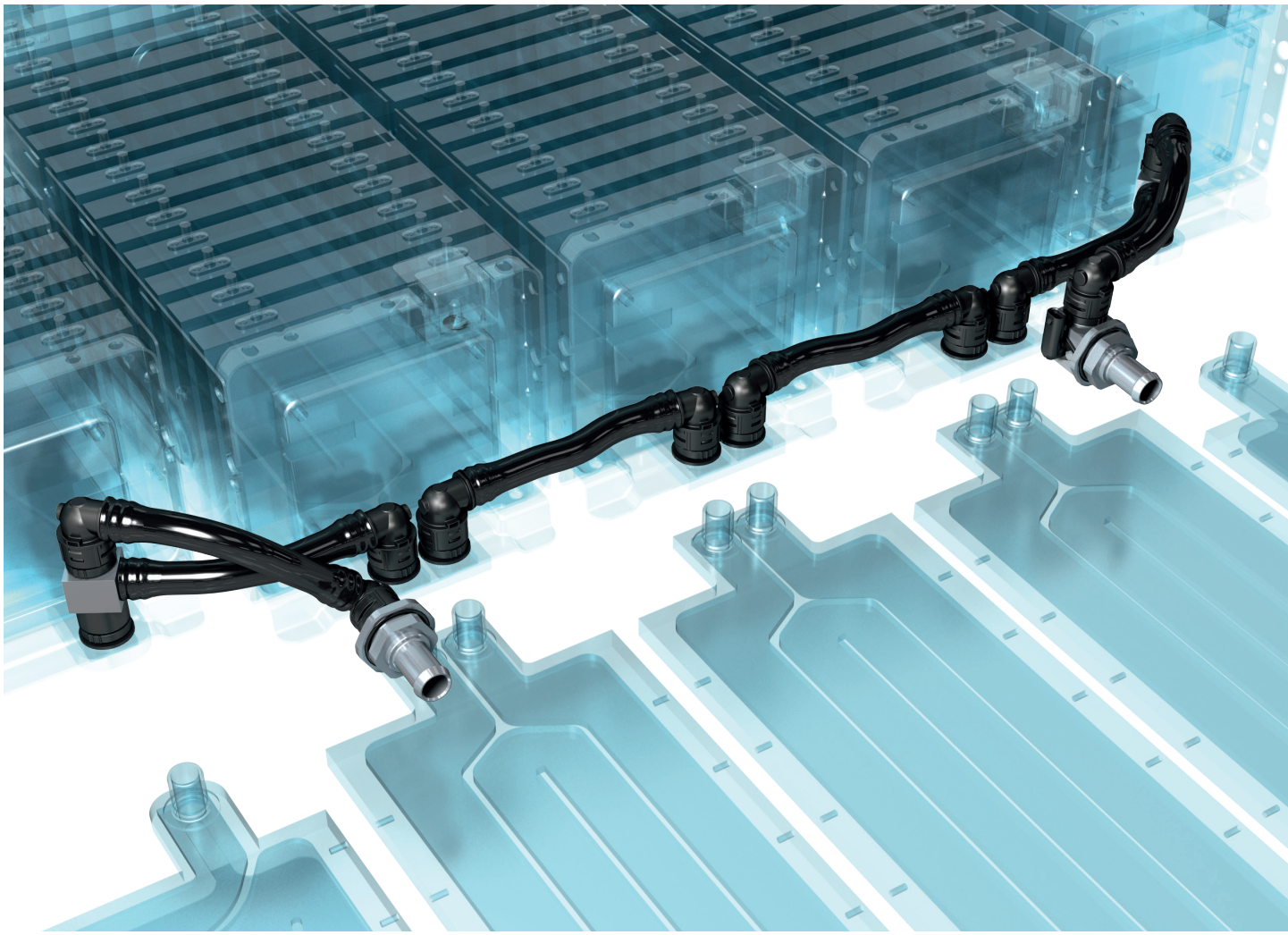
VOSS

Cool systems for thermal management



VOSS Automotive

Thermal management in electric vehicles:

