ELECTRIC DRIVES
FOR EVERY DEMAND

VEMoDrive high-speed

High-speed Motors and Drive Systems by VEM

VEM – specialist for drive solutions in the following branches:

- Oil, Gas, Petrochemicals
- Power Generation
- Food and Beverage
- Air Separation
- Marine Solutions
- Material Handling
- Pulp and Paper
- Test Bench
- Metals
- Public Transportation and Rolling Stock
- Water and Waste Water
- Mining and Minerals

VEM – The competence for motors and drives since 1886

VEM is an innovative, internationally active and reliable manufacturer of technically sophisticated system and drive solutions as well as special drives and individual components. The power range extends from 100 megawatts to 300 megavolt-amperes. Continuity and reliability, also in the future – that's what production and service at VEM stand for. Engineering and quality of the products with the VEM trademark are groundbreaking on the market.

High-Speed Drives – The Future of Efficiency

Fast. Reliable. Sustainable.

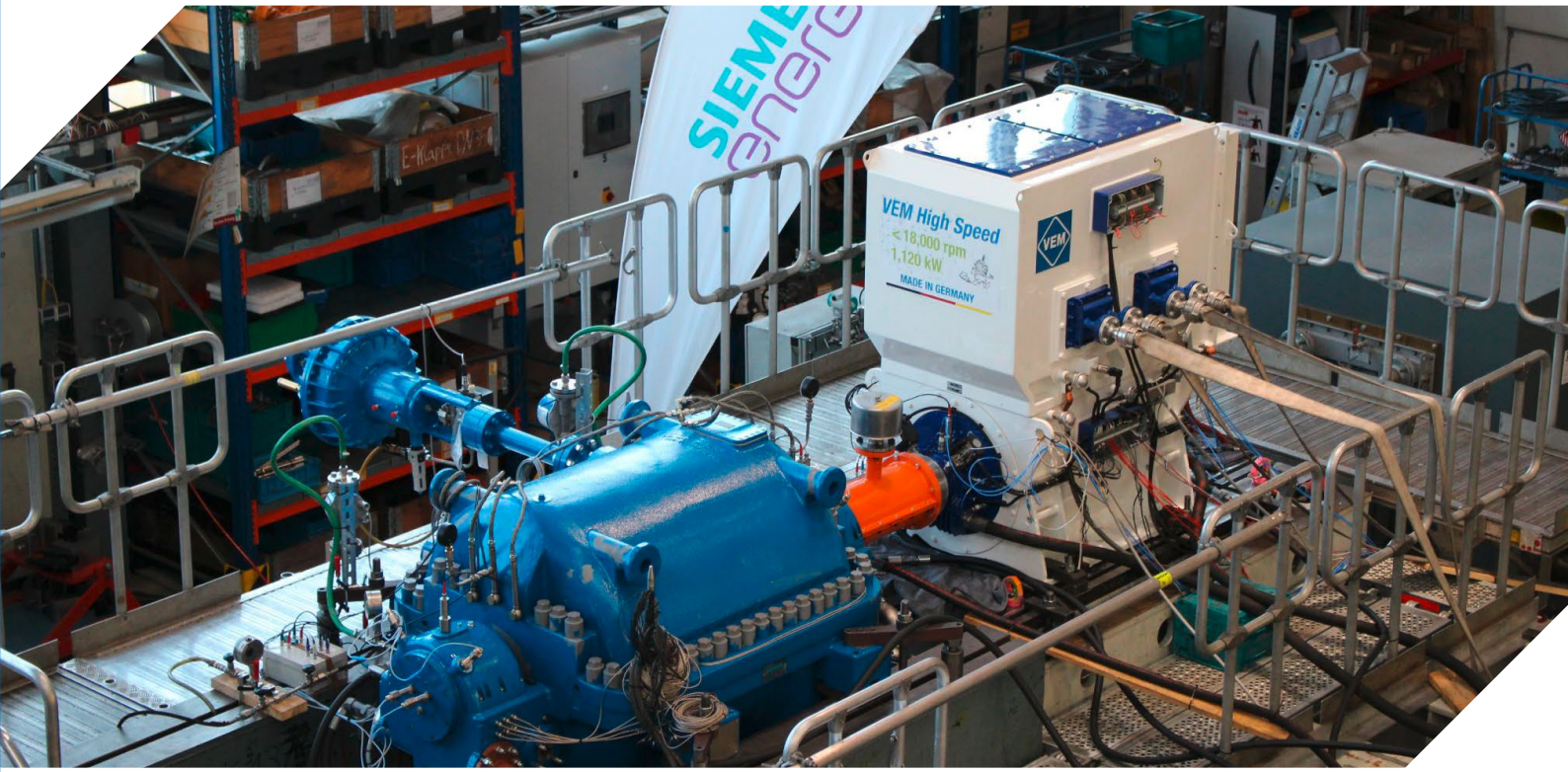
High-speed motors are redefining the application range of electric drive systems. They break through the barrier of conventional electric motors at 3,000 rpm (50 Hz) or 3,600 rpm (60 Hz) respectively and furthermore enable direct electric drive.

