

# Compact, flexible, highest availability.

H-compact PLUS



## Motors

Answers for industry.

**SIEMENS**

# Strong performance in the smallest space. H-compact PLUS.

First and foremost for any motor – you must be able to depend on it 100 percent. Or, put another way, the highest degree of reliability is demanded. And it is precisely this aspect that distinguishes the H-compact PLUS. Based on our extensive know-how we are offering you a family of high-voltage three-phase motors that sets standards – standards regarding reliability and flexibility. But at the same time an extremely compact design.



The following points play a role in ensuring compact motors with extremely low envelope dimensions for the corresponding power ratings

- high utilization of the active parts
- innovative ventilation and cooling systems
- state-of-the-art motor design techniques

This is the reason that our drive solutions save valuable space therefore reducing the costs of a complete plant. The motor foundation costs are also reduced and with it mounting and installation costs.

## **At home in the process industry**

With power ratings up to 11.7 MW (IEC) and 18,000 HP (ANEMA) and shaft heights up to 710 mm, H-compact PLUS is at home everywhere in the process industry – where it distinguishes itself as a result of its reliability, low maintenance and efficiency.

## **Some of the sectors where it is used:**

- Oil & Gas
- Petrochemical
- Chemical
- Mining/wastewater
- Marine
- Cement

## **Typical applications include:**

- Pumps
- Compressors
- Blowers
- Extruders
- Mixers, crushers
- Conveyor belts
- Main ship's drives







# Leading-edge technology for the highest availability.

The reason that our H-compact PLUS motors offer the highest degree of reliability with minimum maintenance costs: Frame, bearings, active parts, ventilation and cooling system are perfectly harmonized with one another.



## Proven concepts for disturbance-free operation

H-compact PLUS motors have the MICALASTIC insulating system that has proven itself over many years in high-rating, high-voltage motors – and that worldwide. An important component of this insulating system is the VPI technique (Vacuum Pressure Impregnation) that is harmonized with the insulation design. This insulation technique fulfills every requirements regarding:

- Motors can either be fed directly from the line supply or a drive
  - High switching and reversing strength due to the high stiffness of the winding overhangs
  - Excellent corona shielding
  - In conjunction with the extraordinary mechanical strength and thermal endurance, these factors ensure an extremely long winding lifetime
- And all of this under tough environmental conditions.

## Long lifetime and reliable

The bearings of our H-compact PLUS motors are precisely aligned to the speed, load and other operating conditions. The motors are equipped as standard with roller bearings. They can also be equipped with sleeve bearings if the application demands it. The bearings are well sealed to make the motors insensitive to external environmental effects – therefore playing a role in achieving the

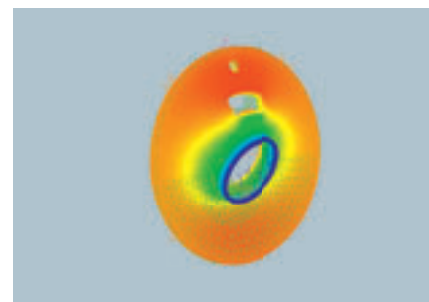
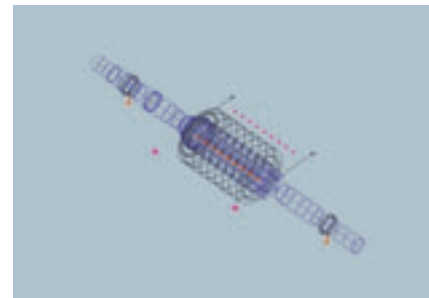
high degree of availability and in turn the productivity of the overall plant or system. The low maintenance costs also have a positive impact on the operating costs. The anti-condensation heating provided as standard prevents moisture condensation forming on the components when the motor cools down therefore extending its lifetime.

## Highest vibration quality

An innovative production process in conjunction with high-precision balancing guarantees the highest vibration quality. This is the reason that our H-compact PLUS motors not only fulfill IEC and NEMA Standards but in most cases they even exceed them. This applies both for constant-speed as well as variable-speed operation – and over the complete speed control range that in some instances extends up to 5000 rpm.

