TekSea®

TEKPOWER

Technical Catalog

BMS - Battery Monitoring System

- 100% National Technology
- 24/7 Online Monitoring
- Direct measurement on the element, with no need for disconnection
- Applicable to Lead-Acid and Alkaline Batteries (Ni-Cd)
- Compatible with Rectifiers, Thyristor-Controlled Chargers and UPS
- Easy Installation and Configuration

FEATURES

- Individual measurement of Voltage, Temperature and Internal Resistance
- Battery Bank Current Measurement
- Individual State of Charge (SOC) of the Battery and Battery Bank
- Individual State of Health (SOH) of the Battery and Battery Bank
- Voltage and Current Ripple Measurement of the Battery Bank
- Individual Balancing of the Elements
- Real-Time Alarms and Events
- Web Interface for Configuration and Monitoring
- Communication available through various protocols: Modbus RTU, Modbus TCP, DNP3, SNMP v1, v2c and v3, MMS IEC61850
- Compliance with international standards

Measurements

Alarms

Load Balancing

Event Log

Analysis

Relatórios

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24/7 Online Monitoring

Continuous monitoring and real-time monitoring of critical variables

Avoid unexpected failures with automatic alarms and historical records

Ensures total availability for mission-critical environments

Easy Installation and Configuration

Automatic detection and configuration of connected sensor addresses

Modular architecture, with dedicated sensors for each element

Simplified installation with optimized wiring and intuitive interface

Measurement of Individual Elements / Batteries

Voltage Measurement, temperature and resistance

Direct reading on each element, without the need to disconnect or isolate the battery

Measurement with Repeatability and Reliability, with performance equivalent to high-precision bench instruments

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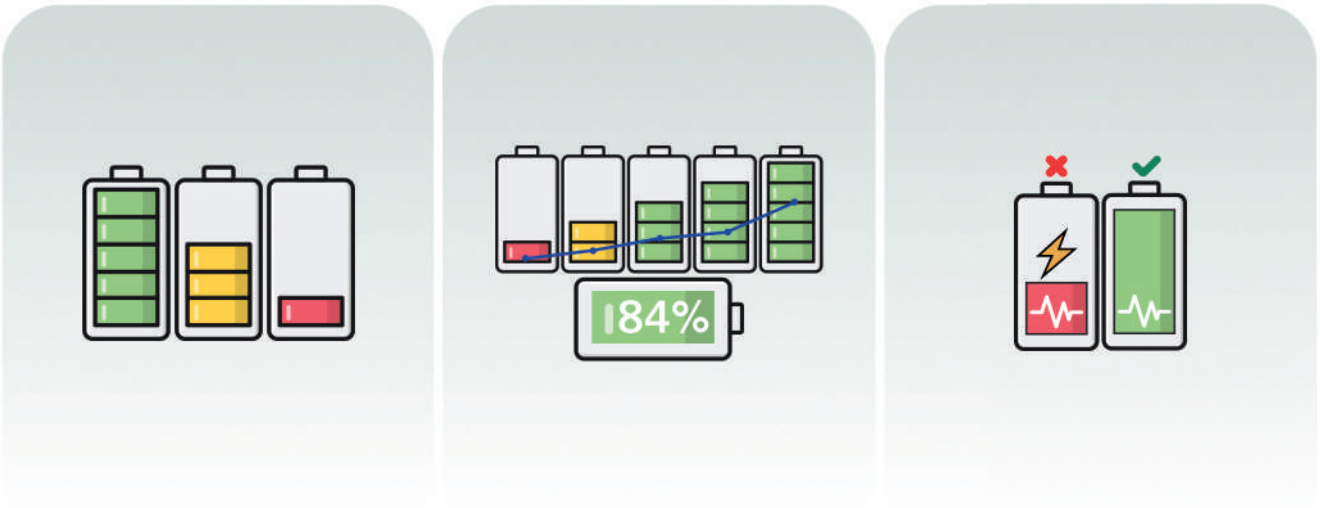

Individual Balancing of Elements

Automatic balancing balancing the battery during charging, maintaining all elements within the operating voltage range.

