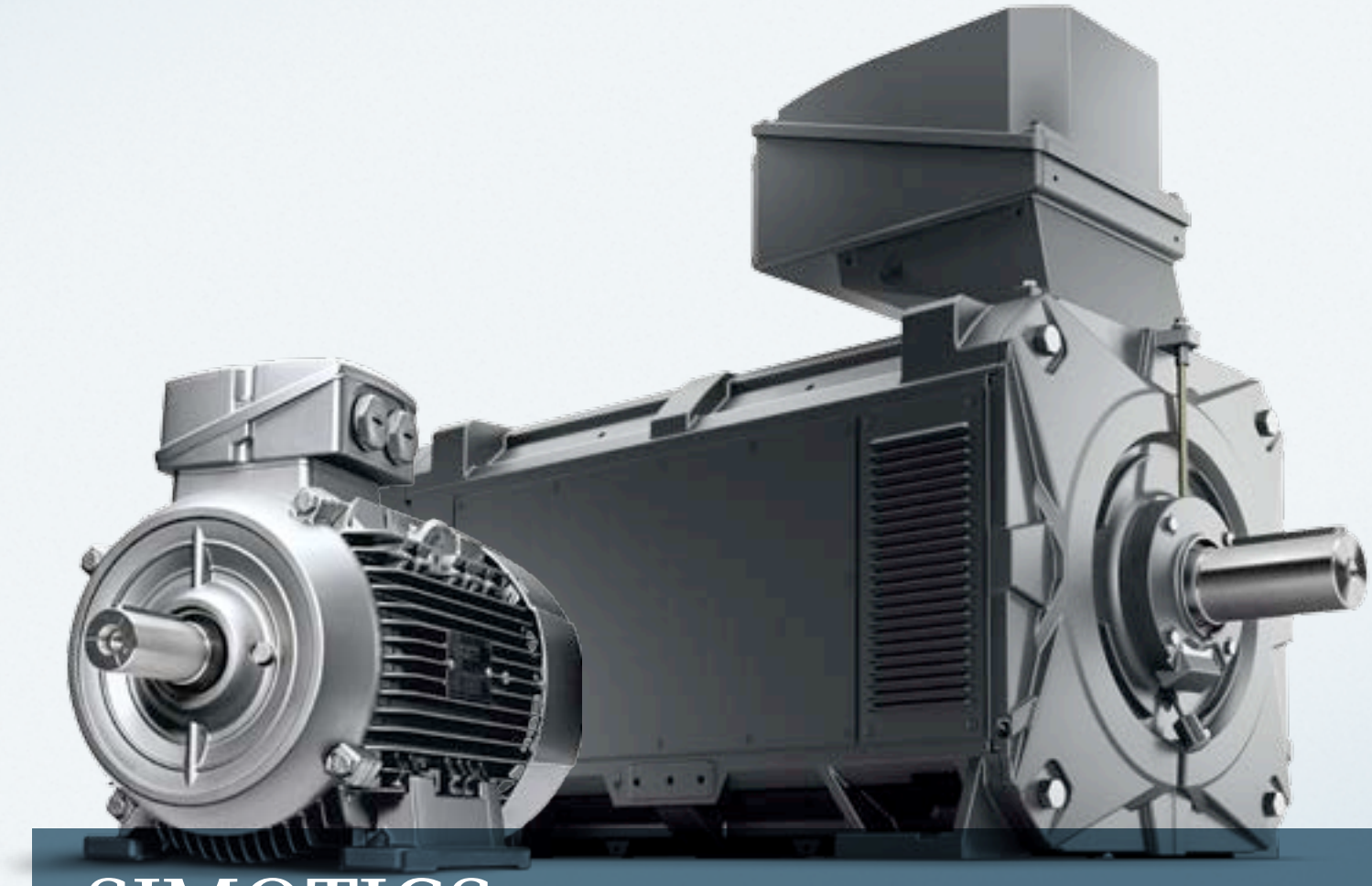
SIEMENS



SIMOTICS
Low-voltage motors

Efficient and powerful up to 3,500 kW

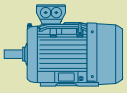
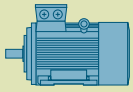
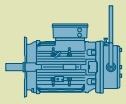
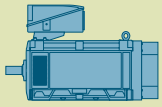
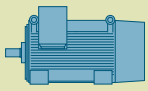
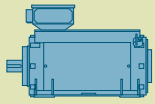
siemens.com/simotics

Answers for industry.

SIMOTICS – the most comprehensive range of motors

The history of today's most comprehensive range of motors worldwide started about 150 years ago in 1866 as Werner von Siemens developed the dynamo-electric principle. This principle allowed powerful electric motors to be designed and built, therefore creating the basis for their widespread use in industry today. Since then, motor development has been a core business of the company, and with far more than 100 years of experience, Siemens sets the pace when it comes to innovative motor technology. Today, millions of Siemens motors are efficiently powering machines and equipment in industrial facilities around the world. In all sectors, applications and power classes. Starting from energy-efficient low-voltage motors through motion control motors – with a high dynamic performance – up to powerful high-voltage motors and well-proven DC motors. Motors that have proven themselves in use, and are attractive as a result of their quality, efficiency and compactness. The only thing that was missing up until now, was a name reflecting their overall performance. We now have a name: SIMOTICS.