High-speed electric drives present a compelling solution, offering clear advantages: they are more efficient and reliable, provide superior process control, and have lower life-cycle costs compared to conventional systems.

VEM has developed a market-ready solution that overcomes key limitations of high-speed electric motors. By combining advanced magnetically active materials with high-strength alloys and an innovative cooling architecture, we significantly expand speed and performance boundaries – delivering reliable, efficient, and scalable motor technology previously constrained by physical and material limits.

VEM high-speed drive systems are designed for applications like:

- Turbo compressors
- Test benches
- Oil & Gas, Steel making, Petrochemical industries
- Turbo fans and blowers
- Industrial heat pumps
- Air separation



VEM high-speed motor (1120kW@18000rpm) in a compressor test bench

Complete Solutions from One Partner

VEM supports you every step of the way in integrating a high-speed drive system into your application. From providing guidance on the right drive solution for your requirements to configuring a coordinated drive system and integrating it into your environment, VEM takes responsibility.

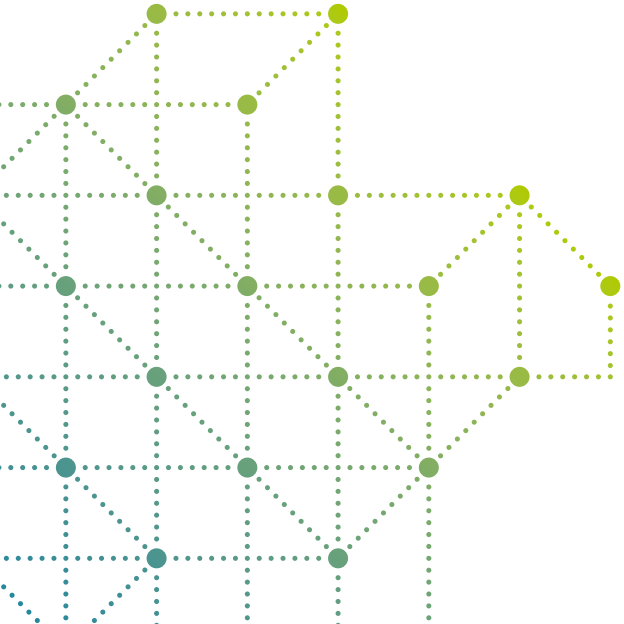
The Drive System for your Application

based on your requirement and specification,
natural frequency calculations and determination of critical
speed for your speed range evaluation of foundation situation

Switchgear	Transformer	VEMoDrive VFD	VEM Highspeed Motor	Coupling

Service and Support
System engineering
Installation & commissioning

In addition to manufacturing the complete VEM high-speed motor, we can also integrate the electrical core into the customer's application (e. g. compressors) and provide technical support based on our extensive experience.



