



# Railway

Onboard drive systems

**LEROY-SOMER**<sup>™</sup>

**Nidec**  
All for dreams

# A worldwide group at your service

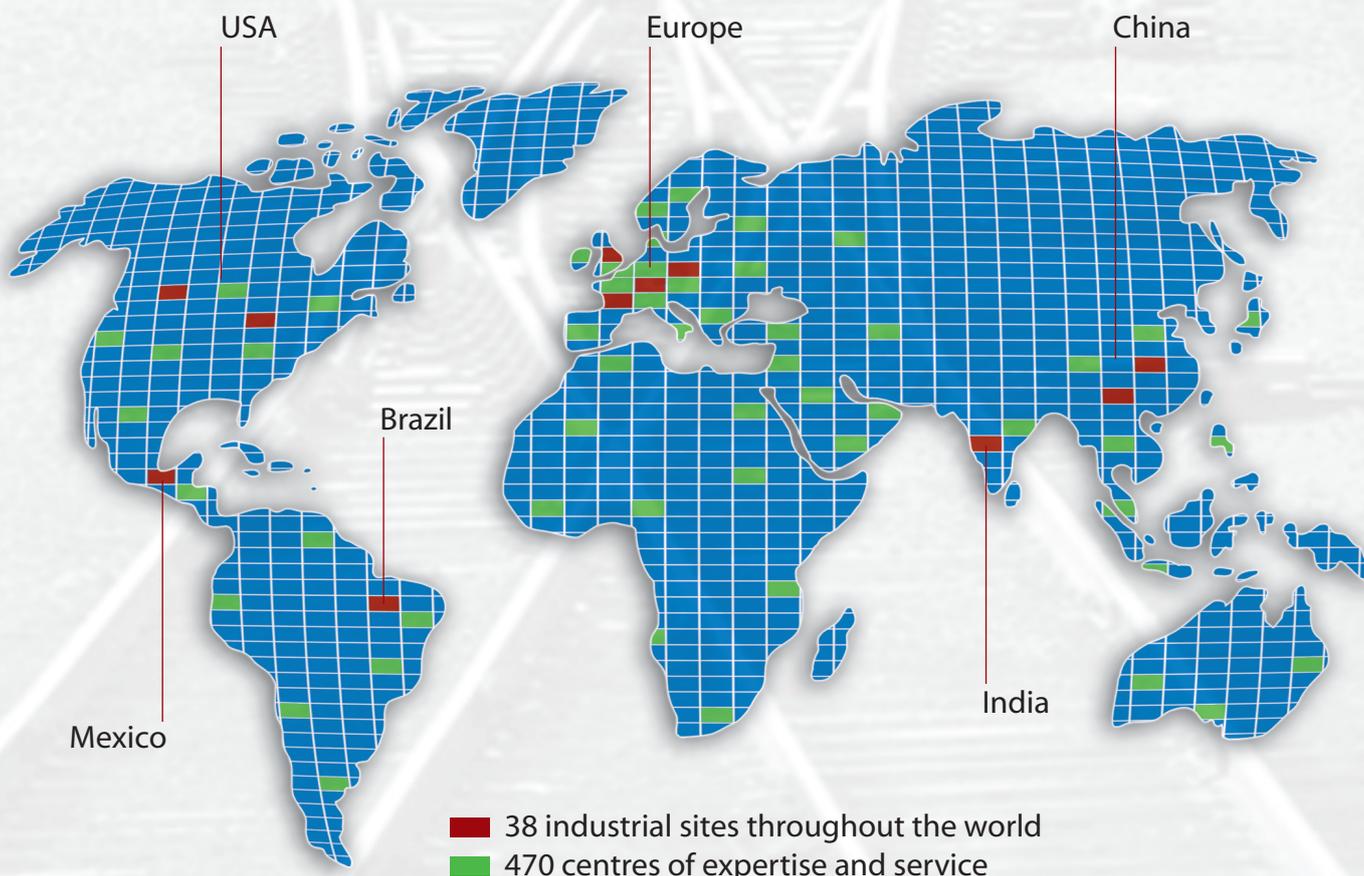


Leroy-Somer is a worldwide specialist in alternators and electromechanical/electronic drive systems.