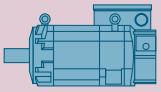
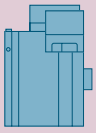
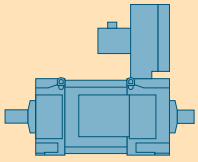
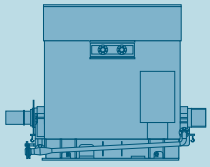
SIMO

Low-voltage motors for line and frequency converter operation						
General Purpose **SIMOTICS GP**	Severe Duty **SIMOTICS SD**	Explosion protected **SIMOTICS XP**	Definite Purpose **SIMOTICS DP**	Flexible Duty **SIMOTICS FD**	Transnorm **SIMOTICS TN**	High Torque **SIMOTICS HT**
						
IEC: 0.09 ... 45 kW NEMA: 1 ... 20 HP	IEC: 0.75 ... 315 kW NEMA: 1 ... 400 HP	IEC: 0.09 ... 1,000 kW NEMA: 1 ... 400 HP	0.37 ... 481 kW	200 ... 740 kW	200 ... 3,500 kW	150 ... 2,100 kW
Pumps, fans, compressors, conveyor technology with special requirements regarding low weight and the highest efficiency	Pumps, fans, compressors, conveyor technology, marine applications, offshore, mixers, mills/crushers, extruders, rolls with special requirements regarding the ruggedness, especially in the chemical and petrochemical industry	For general industrial applications with special requirements placed on explosion protection, for example in the process industry	Special motors for e.g. working and transport roller tables, ventilating tunnels, parking houses, shopping malls, harbor cranes, container railway terminals	Pumps, fans, compressors and conveyor systems with a high power rating as well as cranes, extruders, bow thrusters in sectors such as chemical, paper, oil & gas, marine, metals, cement and mining	Pumps, fans, compressors, mixers, extruders in the chemical and petrochemical industry, paper machines, mining, cement, steel industry, marine applications including propulsion	Gearless motors with high torques for paper machines, slow running pumps, mills/crushers, shears for cutting steel, bow thrusters, winches and main propulsion drives in ships

SIMOTICS stands for

- 125 years of experience
- The most comprehensive range of motors worldwide
- Optimum solutions in all sectors, regions and power classes
- Innovative motor technology with the highest quality and reliability
- Highest dynamic performance, precision and efficiency, with an optimum degree of compactness
- Motors are integrated in the drive train to create an overall system
- The global network of skill sets and worldwide service around-the-clock

TICS

Motion control motors				DC motors	High-voltage motors
Servomotors **SIMOTICS S**	Main motors **SIMOTICS M**	Linear motors **SIMOTICS L**	Torque motors **SIMOTICS T**	**SIMOTICS DC**	**SIMOTICS HV**
					
0.05 ... 34.2 kW	2.8 ... 1,340 kW	1.29 ... 119.3 kW	1.7 ... 380 kW	30 ... 1,610 kW	200 kW ... 100 MW
Applications demanding a high dynamic performance and precision, e.g. handling systems, wood, glass, ceramic and stone processing, packaging, plastics and textile machines, machine tools	Rotary axes with a high dynamic performance and precision, e.g. main drives in presses, printing machines, roller drives and winders in foil machines and other converting applications, main spindle drives in machine tools	Linear motion applications with the highest demands placed on high dynamic performance and precision, e.g. machining centers, turning, grinding, laser machining, handling and in the machine tool domain	Rotary axis applications with the highest demands placed on precision and force, e.g. extruders, winders, roller drives, rotary axes in machine tools, rotary indexing tables, tool magazines	Motors for standard drive applications in all industrial areas and in infrastructure	Medium and high voltage drive applications, including compressors, blast furnaceblowers, refiners, pumps, extruders, rolling mills, mine hoists, conveyor systems, mills/crushers, ship's propulsion systems

SIMOTICS
Low-voltage motors: from large to small and from standard to customized

New drive tasks are always fascinating. This is because every one of them is different. However, some things always remain the same: the call for a profitable, safe and especially an integrated and seamless solution. We can offer you this solution with our Integrated Drive Systems: from gearboxes through couplings up to frequency converter and control systems. Our seamless range of low-voltage motors is a central component here: three-phase motors, which already fit most requirements as standard, as well as customized versions. Motors for every sector and application – for use worldwide. Moreover, motors that are unrivaled in terms of innovation.