Increases battery life increases the useful life of the batteries.

Operates with continuous current balancing, the system operates with continuous balancing current, allowing continuous maintenance.

State of Charge (SoC) Individual and Bank

Calculation of the SoC of each element and battery bank

Coulomb Counting Algorithm, the system, which adjusts the SOC over time based on the current and temperature of the battery.

Allows the battery capacity to be evaluated in real time, without the need to perform discharge tests.

State of Health (SoH) Individual and Bank

Evaluates battery degradation based on internal resistance measurements.

Comparison with reference values, allows identification of parameters outside the specified range.

Prevents failures, ensures battery life and avoids failure in critical applications.

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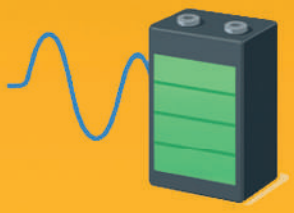

Voltage and Current Ripple Measurement

Ripple measurement for identifying failures in rectifiers.

Prevents degradation of the battery bank.

Uses a current sensor of the Hall effect type with no **installation interruption.**

Real-Time Alarms and Events

Continuous monitoring with immediate alerts in case of anomalies.

Detection of voltage, current, temperature and resistance limits of the elements and battery bank.

Instant generation of events and critical alarms with local and remote indication.

Web Interface Support

Access via browser, without the need for software installation.

Visualization of graphics, tables, export in CSV, PDF and XLS.

User control and secure configuration.

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Communication Protocols

Integration available through the following protocols:

- Modbus RTU
- Modbus TCP
- DNP3
- SNMP v1, v2c and v3
- MMS IEC61850

Compliance with International Standards

Designed in compliance with IEEE 1118, IEEE 450, IEEE 1106

Guaranteed quality in critical applications

Safety and interoperability for regulated markets.

100% National Technology

TekSea invests in technology as a strategic pillar, with solutions developed by a technical team made up of engineers, masters and PhDs. This commitment strengthens innovation and drives the technological development of the Brazilian industry.

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Installation Architecture

Applicable to rectifiers (thyristor-controlled, switched-mode, etc.) and UPS systems, from any manufacturer.

Battery Bank Measurements

Total Current
Voltage Ripple
Current Ripple
SOC
SOH

Element Measurements

Voltage
Resistance
Temperature
SOC
SOH

Hardware

4x Digital Inputs
4x Digital Outputs (NAF relay)
4x Analog Inputs (4–20 mA and 0–10 V)

