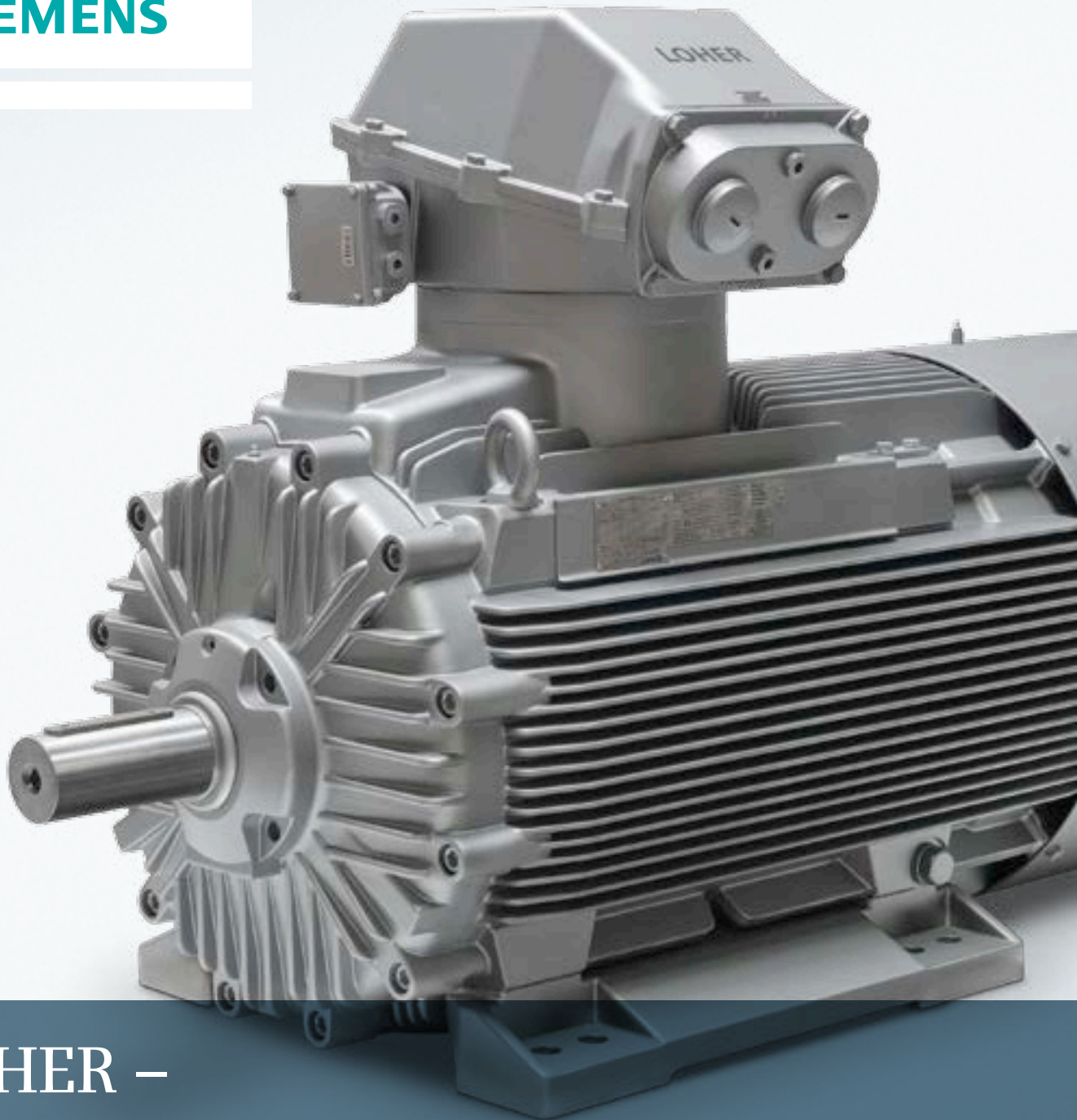


**SIEMENS**



# LOHER – explosion-protected motors

Engineered for maximum safety, reliability and efficiency

[siemens.com/loher-motors](https://www.siemens.com/loher-motors)

Answers for industry.

# Comply with standards and set new benchmarks

Danger of explosion, aggressive atmospheres, extreme temperatures. Drives in the oil & gas, chemical and petrochemical sectors have to cope with a lot of challenges. Even under the harshest conditions conceivable, LOHER motors fulfill all of the associated requirements when it comes to safety, reliability and efficiency. This results in maximum protection for man and machine – and last but not least, also for the environment.



Already back in the sixties, LOHER motors played a leading role when it came to explosion-protected drives. Since then, this leading position has been continually expanded. Today, we are the market leader with a wealth of experience in this domain. The many years of experience and the sector-specific know-how in this area not only allow us to comply with the most stringent standards, but also to set new benchmarks. This is the reason that LOHER CHEMSTAR, LOHER VARIO and LOHER VARIO PLUS motors optimally supplement and expand Siemens drive solutions based on SIMOTICS motors.

**An investment that pays off in plants and systems in the chemical, petrochemical and oil & gas industries**

Very extreme applications in hazardous zones also demand very rugged and durable drive technology. Our decades of experience in the development, design, dimensioning and production of explosion-protected motors guarantees you optimum operational reliability, availability and adaptation to the actual application conditions.