Always the optimum power and performance

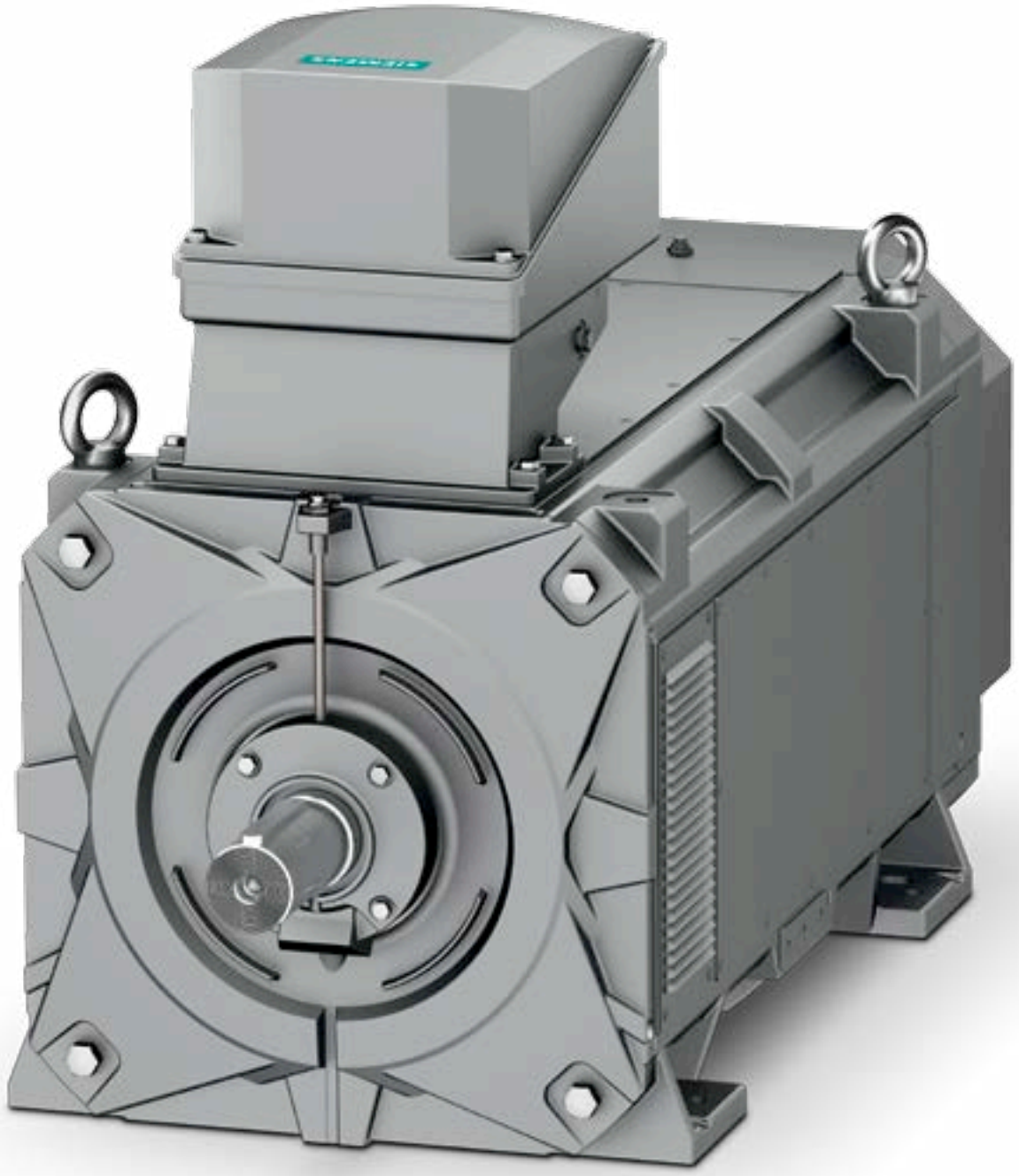
With a power range that extends from 0.09 to 3500 kW, our low-voltage motors drive simply everything. Depending on the requirement, we can offer you efficient motors in different efficiency classes for a positive energy balance and according to different local standards, explosion-protected motors complying with the highest safety standards, motors with high power and power density – and sector-specific and customized motors. All of these motors have a wide range of features as standard to achieve the highest degree of cost effectiveness. And all of this with an attractive price-performance ratio. And we are there for you locally around the world – with production, sales and service.

Environmentally-compatible production

Our motors are manufactured employing the latest, environmentally-friendly technologies. Here, we place a lot of emphasis on an environmentally-compatible production environment that carefully uses valuable resources with solvent-free impregnation and paint for the motors. High-quality materials are combined to achieve maximum efficiency. Put briefly: You obtain a compact, reliable motor.

Efficiency for a high degree of cost-effectiveness

Whether low or high power ratings, all of our motors have one thing in common: high efficiency with a high power density. The compactness of the motors simplifies machine design, the efficiency reduces operating costs and lowers CO_2 emission.



Lightweight design for general purpose applications:

Motors with aluminum frame are suitable for a wide range of standard drive tasks in the industrial environment. As a result of their low weight, they are predestined for pump, fan and compressor applications. However, they are also admirably suited for conveyor technology and cranes.

Little space, lots of power

The motors are available in IE1 up to IE3 efficiencies. The motors have the same shaft heights, in some instances even with the same frame. This represents a huge advantage for retrofit projects. If the motor must be extremely compact as there is not sufficient space available for a conventional standard motor, then motors with increased power can be the solution. With these motors, in efficiency class IE2, power ratings of a standard motor can be realized in the next smaller shaft height.

One motor, many options

Motors drive machines around the world. We offer export lines that address regional efficiency regulations and are certified according to ABNT, China Energy Label, Kemco, UL/SCA and NEMA.

Maximum flexibility, minimum costs

The design and construction of our motors ensure maximum flexibility and minimum associated costs when mounting and installing: Integrated lifting lugs, bolted on mounting feet, reinforced bearing shields and easily accessible terminal boxes, these are just some of the features that ensure easy handling of our motors.

