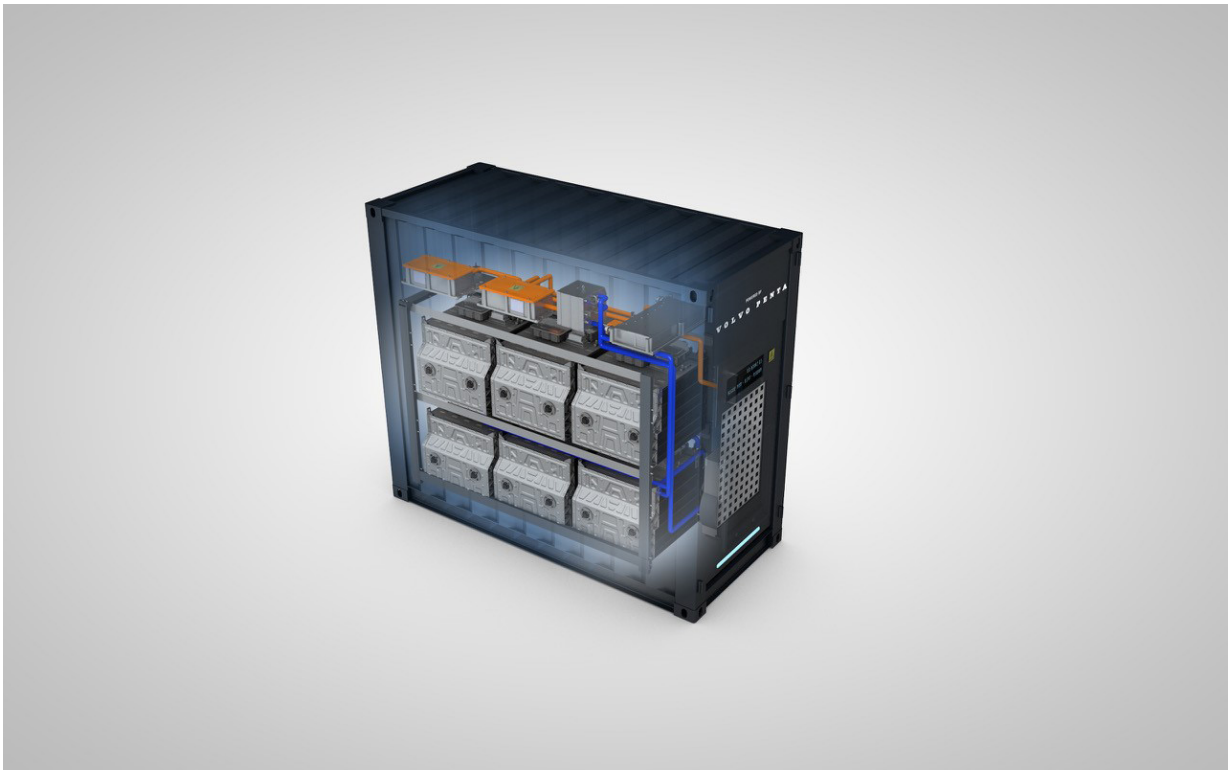
VOLVO PENTA

BATTERY ENERGY STORAGE

Volvo Penta Battery Energy Storage System (BESS) - sub system



The signature attribute in Volvo Penta's modular and scalable BESS subsystem is a high-energy-density and high-power battery system with a favorable C-rate ensuring quick and substantial charge and discharge in response to sudden demand.

The future is electric

These battery systems are energy and power-optimized to meet business and operational needs. Volvo Penta's solution is scalable up to hundreds of megawatts.

Volvo Penta's value-added systems-supplier approach ensures that its offer is deployed holistically to manufacturers. The value chain, spanning the design of the battery packs to meet safety, industry, and performance standards for repeat operation, all the way to its transportability and integration into turnkey BESS applications, is secured.

Built on Volvo Group technology

Volvo Penta's offer is built on the Volvo Group's electromobility platform, which has seen real-world success in applications such as trucks, buses, and construction equipment.

The Volvo Penta BESS offer demonstrates high-power output from an energy-dense and small footprint. The battery system, with origins in the heavy-duty design, is optimized for tough environmental conditions, making it an excellent option for battery energy storage applications.

Tailor-made battery energy storage systems

This approach is built on close collaboration – partnering with customers, evaluating the specific challenges at hand to develop a perfect fit for each project.

- **The sub-system has a common cooling and controls architecture between them, providing a modular capability**
- **The sub-system is scalable to several batteries as per the need for catering applications from temporary power backup to distributed energy resources**
- **The solution is agnostic to be integrated with several other power sources such as solar, wind, or reciprocating engines**
- **Proven electromobility technology from the Volvo Group**

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Technical data

Electrical

Battery Cell Chemestry	NCA/Si-Graphite
Total Usable Capacity	70 - 77%
Charge Power	
Continuous	@50% SOC 46kW/battery
Dischage Power	
Continuous	@50% SOC 91kW/battery

Protections

- Battery protections:
  - Battery current and voltage curtail limits
  - Battery over / undercurrent setpoints
  - Battery over / undervoltage setpoints
- HV Isolation loop
- Thermal management system built into battery modules to monitor and control temperature
- Battery contactor monitoring
- BMS cell temperature, active SOH and SOC monitoring

BMS Communication protocol

- **Communication protocol:** CAN
- **Communication interfaces:** CAN

CAN Protocol hardwired backbone bus between batteries, thermal management system and BMS controller.

Batteries

- Robust packaged solution
- Liquid cooled for better efficiency

Technical description

Battery System

The battery pack is a high-energy-density, high-power battery pack derived from heavy-duty applications. It has a favorable C-rate, allowing for rapid and substantial charging and discharging. The battery systems are energy and power optimised to meet business and operational requirements, scalable from one to hundreds of megawatt hours in energy.

Battery Management System

A control architecture that leverages the knowledge of the Volvo Group and built collaboratively with our customers for seamless integration with the battery energy storage control system.

Thermal Management System

Including pumps, radiators, active cooling unit, and heater for high-functionality in different tough environments.

Battery Monitoring System

Monitoring the BESS subsystem to ensure early fault detection, having the right parts at the right time, maximising uptime, and all-round peace of mind.

Power Distribution Box and High Voltage Cables

Designed with safety as a priority – a secure coffer for high-voltage electrical connections.

Rating	Max charge power (kW)	Max discharge power (kW)	Net capacity (kWh)
270	138	273	191
360	184	364	254
450	230	455	318
540	276	546	382

Contact your local Volvo Penta dealer for more information regarding Volvo Penta engines and optional equipment/ accessories or visit www.volvopenta.com

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