Engineering. Integration. Service – All from VEM.

The Smarter Choice for High-Speed Applications

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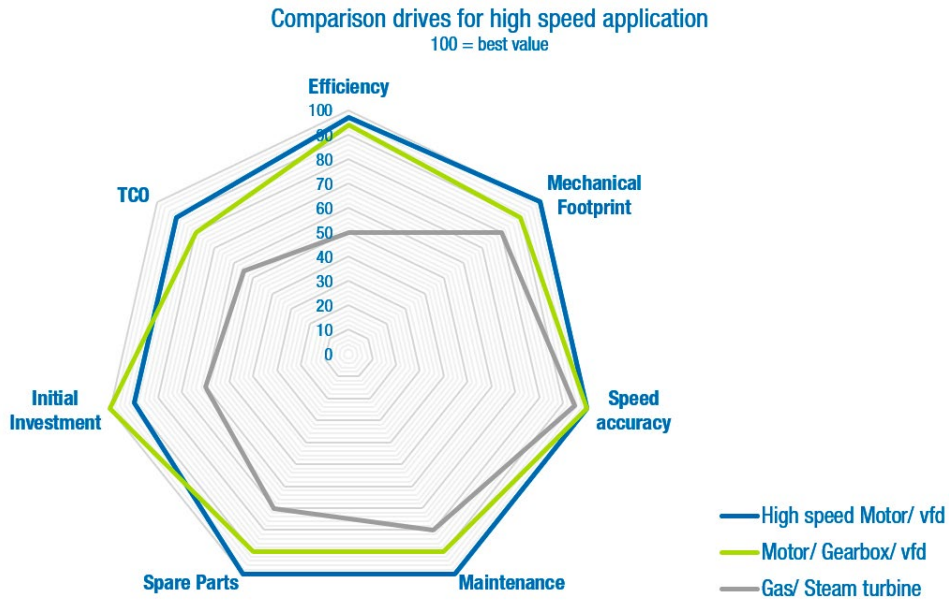


Compared to gas turbines, the electric drive system offers significant advantages in terms of acquisition and operating costs and efficiency. The compact mechanical footprint of the high-speed drive system usually also allows existing plants to be retrofitted. This electrification can make a significant contribution to decarbonisation.

When comparing the two speed-controlled electric drive systems, high-speed motors offer the advantage of lower maintenance costs and higher efficiency over solutions of conventional motors with gearboxes.

Replace complexity with simplicity.

~ 46 t CO_2 per year for one 10 MW gas turbine

VEM High-Speed for Every Application

VEM high-speed motors are designed to meet diverse requirements across industries. With two rotor designs and multiple cooling methods, we ensure optimal performance for every power and speed range. Our solutions cover applications from compact systems to large-scale installations – always engineered for reliability and efficiency.

	VEM High-Speed			
	Compact		Tailormade XL	
				
Power [kW]	10	1,050	300	50,000
Speed [rpm]	up to 13,500	up to 5,500	up to 30,000	3,600
Frame size	112 – 450		315 – 900	
Rotor	laminated		laminated or solid	
Bearings	anti-friction bearings		sleeve- or magnetic bearings	
Cooling Type	air- and water cooled IC416 and IC71		watercooled IC81 and IC86W7	
Features	+ reasonable cost + faster delivery time (6 months)		Explosion proof (EX p, EX ec) zone 1 + 2 + highest performance + highest standards – higher delivery time (12 months)	