General Purpose features:

- Light motors place low requirements on the statics of the foundation
- The motors are available for efficiency classes IE1, IE2, IE3, and as export lines in NEMA Energy Efficient and NEMA Premium Efficiency
- Compact motors where the shaft height does not change between the efficiency classes, facilitate a faster changeover or simple retrofit to optimize the energy efficiency and the CO_2 footprint
- Noticeable reduction of the operating costs through high-efficiency motors with optimized efficiency
- Positive eco-balance of the high-efficiency and premium efficiency motors – environmentally friendly as a result of the CO_2 reduction
- Easy to modify using modular retrofits kits
- Suitable for frequency converter operation

Data, facts, details – General Purpose motors

Frame size	63 to 225	
Power range	0.09 kW to 45 kW	
No. of poles	2/4/6/8	
Motor/material	Frame: Aluminum, Terminal boxe: Aluminum Fan cover: Plastic	
Efficiency classes	IE1 = Standard Efficiency IE2 = High Efficiency IE3 = Premium Efficiency	NEE = NEMA Energy Efficieny NPE = NEMA Premium Efficiency
Versions	Standard motors in IE1, IE2 and IE3 Increased power line in IE2 US export line (Eagle Line) in NEE and NPE	Separately ventilated without an outer fan and fan cover Naturally cooled without external fan
Marking	Classification according to DIN IEC 60034-30: IE1; IE2; IE3; 2, 4, 6, 8-pole according to EISA ... NEE	
Degree of protection	IP55	
Voltages	All of the usual voltages from 230 V up to 690 V	
Frequency	50 Hz and 60 Hz	
Type of construction	All of the usual types of construction	
Cooling method	Surface cooled (TEFC)	
Temperature class	155(F) utilized to 130(B)	
Insulation system	DURIGNIT® IR 2000, frequency converter-proof up to a rated voltage of 460 V, solvent-free and resistant to humidity	
Modular mounting concept	Rotary pulse encoder, brake, external fan or prepared for components to be mounted	
Standard series concept	Cast mounting feet on the frame, can be optionally bolted and changed over, diagonally split terminal box that can be rotated in 90° steps Bearings are identical at the DE and NDE, optional bearing size 63	

The “heavyweights” for Severe Duty applications

Motors with cast iron frames are especially rugged. This makes them the first choice for applications in tough and harsh ambient conditions. They master dust and vibration in crushers and mixers – just the same as aggressive atmospheres in the petrochemical industry. Their design supports optimum motor cooling and offers the same handling as for our General Purpose versions.

Compact design

The size of a motor frequently plays a significant role in machines. This is the reason that the new cast iron motors have been optimized to achieve a compact design. They have the same shaft heights for IE2 and IE3. This means the following: The mechanical interface to the driven machine always remains constant. In turn, this facilitates a straightforward efficiency upgrade – without having to adapt the mechanical design of a machine. In addition to IE2 and IE3, export versions that are certified according to ABNT, China Energy Label, Kemco, UL/CSA and NEMA are available.

Power efficiency

The increased power Severe Duty motors can be the solution if there is not enough space for a standard motor. The reason for this is that these motors have the same power rating, but in the next smaller shaft height. They are the solution where space is especially restricted and in the retrofit business.

Severe Duty features:

- Especially rugged motors for use in aggressive ambient conditions:
  - Basic Line 1LE15 with cast iron frame, bearing size 62 and plastic fan cover
  - Performance Line 1LE16 with an especially rugged design, with cast iron frame, bearing size 63, steel fan cover, high service factor and 36 months warranty
- Compact series facilitates a fast changeover or a simple retrofit to optimize the energy efficiency and the CO_2 footprint
- Positive eco-balance of the high-efficiency and premium efficiency motors – environmentally friendly as a result of the CO_2 reduction
- Easy to modify using modular retrofit kits
- Up to 460 V frequency converter-proof as standard, up to 690 V dedicated versions available
- Suitable for frequency converter operation

Data, facts, details – Severe Duty motors

Frame sizes	100 to 315	
Power range	0.75 kW to 315 kW	
No. of poles	2/4/6/8	
Motor/material	Frame: Cast iron, Terminal box: Cast iron Fan cover: Plastic or sheet steel (depending on the version)	
Efficiency classes	IE1 = Standard Efficiency IE2 = High Efficiency IE3 = Premium Efficiency	NEE = NEMA Energy Efficiency NPE = NEMA Premium Efficiency
Versions	Basic Line in IE2 and IE3 Performance Line in IE2 and IE3 US export line (Eagle Line) in NEE and NPE	Increased Power Line in IE2 Separately ventilated without an outer fan and fan cover Naturally cooled without external fan
Marking	Classified according to DIN IEC 60034-30: IE2; IE3; 2, 4, 6, 8-pole according to EISA ... NEE	
Degree of protection	IP55	
Voltages	All of the usual voltages from 230 V up to 690 V	
Frequency	50 Hz and 60 Hz	
Type of construction	All of the usual types of construction	
Cooling method	Surface cooled (TEFC)	
Temperature class	155(F) utilized to 130(B)	
Insulation system	DURIGNIT® IR 2000, frequency converter-proof up to a rated voltage of 460 V, solvent-free and resistant to humidity	
Modular mounting concept	Rotary pulse encoder, brake, external fan or prepared for components to be mounted	
Standard series concept	Cast mounting feet on the frame, can be optionally bolted and changed over, diagonally split terminal box that can be rotated through 4x 90°, Bearings are identical at the DE and NDE, optional reinforced bearings	

SIMOTICS XP

Explosion-protected motors: maximum safety – extremely rugged

In hazardous areas such as in the chemical and petrochemical industry or in gas works, motors have to meet maximum safety standards for the protection of man, machine and the environment. With our explosion-protected motors you can depend on maximum safety.