## Continuous monitoring

Even the most sophisticated motor can be subject to stresses in operation for which it was originally not designed. Sensors and monitoring devices can continually sense and signal electrical, thermal and mechanical operating data. As monitoring equipment the motors have as standard six slot resistance thermometers PT100 and shock pulse measuring nipple (SPM) for roller bearings.



**Flexible.  
But always appropriate.**

H-compact PLUS are modular motors with a wide range of degrees of protection and cooling types. These flexible concepts allow us – in conjunction with the highest level of technical competence – to optimally adapt the motors to the required application conditions.

**Air-to-water cooler: 1RN4/1RN6 motor**

Independent of the prevailing conditions the top-mounted air-to-water heat exchangers always guarantee the highest cooling power – with minimum thermal dissipation to the immediate environment.

**Air-to-air cooler: 1RQ4/1RQ6 motor**

The alternative solution if cooling water is not available and the ambient conditions are difficult: H-compact PLUS with top-mounted air-to-air heat exchanger. A shaft-mounted fan at the non-drive end ensures an optimum cooling airflow. A separately-driven fan can also be included in this concept.

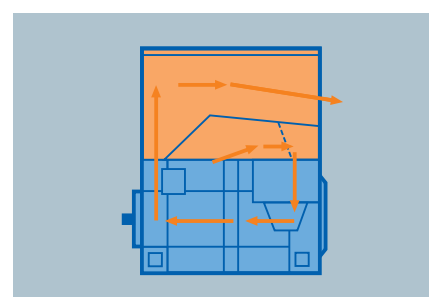
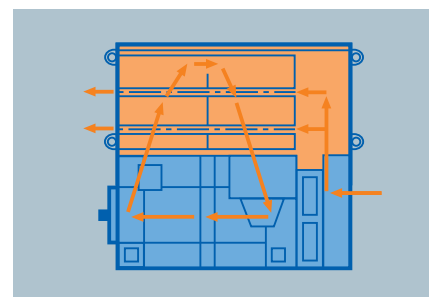
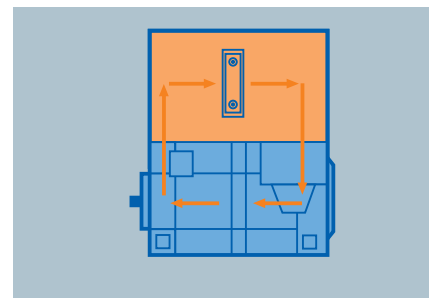
**Open-circuit, air-cooled/weather-protected: 1RA4/1RN4/1RN6/1RP6 motor**

The cooling air is drawn in from the surroundings, routed through the inside of the motor and discharged – for efficient cooling without heat exchanger.

**State-of-the-art design techniques**

Using state-of-the-art design and engineering techniques we flexibly respond to sector- and application-specific requirements and can optimally adapt H-compact PLUS to the particular application.

Finite Element Method (FEM) and vibration analysis are two examples.



# Reduce operating costs with constant and variable speed.

Operated at constant speed the good electrical operating values – efficiency and power factor – reduce energy consumption and therefore costs.

Variable-speed operation when connected to drives results in a significant additional energy-saving potential. When fed from a drive converter the motor speed – and therefore the power drawn – can always be precisely adapted to the actual plant or system requirements. The result – energy savings of up to 60%, in extreme cases even up to 70%.

Not only this, variable-speed operation allows processes to be far more precisely controlled with shorter response times than when using mechanical actuators such as throttles. Soft starting and stopping using continuous speed control reduces the level of stress on the mechanical system of the plant – and in turn also the operating costs.