Control

Load Balancing
Automatic Sensor Addressing
Continuous Data Monitoring

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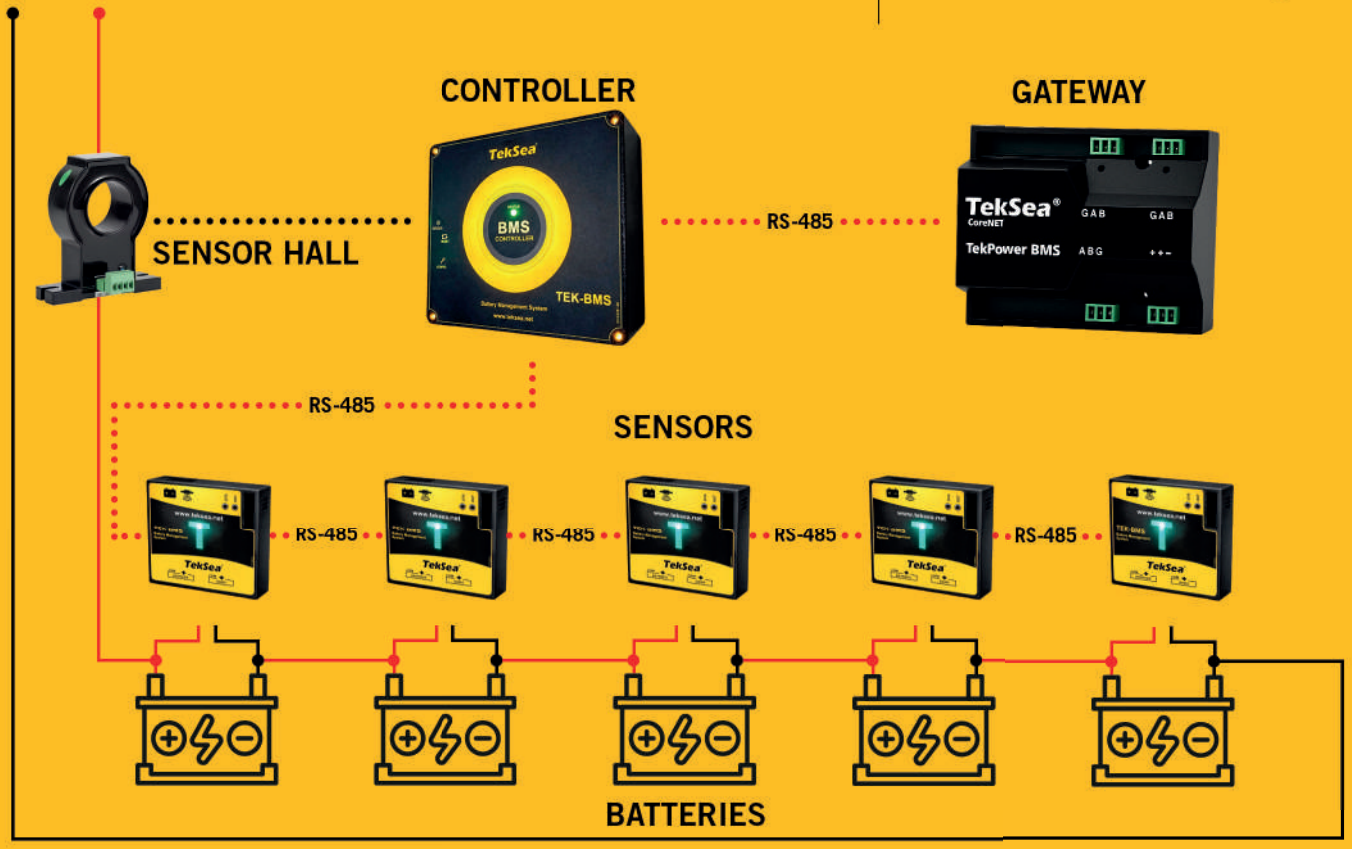

Installation Architecture

Supervision and Configuration

Web Browser access

Personalized access profile

Audit and Diagnostics System

Graphs and Reports

Battery Charge and Discharge Graph

Export function of historical data to .csv and .xls

Alarms and Events

Event and Alarm Log

Alarm and Event Export Function to .csv and .xls

Accurate Recording with Internal RTC

NTP Synchronization with the Internet

Statistical Analysis

Statistical Process Control (SPC)

