Performance That Moves.
EmCon Traction Converters
The request for more mobility is a challenge for public light rail systems. Vehicles and rail networks have to cope with rising numbers of passengers and higher mileages. Reliability and eco-friendly operation are therefore an absolute must. Be it LRV, metro or EMU vehicles, Voith can offer comprehensive product competence for electro-mechanical traction systems. Perfectly adapted systems increase reliability, safety and efficiency in everyday rail vehicle operation.

Voith Turbo offers electro-mechanical traction systems for AC and DC vehicles, as well as for diesel-electric vehicles. Apart from equipment for new vehicles, we can also provide tailor-made solutions for modernizations and repowering projects.

Our systems are developed in modern laboratories and in close cooperation with university research centers. All elements required for driving operation are directly integrated in the traction converter and adapted to other drive components, such as transformer, motor, transmission and vehicle control.

Our modular EmCon traction converters in the power range from 185 kW to 1.5 MW, in air or liquid cooled design, require little maintenance, are energy-efficient and individually adapted to the operating requirements of your vehicles. We supply solutions for 750 V\textsubscript{DC}, 1500 V\textsubscript{DC} and AC vehicles in a wide range of configurations as roof, underfloor or cabinet installations.
High-Performance – The New EmCon Traction Converters.

**Performance and Efficiency for Your Benefit**
State-of-the-art power electronics and highly dynamic motor control systems allow optimum tractive effort in all kinds of operating conditions. During braking, the highest possible share of braking energy is recuperated into the network. This is technically ensured not only by careful design and simulation, but also by comprehensive tests of all relevant drive components in a system test arrangement including transformer, traction converter, motor and transmission.

**Long Operating Life Due to Quality and Service**
Be it at -40 °C in a snow storm or at +40 °C in a sand storm: EmCon traction converters operate reliably and durably under any operating conditions. Starting with the equipment concept and going through all development stages, we are paying utmost attention to optimum design methods and tools, as well as the ultimate suitability of the involved components. Our product developments are accompanied by comprehensive simulations up to standardized type tests, meeting even the highest quality demands.

EmCon traction converters require very little maintenance, have a long service life and are extremely reliable. A sophisticated 3-level service concept that is adapted to the other drive components in the vehicle ensures high availability and low maintenance costs. The worldwide Voith service networks with its short reaction times and original spare parts is another aspect for trouble-free operation.
Intelligence – Trouble-Free Operation Between Pantograph and Rail.

Key Technologies and Innovations with Customer Benefit
- Latest IGBT module generation with improved power cycling and thermal cycling
- Compact and low-inductive power stacks with improved switching characteristics
- High-performance heat sink and cooling circuit for increased power density
- Powerful traction control with digital signal processor (DSP) and MATLAB/Simulink programming
- Energy efficient and line friendly traction control software
- Highly dynamic slip-slide control for optimum utilization of adhesion
- Comprehensive PC tool for parametering, software configuration and fault memory analysis
- Robust lightweight housing with high protection class

Modularity with Proven Core Components
- EmCon traction converters are based on proven and tested power stacks
- The power stacks can be used for inverters and four-quadrant converters
- The Voith Traction Control Unit (TCU) is standardized and used for all EmCon products
- Interfaces and control software can be adapted to suit individual customer requirements
- The net filter is designed in line with customer requirements
- Housing and interfaces can be adapted to customer requirements

Highest Quality from a Competent Source
Product development and testing according to EN 61287-1 and EN 50155. Comprehensive type tests covering:
- Load test, thermal behavior, losses, cooling, climatic tests
- Short circuit, over-voltage and insulation test, dust test
- EMC, noise, shock and vibration tests
- Electrical protection and failure detection
- Protection class test

All traction converters are individually tested in compliance with EN 61287-1.
Modularity and Flexibility – The EmCon Product Family.

**EmCon Traction Converters for LRV**

<table>
<thead>
<tr>
<th>Type</th>
<th>Power 1)</th>
<th>Voltage</th>
<th>Cooling</th>
<th>Mounting</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>DI1000-5AR</td>
<td>Double inverter</td>
<td>2 x 220 kVA</td>
<td>DC 600 / 750 V</td>
<td>air</td>
<td>roof</td>
</tr>
<tr>
<td>I1000-6AR</td>
<td>Inverter</td>
<td>250 kVA</td>
<td>DC 600 / 750 V</td>
<td>air</td>
<td>roof</td>
</tr>
<tr>
<td>I1000-9AR</td>
<td>Inverter</td>
<td>370 kVA</td>
<td>DC 600 / 750 V</td>
<td>air</td>
<td>roof</td>
</tr>
</tbody>
</table>

**EmCon Traction Converters for DEMU, Metro and EMU**

<table>
<thead>
<tr>
<th>Type</th>
<th>Power 1)</th>
<th>Voltage</th>
<th>Cooling</th>
<th>Mounting</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>I1000-9AU</td>
<td>Inverter</td>
<td>370 kVA</td>
<td>DC 750 V</td>
<td>air</td>
<td>underfloor</td>
</tr>
<tr>
<td>I1000-9LU</td>
<td>Inverter</td>
<td>460 kVA</td>
<td>DC 750 V</td>
<td>liquid</td>
<td>underfloor</td>
</tr>
<tr>
<td>I2000-6LU</td>
<td>Inverter</td>
<td>700 kVA</td>
<td>DC 1500 V</td>
<td>liquid</td>
<td>underfloor</td>
</tr>
<tr>
<td>I2000-9LU</td>
<td>Inverter</td>
<td>1100 kVA</td>
<td>DC 1500 V</td>
<td>liquid</td>
<td>underfloor</td>
</tr>
</tbody>
</table>

**EmCon Traction Converters for EMU and Locomotives**

<table>
<thead>
<tr>
<th>Type</th>
<th>Power 1)</th>
<th>Voltage</th>
<th>Cooling</th>
<th>Mounting</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2000-6LC(U)</td>
<td>4QS + Inverter</td>
<td>900 kVA</td>
<td>AC 15 / 25 kV</td>
<td>liquid</td>
<td>cabinet / underfloor</td>
</tr>
<tr>
<td>C2000-9LC(U)</td>
<td>4QS + Inverter</td>
<td>1350 kVA</td>
<td>AC 15 / 25 kV</td>
<td>liquid</td>
<td>cabinet / underfloor</td>
</tr>
<tr>
<td>C2000-12LC(U)</td>
<td>4QS + Inverter</td>
<td>1800 kVA</td>
<td>AC 15 / 25 kV</td>
<td>liquid</td>
<td>cabinet / underfloor</td>
</tr>
</tbody>
</table>

1) Continuous apparent power