**It's safe to say: the optimum type of protection**

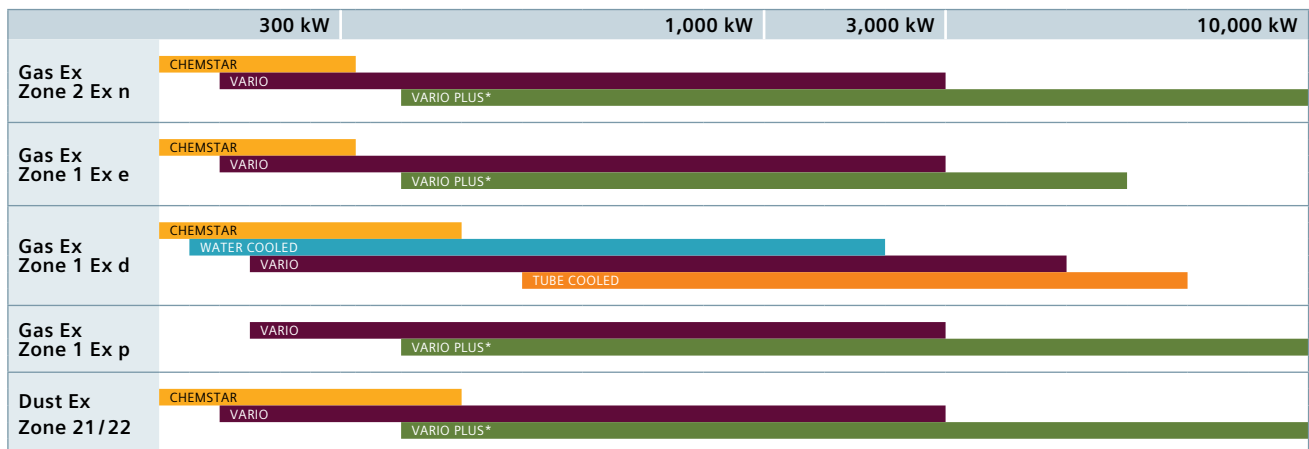
LOHER motors cover all of the applicable types of protection – from 0.1 to 10,000 kW. The seamless LOHER range includes dust explosion protection in hazardous Zones 21 and 22 as well as type of protection Ex n (non-sparking) for Zone 2, where sparks that can potentially ignite an explosion cannot occur. LOHER also covers Zone 1 – with the following types of protection: Pressurized encapsulation Ex p (the motor is pressurized using an inert gas to prevent the ingress of explosive gases), Ex e (increased safety,

which avoids inadmissibly high temperatures at any position on the motor) as well as flameproof motors Ex d. With this type of protection, the motor has been designed so that any explosion inside the motor cannot be propagated to the outside, and the motor frame can withstand the pressure caused by an explosion. Especially with regard to flameproof encapsulated motors, the LOHER series, which extends up into the MW range, is second to none when it comes to the scope and reputation in the global market. This pertains to explosive gases in the chemical, petrochemical and oil & gas industries as well as for Group I fire-damp-proof motors in the mining industry. Explosion-protected motors are available in a rib-cooled design; for higher power ratings, they are also available with pipe cooling or with mounted heat exchangers (air/air or air/water) – and then generally in a pressurized enclosure Ex p. All Ex d motors in all of the various designs, including their Ex d components, are individually tested in the factory to ensure that they can withstand the appropriate pressure levels.

**Motors certified for the global market**

All explosion-protected LOHER motors are ATEX certified; the directive of the European Union, which harmonizes all of the individual country regulations regarding explosion protection. Further, they are certified by the Physikalisch-Technischen Bundesanstalt (PTB), Dekra Exam or by TÜV Nord. A version in compliance with VIK directives (Verband der Industriellen Energie- und Kraftwirtschaft) is optionally available.

The seamless portfolio up into the megawatt range



\* VARIO PLUS available with higher power ratings on request

For global use, it goes without saying that the motors have certificates for specific countries, such as NEPSI (China), PESO (CCOE India) and Rostekhnadzor (Russia) – these are also for low temperatures, which makes them predestined for use in extremely cold regions of the world. They are also certified according to the new international IECEx scheme, which over the medium-term, is to be the global platform for mutually recognizing and accepting tests and certificates for explosion-protected electrical equipment.

#### **Straightforward: customized solutions to address every demand**

The LOHER motor brand label stands for drive solutions that are completely tailored to specific customer and sector requirements – even for demanding and unique specifications and special requirements. To secure this, we work closely with our clients.

Based on well-proven platforms, we adapt explosion-protected LOHER motors to address the specific project needs with the highest degree of flexibility and precision. This is with reference to the design, electrical dimensioning, special monitoring equipment as well as special cooling types and degrees of protection.

#### **Specialized to tackle extremes: motors that you can utterly depend on**

The process industry frequently involves hazardous zones. However, other extreme conditions, such as heat, cold, pollution and aggressive atmospheres, are often encountered on a daily basis. Our drive systems are also optimally equipped to cope with all of these. Examples include operating temperatures from –55 °C up to +70 °C and degrees of protection up to IP68. This means that customized drive solutions are created for the particular plant, application or customer specification. We always develop the optimum configuration irrespective of how extreme the installation site is.

- Vibration-proof, shock resistant and earthquake-proof LOHER motors
- LOHER motors for deserts – specifically designed to withstand heat, dust and sand storms
- Low temperature LOHER motors for drive applications under polar conditions
- LOHER motors for chemically aggressive environments

These are just a few examples.

#### **Double for higher durability: double protection for maximum safety**

The LOHER range also includes drive solutions with double protection: On one hand, this is double certification for gas and dust explosion protection for applications where fine dusts and also explosive gases can occur – for instance in the process industry or in mining. The other option is double protection Ex d and Ex e. This double protection makes sense onboard liquid gas tankers, where, as a result of the hazardous cargo, it must be absolutely excluded that electrical equipment can represent an ignition source. To address this requirement, explosion-protected LOHER motors have a mechanical design with type of protection “flameproof enclosure”. They also have type of protection “increased safety”, which ensures that specific temperatures of the active parts – both inside the motor as well as on the surfaces – are not exceeded.

