

# Motors with the highest power ratings to meet the highest demands

HS-modyn



## Motors

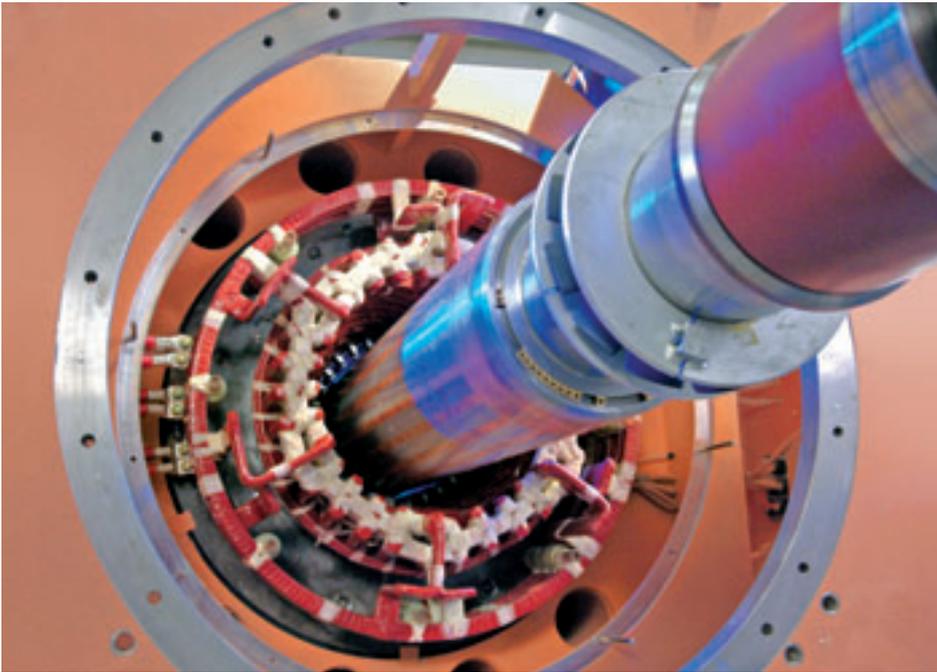
Answers for industry.

**SIEMENS**



## First choice when it comes to an electric motor: HS-modyn

Electric drives instead of gas turbines – the ambitious trends seen in the oil and gas industry are being implemented in reality using HS-modyn: Cutting-edge drive technology for your sector.



#### HS-modyn – facts at a glance:

- Power ratings up to 30 MW
- Solid rotor for speeds up to 15,000 rpm
- Highest reliability in use
- Based on a well-proven platform concept
- Minimum service & maintenance costs
- Extremely space saving
- High degree of efficiency
- Oil-free if magnetic bearings are used
- Predestined for the oil & gas industry

#### More than reliable – HS-modyn

At speeds of up to 15,000 rpm in the Megawatt range, this induction motor is convincing thanks to its maximum reliability and minimum service & maintenance costs. This is especially as a result of its extremely rugged rotor technology. Combining this technology with well-proven concepts ensures that the HS-modyn – in a direct comparison with other motors used in compressor drives – sets standards when it comes to availability. For instance, when it comes to the bearings, cooling systems and winding insulation.

#### Maximum cost-effectiveness – at extremely high compressor speeds

With the HS-modyn, you save over the complete life cycle: The lower mounting footprint reduces the costs for the foundation and buildings, the high efficiency slashes the energy costs and the oil lubrication system can be eliminated when magnetic bearings are used. And this not only has a positive impact on the financial situation – but also on the environment.

Further, when used as part of a direct drive, HS-modyn does not require any complex gear unit. This facilitates a significantly more compact drive train, the costs for the otherwise necessary gear unit inspections and service are eliminated and the overall availability of the drive train is increased.

#### Maximum availability – even at the highest speeds

You wish to increase the availability of existing gas compressor stations? Or you wish to construct new compressor stations within the scope of new gas exploitation projects and additional pipelines. With HS-modyn, you can always depend on its outstanding reliability as well as the low service & maintenance costs. And as a result of a power and speed range from 15,000 rpm at 4 MW up to 6000 rpm at 30 MW – you benefit from a flexible powerhouse that optimally fulfills your individual requirements. Enormous speed and power combinations that have a substantial base: Decades of experience and the unique power of innovation of our Dynamowerk in Berlin – the birthplace of the HS-modyn.

# Maximum advantages – from every perspective

## **Well-proven basis:**

### **From the cooling to the bearings**

The innovative HS-modyn concept is based on well-proven technology. The two cooling versions that are available – self-ventilated with shaft-mounted fans or forced ventilation – have proven themselves many times over. For instance, the shaft-mounted fans have been used as standard up into the high double-digit Megawatt range for many years – and magnetic bearings have been successfully tested and used in the field for years.

