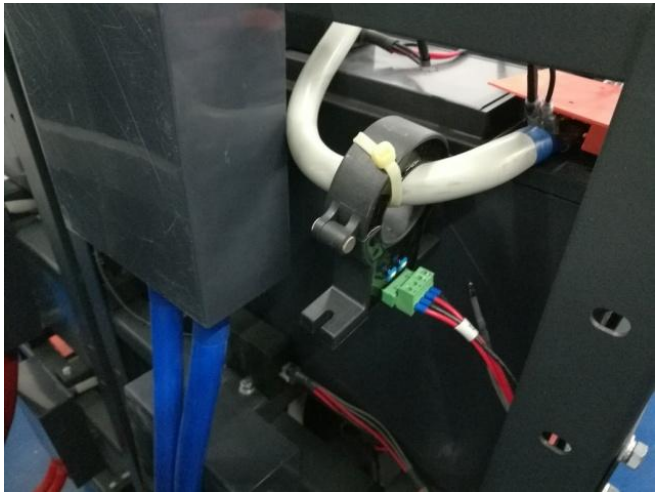
CS module Installation



The CS module can be fixed on the battery shelf or Pasted on battery cases directly, the CT is fixed on the connecting strip , and the arrow of the top of the CT keeps the same direction with the charging current of the battery

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