With its 10,000-strong workforce, the company has created an international network of 470 centres of expertise and service centres capable of offering you the sales support and technical assistance you need, 24 hours a day, 7 days a week throughout the world.

Leroy-Somer is establishing industrial sites in Europe, North and South America and Asia not only to develop its presence in these booming markets but also to support your global expansion and guarantee a high performance service.

Due to our ongoing commitment to reinforce the railway division, Leroy-Somer has put together a highly skilled multidisciplinary team of engineers. This resource will allow us to undertake global project management with direct involvement of the Research and Development department. Leroy-Somer supports customers from the feasibility study through to commissioning the equipment, including the equipment testing and staff training phases.



# The Leroy-Somer Railway Offer

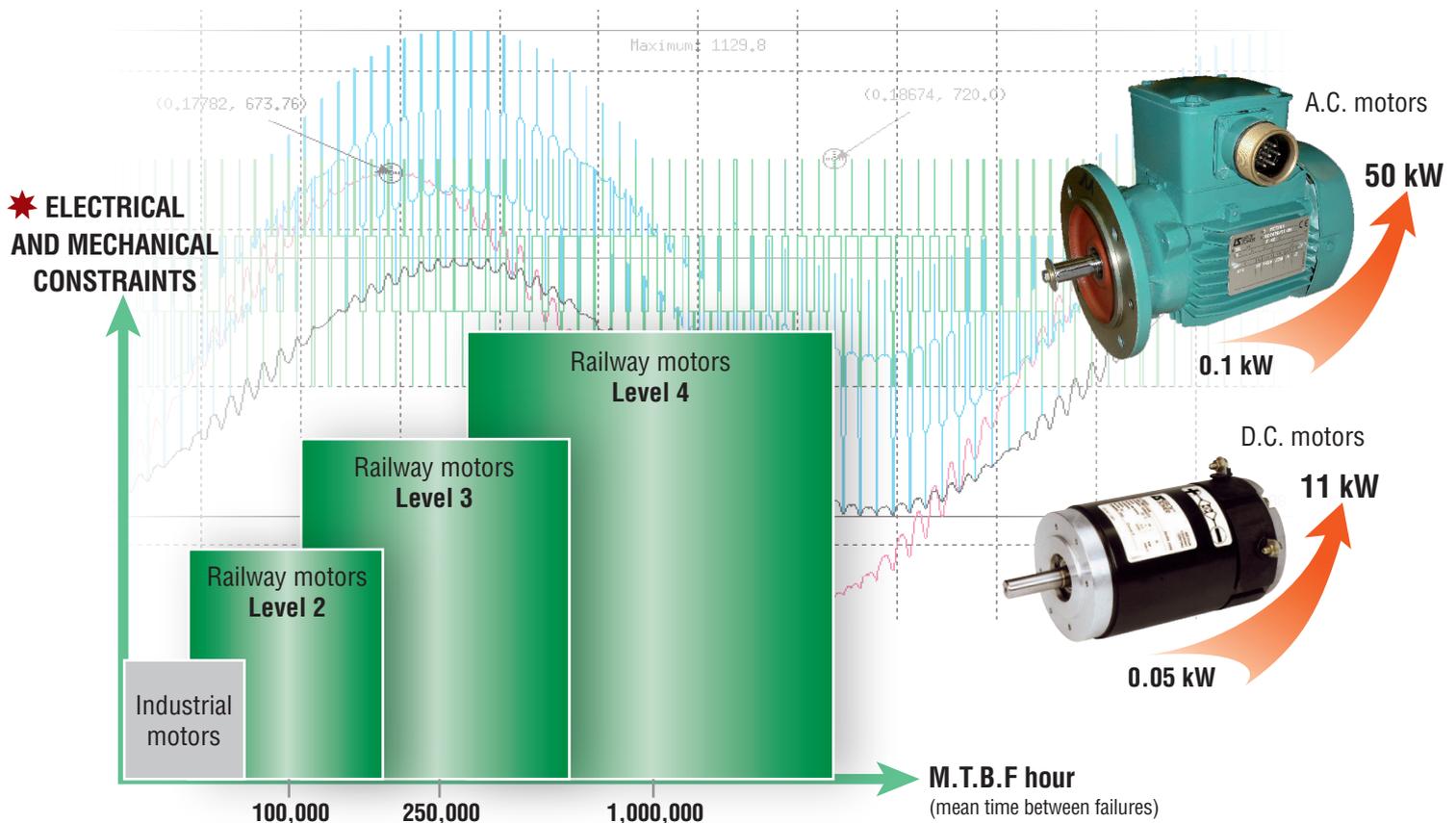


**Leroy-Somer offers Asynchronous or Direct Current motors for the rail industry: drives for auxiliary equipment, air production, door opening and easy-access platforms.**

**Our engineers have developed a range of railway motors consisting of 3 levels, taking into account reliability and Life Cycle Cost criteria from their conception.**

**This offer is based on:**

- our experience obtained from over 350,000 motors in operation
- qualification of our insulation systems using partial discharge tests, in a harsh environment for rolling stock



## Electrical and mechanical constraints

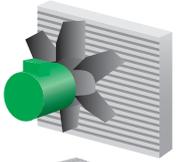
