Rolled-Ribbon Battery Management System Components

Battery Management System

- Flexible, Modular, Scalable Architecture
- Advanced Algorithms
- Voltage Range: 12-1,000V (nominal)
- Current Range: Up to ±500A, 10mA Resolution

System Controller (SC)

- Functions: State of Charge (SOC), State of Health (SOH), Charge Control, Discharge Control, Pre-Charge Control, Isolation Resistance Control
- Application Interfaces (Slave): CAN 2.0 A & B 125-500Kbps, RS-485 Full-Duplex 100-500Kbps, Digital I/O
- Support Interface (Slave): CAN RRBC 100-500Kbps
- Battery Bus (BATBUS): Master
- Control up to 4 Contactors (2 CC), 32 Battery Modules
- Monitor up to 2 Current Sensors (CS), 1 Isolation Resistance Monitor (IM)
- Other: Synchronized Real Time Clock, Event Logs, Fault Detection, Secondary Fault Protection
- Power: 12-48VDC

Battery Controllers (BC)

- Functions: State of Charge (SOC), State of Health (SOH), Charge Control, Discharge Control, Pre-Charge Control, Isolation Resistance Control, Cell Bank Balancing
- Application Interfaces (Slave): CAN 2.0 A & B 125-500Kbps, RS-485 Full-Duplex 100-500Kbps, Digital I/O
- Support Interface (Slave): CAN RRBC 100-500Kbps
- Battery Bus (BATBUS): Slave or Master
- String Bus (STRBUS): Master, Isolated
- Control up to 4 Contactors (2 CC), 32 Battery Modules
- Monitor up to 2 Current Sensors (CS), 1 Isolation Resistance Monitor (IM)
- Other: Synchronized Real Time Clock, Event Logs, Fault Detection, Secondary Fault Protection
- Power: String Bus (STRBUS) or 12-48VDC

Battery Interfaces (BI)

- Provide physical interfaces and temperature sensors for Rolled-Ribbon Battery Modules for connection to Battery Monitors (BM)

Battery Monitors (BM)

- Provide cell voltage measurement and temperature measurements for Battery Modules; provide cell bank balancing for Battery Modules
- Up to 16 cell banks with up to 1.0A passive balancing current
- Secondary fault protection

Current Sensors (CS)

- Provide battery system and battery string current measurement during charge and discharge
- Isolated measurements, ± 500A, 10mA resolution
- Internal fault detection

Contactor Controllers (CC)

- Provide control for up to 2 contactors
- Works with popular contactors

Pre-Charge Circuits (PC)

- Provide differential voltage measurement between battery bus and load bus to control pre-charge function; provide current limited charge-discharge path

Isolation Resistance Monitors (IM)

- Provide isolation resistance measurements between battery buses, load buses and ground

Communication Adapters (CA)

- Diagnostic tool for communicating with, and configuring, system components via Support Interface, Battery Bus (BATBUS) and String Bus (STRBUS). USB interface. PC-based software.

Rolled-Ribbon® Battery Management System
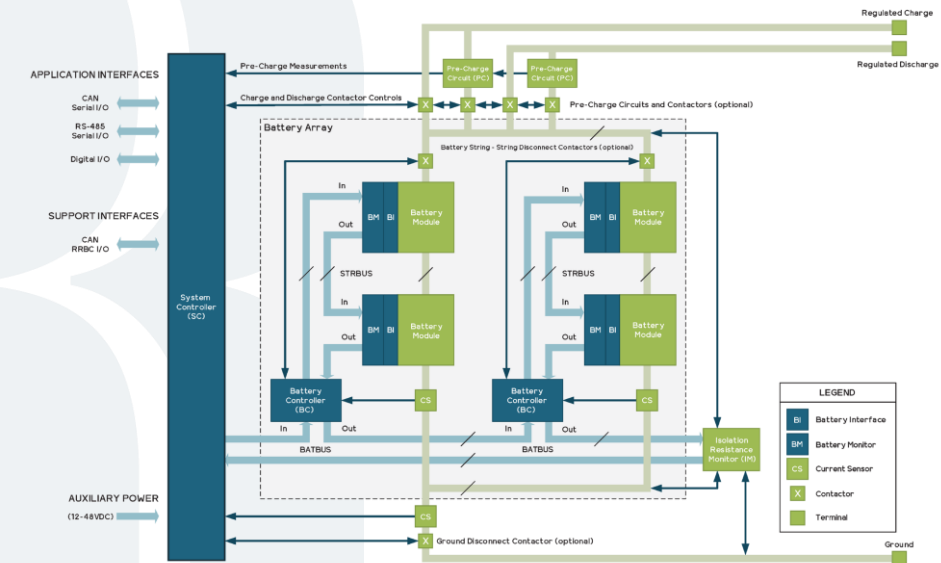
(See diagram inside)

The Rolled-Ribbon Battery Management System can be configured to meet a wide variety of application requirements. Further, it can be customized to meet unique requirements or to optimize for specific requirements.

The Rolled-Ribbon® Battery Management System is a flexible modular system of scalable components for managing Li-ion battery systems that can include multiple battery strings of up to 1,150 Volts. The system incorporates advanced algorithms for determining State of Charge (SOC) and State of Health (SOH). The system can be used with a wide variety of Li-ion battery chemistries, including but not limited to LFP, NMC, LTO, NCA, LMO and LCO. System components include:

- System Controllers
- Battery Controllers
- Battery Interfaces
- Battery Monitors
- Current Sensors
- Contactor Controllers
- Pre-Charge Circuits
- Isolation Resistance Monitors
- Communication Adapters

Rolled-Ribbon Advantage

- **Advanced Algorithms**
- **Flexibility**
- **Modularity**
- **Scalability**
- **Customizability**

Applications

- **Industrial Equipment**
- **Utility Vehicles**
- **Electric Vehicles**
- **Marine Vessels**
- **Transportable Power Systems**
- **Microgrids – Grid Energy Storage**
- **Uninterruptible Power Systems**

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Rolled-Ribbon Battery System Block Diagram

Regulated Charge

Regulated Discharge

APPLICATION INTERFACES

Pre-Charge Measurements

CAN Serial I/O

RS-485 Serial I/O

Digital I/O

Charge and Discharge Contactor Controls

Pre-Charge Circuit (PC)

Pre-Charge Circuit (PC)

Pre-Charge Circuits and Contactors (optional)

Battery Array

Battery String - String Disconnect Contactors (optional)

In

BM BI

Battery Module

Out

SUPPORT INTERFACES

CAN RRBC I/O

In

BM BI

Battery Module

Out

STRBUS

In

BM BI

Battery Module

Out

In

BM BI

Battery Module

Out

STRBUS

System Controller (SC)

Battery Controller (BC)

CS

Battery Controller (BC)

CS

In   Out

BATBUS

In   Out

BATBUS

Isolation Resistance Monitor (IM)

LEGEND

BI   Battery Interface

BM   Battery Monitor

CS   Current Sensor

X   Contactor

Terminal

AUXILIARY POWER

(12-48VDC)

CS

X   Ground Disconnect Contactor (optional)

Ground