VOSS

STAY COOL, STORE EFFICIENTLY.

Liquid cooling solutions for
Battery Energy Storage Systems

bess.voss.net

That´s who we are

Fluid-Management for vehicle and machine construction

As a larger medium-sized group of companies, VOSS develops and produces line and connection systems for the automotive industry and mechanical engineering. The success of the VOSS Group is based on great customer proximity, committed employees, innovative products and the demand for permanent top quality for customers with the highest requirements.

With strategic corporate development, a responsible awareness of people, the environment and the region, VOSS has evolved over the past 90 years to an internationally successful group of companies.

VOSS in figures

23 group companies in 13 countries

54 sales partners in 56 countries

7,500 employees

>40,000 marketable articles

16 international subsidiaries

VOSS

Competence for battery energy storage systems.

Our system competence. Your added value.

Our expertise is in the development and production of customer-specific system solutions for the thermal management of mobile and stationary applications. Optimum temperature control is essential for maximum battery performance in electric vehicles or battery energy storage systems. To this end, VOSS designs connection and manifold solutions tailored to individual customer requirements.

This includes the creation of precisely fitting line routings for the smallest and most complex installation spaces as well as the integration of supplementary system components such as quick connect systems, valves, sensors or customer-specific components. User-friendly innovations such as double flow stop valves for leak-proof battery module removal impress with minimal installation effort. Customers and users benefit from the system expertise of the entire VOSS Group. This includes not only our innovative product solutions but also our comprehensive services:

- In-house tool construction
- Worldwide standardized production and assembly processes
- Intelligent logistics concepts
- First installation advice & service also after series production
- Extensive theoretical and practical training
- Worldwide availability of our products & services
- Comprehensive certifications and compliance with the highest quality standards

Applications

Mobility

- Onshore/offshore power supply
- Mobile power supply (e.g. construction sites)
- Charging infrastructure for electric vehicles

Trade & industry

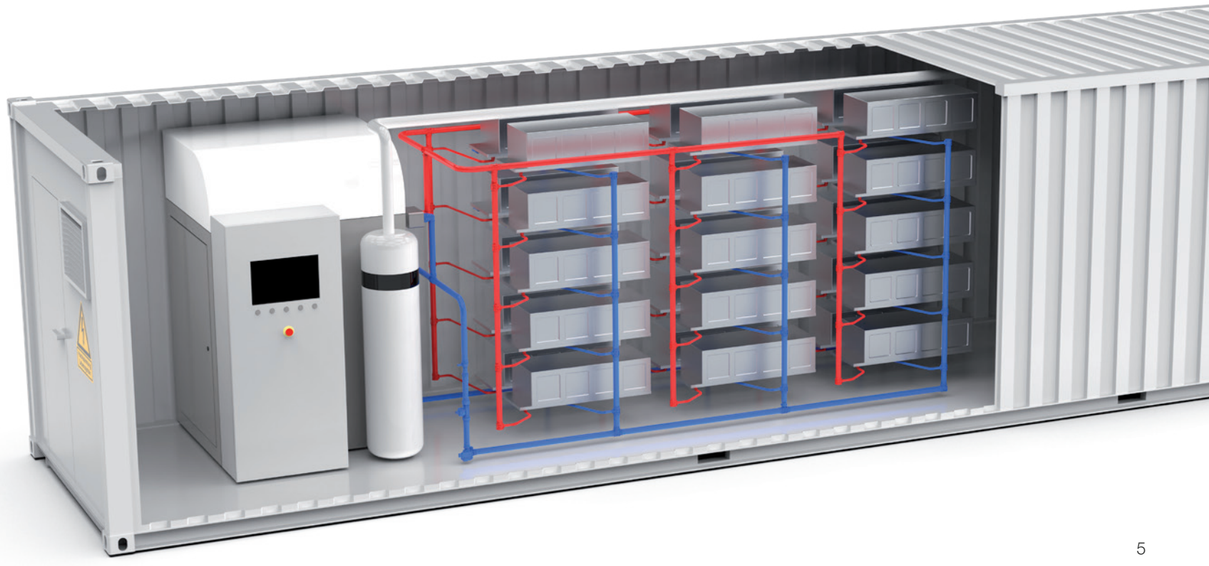
- UPS (Uninterruptible Power Supply)
- Replacement of diesel generators
- Peak load disconnection
- Load balancing