Optimized for your application

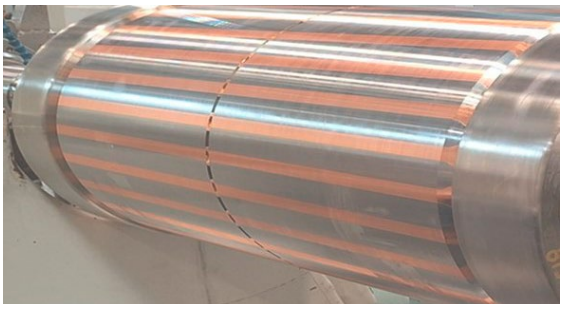
Two rotor designs: laminated & solid

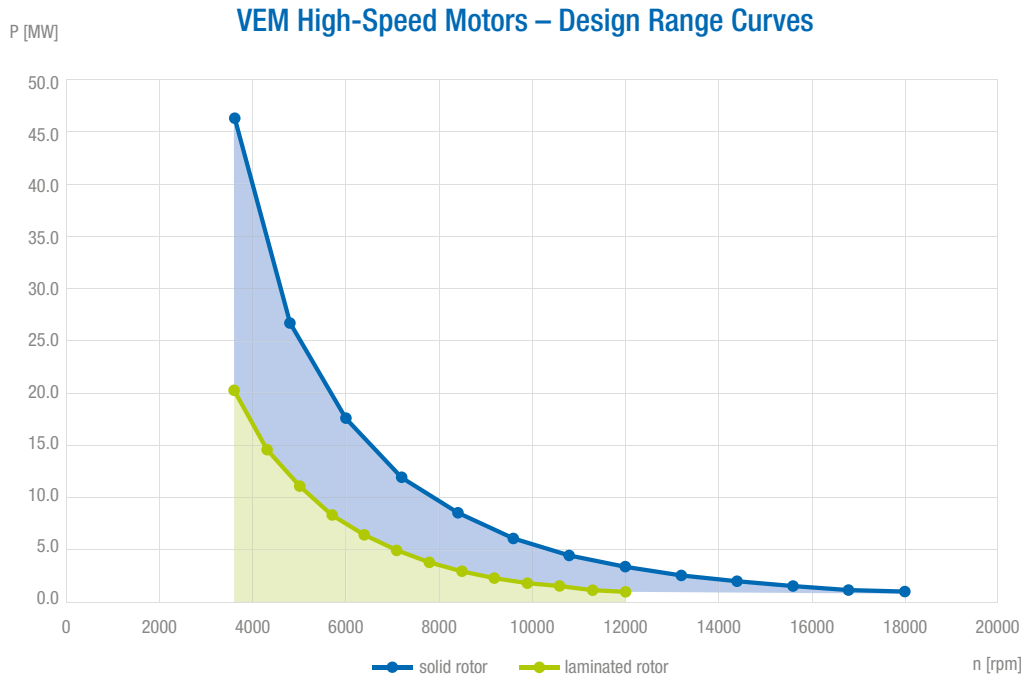
The rotors of the high-speed motor are subject to particularly high loads. The circumferential speeds reach up to 300 m/s, exceeding the limits that conventional solutions (copper bars or die-cast aluminium rotors) can withstand.

Therefore, innovative solid designs had to be developed.

The improved and reinforced laminated rotor represents the entry point into high-speed applications, offering high efficiency and moderate costs.

A solid rotor pushes the boundaries further, enabling even higher speeds while maintaining high reliability and long-lasting performance.





Cooling Types

For our Compact motors, we offer cooling options using air cooling (IC 416) or water-jacket cooling (IC 71). These systems provide reliable thermal management tailored to the motors' performance range.

Due to the higher power density of our Tailormade motors, they consistently employ air–water cooling systems (IC 81 or IC 86). This ensures efficient heat dissipation and stable operation even under demanding conditions.

Bearing Selection

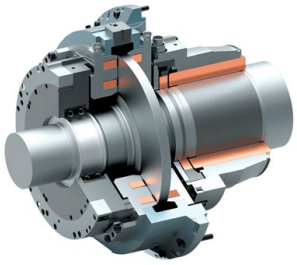
For our compact motors, rolling bearings represent the optimal solution. They match the motors' performance requirements while maintaining reasonable overall costs.

