



VEM  DRIVE  
drive systems

## Compact drives for railway applications

SENSE EXPERIENCE  
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## Compact drives for railway applications

Compact drives for railway applications are used above all as drives for on-board, variable-speed fans on trains. They not only provide for optimum air-conditioning of the passenger carriages, but are also responsible for the efficient cooling of traction motors and transformers. Like all components developed and manufactured for use in the rail sector, the compact drives must satisfy particularly high mechanical and electrical demands. The climatic conditions, vibration and shock loads encountered are extreme compared to most other branches. According to DIN EN 61373, for example, components installed on board rolling stock must withstand a shock of 5 g without impairment.

The temperature range of -25 ... +50°C for drive operation without performance reduction similarly exceeds the standard range for general applications incorporat-

ing variable-speed drives. At the same time, the drive must still deliver its full output for 10 minutes if the ambient temperature increases to +70°C. When a train enters or leaves a tunnel, moreover, the motor mounted on the vehicle underbody and the control electronics are subjected to a temperature shock of up to 3 K/s.

Such conditions place considerable demands on the design and construction of both motors and built-on inverters, as the performance parameters must be guaranteed not only at nominal frequency, but over the whole frequency range. To ensure the high levels of reliability and availability demanded by the rail sector over a service lifetime of 20 years, the compact drives used must be manufactured in accordance with special railway standards (see Table 1). Regular maintenance cycles are likewise imperative.

**Table 1: Special standards applicable for railway applications**

EN 50121-3-2	Railway applications – Electromagnetic compatibility – Part 3-2: Rolling stock – Apparatus
EN 50124-1	Railway applications – Insulation coordination – Part 1: Basic requirements – Clearances and creepage distances for all electrical and electronic equipment
EN 50125-1	Railway applications – Environmental conditions for equipment – Part 1: Equipment on board rolling stock
EN 50155	Railway applications – Electronic equipment used on rolling stock
EN 60077-2	Railway applications – Electric equipment for rolling stock – Part 2: Electrotechnical components; General rules
EN 60349-2	Electric traction – Rotating electrical machines for rail and road vehicles – Part 2: Electronic converter-fed alternating current motors
EN 60529	Degrees of protection provided by enclosures (IP code)
EN 61373	Railway applications – Rolling stock equipment – Shock and vibration tests

### Technical data

Input voltage range 3 AC	project-specific e.g. 360 ... 440 V static or 456 ... 506 V static
Input frequency	50/60 Hz +/- 10 %
Output	2.2 ... 8 kW (output > 8 kW on request)
Max. output speed	0 ... 5,600 rpm (parameterised)
Degree of protection	IP 55 (others on request)
Accessories	PC software for parameterisation and control Connecting cable with interface converter Hand-held controller (in preparation)

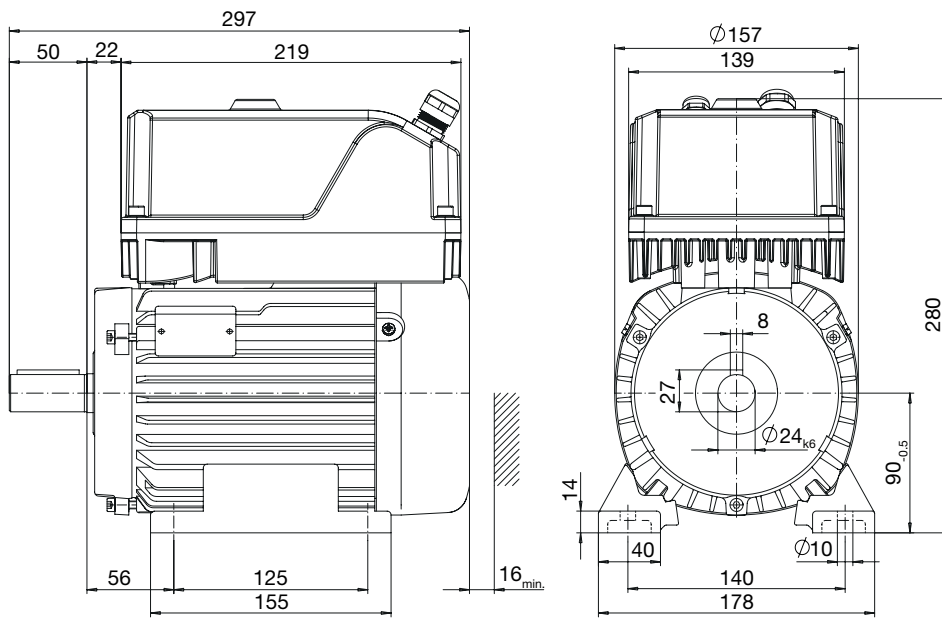
### Inputs, outputs, interfaces

<b>Control connections</b>
One analogue input
Two digital inputs
Three digital outputs
One serial interface

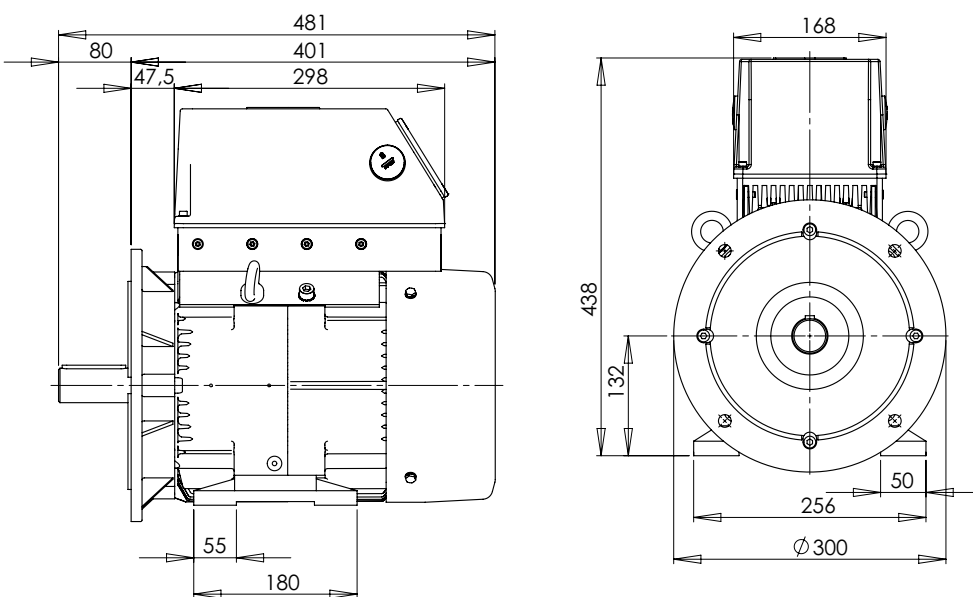


The new compact drives for railway applications are designed to handle exceptional vibration and shock loads, as well as constantly changing climatic conditions.

Dimension drawing M21R 90 L2 AST



Dimension drawing ME1R 132 SX2 AST



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