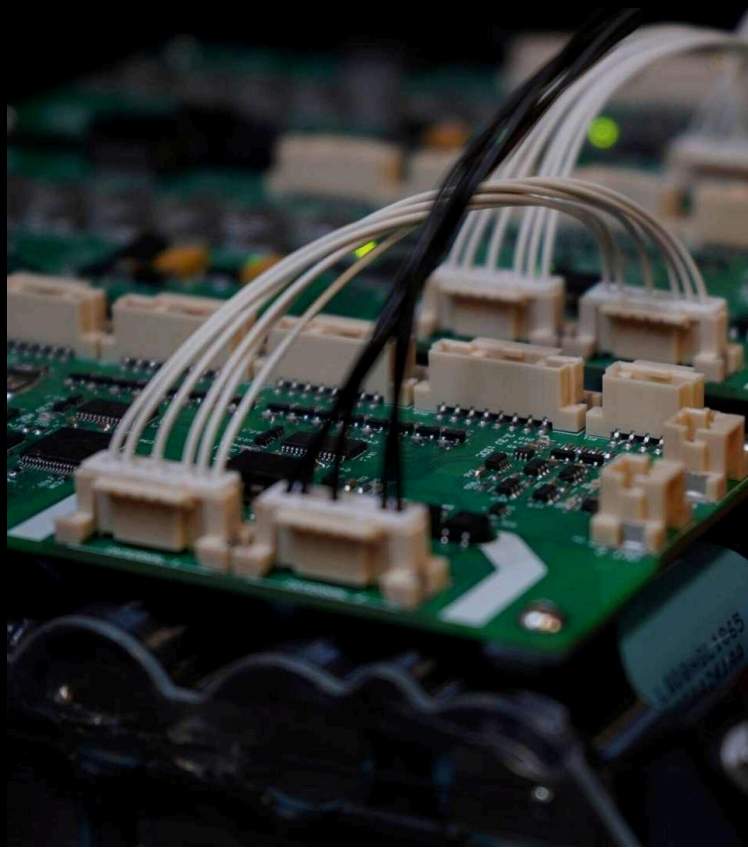
Battery Control System

A modular battery control system for packs up to 1200 V and 380 cells in series. It measures every cell, balances charge, controls the contactors and reports to the vehicle or system.



BCS-MM01 BCS-PM01 BCS-AM01-04 BCS-CM BCS-DM01

Key features

System

- Modular, distributed architecture
- Integrated high-voltage DC/DC converter
- Redundant communication loop

Measurement

- Up to 16 cells per cell module
- Operating voltage up to 1200 V
- Current measurement up to ±1825 A
- Cell voltage refresh rate up to 900 Hz

Temperature sensing

- 16-bit delta-sigma ADC
- Accuracy down to ±0.1 °C
- Up to 14 sensors per cell module

Safety

- Open-wire detection
- Redundant isolated CAN bus
- Intelligent Shutdown Circuit (iSDC)
- Independent power supply in each cell module

Applications

Motorsport	Industrial machines	Energy storage

General description

The Volteek Battery Control System (BCS) is made of separate modules joined by a redundant communication loop. If one connection in the loop breaks, the modules keep communicating and the pack stays in operation.

The **Intelligent Shutdown Circuit (iSDC)** runs through all safety-critical modules. It works as an interlock, and any module can open it to shut the system down immediately.

Inside the pack the modules communicate over **isolated CAN**, for safety and better EMI performance.

Each cell module has its **own power supply**, so it keeps measuring and protecting its cells if the main supply fails. Low standby consumption lets a pack stay in storage for long periods.

A cell module measures **up to 16 cells** and refreshes each cell voltage at **up to 900 Hz**.

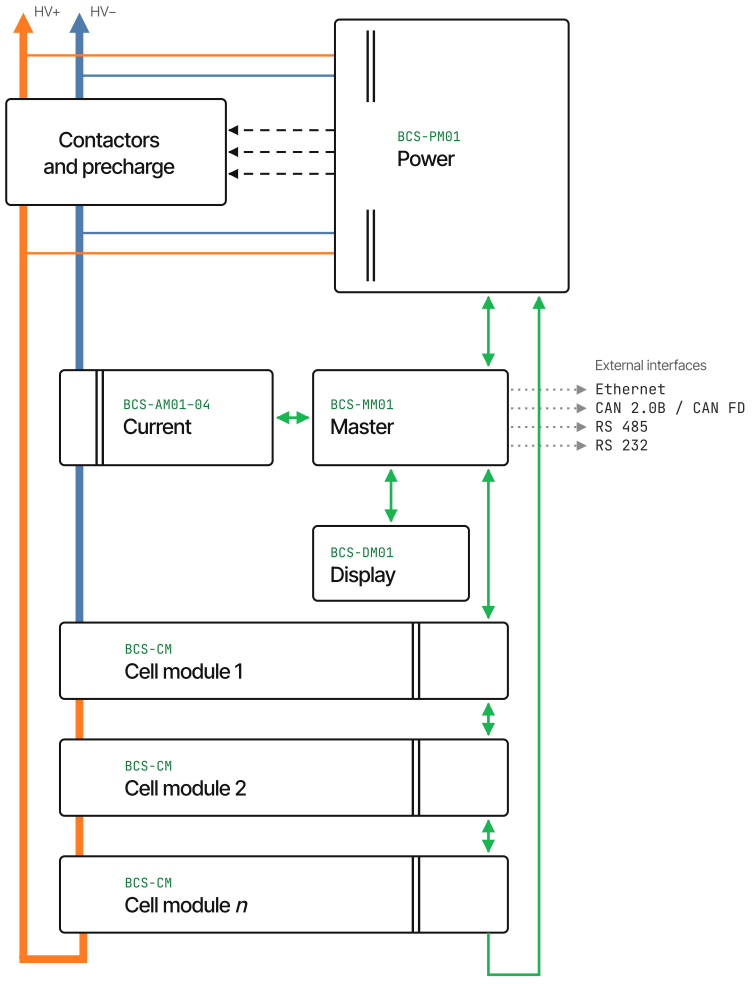
System architecture

The BCS uses a modular, distributed architecture. The Master Module connects the battery to the vehicle or system. It communicates with the safety-critical modules (Power, Current and Cell) over isolated CAN and through the Intelligent Shutdown Circuit.