#### **Bonus points when it comes to economy and ecology: high efficiency and low operating costs**

For several years now, the IE2 efficiency class is specified in the European Economic Area for motors. An IE2 motor has an efficiency that is up to seven percent higher than conventional motors. According to the applicable legislation, explosion-protected motors do not fall under this ruling. In spite of this, the LOHER series of explosion-protected motors has IE2 efficiency as standard over the complete validity range of the standard – from 0.75 kW up to 375 kW. This is true for all types of protection: Ex n, Ex e, Ex p and Ex d. Not only this, on request, explosion-protected motors are also available in an even higher IE3 efficiency class. These motors have an efficiency that is up to ten percent higher than conventional motors.

#### **At a glance: the many advantages of LOHER Ex motors**

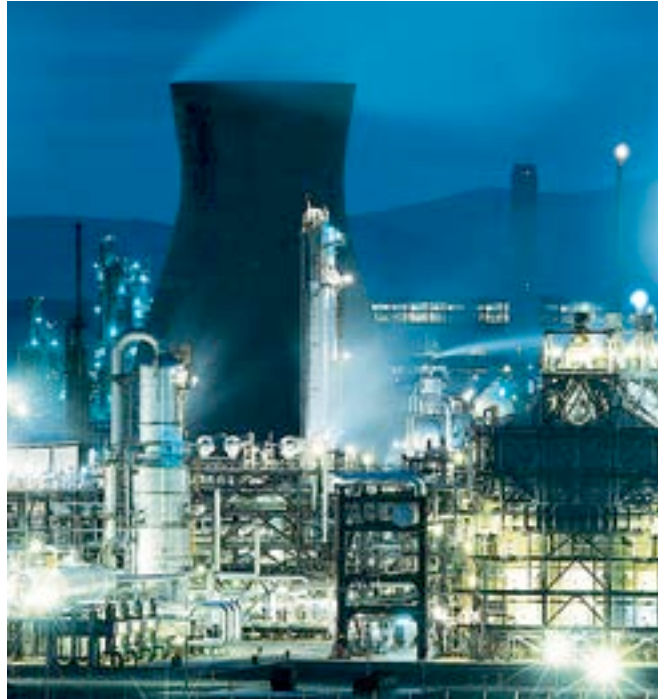
- All Ex types of protection, also double protection
- Double certified motors for use in hazardous zones with gas or dust
- Compliance with almost all user requirements and specifications
- Predestined for extreme installation sites
- Specially designed to address applications in the oil & gas, petrochemical and chemical industries
- Extremely robust with a wide range of operating temperatures
- Degrees of protection up to IP68
- Operation with converters is generally possible without involving complex system tests
- Short delivery times



- Complete project documentation guarantees minimum planning costs
- Connection system for large cable cross-sections avoids additional cabling costs, even more generously dimensioned connection systems optionally available
- State-of-the-art production technologies (e.g. UV impregnation) secure a high product quality
- High degree of cost effectiveness and low operating costs as a result of optimum electrical and mechanical values
- Available in the area of validity of the new efficiency classes in IE2 (high efficiency) and IE3 (premium efficiency)
- All of the important international certificates for hazardous zones, e.g. ATEX, IEC Ex, NEPSI (China), PESO (CCOE India) and Rostekhnadzor (Russia)

# Integrated Drive Systems

LOHER explosion-protected motors in perfect collaboration with their system partners



Siemens Integrated Drive Systems transform drive components into real systems. As a consequence, basic capital investment goods are turned into important success factors. Drive technology based on Integrated Drive Systems secures maximum productivity, energy efficiency and reliability in any automation environment and over the complete lifecycle – tailored to individual requirements or as standard system for all torque ranges, power and performance classes and voltage specifications.

Based on the unique concept of triple integration, Siemens drive technology based on Integrated Drive Systems creates a real value added. Convertors, motors, couplings and gearboxes from a single source are fully integrated at the drive level, and at the communication and

information levels with Totally Integrated Automation – with a perspective that encompasses the complete lifecycle. Worldwide, Siemens Integrated Drive Systems are the only real complete drive solution. They facilitate a noticeably shorter time to market and a correspondingly shorter time to profit.

LOHER explosion-protected motors, converters that have been specifically tailored to control explosion-protected motors – such as the SINAMICS G180 – as well as ATEX-certified FLENDER couplings and gearboxes can be integrated to form a perfectly coordinated Integrated Drive System for applications in hazardous locations.



**Side by side with SINAMICS G180:  
first choice on the converter side**

Converters are available that have been specifically designed to control LOHER explosion-protected motors, and which address the requirements relating to explosion protection. For instance, SINAMICS G180 converters developed for the chemical and petrochemical industries are available, which have been developed for operation with explosion-protected motors in Zones in 1 and 2 and have ATEX certification. With these devices, a shutdown concept that is also ATEX-certified allows a plant or system to be safely shut down without requiring a main contactor. This is also applicable when operating motors in hazardous Zones 1 without having to change the dimensions, which ensures a significant cost saving potential on the plant side.

And with a range of power ratings from 2.2 to 6,600 kW, this series of devices is available for voltages typically used in the process industry – of course also for 500 and 690 V.

