VEM

ELECTRIC DRIVES

FOR EVERY DEMAND

Drive systems for the chemical, oil and gas industry

Electric drives and systems

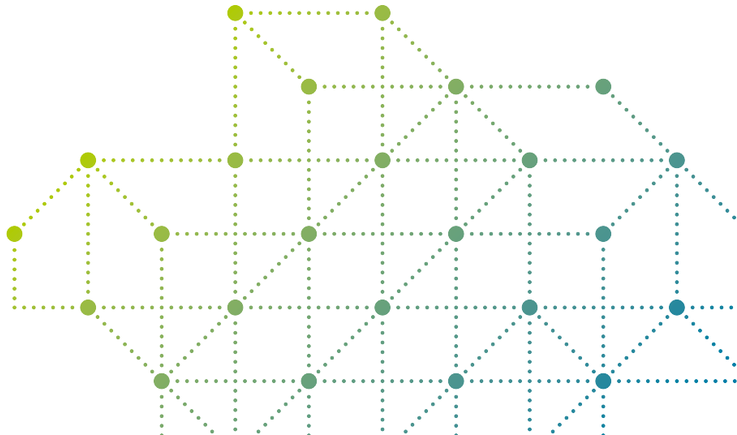
VEM – your partner for drive solutions in the chemical sector

Commitment to innovation, more than 130 years of specialist experience and high engineering standards are our trademarks.

Our product range embraces the whole spectrum from complete drive solutions, via special drives to individual components for outputs from 0.06 kW to 60 MW. Throughout the chemical, oil and gas industry, major industrial complexes on all continents are benefitting from our know-how.

The special machines, variable-speed drives and complete system solutions from VEM, for both low- and high-voltage applications, are matched to the special demands of the chemical, oil and gas industry and tailored to customer specifications. They are to be found, for example, in compressors, extruders, fans, mixers and pumps. All drives reflect the ultimate importance attached to the production reliability of your plants and efficient use of the world's resources.

As a company with broad international activities, VEM has established a worldwide network of sales offices. Wherever you are located – whether in Europe, the Middle East, Asia, Africa or the Americas – there is always a competent VEM contact partner on your doorstep. This dependable global team supports and accompanies your project through to successful completion.



Safe drives for hazardous areas

The explosion hazards, aggressive atmospheres and extreme temperatures of the oil, gas, chemical and petrochemical industries demand compliance with the strictest safety standards. Electric drives must display maximum reliability, as a guarantee for protection of the workforce, technical installations and the environment.

Motors of the VEM type series are tested and certified in accordance with Directive 2014/34/EU (ATEX).
EU type-examination certificates are issued by the following test bodies:

- Physikalisch-Technische Bundesanstalt Braunschweig (*Notified Body* no. 0102)
- IBExU Institut für Sicherheitstechnik GmbH Freiberg (*Notified Body* no. 0637)
- DEKRA EXAM GmbH (*Notified Body* no. 0158)
- CESI (*Notified Body* no. 0722)

Customer-specific motors which deviate from the VEM type series receive a Declaration of Conformity in accordance with Directive 2014/34/EU after testing.

The aforementioned certificates are recognised by all member states of the European Union. IECEx certification is possible by request. Where a special design influences explosion protection (pole-changing motors, different frequencies, outputs or coolant temperatures, converter-fed operation, etc.), supplementary or renewed certification may be necessary.

Ex motor, explosion protection type: Increased safety – “eb”, 117 kW, K12R 355 M10 Ex eb IIC T3 Gb

Ex motor, explosion protection type: Increased safety – “ec”, 215 kW, K12R 355 M4 Ex ec IIC T3 Gc

VEM supplies special electric drives to suit your individual needs:

- Highly qualified specialists are available to advise our customers
- VEM has gained decades of experience in the manufacturing of high-quality explosion-protected drives
- Production in our factories is subject to a quality management system certified by IBExU Institut für Sicherheitstechnik GmbH Freiberg
- Our machines can be used in hazardous areas of Zones 1 and 2 as well as Zones 21 and 22, equipment class II, categories 2G (Gb), 3G (Gc), 2D (Db) and 3D (Dc). Combinations of gas- and dust-protected Ex motors are possible by request.
- VEM drives of this type are already in reliable operation for renowned European and global chemical, petrochemical and energy companies.

Our product range – Ex motors from VEM

The explosion hazards, aggressive atmospheres and extreme temperatures of the oil, gas, chemical and petrochemical industries demand compliance with the strictest safety standards. Explosion-protected motors and drives from VEM guarantee maximum reliability and protection for the workforce, installations and the environment.