## Consequences

## Effects

<p>★ <b>ROLLING STOCK</b></p> <ul style="list-style-type: none"> <li>- Vibration</li> <li>- Humidity (100%)</li> <li>- Operating temperature (-40 to +90°C)</li> <li>- Storage temperature (-40 to +90°C)</li> </ul>	<ul style="list-style-type: none"> <li>- Mechanical and thermal shocks</li> <li>- Condensation</li> </ul>	<ul style="list-style-type: none"> <li>- Ageing of components: insulation, bearing unit, seals, external finish, etc.</li> </ul>
<p>★ <b>CVS POWER SUPPLIES</b></p> <ul style="list-style-type: none"> <li>- Current and voltage harmonics</li> <li>- High dv/dt</li> <li>- Voltage peaks</li> </ul>	<ul style="list-style-type: none"> <li>- Electromagnetic vibration</li> <li>- Overvoltages (dielectric)</li> <li>- Winding stress (between turns and phases)</li> <li>- Temperature rise (+10 to +20%)</li> </ul>	<ul style="list-style-type: none"> <li>- Ageing of insulation system: winding, insulation, wires, etc.</li> </ul>
<p>★ <b>LIMITED SPACE AVAILABLE</b></p>	<ul style="list-style-type: none"> <li>- Need for compact dimensions</li> </ul>	<ul style="list-style-type: none"> <li>- Additional temperature rise</li> </ul>
<p>★ <b>PASSENGER COMFORT</b></p> <ul style="list-style-type: none"> <li>- Reduction in station noise levels</li> <li>- Regulation of motor speed on demand</li> </ul>	<ul style="list-style-type: none"> <li>- Numerous starts</li> <li>- Variable speed</li> </ul>	<ul style="list-style-type: none"> <li>- Additional temperature rise</li> </ul>

# Onboard drive system

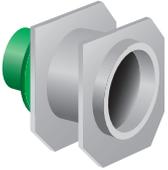
## PULL CHAIN



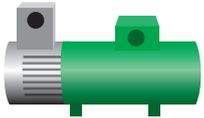
**Transformers**  
Radiator cooling and drive system  
for oil circuit pumps