Autoregressive Modeling AR(1) with RLS Algorithm

Communication Protocols

Modbus TCP
DNP3
SNMP v1, v2c and v3
MMS IEC61850

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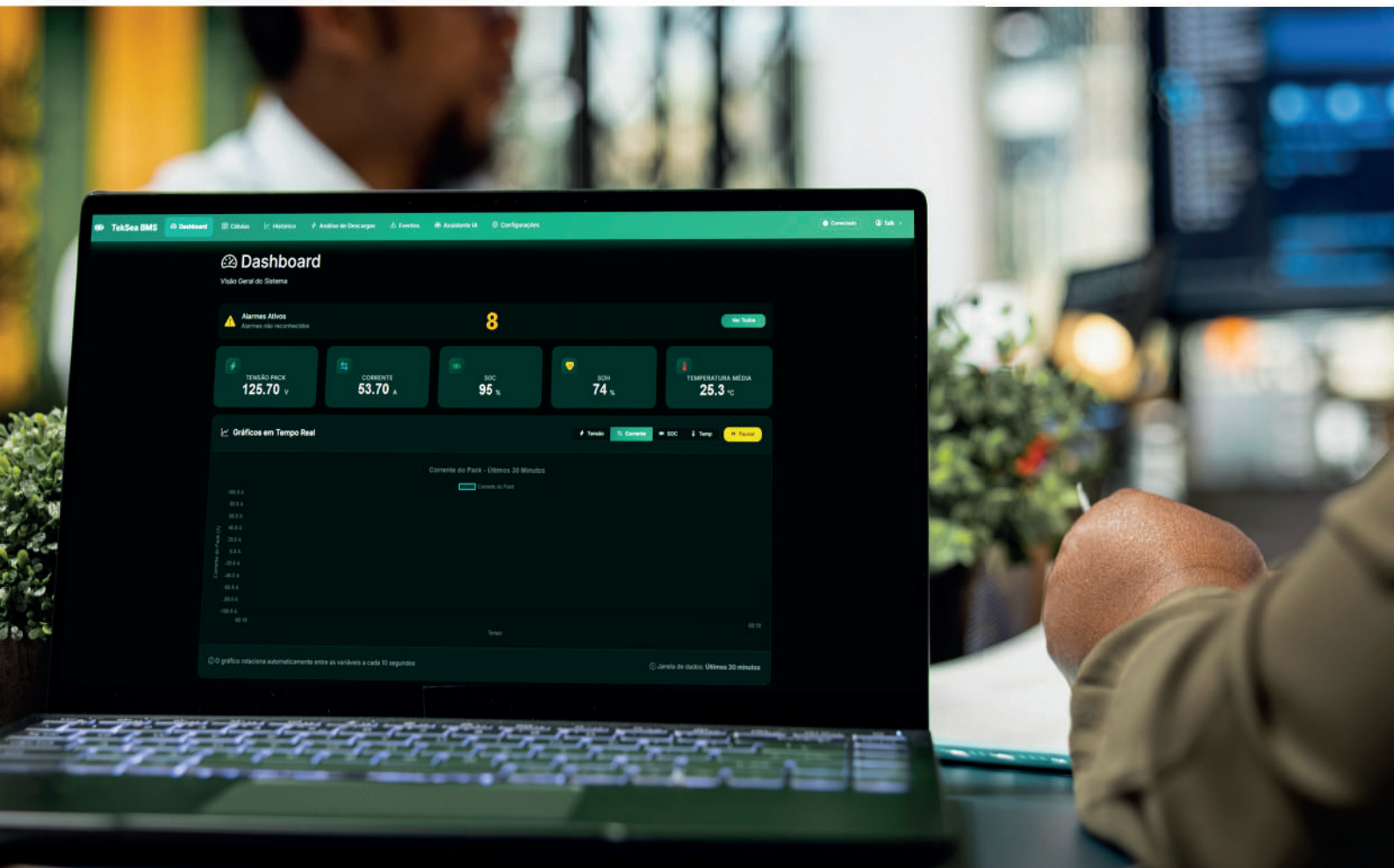
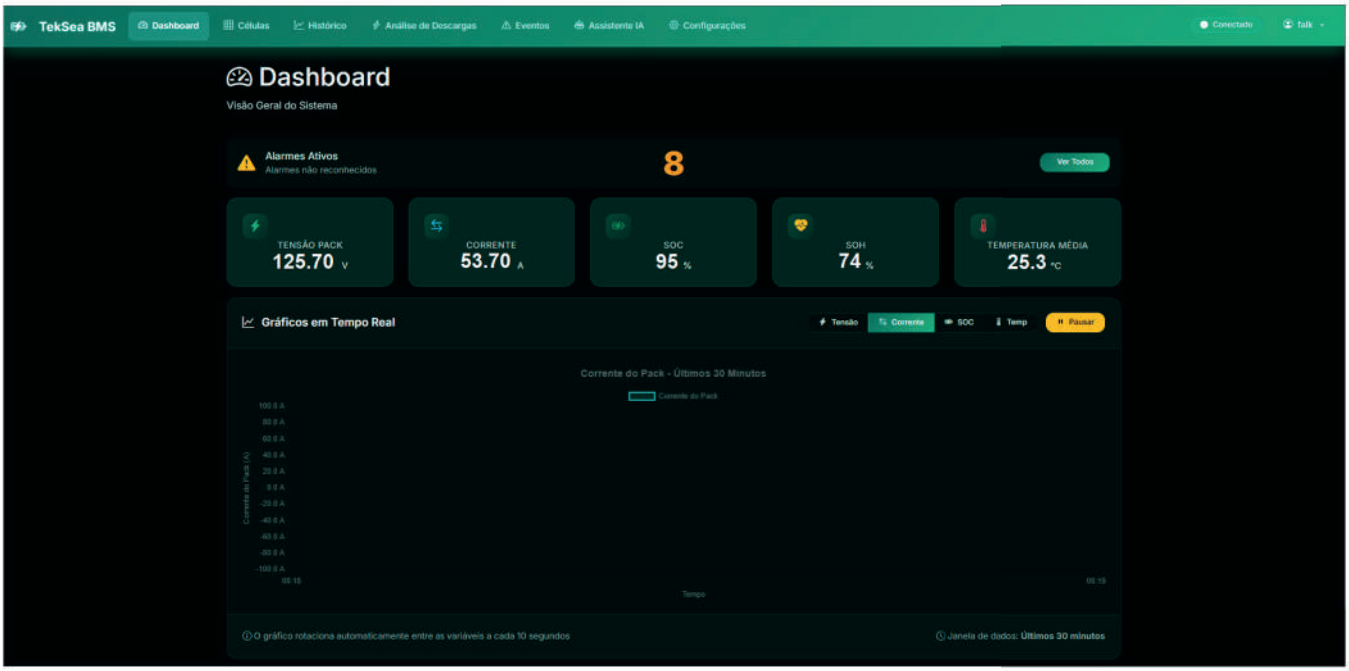
BMS Web Interface