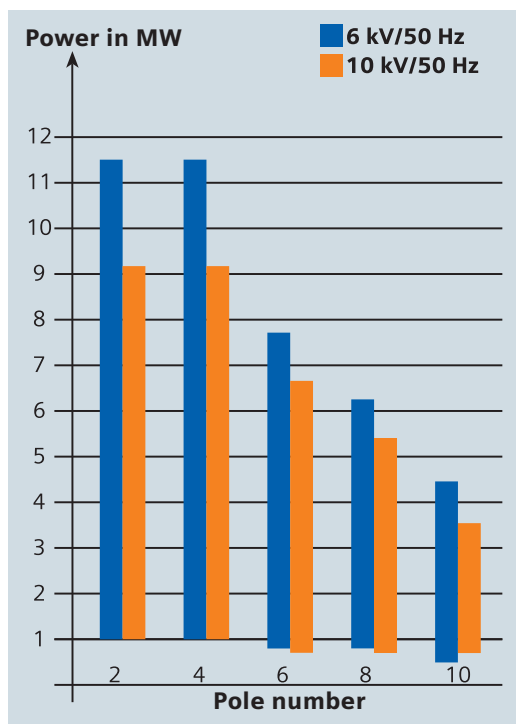
H-compact PLUS can be used to implement cost-saving variable-speed drive systems but at the same time offering a high degree of availability. Medium-voltage ROBICON Perfect Harmony and SINAMICS GM150 drives are the system partners on the drive side. For low-voltage versions – available up to 4 MW – these are the SINAMICS G150, G130, S150 and S120.