Quality-tested

Our explosion-protected motors for the IEC market are developed, produced and certified in accordance with explosion protection directive 94/9/EC (ATEX). Further, they are tested and certified from a nominated European testing body (PTB, DEKRA EXAM, FTZU). As a consequence they offer certified reliability and efficiency for each and every drive application.

Extremely long lifetime

Explosion-protected motors are extremely rugged, have a long service lifetime and operate without any disturbances, even when subject to the harshest conditions. This has been proven hundreds of thousands of times over in operation around the world. And not only that: Our range of explosion-protected motors is seamless and covers all requirements with maximum safety and efficiency in operation.

Extremely safe

Explosion-protected motors are used in environments with explosive gases or dusts. Depending on the particular requirement, motors are available with aluminum or cast iron frame, suitable for Zone 1, 2, 21 or 22. For special locations, which have potentially explosive dust as well as gas atmospheres, motors with double protection for Zones 2 and 22 or 1 and 21 are the ideal solution.
In addition to SIMOTICS, with the LOHER CHEMSTAR motors, we can provide special solutions adapted to the particular application. Special mechanical and electrical versions up to a combination of Ex d and Ex e types of protection can be implemented.
SIMOTICS XP motors are suitable for frequency converter operation, and are available in different efficiency classes – up to efficiency class IE3 – without any change in the shaft height.

IEC type spectrum

Our explosion-protected motors fulfill the explosion protection directive 94/9/EC (ATEX):

- Motors in type of protection
  - Increase safety “e” (Ex e IIC)
  - Flameproof frame “d” (Ex de IIC)
  - Non-sparking “nA” (Ex nA IIC T3)
  - Dust explosion protection “t” (Ex tb IIIC / Ex tc IIIB, Zone 21/22)
- Seamless series of explosion-protected motors
- VIK version, IECEx and NEPSI optionally possible

An overview of the technical data

Zones	Gas Zone 1		Gas Zone 2	Dust Zone 21/22
Type of protection	Ex e	Ex d	Ex nA	Ex tb, Ex tc
Power range	0,12 – 165 kW	0.25 – 500 kW	0.09 – 1,000 kW	0.09 – 1,000 kW
Voltage range	All of the usual voltages			
Frame size	63 M – 315 L*	71 M – 355*	63 M – 450*	63 M – 450*
Type of construction	All of the usual types of construction			
Rated speed	750 – 3,600 rpm			
Torques	0.6 – 8,090 Nm			
Application areas	Pumps, fans, compressors and centrifuges in the chemical and petrochemical industries, oil & gas			Woodworking, plastics, agriculture

* Higher power ratings are available in SIMOTICS TN, SIMOTICS FD and the LOHER CHEMSTAR and VARIO motors.

Customized motors for precisely fitting solutions with low lifecycle costs

Every sector has its own particular requirements when it comes to drive technology. As full liner with many years of experience, we precisely understand these requirements. Our engineers are in a position to clearly understand your individual requirements when it comes to drive technology: When all is said and done, standard drives from Siemens are at home in almost every sector around the world. And not only that: We are always on the search for innovative solutions to achieve optimum cost effectiveness. As a consequence, to complement our standard motors, we also offer our Definite Purpose motors. These completely comply with special sector requirements – therefore guaranteeing the highest efficiency.

Customized motors for precisely fitting solutions with low lifecycle costs

We also have our 1PC3 motors. The special name signifies that they are tailored to address special requirements. Examples include mechanically adapted mounting flange, special types of construction up to motors that are completely integrated into the driven machine. The electrical operating values can also be adapted. For example, peak power levels or efficiencies, such as Super Premium. Together with you, we can develop a series of motors that precisely addresses your requirements.

Optimized lifecycle costs

Take full advantage of the optimized lifecycle costs to address your special application conditions. Options range from the usual IE2 and IE3 efficiencies up to IE4 – or even special efficiencies. For example, the advantages of a motor with IE4 efficiency are best utilized when it runs for more than 4000 hours per annum. Assuming 10 ct / kWh and 100 % load, the return on investment for the additional cost for IE4 efficiency is already less than 18 months.

Examples for customer-specific adaptations:

- Electrical adaptations
  - Special service factors
  - Special power densities
  - Adaptations regarding frequency converter operation
  - Especially high efficiencies, e.g. IE4
- Mechanical adaptations
  - Special mounting flanges
  - Special types of construction and mounting options
  - Special mounting interfaces up to motors completely integrated in a machine
  - Special shafts and high ball bearing loads

Platform-based compact motors

We can develop motors to address your specific requirements for a wide range of power ratings. This is because they are based on the well proven and known platform for our standard 1LE1 motors. They can have either aluminum or cast iron frames, and can be perfectly adapted to address your particular application. As a result of the high-power density, compact as well as special high-efficiency versions can be specified in IEC standard frame sizes.