For the more powerful and high-performance tailormade motors, customers can choose between sleeve bearings and magnetic bearings. sleeve bearings provide a cost-efficient entry option, whereas magnetic bearings offer additional benefits: they operate lubricant-free, can shift the critical speed, and enable integrated vibration monitoring for enhanced operational reliability.

Anti-friction Bearings	Sleeve Bearings	Magnetic Bearings
+ low initial costs – regreasing required – wear rate	+ little or no wear – lubrication required	+ high sub-critical speeds + lubrication free + integrated vibration monitoring – high initial costs + long term cost benefits

Anti-friction bearings

Sleeve bearings



Magnetic bearings

Ready for Your Application – Fully Equipped

We also offer a wide range of customizations and equipment for our high-speed motors to meet your requirements. State-of-the-art motor monitoring options are available, which can also be integrated into our VEMoDiAC monitoring system.

VEMoDiAC offers you online condition monitoring with alerts, automated reports and remote service.

See our VEMoDiAC website

Perfect Match: Motor & VFD

Every high-speed motor needs a perfectly matched VFD. VEM provides complete drive systems designed for seamless integration and optimal performance. Whether low-voltage or medium-voltage, our solutions ensure efficiency, reliability, and flexibility for your application.

High-speed motor VFDs differ from traditional designs. In low-voltage applications, they deliver higher output current at elevated switching frequencies and allow smaller construction sizes. Medium-voltage VFDs adopt cell-series multilevel PWM, producing almost sinusoidal waveforms, so standard motors can be used without additional du/dt filters, enhancing efficiency and reliability.

With VEM, you get more than components – you get a fully engineered system with one-stop responsibility. This means simplified procurement, consistent quality, and a partner who understands your process.

For every high-speed motor, VEM provides the right converter:

- Low-voltage drives
- Medium-voltage drives
- Complete system integration

VEMoDrive medium voltage VFD for high speed applications

Medium voltage VFD of selected VEM partner

One-stop solution for your drive system.

Quality You Can Trust

Every high-speed motor from VEM undergoes rigorous testing to guarantee performance and reliability. Our advanced 5 MW test bench for full-load testing ensure your system operates safely under all conditions.

Test capabilities include operation up to 20,000 rpm, with optional full system testing available. Motors are examined under at variable loads in steady state operation, and verified for vibration stability. This comprehensive testing ensures optimized efficiency, reduced commissioning risks, and long-term reliability across demanding industrial environments worldwide.

We combine following testings to validate every design. This means fewer risks, optimized efficiency, and peace of mind for your operation.

Routine and Type tests are available according to DIN EN 60034, with additional customized testing services offered upon request.

Test facility with load machine capable of 5 MW full load at 9.000 rpm

Proven reliability before delivery.

Your Partner Beyond Delivery

As your reliable service partner, we're by your side whenever you need us – ensuring smooth operations and long-term efficiency across your systems. Our comprehensive portfolio covers Technical Service, On-Site Support, and Spare Parts Supply to keep your machines running at peak performance.

Our Technical Service provides expert consulting, preventive maintenance, and diagnostics to reduce downtime and extend the lifespan of your equipment. With our On-Site Support, experienced technicians carry out installations, commissioning, inspections, and troubleshooting directly at your facility – flexible and available worldwide.

When it comes to Spare Parts Supply, we ensure fast delivery and OEM-grade quality. Whether standard components, custom parts, or safety-critical elements – we get what you need where you need it, thanks to efficient logistics and priority access to manufacturing.

With global reach and centralized coordination from Dresden, we deliver tailored service solutions with rapid response times and maximum reliability. Our mission: to keep your production running, minimize unplanned downtime, and safeguard the long-term performance of your machinery.

Our Services at a Glance:

- Commissioning with special focus on natural frequencies and critical operating conditions
- Fast support for complaints and technical issues
- Maintenance and repair of VEM and third-party systems
- Spare Parts Management – Organization and lifecycle support
- Condition monitoring and diagnostics for maximum system availability
- Retrofits & upgrades to optimize your drive systems
- Customized consulting & training for your staff

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