# Technical features and power ranges

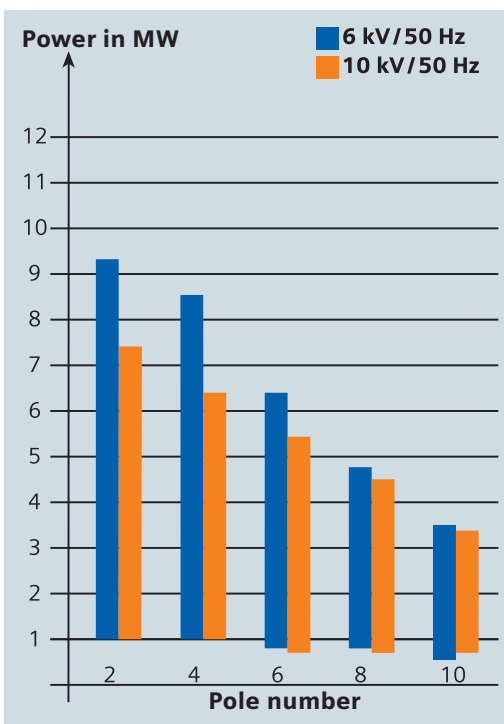


1RA4/1RN4/1RN6/1RP6 series



Cooling: Air-water, open-circuit cooling, open-circuit cooling/weather-protected

1RQ4/1RQ6 series

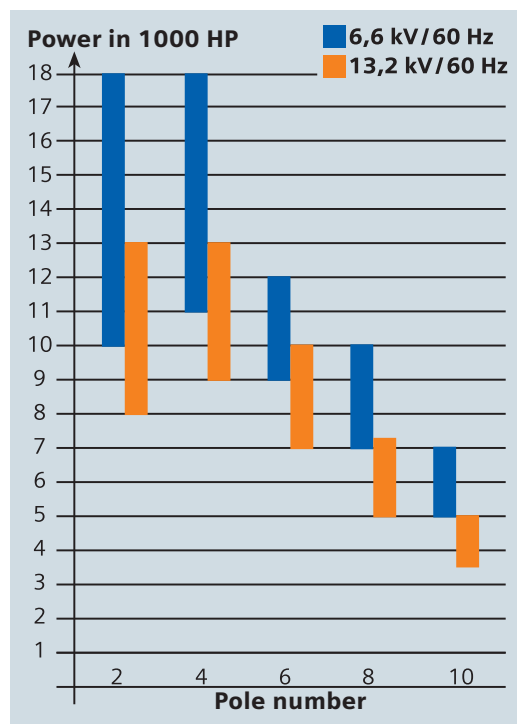


Cooling: Air-air

### Technical features for the standard versions

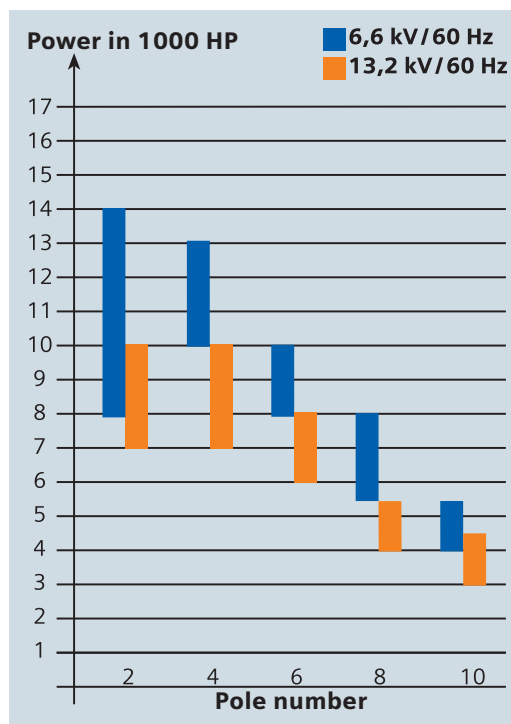
	1RA4 /1RN4/1RN6/ 1RP6 motors open-circuit cooling	1RN4/1RN6 motors air-to-water cooler	1RQ4/1RQ6 motors air-to-air cooler
Voltage	690 V – 13.2 kV		
Frequency	50 / 60 Hz		
Pole number	2 – 12		
Speed	Constant speed (when connected to the line supply)/ variable speed when fed from a drive up to max. 4800 rpm		
Shaft height	450 / 500 / 560 / 630 / 710 mm		
Type of construction	Horizontal IM B3 (IM 1001)/vertical IM V1 (IM 3011)		
Protection/cooling IEC	IP W24 / IC 01	IP55 / IC 81 W	IP55 / IC 611
Protection/cooling ANEMA	Weather-Protected II	Totally Enclosed Water-to-Air Cooled (TEWAC)	Totally Enclosed Air-to- Air Cooled (TEAAC)
Frame, SH 450/500/560	Gray cast iron	Gray cast iron	Gray cast iron
Frame, SH 630/710	Steel	Steel	Steel
Rotor cage	Copper		
Insulation	MICALASTIC VPI insulation system		
Explosion protection	Non-sparking EX n/pressurized enclosure Ex p/Class I, division 2b		
Standards	IEC / NEMA / API		

1RA4/1RN4/1RN6/1RP6 series



Cooling: Air-water,  
open-circuit cooling/weather-protected  
Drip Proof/Weather-Protected II

1RQ4/1RQ6 series



Cooling: Air-air



# Close to you – and that worldwide. With extensive service.

Just as important as the optimum motor: the optimum partner – and that from the very beginning. We are one of the world's leading electrical and electronic engineering companies and we are there to support you in over 170 countries worldwide.

Our competent personnel support you locally around the world – from initially helping you to select the optimum drive concept up to reliable technical service.

**With Siemens everything runs smoothly –**

and you always have a personal contact partner. Just ask us, we will take care of you. Our hotline:  
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**First class from A to Z**

With our sophisticated logistical and production control systems we can flexibly address your individual demands and requirements. We place topmost priority on the highest quality. This is the reason that we take extreme care in selecting our suppliers. For us, quality testing and assurance mean a qualified incoming goods check. Not only this, for production monitoring we use a sophisticated tracking system that allows us to immediately intervene if the situation demands it. And with our final test we ensure that only perfect products are shipped from our factories. When so required we can also fulfill specific customer testing criteria.



In our new system test facilities in Nuremberg (Germany) and Norwood (USA) – the most modern worldwide – the interaction between all of the drive components is intensively tested under real conditions. The result – maximum reliability and therefore the highest degree of availability.