For applications in the chemical and petrochemical industries, our converters are also equipped with NAMUR functions and terminal strips. Operation based on the PROFIBUS profile PROFIdrive 4.1 – “process technology” – operating mode is also possible. Further, protective separation (PELV) is guaranteed. Sine-wave output filters or du/dt filters are available to limit voltage peaks and rates of rise. Driver blocks and faceplates specifically developed

for the SINAMICS G180 are used to integrate the drive system into the automation environment as part of Totally Integrated Automation. This means that the SINAMICS G180 can also be integrated into higher-level SIMATIC PCS 7 process control systems and, via PROFIBUS, can be controlled from the central PCS 7 control station. Further, all of the operating data can also be visualized.

**Optimum option:  
our mechanical drive components**

On the mechanical side, FLENDER gearboxes and couplings complete our Integrated Drive System for hazardous zones in the process industry. FLENDER gearboxes as well as couplings are available with ATEX certification. RUPEX/ N-EUPEX and ARPEX couplings can be optionally certified as devices for use in hazardous zones according to this directive.

For decades, mechanical FLENDER gearboxes have been used to address different requirements in the process industry: whether gearboxes for agitators, ventilators or water screw pumps. They are especially quiet, and set themselves apart as a result of their high efficiency, reinforced bearings and the fact that they are absolutely oil tight. In conjunction with ARPEX and N-EUPEX couplings, which have especially proven themselves in drives for conveying and pumping aggressive and hot media, they provide an environmentally-friendly solution that has been technically proven in the field.

# LOHER CHEMSTAR

Rib-cooled low-voltage motors for exceptional requirements in the process industry



LOHER CHEMSTAR motors set themselves apart as a result of the fact that they have been specifically designed for hazardous zones and extreme installation sites in the chemical, petrochemical as well as oil & gas industries.

For small and medium-power ratings, it is especially the LOHER CHEMSTAR motor series that ensures a maximum degree of safety and reliability, highest availability and low operating costs. With power ratings up to 500 kW, this motor is the ideal drive component as it complies with all of the requirements of the chemical and petrochemical industries. A design that addresses specific sector requirements takes into account the installation site – not only for hazardous zones, but also for explosion-free environments. A high-quality paint finish resistant to chemicals and the optionally galvanized fan cover protect against aggressive atmospheres.

Anti-condensation heating is frequently not even required for a high humidity. LOHER CHEMSTAR motors operate smoothly from  $-55\text{ }^{\circ}\text{C}$  up to  $+70\text{ }^{\circ}\text{C}$ , even in zones with

dust and gas. This means that these motors are admirably suited for desert and polar regions. When required, the motors can be equipped with corrosion-resistant stainless steel screws and shaft seals in IP66 to protect against water and dust. IP55 is the standard degree of protection, however, degrees of protection are available up to IP67.

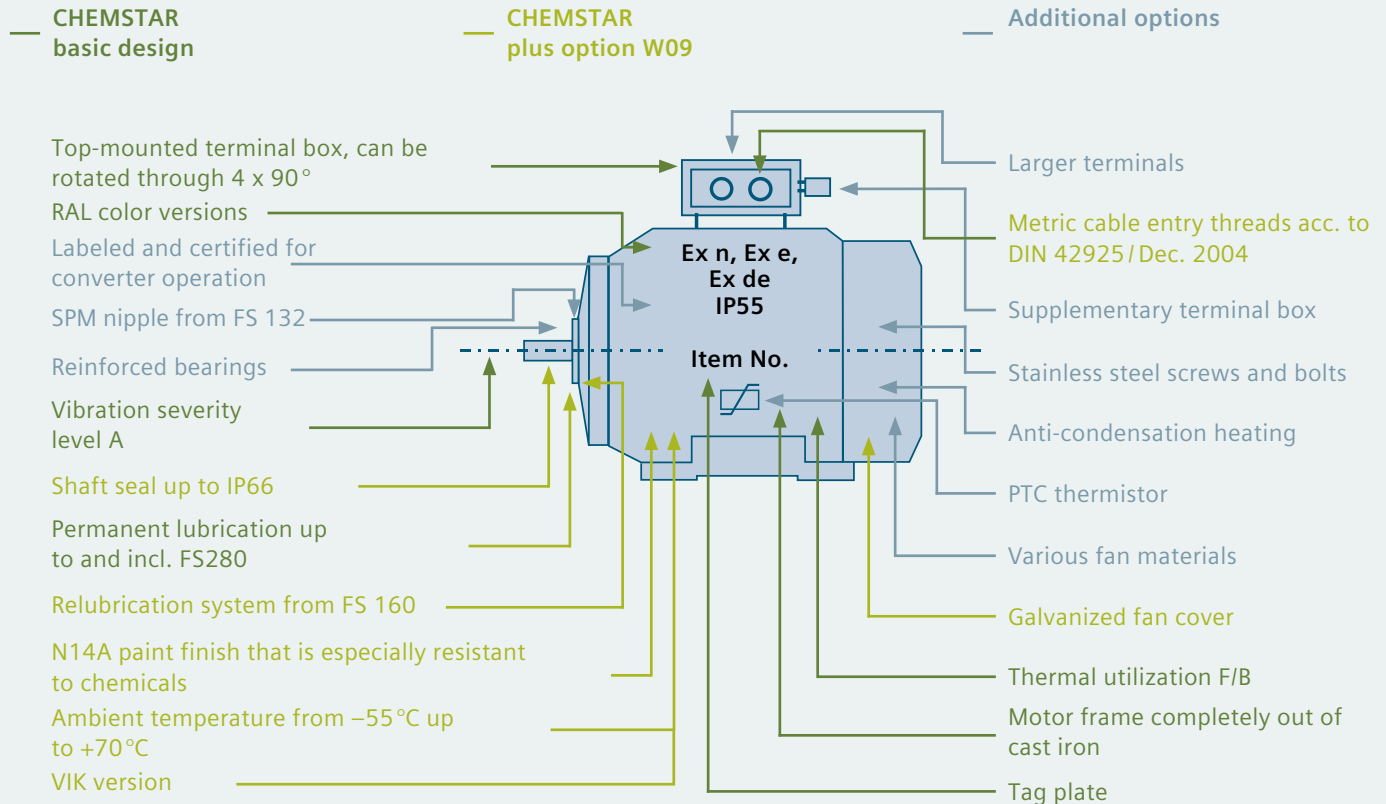
#### Certified for special requirements

LOHER CHEMSTAR motors are supplied with sector-specific documentation, including ATEX certificate for the chemical and petrochemical industry. In addition to ATEX, it goes without saying that other sector-specific certificates are available, such as NEPSI (China), PESO (CCOE India) and Rostekhnadzor (Russia).