The BMS Web Interface enables complete, intuitive, real-time monitoring of the battery system, providing a clear view of the operational status and performance of the energy bank.

- Complete real-time monitoring, including voltage, current, State of Charge (SOC), State of Health (SOH), and temperature, with visualization at the pack level and individually for each cell;
- Operational dashboard with dynamic charts, enabling analysis of system behavior, cells, and discharge cycles;
- Data history and time-based analysis, enabling detailed monitoring of the evolution of system variables;
- Event and alarm logging and management, with identification of active conditions and occurrence history;
- System configuration interface, allowing operational parameterization and adjustment of limits and alarms.



Dashboard



Discharge Analysis

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Individual Monitoring

ID	Nome	Tensão (V)	SOC (%)	SOH (%)	Temp (°C)	Res. Int. (mΩ)	Comunicação	Timestamp
1	Célula 001	10.379	89.6	84.5	25.9	1.846	Ok	05/03/2026 15:34:44
2	Célula 002	11.602	87.5	85.2	24.0	1.837	Ok	05/03/2026 15:34:44
3	Célula 003	12.149	86.7	72.9	34.0	1.516	Ok	05/03/2026 15:34:44
4	Célula 004	12.920	74.5	92.7	25.5	1.803	Ok	05/03/2026 15:34:44
5	Célula 005	13.813	79.5	74.1	21.6	1.742	Ok	05/03/2026 15:34:44
6	Célula 006	12.951	91.9	94.2	18.1	2.090	Ok	05/03/2026 15:34:44
7	Célula 007	12.255	87.9	72.3	20.7	1.947	Ok	05/03/2026 15:34:44
8	Célula 008	13.782	72.5	74.5	26.8	1.905	Ok	05/03/2026 15:34:44
9	Célula 009	11.029	87.5	75.3	20.8	1.852	Ok	05/03/2026 15:34:44
10	Célula 010	12.932	72.2	68.5	24.6	1.711	Ok	05/03/2026 15:34:44

TEKPOWER BMS vs. Traditional Maintenance

Item	Tekpower BMS	Traditional Maintenance
Voltage, Resistance, Temperature	Real Time	Periodic
State of Charge (SoC)	Real Time	Through Discharge Testing
State of Health (SoH)	Real Time	Periodic
Voltage and Current Ripple	Real Time	Periodic
Load Balancing	✔	✖
Alarms and Events	Real Time and Comprehensive	Periodic and Limited
Charts and Reports	Real Time	Periodic and Limited
Fault Location	Fast and Efficient	Slow
Battery Replacement Alarm	✔	✖

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What is not measured cannot be managed. What is not managed FAILS.