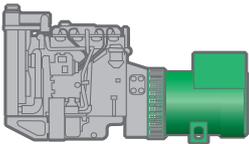
**motor blocks**  
Cooling



**Traction motors**  
Cooling



**Pantographs**  
Lifting compressor

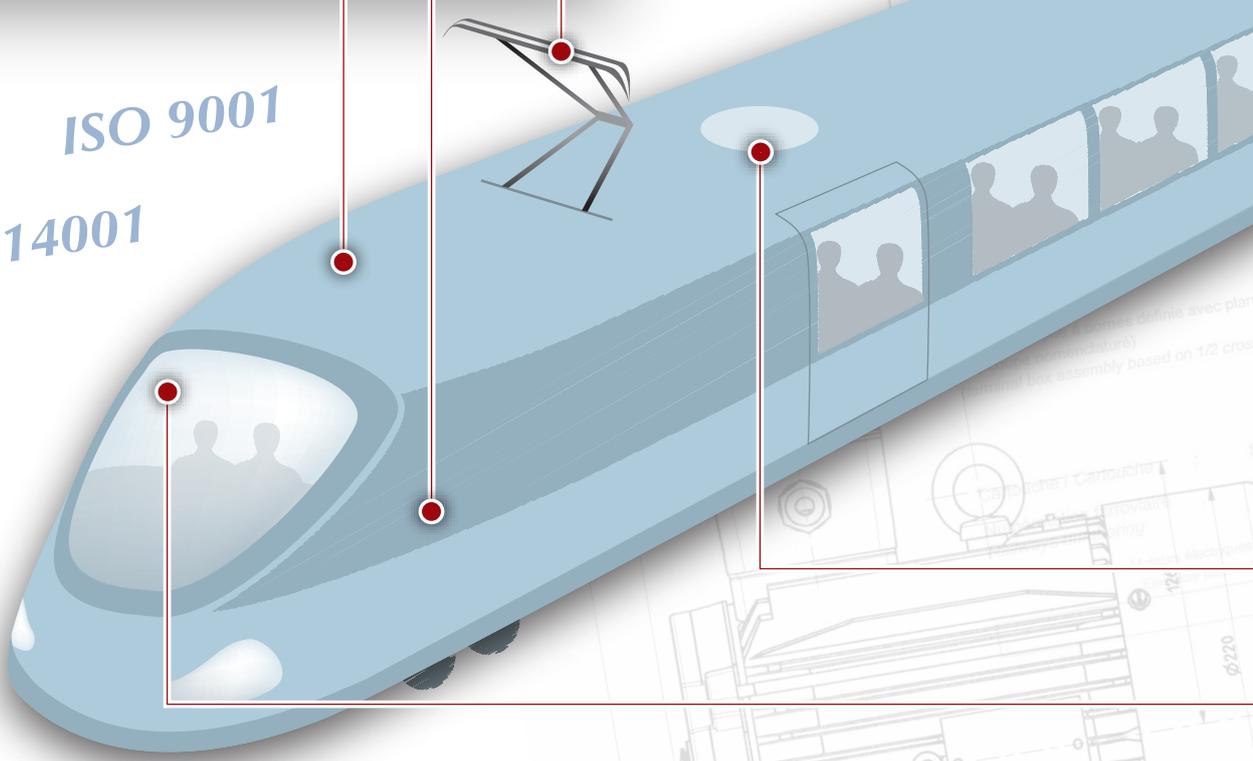
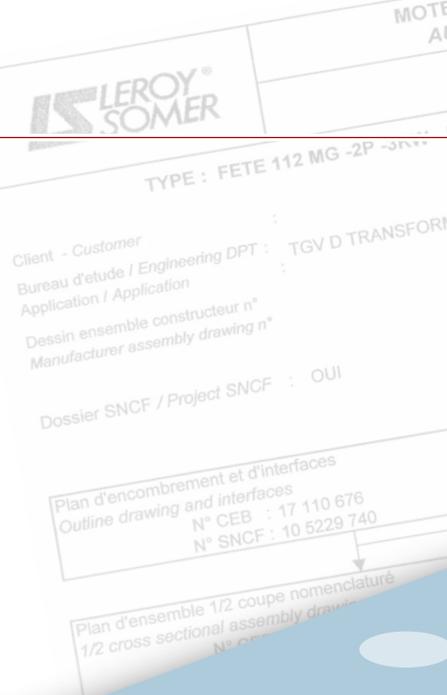