Energy supply

- Frequency control
- Load balancing
- Peak shaving
- Capacity adjustment
- Power quality
- Safety reserve
- Self-contained start
- Energy trading

The complete system

Our innovative liquid cooling solutions offer numerous advantages, including efficient heat dissipation for longer battery life, even temperature distribution for optimal performance and reliability, and a compact design for space-saving installations. They also enable higher C-rates and more frequent charging cycles. Benefit from higher operational efficiency and improved service life for your battery system.



System experience and innovations

Our customized system solutions start with:

- System analyses and benchmarking
- Innovative product and system development
- Continuous accompanying simulations and FE analyses
- Rapid prototype and pre-series construction
- Validation and tests during development

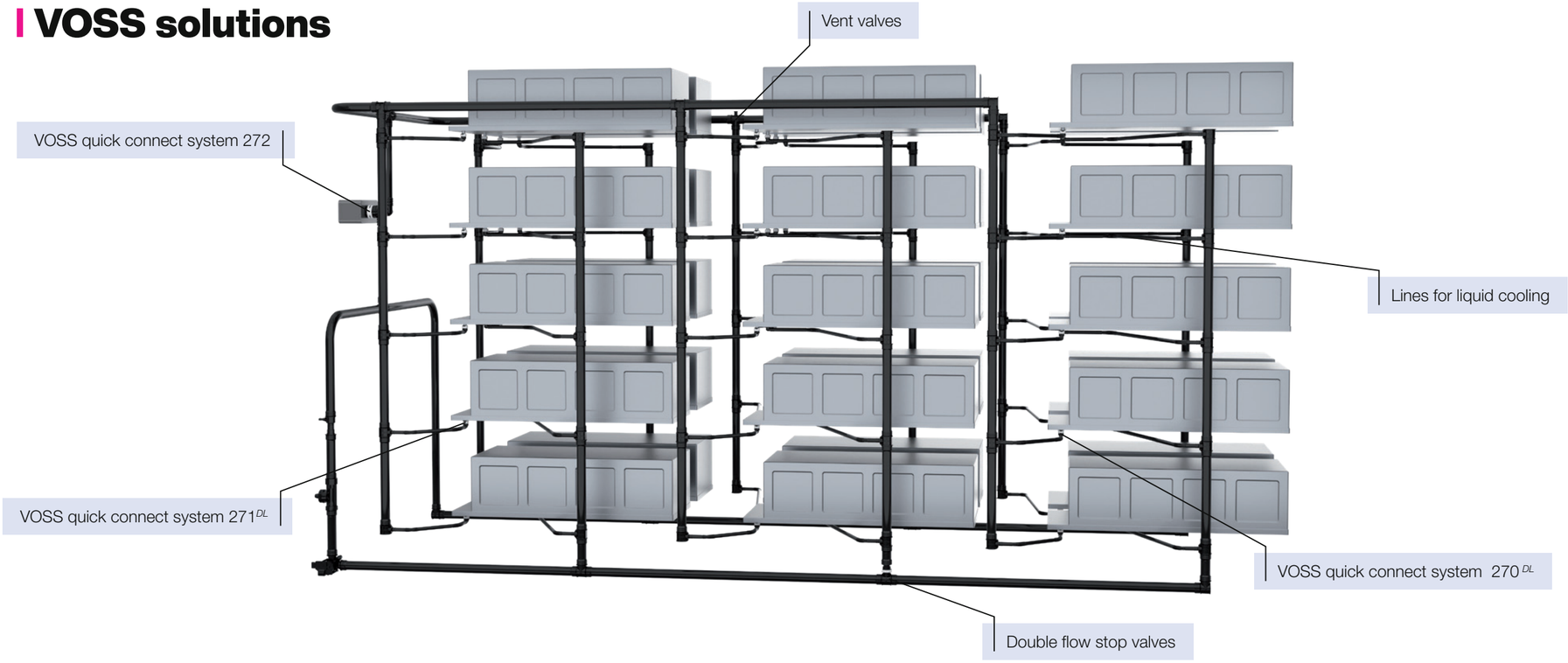
We succeed through:

- Development, design and production of customer-specific solutions for liquid cooling systems
- Maximum system and component expertise
- Tightness of the systems over the entire service life
- Components that are easy and safe to (dis)assemble
- Reliable and cost-effective solutions

Our product innovations are the perfect combination of:

- Maintenance-free and space-optimized connection technology
- Precisely preformed line systems and their routing
- Innovative double flow stop valves for leak-proof battery module removal
- Easy-to-integrate sensors, manifolds and valves as well as customer-specific components and assemblies

VOSS solutions



Components for battery energy storage systems

VOSS lines for liquid cooling

Individual solutions for liquid cooling based on line routing and function integration

- Integration of different connection systems, e.g., VOSS QC systems 270, 271 and 272
- Realization of minimum installation space
- Component and installation space optimization through function integration in customer-specific manifolds and connectors
- Leak-tight and maintenance-free media-bearing systems along the entire service life of the system
- Pressure-drop optimized line design
- Hydraulic balancing through defined cross-section changes
- Various combinations of hose and tube, plain and corrugated tube, or straight and preformed lines possible

VOSS quick connect system 271 *DL*

Robust plastic connectors for fir-tree connection of plastic tubes

- Particularly suitable for components with recessed ports or with material for profiles bores
- Quick and secure assembly
- Double Lock (DL) for additional safety through active confirmation of the correctly inserted QC system
- Very low system height
- Opening mechanism available in two different positions for easy access
- Nominal sizes S6, S10, S14, S18
- Temperature range -40 °C to +85 °C
- Operating pressure max. 2 bar

VOSS

VOSS quick connect system 270 *DL*

Robust plastic couplings for fir-tree connection of plastic tubes

- Particularly suitable for connections to filigree cooling plates and similar components
- Quick and secure assembly
- Double Lock (DL) for additional safety through active confirmation of the correctly inserted QC system
- Very low system height
- Opening mechanism available in two different positions for easy access
- Nominal sizes S6, S10, S14
- Temperature range -40 °C to +85 °C
- Operating pressure max. 2 bar

VOSS quick connect system 272

Function-optimized QC systems for thermal management solutions

- System-specific connection contour according to VOSS QC system 270
- Fast and 100% secure installation thanks to autolatch function (automatic engagement of the retaining element after successful connection)
- Pressure-locked retaining element (no release of the connector possible under pressure)
- Reduced insertion force due to optimized installation of the O-ring
- Minimum installation height
- Optionally available with visible indicators of correct connection
- Retaining element available in four different positions for easy access
- Nominal sizes S6, S10, S14, large sizes available on request
- Temperature range -40 °C to +85 °C
- Operating pressure max. 2 bar

Components for battery energy storage systems

Double flow stop valves

Double-sided flow stop valve for disconnecting cooling circuits – for maintenance purposes and changing battery modules

- Can be integrated into various QC systems of different sizes
- Automatic opening of the valve during assembly
- Automatic closing of the valve during disassembly
- Leakage-free over the entire service life
- Compact and robust design
- Consistent flow with very low pressure loss

Vent valves

Single-sided flow stop valve for manual venting of cooling circuits

- Closed leak-proof when not actuated
- The valve opens automatically when the vent line is plugged in
- Compact design
- Integrated at the highest point of the circuit
- Can also be used as a drain valve when integrated at the lowest point of the circuit

VOSS

Customized components

- Individually developed system components and special products according to requirements and customer wishes
- Based on our many years of experience, visionary creativity and state-of-the-art production technologies, we design custom-made products according to specific requirements
- We are also available as a development partner and manufacture individual customer solutions in the usual high VOSS quality
- The best examples are specific T-pieces with different internal diameters for an even distribution of the cooling liquid
- Also possible in combination with double flow stop valves

VOSS

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