The motor frame is manufactured out of rugged grey cast iron. This makes it extremely resistant to corrosion, it dampens vibration and has a high mechanical strength. Reinforced bearings and integrated PTC thermistors are also available. The adapted motors comply with almost all user requirements and specifications.



## Loher CHEMSTAR motor – technical design



### Basic CHEMSTAR design

- Vibration severity level A
- Permanent lubrication up to and incl. FS 280
- Top-mounted terminal box, can be rotated through 4 x 90°
- Metric cable entry threads acc. to DIN 42925 / Dec. 2004
- Thermal utilization F/B
- Motor frame completely out of cast iron
- RAL colors
- Tag plate

### Option package W09 – CHEMSTAR plus design for chemical and petrochemical applications

- VIK version
- Vibration severity values the same as level B
- IP56 motor degree of protection
- Shaft seal IP66
- Galvanized fan cover
- N14A paint finish that is especially resistant to chemicals

### Additional supplementary options (with and without W09)

- Labeled and certified for converter operation with standard and special insulation
- SPM measuring nipple
- Reinforced bearings
- Relubrication system from FS 160
- Stainless steel screws and bolts
- Anti-condensation heating
- Various fan materials
- Ambient temperature from -55°C up to +70°C
- PTC thermistor as additional protection or exclusive protection
- Supplementary terminal box
- Special paint finishes
- Special paint colors
- Cable glands – also for shielded or armored cables
- Larger terminals
- and a lot more



### Explosion-protected motors also with a high efficiency

The new international efficiency standard IEC 60034-30, which reflects the increasing significance of energy efficiency, also involves explosion-protected motors.

To address this, the series is available across the board with high IE2 efficiency – and we have developed a new series of flameproof encapsulated motors (type of protection Ex d) and motors with increased safety (type of protection Ex e) with an even higher efficiency class – IE3 (premium efficiency).

Our high-efficiency explosion-protected LOHER CHEMSTAR motors cover a power range extending from 0.75 kW up to 375 kW. They are available in 2, 4 and 6-pole versions as well as in 50 and 60 Hz. The majority of CHEMSTAR motors also fulfill the IE2 standard at increased ambient temperatures (e.g. 50 °C) or higher installation altitudes (e.g. 2000 m) without requiring derating.

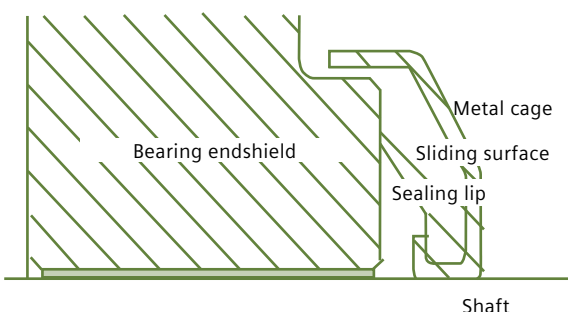
#### All advantages at a glance:

- Available in high efficiency class IE2 and also IE3
- For applications in hazardous Zones 1 and 2 with converter operation
- Double protection Ex d and Ex e possible
- Double certified motors for hazardous locations with gas and dust
- Accepted by Shell, DOW, BAYER, Statoil, BP, ABB Lumus, Technip and many more
- Extremely rugged, corrosion-resistant, torsionally stiff cast iron frames with a high strength
- Smooth, disturbance-free operation from –55 °C up to +70 °C
- Frequently, anti-condensation heating is not required even for high humidity levels
- High quality paint finish resistant to chemicals
- Galvanized fan cover
- Available with corrosion-resistant stainless steel screws and bolts
- Shaft seals in IP66 protect against water and dust

## Technical data

<b>Shaft heights:</b>	Frame size 071 – 355 mm
<b>Power range:</b>	Up to 500 kW (thermal utilization according to the thermal class B)
<b>Number of poles:</b>	2–12-pole;
<b>Voltage range:</b>	The usual low voltages and voltage ranges according to IEC 600038
<b>Rated voltages:</b>	400 V/D $\pm$ 10 % 690 V/S $\pm$ 10 % 500 V $\pm$ 10 % special voltages
<b>Operating mode:</b>	S1 line operation or S9 converter operation; special operating mode
<b>Degree of protection:</b>	IP55, IP56, IP65 on request up to IP67
<b>Cooling method:</b>	IC 411, IC 416
<b>Type construction:</b>	IM B3 IM B5, IM B35, IM V1, IM V3, IM V5, IM V18, IM B14, IM B34 (special)
<b>Frame:</b>	Cast iron
<b>Bearings:</b>	Roller bearings (standard) and special bearings for high axial and radial forces
<b>Regulations:</b>	IEC, EN, DIN, VDE
<b>Types of protection: marked according to EN 60079-0, 2009</b>	Zone 1: II 2G Ex de IIC temperature class T4 EPL Gb Zone 21: dust protection (max. surface temperature 120 °C): II 2D Ex tb IIC T120 °C Gb Zone 2: II 3G Ex nA IIC T3 Gc Zone 22: II 3D Ex tc IIIC T120°C Gc
<b>Noise level:</b>	$\leq$ 77 dB(A) + 3 dB(A) tolerance low-noise version possible for 2-pole motors (GG3)