## **Proven and patented quality of the insulating system: MICALASTIC®**

MICALASTIC – the well-proven insulating system used for high-rating high-voltage motors worldwide is also used for the HS-modyn. An important component: The VPI technique (Vacuum Pressure Impregnation) that is harmonized to the insulation design. This insulation technique fulfills all of the basic requirements, such as:

- drive converter operation
- outstanding switching strength due to the high stiffness of the winding overhangs
- the excellent corona shielding

In conjunction with the extraordinary high mechanical strength and thermal endurance, these factors guarantee the extremely long service life of the winding – even under tough environmental conditions.

## **Maximum smooth operation thanks to the active magnetic bearings**

Especially innovative: HS-modyn can be equipped with active magnetic bearings. These are completely wear-free and quiet. They distinguish themselves as a result of the well-tested contactless bearing technology with a whole raft of associated advantages. In addition to lower power losses, contrary to mechanical bearings such as roller or sleeve bearings – they have no speed limit. Therefore, magnetic bearings offer an extremely wide speed control range as well as maximum smooth operation.

And as a result of this completely oil-free drive train, even the toughest environmental regulations are complied with – costly oil capture basins and disposal of old oil are eliminated.

Alternatively, conventional sleeve bearings or trapped oil damper bearings can be used.

## **Fit for the oil and gas industry**

Its rugged design makes the HS-modyn the ideal motor for the rugged conditions that are encountered in the oil & gas sector. And this applies worldwide. It complies with API specifications for the US market, the ATEX specifications for Europe and Russia's Rostekhnadzor – as well as GOST. HS-modyn is available in a version with pressurized enclosure Ex p for gas explosion protection, Zone 1. In this case, absolutely pure air is kept at a pressure inside the motor therefore preventing the ingress of explosive gases (this is ATEX certified).

## **Key to the highest degree of reliability: The rugged rotor technology**

The rotor boasts two features that no other high-speed induction motor in the marketplace has, which make HS-modyn so exceptionally reliable: The solid rotor with copper cage – and, wherever possible, self-ventilation using shaft-mounted axial fans manufactured out of Kevlar.

As a result of the solid rotor with integrated copper cage, centrifugal forces are optimally handled – even at the highest speeds. The advantage for you: Highest reliability thanks to the minimum and reproducible vibration over the complete life cycle – and in each and every operating state. For the self-ventilated versions, shaft-mounted fans guarantee reliable cooling of the motors including the bearings. The extremely light axial shaft-mounted fans manufactured out of Kevlar with the highest mechanical strength are predestined for the highest speeds and have a high velocity profile for the highest aerodynamic efficiency. This, in turn, maximizes the motor efficiency. The inner cooling circuit of force-ventilated versions of the motor are supplied using reliable fan units.

## **Consequentially designed stator concept**

Optimized for minimum vibration, absolutely quiet and rugged: HS-modyn stators are ideally designed for operation with medium-voltage converters. The active stator part is elastically suspended in the motor enclosure to ensure optimum low noise levels and low structural vibration.

# Siemens response to the trend towards electric drives

The trend in the oil and gas industry away from the gas turbine to electric drives – especially for large gas compressors with power ratings up into the double-digit megawatt range – didn't just happen by chance. The speed of a motor connected to a drive converter can be optimally adapted to the process. On the other hand, when a gas turbine is used, then the process must be adapted to the gas turbine. Put another way: Process control using an electric drive is significantly more flexible.

## For high-speed high-voltage motors up to 15,000 rpm

Especially in conjunction with the SINAMICS and ROBICON Perfect Harmony families of drive converters, HS-modyn offers you a perfectly harmonized drive system. It can achieve speeds up to 15,000 rpm, has a wide speed control range without any significant power losses as well as low derating factors at higher ambient temperatures.

Not only this, the maintenance costs and probability of failure are significantly lower than for a gas turbine – and with a significantly higher degree of availability. Used in a direct compressor drive, the HS-modyn induction motor neither requires a gear unit nor the associated oil supply – this is what gives it unbeatable availability figures when compared to conventional electric drives.

An additional big advantage: The electric drive generates significantly less emissions. It produces fewer exhaust gases, is perceptibly quieter and when magnetic bearings are used, allows a complete oil-free drive train to be realized.

Also, with the background of increasingly more stringent emission regulations such as CO<sub>2</sub> and noise, it definitely offers an interesting alternative to conventional solutions.



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