**Traction energy supply**  
Alternator



**Rheostats**  
Cooling

NF F 65101 SQ 900



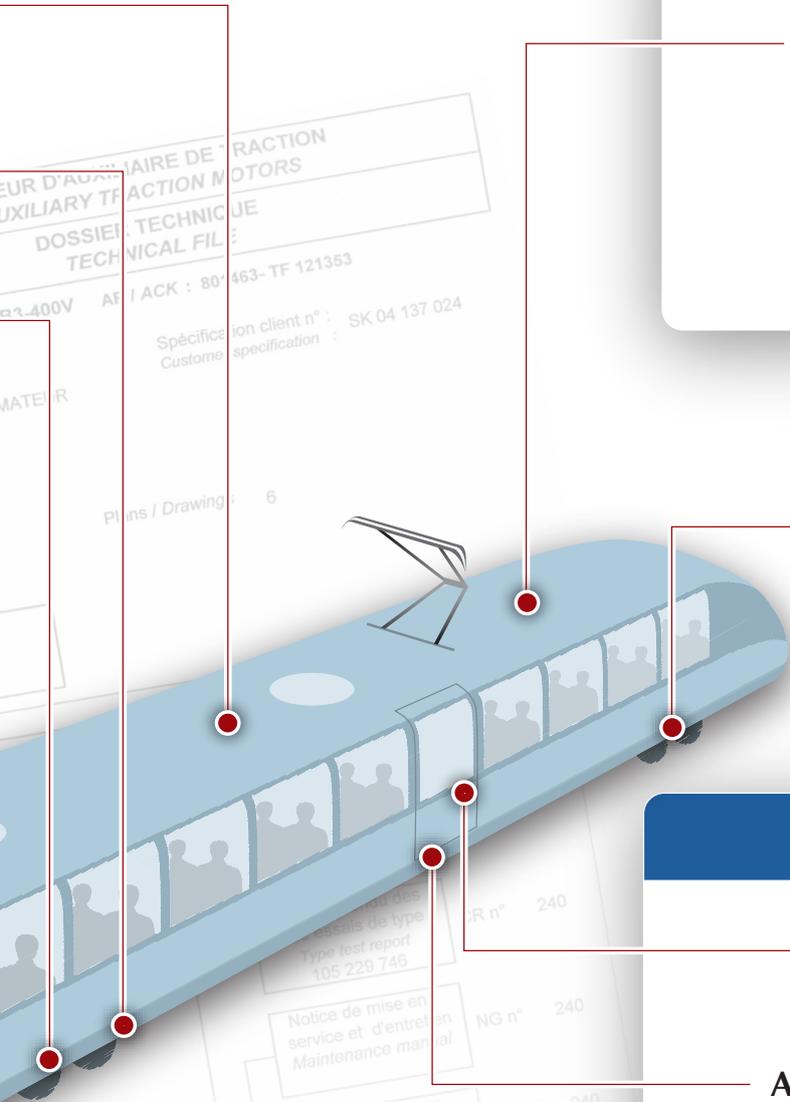
ISO 9001

ISO 14001



# Systems for railway equipment

CEI 349 CEI 77



## POWER SUPPLY

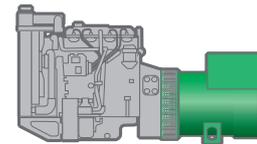
### Auxiliary blocks

Cooling



### Auxiliary supply

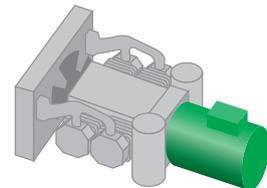
Alternator



## AIR PRODUCTION

### Braking

Compressor



## ACCESSIBILITY

### Doors

Opening



### Access for people with restricted mobility

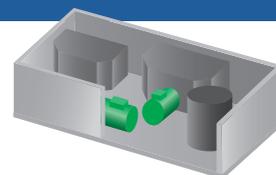
Lifting platform



## COMFORT

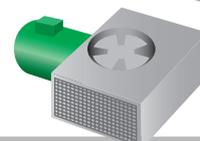
### Air conditioning for passengers

Cooling unit fans, condenser fans and extractor fans



### Air conditioning for the driver's cab

Cooling unit fans and condenser fans



# Expertise and Innovation

*For more than 40 years, Leroy-Somer has supported the drive for innovation in onboard equipment for rail transport:*