Why is monitoring essential?

Detected Problem	Consequences
Ambient temperature above 25 °C increase of 6 °C to 10 °C	Reduces service life by half due to the acceleration of electrochemical reactions and increases the corrosion rate of the plates.
Overcharge in an individual element	Electrolysis of water, increased internal pressure, thermal runaway, swelling of the casing and risk of electrolyte leakage.
Undercharge in an individual element	Formation of lead sulfate crystals (sulfation), reduced capacity, loss of SoH and irreversible loss of active material.
Actual float voltage with deviation ≥ 5% from the specified value	Causes accelerated degradation of the positive and negative plates, reducing service life by half.
Voltage and current ripple above IEEE limits	Additional heating, premature plate wear and instability in the charging process.
Internal short circuit in the element	Sudden increase in temperature, separator destruction and risk of explosion.

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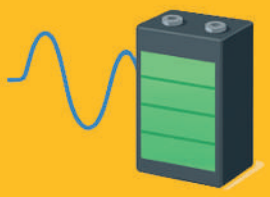
Monitoring means preserving performance, safety and investment.

Technological Differentials

Individually Controlled Balancing

Automatically equalizes each element, compensating for load differences and mitigating natural battery degradation. The balancing current is adjusted to prevent overcharging, ensuring the capacity is equalized and extending battery life.



Voltage and Current Ripple Measurement

The ripple of the battery is the AC component of the voltage or current waveform superimposed on the continuous component. It is caused by rectifiers and inverters.

High ripple levels accelerate the corrosion of plates, increase temperature and reduce the life of the elements. Continuous monitoring allows the detection of voltage variations outside the limits recommended by the manufacturer, avoiding premature failures.

FLUKE®
HIOKI

Reference Instrument Precision

Measurements of voltage, temperature and internal resistance with repeatability and precision equivalent to laboratory instruments of reference, such as Fluke and Hioki. Guaranteed precision for critical applications and equipment.

Avoid critical shutdowns: Detect the problem before it happens.

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The Challenge Faced by Our Customers

The reliability of critical operations — whether in substations, industrial plants, or data centers — depends directly on the availability and continued operation of battery banks.

These batteries represent **the last line of defense** for maintaining protection, control, communication and automation systems operating in the event of grid or electrical distribution failures.

CONSEQUENCES OF BATTERY BANK FAILURE

Unplanned interruptions
Interruptions in the supply of electrical power to customers.

Unexpected shutdowns of production lines and critical processes (industry, process, telecommunications).

Risk of accidents and environmental damage in petrochemical and chemical facilities.

Fines and penalties
Regulatory fines and penalties in utilities.

Million-dollar financial impacts
per hour of downtime in industrial sectors.

The traditional maintenance model, based on periodic inspections and manual testing, cannot anticipate **critical failures that develop between inspection cycles**.

The result is always the same: unexpected shutdowns, loss of productivity, high battery-bank replacement costs, and risks to institutional and operational reputation.