### Shaft seal IP66 (optional)



- Axial sealing ring (Gamma ring 9RB)
- Sealing lip slides on a precision-machined metal surface
- As the speed increases, the contact pressure decreases – therefore minimum wear
- Together with the frame, the metal cage forms a labyrinth seal and protects the sealing lip against jets of water, dust and mechanical damage
- Suitable for horizontal and vertical motor types of construction
- Mechanical design prevents water from collecting in the area around the sealing lip
- Especially suitable for outdoor installation, especially V3
- Degree of protection of the seal IP66/65 verified by EXAM
- Used under extreme conditions for 25 years

# LOHER VARIO

Maximum safety in the oil and gas industry



In a welded steel design from shaft height 355 and higher, the LOHER VARIO motors are available in low-voltage and high-voltage versions depending on the particular application. LOHER VARIO low-voltage and high-voltage motors are equipped as standard with features that are required to address applications in the oil & gas sectors as well as the petrochemical and chemical industries. This series of motors complies with the standards of the various operating companies to an extremely high degree. With power ratings up to 3,150 kW, their main applications are in the oil and gas sector where high-rating pumps and compressors are required for pumping and transporting oil and gas.

They can be used in any hazardous Zone – up to gas group II C according to explosion protection class II 2 G Ex de II C T4 Gb. Equipped with roller bearings, LOHER VARIO motors are predestined for use in Zone 1 and in highly explosive environments containing hydrogen. All of the motors are certified according to ATEX, NEPSI, PESO (CCOE) and Ros-tekhnadzor.

They are also certified for low temperatures, which makes them admirably suited for use in oil and gas fields in cold climatic regions around the world such as in Canada, Alaska and Siberia.

#### Designed down to the finest detail

LOHER VARIO motors are available in all of the usual voltages and frequencies up to 11 kV. They set themselves apart as a result of their extremely rugged design: Torsionally stiff steel frames – which at higher power ratings offer increased stiffness and low vibration levels – ribbed bearing endshields in cast iron or steel with a high mechanical strength. Vertical motors can also be equipped with thrust bearings for high axial and radial loads.

The high efficiency is obtained by using magnetic slot wedges – resulting in significantly lower power costs. The terminal box can either be mounted on the side or at the top – other modifications are available on request. All of the terminal boxes can be rotated through 90°.

## Technical data

<b>Shaft heights:</b>	355, 400, 450, 500, 560, 630
<b>Power range:</b>	80 kW – 3,150 kW
<b>Number of poles:</b>	2 – 16-pole, higher pole numbers available on request
<b>Voltage range:</b>	400 V – 11,000 V
<b>Rated voltage:</b>	400 V, 690 V, 3.3 kV / 4.16 kV / 6 kV / 6.6 kV / 10 kV / 11 kV
<b>Degree of protection:</b>	IP55, IP56, IP65, IP67, IP68
<b>Cooling method:</b>	IC 411, IC 416
<b>Type of construction:</b>	IM B3, IM B35, IM V1, IM V3, additional types on request
<b>Frame:</b>	Welded steel
<b>Bearings:</b>	Roller bearings, sleeve bearings (only for gas group IIB)
<b>Standards:</b>	IEC, EN, DIN, VDE
<b>Explosion protection:</b>	II2G Ex d(e) IIB T4 Gb, II2G Ex d(e) IIC T4 Gb II2G Ex e IIC T3 Gb II2G Ex px (e) IIC T3 Gb II3G Ex nA IIC T3 Gc II2D Ex tb IIIC T120 °C Db II3D Ex tc IIIC T120 °C Dc
<b>Noise level:</b>	Max. 85 dB(A) (load, 50 Hz), low noise version available

### All advantages at a glance:

- All explosion types of protection, also double
- Double certified motors for use in hazardous zones with gas or dust
- Also predestined for highly explosive environments containing hydrogen
- Special versions of the motors are suitable for polar regions down to  $-55\text{ °C}$  (without heating the motor, down to  $-40\text{ °C}$ ) or desert regions with  $+60\text{ °C}$
- Also certified for low temperatures
- When required, vertical motors can also be equipped with thrust bearings for high axial and radial loads
- Extremely rugged due to torsionally stiff steel frame
- Wide range of connection systems for large cable cross-sections, high short-circuit strength or phase segregated version
- Optimized starting and operating parameters and high efficiency using copper bar rotors as standard
- High degree of variability using a welded steel frame (dimensions can be adapted, mounted components)



# Tube-cooled LOHER motors

Flameproof motors for especially high power ratings



LOHER motors with tube cooling are used to address the higher power range of flameproof motors up to 6,500 kW. The stainless steel cooling pipes concentrically arranged around the active motor part act as air-air heat exchanger. The special inner cooling system with X ventilation, axial and radial cooling slots ensure a uniform temperature level. The rugged design facilitates safe and straightforward operation in Zone 1 – both when connected directly to the line supply or fed from a converter.