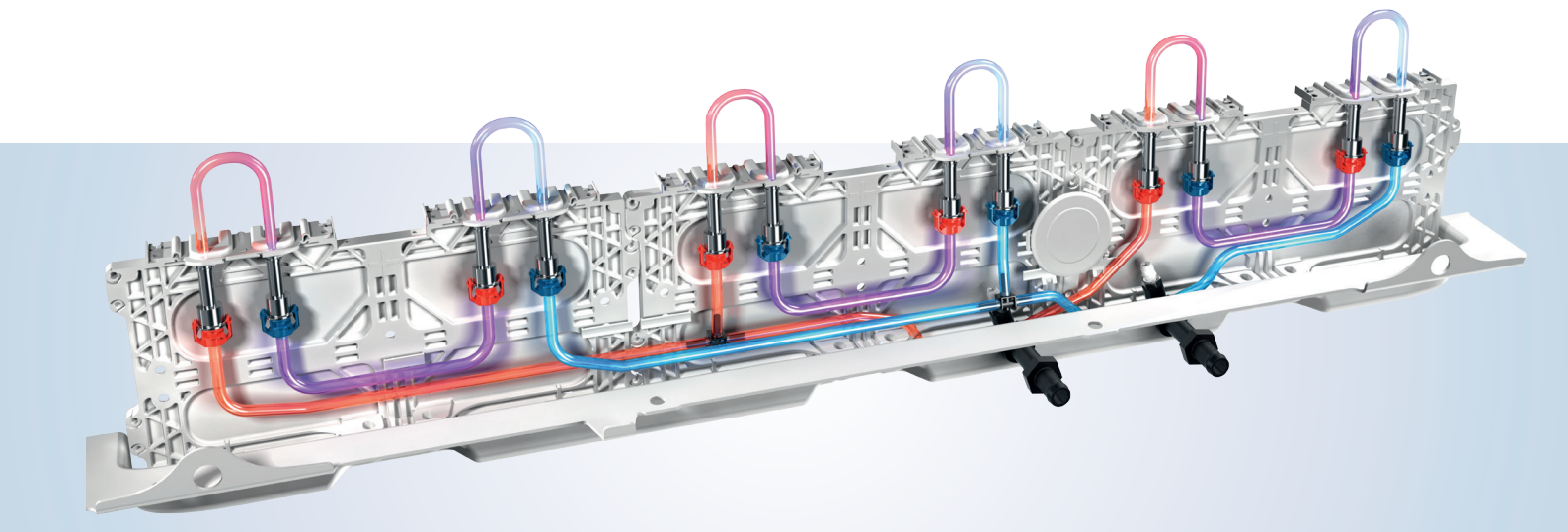
Customized solutions for tempering batteries

For maximum performance and range of electric and hybrid vehicles, optimum temperature control of the battery is essential. The desired operating temperature of common lithium-ion batteries is approximately 25°C. At this temperature its lifetime is maximized. To reliably ensure this temperature level, the battery must be cooled during the summer and heated during the winter.

The media distribution systems must be leakage- and maintenance-free for the entire service life of the vehicle. In addition, the connection technology must be easily and safely installed respectively removed.

VOSS offers customized connection and distribution technologies that meet these requirements and are compatible with the wide spectrum of applications in the thermal management sector.
This includes creating space-optimized distributor solutions in different sizes and materials for complex and small spaces. VOSS also integrates customer-specific components such as sensors and mounting elements. At the same time, VOSS develops special quick connect systems – robust, space-optimized, protecting against operation errors (Double Lock) and easy to assemble.

Thanks to its own testing and prototype workshops in Germany and other international locations, VOSS can quickly deliver complete, vehicle-compatible samples in a very short time, the function of which can be transferred to later serial production 1:1.



Individual line solutions for every thermal management system

Line assemblies

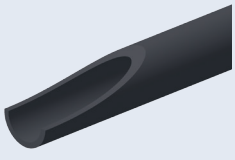
- Hose/tube combinations
- Pre-formed lines
- Integration of VOSS quick connect systems
- Integration of space-optimized temperature sensors
- Integration of customer-specific manifolds and connectors
- Optimal assembly space utilization
- Minimized pressure losses
- Hydraulic balancing by defined change in cross-section
- Parallel and serial coolant flow options

Tube materials

Tube materials for coolant applications are in series application at several commercial vehicle manufactures.