- Keeping up with technical developments in conventional passenger trains (62 mph), through to Very High Speed Trains (TGV) (217 mph)
- Revamping solutions on all types of existing rolling stock (dimensions, power ratings, noise levels, etc.)
- Solutions to thermal, mechanical, electrical constraints, plus those affecting logistics and standards, for all the major international programmes: EMU, DMU, Urban and Suburban, locomotives, TGV
- Technological change of the power supply for D.C. motors to asynchronous current via high-demand IGBT converters.
- Very high reliability products, with a service life of more than 40 years, with specific commitments with regard to MTBF and Life Cycle Cost
- Involvement in projects to develop standards for rail drive systems, in partnership with rail operators (SNCF, RATP, etc.)



Compact induction motor  
18 kW - LB dimension: 300 mm



Single-phase induction motor  
2.1 kW

Low voltage brushless geared  
motors/24V D.C.



Low-voltage A.C. motors  
12 to 96V  
1 to 30 kW

## Innovation

Benefiting from modern production facilities and high-level Research and Development centres that envision the drive systems of tomorrow, Leroy-Somer is exploring all possible innovation channels and focusing on criteria such as energy saving, compact designs, reduced maintenance and new challenges from the market.

Equally involved in a wide variety of industrial applications, Leroy-Somer harnesses this vast wealth of experience for the benefit of its customers on a daily basis.



Integrated variable  
speed motors  
0.25 to 11 kW



Water-cooled motors



Synchronous motors with  
permanent magnets,  
H.P.M. technology



# International references

## Europe

Belgium  
France

T13 locomotives - AM86-AM96-M6 railcars - Brussels metro  
TGV: Paris sud est - Réseau - Atlantique - Duplex - Thalys  
Metro: MF77 - MF88 - MF2000 - MP89 - MP05 - Mi09  
MI79 - MI84 - MI2N - Val206 - Val208

TER: Z2 - Z2N - ATER - TER2N - TER2N NG - AGC - NAT

Trams/Trolleybuses: Citadis - Civis

BB 26000 - 27500 - 36000 - 37500 - 47500 locomotives

Germany

BR101 locomotives - TGV Paris Ost Frankreich Sud Deutschland

Greece

LOK OSE locomotives

Italy

E402 and E412 - ETR 500 - TAF locomotives

Luxemburg

Z2 - T13 railcars

Portugal

TER TAGE

Spain

TER UT450 - AVE

Sweden

X40 railcars

UK

Class 92 locomotives - Eurostar TGV - The Shuttle



## America

Brazil

Sao Paulo metro

Canada

Vancouver metro

Chile

Santiago metro in Chile

Mexico

Mexico metro

USA

New York metro - VAL Jacksonville

Venezuela

Caracas metro



## Asia

China

electric locomotives

South Korea

TGV KTX

Sri Lanka

diesel locomotives

Taiwan

Val 256 T'aipen

Turkey

Z TER Istanbul

## Africa

Algeria

electric locomotives

Egypt

Cairo metro

Ghana

diesel locomotives

Mauritania

diesel locomotives

Mozambique

diesel locomotives

Senegal

Corail coaches

Zaire

diesel locomotives

## Oceania

Australia

GT40 locomotives



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Moteurs Leroy-Somer SAS. Headquarters: Bd Marcellin Leroy, CS 10015, 16915 Angoulême Cedex 9, France. Share Capital: 65 800 512 €, RCS Angoulême 338 567 258.