Classified according to DIN IEC 60034

	IE1*/IE2/IE3	IE4
Frame sizes	80 – 315	132 – 315
Power range	0.75 – 315 kW	5.5 – 315 kW
No. of poles	2/4/6/8	2/4/6
Efficiency class	IE1*/IE2/IE3	IE4 = Super Premium Efficiency
Versions	Customized design	
Marking	Classified according to DIN IEC 60034	
Degree of protection	IP55, IP56, IP65	
Voltages	Customizer-specific	
Frequency	50 Hz and 60 Hz	
Type of construction	Customizer-specific	
Cooling method	Customizer-specific	
Temperature class	Customizer-specific	
Connection concept	Customizer-specific	
Bearing concept	Customizer-specific, based on the 1LE1 platform	
Series concept	AH 80 – 160 in aluminum, AH 100 – 315 in cast iron	

* only for export outside the European Economic Area, corresponding to EC regulation 640/2009

Sector-specific motors: to address individual requirements, precisely fitting solution

Smoke extraction motors:
Reliable ventilation even at high temperatures

When accidents occur in buildings with smoke detection systems, the ventilation and cooling systems have their work cut out for them. Because then, upmost priority must be given to ensure that ventilation is maintained as long as possible to keep escape routes free of smoke and improve the chances of survival. Our certified low-voltage motors for smoke extraction fans reliably master even high ambient temperatures. They reduce the thermal stress placed on buildings and reliably ensure smoke-free escape and access routes.

Application areas

They are used in highly frequented public buildings such as night clubs, shopping malls, movie theaters, airports, enclosed car parks as well as industrial buildings, staircases, tunnels, etc.

Crane motors:
Maximum power even when things get stormy

Just the same as ship motors, crane motors are often exposed to extreme weather conditions – and at the same time, high operational requirements. They have to withstand high humidity, salty air and high wind speeds while ensuring a high overload capability and a wide speed control range. Our crane motors are protected by special paint finishes as well as seals to reliably protect them against corrosion.

Application areas

Our rugged cast iron motors are particularly suitable for harsh crane operation under adverse operating conditions – for indoor and outdoor applications, e.g. in harbor facilities for rubber-tired gantry cranes, rail-mounted gantry cranes and automatic stacking cranes.

Features of smoke extraction motors

- Motor series in accordance with EN 12101-3/2002 certified for operation under emergency conditions
- Power ratings 15 kW up to 200 kW
- Efficiency class IE2
- F200/300, 200/300 °C for 120 minutes
- Safe and reliable ventilation in case of accidents
- Motors operate longer than specified in the relevant standards
- Axial or radial fan drive possible
- Smoke-free access routes for appropriate fire-fighting measures and rescue operations
- Reduced consequential fire damage
- Can be used in already certified systems without testing
- Frequency converter operation is possible (normal operation, however, not in the case of a fire)

Smoke extraction motor

Crane motor

Features of crane motors:

- Torque reserves permit high surge loads
- For ambient temperatures up to 50 °C, optionally also higher
- Protected against 100 % humidity and salty atmospheres
- As accelerating drives they have an overload capability of up to 230 %
- One motor version covers all of the usual duty types (e.g. S2, S3)
- Generously-dimensioned terminal box
- Corrosion protection inside the motor (winding, frame, bearing shields)
- As option, especially rugged mounting feet and flanges made of torsionally-stiff spheroidal iron
- Optionally available – with mounted rugged rotary pulse encoder
- Travel gear motors in rugged, non-ventilated design
- Together with the installed encapsulated and seawater-proof disk brakes, the brake motors form a compact unit and serve as ideal travel gear motor for modern frequency converter-fed crane systems
- Special versions on request

Extremely rugged and tested for the harshest conditions

Ship motors: Full speed ahead

Salty air and high humidity expose electrical equipment installed on ships and in coastal regions to extreme conditions. This is why renowned ship classification societies have strict requirements regarding the additional qualification of motors.
Our ship motors comply with the specifications of leading classification societies (BV, DNV, GL, LR, RS) and have EC-type examination certificates up to a power rating of 200 kW. They are always adapted to the higher ambient temperatures on board ships. Upon request, they can also be individually accepted by representatives of the ship classification societies.

Below-deck motors

Our EC type-tested ship motors are especially designed for below-deck applications on ships and for the offshore industry, e.g. on oil platforms. Drives for ships:

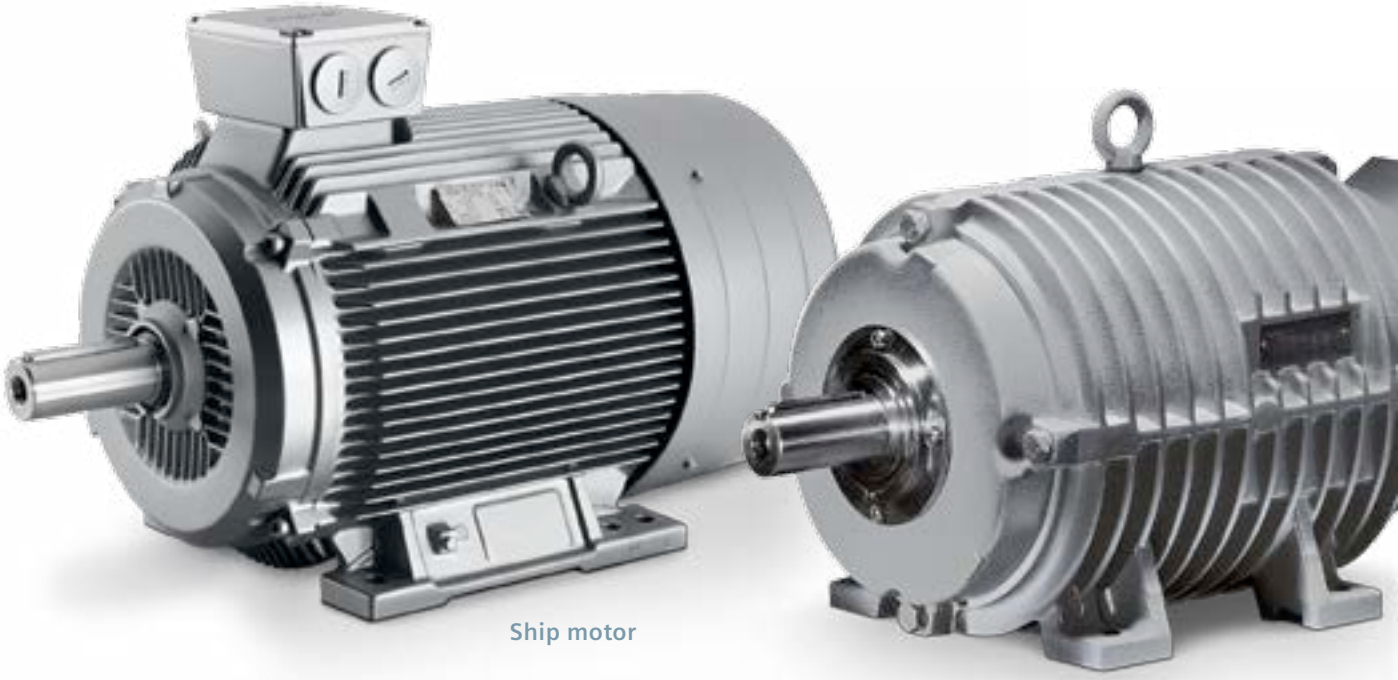
- Fans (e.g. for air conditioning and cooling systems)
- Feed pumps (for fire-fighting and cooling water, fuels, oils)
- Winches (anchor and mooring winches, lifting gear)
- Compressors
- Bow thruster drives

Ondeck motors

Drive systems on ship decks have to withstand wind and weather. They must not be affected by spray, flooding and icing. LOHER special ondeck motors are precisely designed for these application conditions and continue to run undisturbed even when completely submersed. A special offshore paint finish ensures additional corrosion protection. Further, specifically designed fan covers and an ice-proof design are available.

Features of ship motors

- Produced according to the regulations of the leading international marine classification societies BV (Bureau Veritas, France), DNV (Det Norske Veritas, Norway), GL (Germanischer Lloyd, Germany), LR (Lloyds Register, Great Britain) as well as RS (Russian Maritime Register of Shipping) and EC type tested (type approved)
- No individual acceptance required up to max. power ratings of BV < 100 kW; DNV < 300 kW; GL < 50 kW; LR < 100 kW; RS < 75 kW
- Motors are available according to the specifications of the marine classification societies ABS (American Bureau of Shipping, USA), RINA (Registro Italiano Navale, Italy), CCS (Chinese Classification Society, China); EC type test certificate only for individual acceptance tests
- Special versions are available on request



Ship motor

Roller table motor

Roller table motors: Powerful and extra rugged

Today, operational roller tables in reversing rolling mills are almost exclusively equipped with directly driven rollers. Extremely high requirements are placed on the drive's mechanical design. To meet these requirements, we developed our three-phase roller table motors for frequency converter operation. They are totally enclosed three-phase induction motors – with a housing made of spheroidal graphite iron, ring ribs and reinforced bearing shields.

Application areas

The rugged, non-ventilated roller-table motors are especially suitable for operation in tough environments – such as rolling mills with extreme application conditions, in working and transport roller tables, at high ambient temperatures, high air humidities and in the presence of scale dust.

Features of roller table motors

- The torsionally stiff frame manufactured out of spheroidal iron is especially rugged to withstand mechanical stress
- In addition, the ring-structured rib housing prevents the accumulation of scale dust
- Torque reserves allow for high surge torques of up to 400 %
- One motor version covers all of the usual duty types (e.g. S2, S3)
- Frequency converter-proof up to a line-supply voltage of 460 V, optionally available with special insulation up to 690 V
- Optimum utilization when fed from an frequency converter by adapting the winding to the particular voltage/frequency
- Optionally available with mounted rugged rotary pulse encoder
- Versions as foot or flange-mounted motor
- Special versions on request

Flexible Duty motors – increased flexibility for powerful motors

In the power range from 200 kW up to over 1,600 kW when finally expanded, SIMOTICS FD is the basis for a cost-effective complete drive system comprising a motor and frequency converter with high power density. The cast iron frame means that the motor is rugged and durable. The water-cooled motor versions signify that a wide range of applications can be addressed. Being flexible, the motor can be used in the widest range of applications. These include pumps, fans, compressors, conveyor belts and in sectors such as water & wastewater, marine, plastics industry and oil & gas.