Our product range covers:

- High-voltage machines for the following explosion protection types: Increased safety “eb”, increased safety “ec”, pressurised enclosure “p”, and flameproof enclosure “d”
- Low-voltage motors in efficiency classes IE2 and IE3 for the following explosion protection types: Increased safety “eb”, flameproof enclosure “db” or “db eb”, protection by enclosure “tb” and “tc”, and increased safety “ec”
- Complete drive systems for high- and low-voltage applications with frequency converter and soft starter
- Retrofit solutions for VEMoDRIVE and VEMoCHEM systems
- **For areas subject to gas explosion hazards in Zone 1:** Motors with explosion protection for equipment class II, category 2: Increased safety “eb” (to EN 60079-7, IEC 60079-7), flameproof enclosure “db” or “db eb” (to EN 60079-1, IEC 60079-1) and pressurised enclosure “pxb” (to EN 60079-2, IEC 60079-2)
- **For areas subject to dust explosion hazards in Zone 21:** Motors with explosion protection for equipment class II, category 2: Protection by enclosure “tb” (to EN 60079-31, IEC 60079-31)
- **For areas subject to gas explosion hazards in Zone 2:** Motors with explosion protection for equipment class II, category 3: Increased safety “ec” (to EN 60079-7, IEC 60079-7) and pressurised enclosure “pzc” (to EN 60079-2, IEC 60079-2)
- **For areas subject to dust explosion hazards in Zone 22:** Motors with explosion protection for equipment class II, category 3: Protection by enclosure “tc” (to EN 60079-31, IEC 60079-31)

Explosion-protected motors from VEM:

- meet the highest safety demands
- offer high energy efficiency
- ensure favourable operating costs

Explosion protection type	High voltage	Low voltage
	Three-phase synchronous motors, brushless Three-phase asynchronous motors	Three-phase motors
Increased safety “eb”	up to 6 000 kW	0.12 – 320 kW (IE1, IE2, IE3)
Increased safety “ec”	up to 20 000 kW	0.06 – 650 kW (IE1, IE2, IE3)
Flameproof enclosure “d/de”	up to 3 000 kW	0.12 – 630 kW (IE1, IE2, IE3)
Pressurised enclosure “p”	up to 60 000 kW	
Protection by enclosure “tb”		0.06 – 500 kW (IE1, IE2, IE3)
Protection by enclosure “tc”		0.06 – 650 kW (IE1, IE2, IE3)

VEMoDRIVE: Frequency converters for variable-speed drive systems

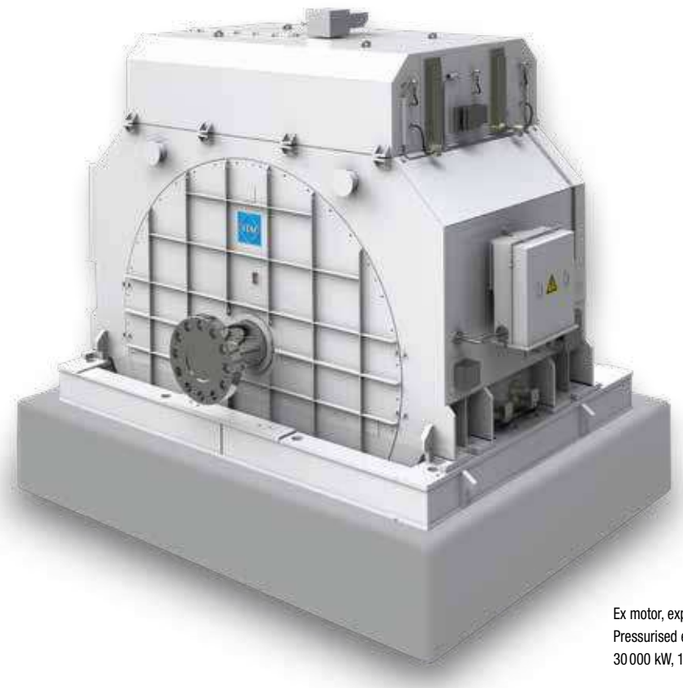
VEMoDRIVE frequency converters satisfy all demands relating to variable-speed drives for countless industrial applications. The converters stand out with a uniform and user-friendly operating concept and are designed on a service-friendly modular basis.