## Technical data

<b>Shaft heights:</b>	710, 800, 1,000
<b>Power range:</b>	800 kW – 6500 kW
<b>Number of poles:</b>	2 – 16-pole, higher pole numbers available on request
<b>Voltage range:</b>	3,000 V – 11,000 V
<b>Rated voltage:</b>	3.3 kV / 4.16 kV / 6 kV / 6.6 kV / 10 kV / 11 kV
<b>Converter:</b>	Line and converter operation
<b>Degree of protection:</b>	IP55, IP56, IP65
<b>Cooling method:</b>	IC 511, IC 516
<b>Type construction:</b>	IM B3, IM B35, IM V1
<b>Frame:</b>	Welded steel
<b>Bearings:</b>	Roller bearings, sleeve bearings (only for gas group IIB)
<b>Standards:</b>	IEC, EN, DIN, VDE
<b>Explosion protection:</b>	II2G Ex d(e) IIB T4 Gb II2G Ex d(e) IIC T4 Gb (on request) II2G Ex e IIC T3 Gb II3G Ex nA IIC T3 Gc II3D Ex tc IIIC T120°C Dc
<b>Noise level:</b>	Max. 86 dB(A) (load, 50 Hz), lower noise version available



### All advantages at a glance:

- Very rugged with stainless steel cooling pipes
- Special inner cooling system for a uniform temperature distribution
- Also available for exceptional requirements, such as explosion protection for dust or double protection Ex e and Ex d
- Special versions of the motors are suitable for polar regions down to  $-55^{\circ}\text{C}$  (without heating the motor, down to  $-40^{\circ}\text{C}$ ) or desert regions with  $+60^{\circ}\text{C}$
- When required, vertical motors can also be equipped with thrust bearings for high axial and radial loads
- Wide range of connection systems for large cable cross-sections, high short-circuit strength or phase segregated design
- Optimized starting and operating parameters and high efficiency using copper bar rotors as standard
- High degree of variability based on a welded steel frame (dimensions can be adapted, mounted components)

# LOHER VARIO PLUS

High-voltage motors with modular cooling system for maximum safety and availability for demanding applications



LOHER VARIO PLUS motors can be tailored to address the particular application making them admirably suited for individual drive and customized solutions. The motors have a modular cooling system, are highly reliable and efficient and are available up to shaft height 800 in low and high voltage versions. They are built according to customer and sector-specific requirements to address applications in Zones 1 and 2 as well as Zone 22. LOHER VARIO PLUS motors are equipped with dual-flow internal cooling for a high power density and uniform temperature distribution.

## Two versions are available:

### Mounted air-water heat exchanger

Heat exchangers specifically coordinated and harmonized for this series guarantee optimum cooling. The motor power loss is dissipated through the cooling water, and is therefore decoupled from the ambient temperature. The heat exchangers are available in a wide range of versions with single and double-pipe designs. The high-quality materials used for the cooler are adapted to the particular requirements.

### Mounted air-air heat exchanger

The motors are equipped with air-air heat exchangers. The cooling pipes are manufactured out of galvanized steel; stainless steel versions are available for especially aggressive atmospheres. In conjunction with the appropriately coordinated Ex p system they can be used for Zone 1 applications in the upper power range.



**All advantages at a glance:**

- All motors have dual-flow inner cooling for a high-power density with uniform temperature distribution
- Highest degree of flexibility both regarding the electrical as well as mechanical features, e.g. starting characteristics, noise, vibration and efficiency requirements etc.
- High quality materials for the cooling system
- Flexible cooling concept, e.g. redundant ventilation systems
- Special versions for especially aggressive atmospheres
- Special series in a sleeve bearing version for continuous sub-critical operation when connected to a converter
- Wide range of connection systems for large cable cross-sections, high short-circuit strength or phase-segregated design
- Optimized starting and operating parameters and high efficiency by using copper bar rotors as standard
- High degree of cost effectiveness and lower operating costs based on optimum electrical and mechanical values
- High degree of variability using a welded steel frame (dimensions can be adapted, mounted components)