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Technical Catalog

BMS – Battery Monitoring System

Technical Specifications

Measurement Sensor [Sn]

General Data	Nominal Voltage	1.2 V / 2 V / 12 V
	Voltage Range	0.9...1.8 V / 1.6...2.6 V / 7.5...15.6 V
	Voltage Resolution	0.001 V
	Voltage Accuracy	±0.2%
	Resistance Range	0.1...50 mΩ
	Resistance Resolution	0.001 mΩ
	Resistance Accuracy	±1.0%
	Temperature	-20...85°C
	Options	Level Sensor / Leakage Sensor

Controller [SO]

General Data	Nominal Voltage	24 V
	Protection	Reverse Polarity
	Communication	Modbus RTU (RS485)
	Digital Inputs	4 × 24V (Opto-isolated)
	Digital Outputs	4 × NAF Relays
	Analog Inputs	4 × 0...10V or 4...20mA
	Current Measurement	Hall Sensor (string current measurement + ripple)
	Voltage Measurement	Isolated AC ripple voltage input from the string

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Gateway

General Data	Nominal Voltage	24 V
	Protection	Reverse Polarity
	Communication	Modbus TCP
		DNP3
		SNMP v1, v2c and v3
		MMS IEC 61850
	Web Browser	Yes, for monitoring and configuration
	Charts and Reports	Yes, with statistical analysis
	Alarm and Event Log	Yes, in .csv and .xls

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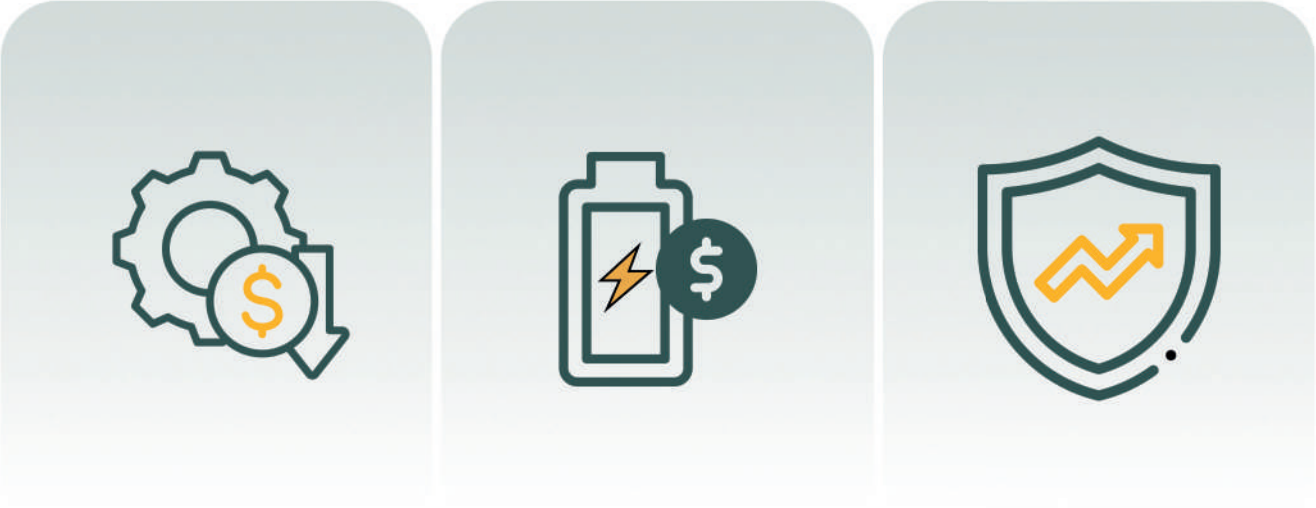
Advantages of a BMS System



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Reduction in Maintenance Costs

Reduction in Replacement Costs

Increased Safety

Scheduled Maintenance

Preventive maintenance is always more cost-effective than replacement.

Discover other solutions in our portfolio

Energy

Rectifiers, Thyristor-Controlled Chargers and Switched-Mode Power Supplies (with or without batteries)

Industrial UPS

Inverters CC/CA with key switch
⊠ DC/AC Inverters with key switch

Integration

Electrical Panels for Services Auxiliaries

Monitoring and Automation Systems

Services

Maintenance contracts and specialized technical support

Supply of spare parts

Retrofit and modernization services

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Contact us and learn how to integrate these solutions into your project.

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Need more information?

www.teksea.net

The information contained in this document consists of descriptions of the technical solutions available and is intended for reference purposes only.

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