Technical data	Converter for speed control of three-phase motors
Low-voltage converter	
Input voltage	3 AC 380 V – 690 V
Output range	Air cooling 0.75 to 200 kW as wall-mounted unit, 75 to 3 000 kW as cabinet unit (6- or 12-pulse) Water cooling 315 to 5 600 kW as cabinet unit
Design	IGBT converter in ready-to-connect cabinet version
Temperature classes	T1 and T2, T3 (T4)
Medium-voltage converter	
Input voltage	3 AC 3.3 kV – 13.8 kV
Output range	Air cooling 200 to 20 000 kW Water cooling 1 800 to 27 000 kW
Design	IGBT or IGCT converter in 3-, 5- or multi-level topology

Technical data	Current converter for special applications
Start-up converter for synchronous motors (LCI)	
Design	Air cooling
Output voltage	up to 11 kV
Output power	up to 25 MVA
Excitation systems for synchronous motors	
Principle	Static excitation up to 850 A Auxiliary excitation for brushless synchronous motors
Further system components	Converter transformers, switchgear, MCCs, automation systems
Other services	Project engineering, service and commissioning, spare parts

System solutions for the chemical, oil and gas industry

In the chemical, petrochemical, oil and gas industry, explosion protection is an imperative prerequisite for the safe operation of installations. The range of drive solutions and electrical components offered by VEM is geared to this fundamental requirement.
Industrial areas in which explosive gases and vapour-air mixtures may be formed or else combustible dusts are to be expected call for special electric drives and solutions, with corresponding customer services. We offer solutions which safeguard the production reliability of your installations and allow the efficient handling of natural resources.
The special machines, variable-speed drives and complete systems manufactured by VEM for low- and medium-voltage applications are adapted to such requirements and configured to individual customer specifications.



Ex motor, explosion protection type:
Pressurised enclosure “pxb”,
30 000 kW, 10 000 V, 200 rpm

Our large drives and generators are to be found in use all over the world – in the chemical process industry, oil refineries, gas processing and transport systems, drilling installations and tank storage facilities.

Ex motor, explosion protection type:
Pressurised enclosure “pxb”,
25 000 kW, 10 000 V, 1 500 rpm

Motors of the VEM type series

With a broad range of low-voltage motors, VEM is able to serve all those customers who need special electric drives for use in situations where explosive gases or vapour-air mixtures may be formed or else combustible dusts are to be expected.

Technical data	Explosion protection type – Increased safety “eb”, Ex e
Type	(IE.) – KPR/KPER/K..R
Sizes	63 to 400
Output range	0.12 – 320 kW
Temperature classes	T1 and T2, T3 (T4)
Ambient temperature	-40 °C to +40 °C (+55 °C), other values according to addenda and corresponding data sheets
Explosion-protected design for equipment class II, category 2G, according to	EN 60079-0 General requirements EN 60079-7 Equipment protection by increased safety “eb”
Product marking example	Ex e IIC T3 Gb

Technical data	Explosion protection type – Increased safety “eb”, Ex e
The new test method developed by PTB for the certification of motors with explosion protection type ‘Increased safety “eb”’ permits operation of these motors on a frequency converter without requiring permanent coupling of the motor and converter as in the past. The frequency converter used must merely comply with the requirements specified in the EU type-examination certificate.	
Type	K..R
Sizes	132 to 400
Temperature classes	T3
Ambient temperature	- 40 °C to + 40 °C
Explosion-protected design for equipment class II, category 2G, according to	EN 60079-0 General requirements EN 60079-7 Equipment protection by increased safety “eb”
Product marking example	Ex e IIC T3 Gb

Technical data	Explosion protection type – Flameproof enclosure “db”, “db eb”, Ex de
Type	(IE.) – K8.R
Sizes	63 to 450
Output range	0.12 – 710 kW
Temperature classes	T3 – T6
Ambient temperature	(-55°C) -20 °C to +40 °C, (+55 °C) +60 °C
Explosion-protected design for equipment class II, category 2G, according to	EN 60079-0 General requirements EN 60079-1 Equipment protection by flameproof enclosure “db”
Product marking example	Ex d(e) IIC T4 Gb

Low voltage

VEM low-voltage motors are already in reliable operation for renowned European and global chemical and petrochemical companies.