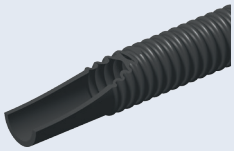
Performance data

- Medium: Coolant
- Operation pressure: 2 bar
- Burst pressure: > 6 bar
- Operation temperature: -40 °C to +85 °C



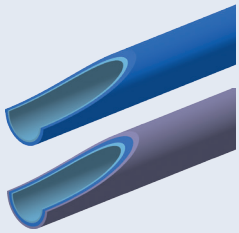
Monolayer tube (PA 12)

- Strong resistance against hydrolysis



Corrugated tubes (PA 12) with straight ends

- Strong resistance against hydrolysis
- High flexibility, small bending radius



Multilayer tubes

- Inner layer offers excellent resistance against hydrolysis
- Outer layer provides flexibility and pressure-resistance
- Optional self-extinguishing material

Quick connect systems for thermal management systems

Quick connect system 270

Quick connect system 271

Quick connect systems 270 and 271 are the new benchmarks for customer-specific connection solutions for thermal management in hybrid and electric vehicles.
Both systems are optionally available with an additional safety device (Double Lock). This control mechanism helps ensure the correct connection process by both visual and haptic control (end-of-line test possible).
Quick connect system 270 is particularly suitable for connections to filigree cooling plates and similar components. For components with deeper connecting ports, or with material for special port configuration, quick connect system 271 is the perfect solution.

Product features:

- Very low system heights
- Easy to handle
- Three-piece design for easy setup
- Optionally available with Double Lock
- Small axial distances for multi-connector applications
- Lack of cross-section changes within the connector minimizes pressure losses
- Integration in various components possible
- Individual connection solutions
- Easy adaption for customer-specific solutions

Quick connect system 246 NX

Quick connect system 246 NX is the new standard for the connection of fuel, AdBlue® (DEF), coolant, oil and hydrogen lines, making it ideal also for thermal management systems.

Product features:

- Very low system heights
- Easy to handle
- Release mechanism can be rotated into eight different positions for easy access
- Color coding on release clip indicates different fir-tree/tube sizes
- Connection port profile identical to previous 246 system variants
- Operating pressure: 10 bar
- Operating temperature range: -40 °C to +120/140 °C
- Connector actively heatable

VOSS coolant control valves

Innovative and flexible coolant valve technology designed for next generation thermal management systems

- Single solution provides multiple configurations
- Designed to meet customer specific requirements
- Modular building block concept adapts to and optimizes new or existing cooling circuits

Stacked multi-cross valve

- Two cross valves (2-in / 2-out) stacked one on top of the other
- Hermetically sealed, no leakage between units
- Single actuator operation provides cost savings
- Smart or non-smart actuator (LIN-Bus control)
- Synchronous or independent switching of valve positions
- Simple design by intelligent component reuse
- 25 l/min flow rate @ max. 3bar (operating pressure)

Additional variants available

- Single cross valve
  - Similar to the stacked cross valve but with only one cross valve unit (2-in / 2-out)
- 3-way control valve
  - One valve unit (1-in / 2-out or 2-in / 1-out)
  - Modified valve spool and housing for proportional control
  - Valve housing reused from the cross-valve variant (modified with mold-inserts)
  - Proportional flow splitting and mixing function

Temperature sensor

Product features:

- Can be integrated with VOSS quick connect systems and customized components
- Fast and easy installation
- Flexible implementation of temperature sensor in thermal management and fuel systems

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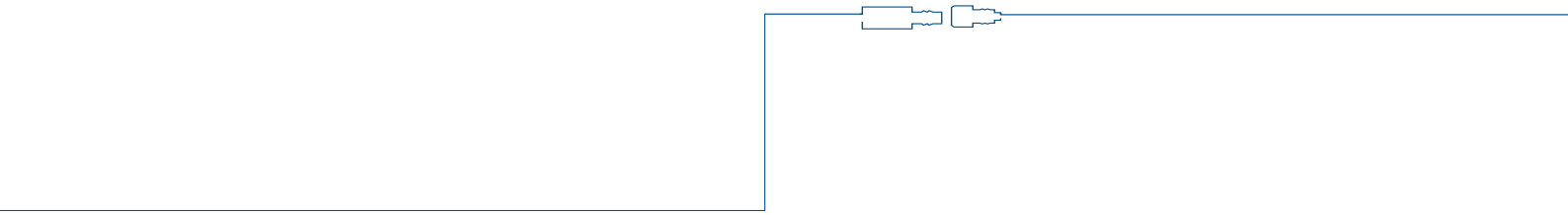

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