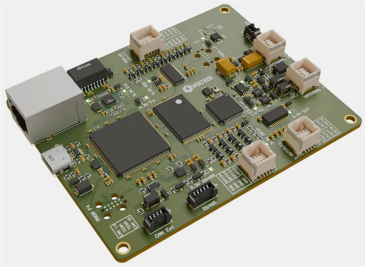
The safety-critical modules are connected in a loop. If one module or connection fails, the others stay active and the battery keeps operating.

`BCS-MM01`	Master Module
`BCS-PM01`	Power Module
`BCS-AM01-04`	Current Module
`BCS-CM`	Cell Module, up to 60 per system
`BCS-DM01`	Display Module, optional

- High voltage, positive
- High voltage, negative
- Internal communication (isolated CAN)
- Contactor control
- External interfaces
- Isolation barrier



Modules



BCS-MM01

Master Module

Handles communication with the rest of the system, such as the charger, ECU or VCU, over several interfaces. A dual-processor design improves cybersecurity.



BCS-PM01

Power Module

Manages the flow of energy to and from the battery. It contains the high-voltage DC/DC converter that powers the BCS and drives the positive, negative and precharge contactors. It also measures battery and load voltage and communicates with the insulation monitoring device.



BCS-CM00801, BCS-CM01201, BCS-CM01601

Cell Module

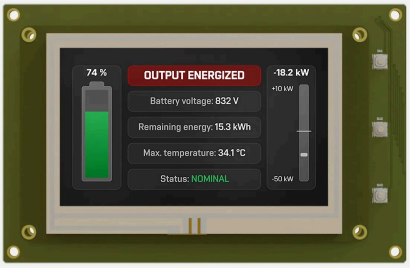
Measures and balances the voltages of up to 16 cells and monitors their temperatures. It samples at up to 900 Hz for fast and accurate SoX calculation. With fewer cells per module, a system can use up to 60 cell modules.



BCS-AM01, BCS-AM02, BCS-AM03, BCS-AM04

Current Module

Measures the current into and out of the battery with a temperature-compensated shunt, at a refresh rate of up to 2 kHz. Four versions cover ranges from ±250 A to ±1825 A.



BCS-DM01

Display Module

Optional. Shows the state of the battery: state of charge, pack voltage, contactor status and the highest temperature in the pack.

Module datasheets

Each module has its own datasheet with a description of its functions, communication interface, connector pinout, mechanical drawings, operating limits and mounting information.

Download them at volteek.com/products or ask us at info@volteek.com.

System specifications

System

Architecture	Modular, distributed, redundant communication loop
Internal communication	Isolated CAN
Shutdown	Intelligent Shutdown Circuit (iSDC)
Operating voltage	Up to 1200 V
Cells in series	Up to 380
Cell modules per system	Up to 60, with fewer cells per module

Master Module

Interfaces	100 Mbit/s Ethernet, CAN 2.0B / CAN FD, RS 485, RS 232
Internal storage	Up to 16 GB
Outputs	8 low-side, 1 A sink
Inputs	4 digital, 8 analog

Power Module

Supply	HV DC/DC for 200–900 V packs, or external 9–36 V
Contactor outputs	3 (main and precharge, 12/24 V), 2 PWM-capable
Contactor hold current	Up to 1 A
Auxiliary contact sensing	Yes
Pack and load voltage	Up to 1200 V, refresh rate up to 2 kHz
Pack voltage accuracy	±0.5 %
Insulation monitoring	External IMD supported

Current Module

Method	Temperature-compensated shunt
Range	±250 A (AM01), ±500 A (AM02), ±1000 A (AM03), ±1825 A (AM04)
Accuracy	±0.01 A
Refresh rate	Up to 2 kHz

Cell Module

Cells per module	Up to 16
Cell voltage refresh rate	Up to 900 Hz
Balancing current	Up to 800 mA
Temperature sensors	Up to 14
Temperature ADC	16-bit delta-sigma, accuracy down to ±0.1 °C
Open-wire detection	Yes
Supply	Independent, in each module

Changelog

Rev.	Date	Description
A	06/2025	Initial release
B	10/2026	New layout, edited text, updated specifications, part numbers for all module versions

Disclaimers

Performance

Values are measured under standard test conditions and can differ in other environments and operating conditions. Test the system in your own application.

Hardware revisions

Pinouts, connector lists and drawings apply to the current hardware revision and may change in later revisions.

Measurement accuracy

Measured values can vary. Validate the data and take all sources of error and tolerances into account.

High voltage

The system can operate at hazardous voltages. Only qualified personnel may install, handle or modify it, following high-voltage safety procedures.

Electrostatic discharge

The modules contain components that are sensitive to electrostatic discharge. Follow ESD precautions to avoid degraded performance or permanent damage.

Liability

The manufacturer is not liable for any direct, indirect, incidental or consequential damage arising from the use of, or inability to use, the product.