Technical data	Explosion protection type – “n”, Ex nA Explosion protection type – Increased safety “ec”, Ex nA
Type	(IE.) – KPR/KPER/K..R/W..R
Sizes	56 to 400
Output range	0.06 – 650 kW
Temperaturklassen	T2, T3 or T4
Ambient temperature	-40 °C to +40 °C (+55 °C) other values according to corresponding data sheets
Explosion-protected design for equipment class II, category 2G, according to	EN 60079-0 General requirements EN 60079-7 Equipment protection by increased safety “ec” EN 60079-15 Equipment protection by type of protection “n”
Product marking example	Ex nA IIC T3 Gc

Technical data	Explosion protection type – Protection by enclosure “tb” for use in Zone 21, Ex tb Explosion protection type – Protection by enclosure “tc” for use in Zone 22, Ex tc
Type	(IE.) – KPR/KPER/K..R/W..R
Sizes	56 to 400
Output range	0.06 – 650 kW
Ignition temperature	T125 °C (105 °C)
Ambient temperature	-30 °C to +40 °C (+55 °C)
Explosion-protected design for equipment class II, category 2D or 3D, according to	EN 60079-0 General requirements EN 60079-31 Equipment dust ignition protection by enclosure “t” for use in Zones 21 and 22
Product marking example	for Zone 21: Ex tb IIIC T125 °C Db for Zone 22: Ex tc IIIB T125 °C Dc for Zone 22, conductive dust: Ex tc IIIC T125 °C Dc

Technical data	Special version: Chemical industry motor VC (only for low voltages up to 690 V)
Sizes	56 to 400
Output range	up to 650 kW
Number of poles	2 to 8 poles, other pole numbers and pole-changing motors by request
Efficiency classification	none or IE1, IE2 and IE3 to IEC/EN 60034-30-1
Voltage range	Low voltages and voltage ranges according to IEC/EN 60038
Duty type	S1 mains operation and S9 converter-fed operation
Type of protection	IP 55, IP 56, IP 65 to IEC/EN 60034-5
Type of construction	IM B3, IM B35, IM B5, IM B14, IM B34 and derived types to IEC/EN 60034-7
Type of cooling	IC 411 to IEC/EN 60034-6 (IC 416 possible by request)
Regulations	IEC, EN, VIK
Labelling	Second rating plate in terminal box Optionally with data for converter-fed operation on rating plate
Housing	Grey cast iron
Terminal box	Grey cast iron
Fan cowl	Zinc-plated
Lubrication	Lifetime lubrication up to size 315, relubrication facility from 315 MX
Bearings	Anti-friction bearings C3
Winding protection	PTC thermistor as additional protection for converter-fed operation, sole protection upon request
Vibration severity	A
Balancing	Half-key
Explosion protection type	Explosion protection type – Increased safety “eb” Explosion protection type – Increased safety “ec”, “nA” Explosion protection type – Flameproof enclosure “db” Explosion protection type – Protection by enclosure “tb” for use in Zone 21 Explosion protection type – Protection by enclosure “tc” for use in Zone 22
Noise level	≤ 77 dBA + 3 dBA tolerance
Paint finish	Chemical paint finish FS 07 150 µm
Cable routing	Metric ATEX metal screwed glands according to VEM Catalogue
Screws (external)	Stainless steel

All further options which VEM offers for its product range are naturally also available for these motor variants.

Customer-specific VEM motors

Large machines and generators from VEM are tailored to the particular requirements of major chemical plants, oil and gas production facilities or pipeline projects. Our complete drive solutions serve an output range up to 60 MW.

High voltage

Technical data	Explosion protection type – Protection by enclosure “t”
Output range	up to 14 MW
Voltage	up to 13 800 V
Ignition temperature	≥ T130 °C
Explosion-protected design for equipment class II, category 2D or 3D, according to	EN 60079-0 General requirements EN 60079-31 Equipment dust ignition protection by enclosure “t” for use in Zones 21 and 22
Product marking example	Ex tb IIIC T130 °C Db

Technical data	Explosion protection type – Increased safety “ec”
Output range	up to 20 MW
Voltage	up to 11 000 V
Temperature classes	≥ T3
Explosion-protected design for equipment class II, category 3G, according to	EN 60079-0 General requirements EN 60079-7 Equipment protection by increased safety “e“
Product marking example	Ex ec IIC T3 Gc

Technical data	Explosion protection type – Increased safety “eb”
Output range	up to 6 MW
Voltage	up to 11 000 V
Temperature classes	≥ T3
Explosion-protected design for equipment class II, category 2G, according to	EN 60079-0 General requirements EN 60079-7 Equipment protection by increased safety “e“
Product marking example	Ex eb IIC T3 Gb

Technical data	Explosion protection type – Pressurised enclosure “p”
Output range	up to 50 MW
Voltage	up to 13 800 V
Temperature classes	≥ T4
Explosion-protected design for equipment class II, category 2G or 3G, according to	EN 60079-0 General requirements EN 60079-2 Equipment protection by pressurised enclosure “p”
Product marking example	Ex pxb IIC T3 Gb

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