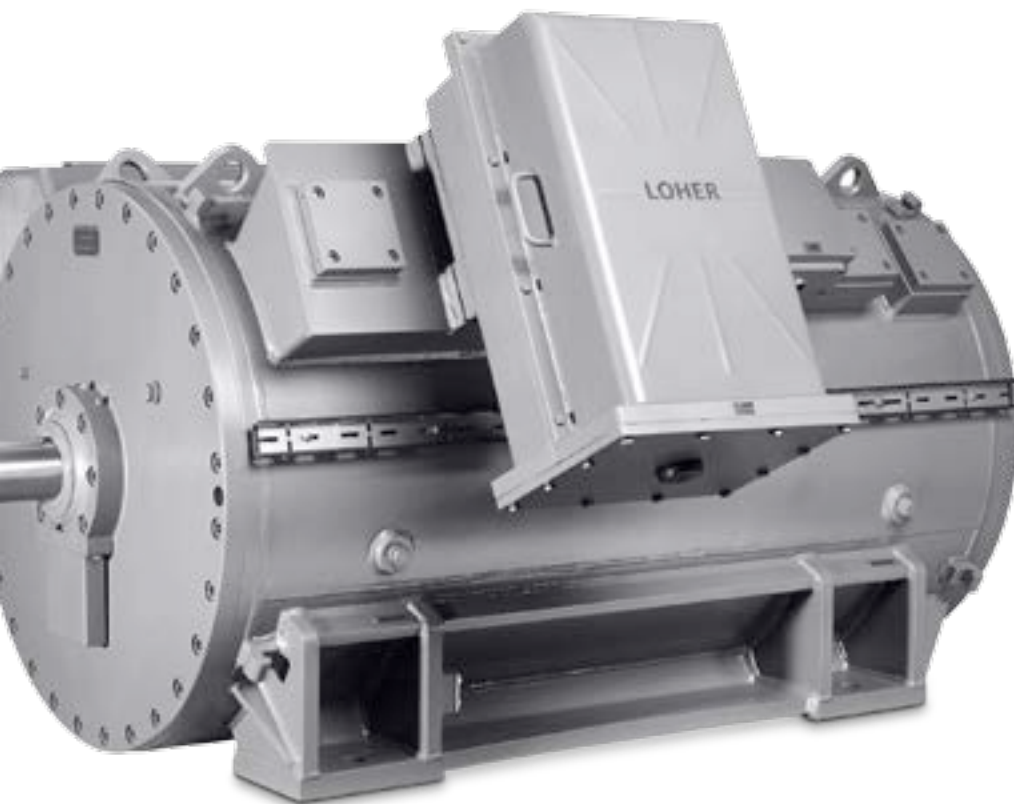


## Technical data

<b>Shaft heights:</b>	500, 560, 710, 800
<b>Power range:</b>	355 kW – 10,000 kW, higher power ratings on request
<b>Number of poles:</b>	2 – 16-pole, higher pole numbers available on request
<b>Voltage range:</b>	690 V – 11,000 V
<b>Rated voltage:</b>	690V, 3kV, 3.3 kV / 4.16 kV / 6 kV / 6.6 kV / 10 kV / 11 kV
<b>Converter:</b>	Line and converter operation
<b>Degree of protection:</b>	IP55, IP56
<b>Cooling method:</b>	IC611, IC616, IC666, IC81W, IC86W
<b>Type of construction:</b>	IM B3, IM B35, IM V1, IM V10
<b>Frame:</b>	Welded steel
<b>Bearings:</b>	Roller bearings, sleeve bearings
<b>Standards:</b>	IEC, EN, DIN, VDE
<b>Explosion protection:</b>	I12G Ex px (e) IIC T3 Gb I12G Ex e IIC T3 Gb I13G Ex nA IIC T3 Gc I13D Ex tc IIIC T120°C Dc
<b>Noise level:</b>	Max. 85 dB(A) (load, 50 Hz), lower noise version available

# Water jacket cooled LOHER explosion-protected motors

Predestined for extreme installation locations



Water jacket cooled LOHER explosion-protected motors are available in low and high-voltage versions. They can be flexibly used, and as a result of their high degree of reliability they always ensure the availability of the complete plant or system – even under the harshest of conditions. Further, they always comply with the safety-related requirements. These motors are especially quiet when compared to air-cooled motors, therefore playing an important role in protecting operating personnel and complying with environmental regulations. Complex noise attenuating measures are superfluous. Power loss is dissipated, so that the machine room temperature does not increase, which in turn improves working conditions. The operating costs are significantly reduced as a result of the efficiency and low maintenance requirements.

The energy efficiency of the complete plant or system can be improved through thermal recovery. Further, the power rating can be significantly increased while still maintaining the frame size as a result of the water jacket cooling principle. This facilitates especially compact and space-saving drive solutions – ideal for applications where space is limited, for example on oil platforms. In addition to freeing up valuable space, this also reduces transport costs. Water jacket cooled LOHER motors are predestined for offshore use also as a result of the cooling concept. This reliably prevents the ingress of pollution, dust, dampness and aggressive salt-laden air into the motor.

### High plant availability based on extreme reliability and low maintenance

This cooling principle ensures that the complete LOHER motor is uniformly cooled. This feature reliably avoids hotspots and has a positive impact on the service life. With their high reliability, these motors decisively enhance the availability of the complete plant or system. Further, a design that is rugged and insensitive to even harsh environmental conditions allows longer maintenance intervals when compared to traditional motors types. As a consequence, the water jacket cooling system requires very little maintenance and the special water routing reduces the formation of deposits. Special anti-corrosion protection can be optimally applied to the chambers (according to DIN EN ISO 12944, protection level high, corrosivity level IM2). In fact, this even means that seawater/saltwater can be directly used as coolant.

### Fully compatible for speed control

As a result of the optimized cooling concept, water jacket cooled LOHER motors are especially suitable for converter operation. Specifications for constant torque at zero speed can be addressed without high associated costs. Ideally, flameproof encapsulated motors are the optimum solution when replacing other motors as a result of the simplified handling for converter operation. Further, converter operation is possible without involving complex system tests and certifications.

### Optimum operating characteristics

Water jacket cooled LOHER motors with copper rotors set themselves apart as a result of their optimum operating characteristics. These include improved starting behavior, an extremely high overload capability as well as low surface temperature (T4).

## Technical data

<b>Shaft heights:</b>	200 – 500
<b>Power range:</b>	22 kW – 1,850 kW
<b>Number of poles:</b>	2 – 16-pole, higher pole numbers are available on request
<b>Voltage range:</b>	400 V – 6,600 V
<b>Converter:</b>	Line and converter operation
<b>Degree of protection:</b>	IP55; IP56 to IP66
<b>Cooling method:</b>	IC71W
<b>Type of construction:</b>	IM B3, IM B35, IM V1
<b>Frame:</b>	Cast iron, welded steel (HV versions)
<b>Bearings:</b>	Roller bearings, sleeve bearings
<b>Standards:</b>	IEC, EN, DIN, VDE
<b>Explosion protection:</b>	II2G Ex de IIB (IIC) T4 Gc II3G Ex nA IIC T3 Gc II3D Ex tc IIIC T120°C Dc
<b>Noise level:</b>	<75 dB(A) (load, 50 Hz)

### All advantages at a glance:

- Highest degree of reliability even under the toughest of conditions
- Compact design to reduce space required and transport costs
- Very low maintenance water jacket cooling system
- Long service life as a result of the uniform cooling
- Seawater/saltwater can be directly used as coolant
- Extremely quiet as they have no fan
- Improved starting characteristics
- Extremely high overload capability

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