Modular system for a high degree of flexibility

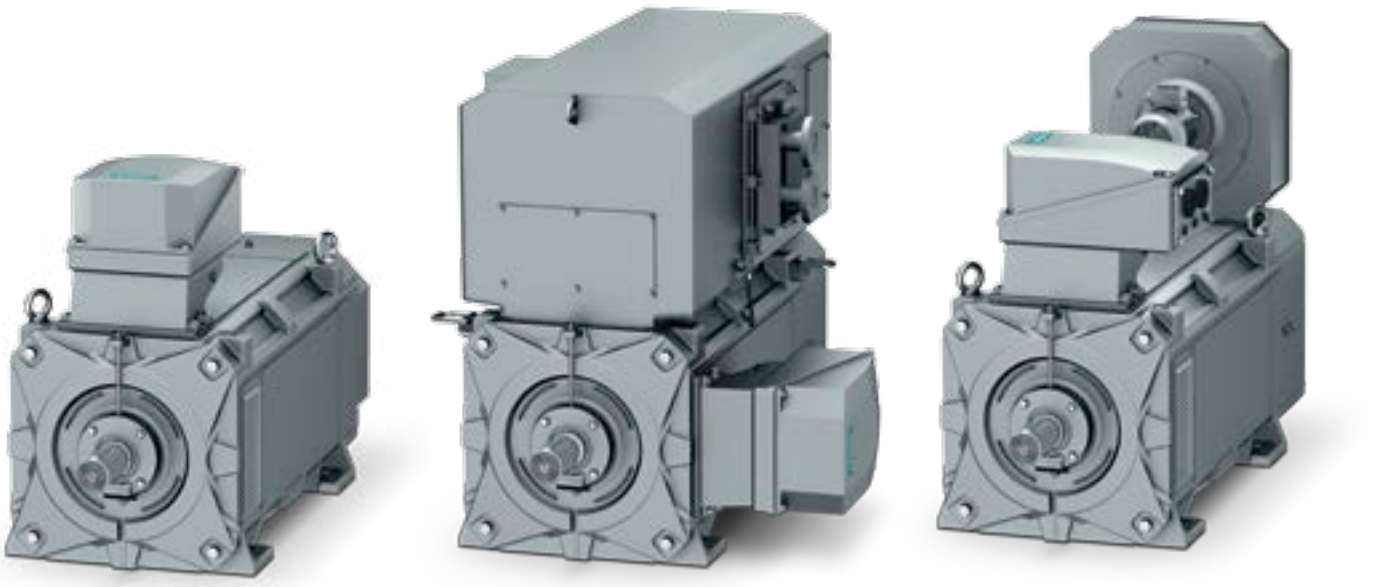
The intelligent, modular system is what makes SIMOTICS FD motors so flexible. Motors are available with air or water cooling in a total of six different versions. Based on these various different cooling methods and types of construction, the motor can be optimally adapted to the particular application. This is also true as external fan units, terminal boxes and monitoring systems can be simply connected and mounted, for instance.

New design – new possibilities

SIMOTICS FD sports a compact motor design without any outer ribs. The laminated core surface allows efficient cooling directly in the frame close to the source of heat. The motors have low envelope dimensions – and are attractive as a result of their powerful performance. Further, they can be individually adapted to specific sectors and customer applications as a result of the wide range of options.

Features of Flexible Duty motors

- Six cooling methods
- Three solutions for water-cooled motors
- Three mounting positions for radial fans, and axial fan versions are also available
- Two versions of air-cooled, force-ventilated motors
- Diagonally split terminal box with flexible terminal box position
- High power density but with low envelope dimensions
- High overload capability
- Low noise operation
- Various encoder systems
- Wide range of options with various packages to address specific sectors
- National sector-specific certifications and approvals



An unbeatable team

The combination of SIMOTICS FD and SINAMICS low-voltage G130, G150, S120 and S150 frequency converters is especially cost-effective as the motor and frequency converter are precisely coordinated with one another. The rated motor currents are adapted to the frequency converter output currents, and the motor is designed for the rated frequency converter pulse frequency. This avoids overdimensioning the frequency converter, and the voltage is optimally utilized with low associated noise emission when operated with SINAMICS G and SINAMICS S frequency converters.

An overview of the technical data – Flexible Duty motors

	Air-cooled, enclosed version		Water-cooled version		Air-cooled, open version	
Cooling method	Self ventilated IC 411	Force ventilated IC 416	Water cooling IC 71W	Air-water jacket heat exchanger IC 86W	Self ventilatd IC 01	Force ventilated IC 06
Power range	200 – 530 kW (up to 1,150 kW available later)		200 – 670 kW (up to 1,500 kW available later)		200 – 740 kW (up to 1,690 kW available later)	
Shaft heights	315, 355 (up to 450 available later)					
Versions	Motor optimized for operation with SINAMICS frequency converters – or motor for line operation (only IC 71W)					
Efficiency classes	Line motors: IE2 and IE3 to 375 kW					
Line voltages	0 Hz line supplies: 400 / 500 / 690 V 60 Hz line supplies: 460 / 575 V (other voltages on request)					
Rated speeds	750 – 3,600 rpm					
Motor / material	Frame: cast iron; terminal box: cast iron					
Degrees of protection	IP23, IP55, IP56 non-heavy sea, IP65					
Types of construction	IM B3, IM B 35, IM B5 with supporting foot, IM V1, IMV15, IM V5, IM V6 acc. to DIN EN 60034-7					
Temperature class	Converter motors: 180(H) utilized to 155(F); line motors: 180(H) utilized to 130(B)					
Insulation system	DURIGNIT® IR 2000					
Modular mounting concept	Prepared for rotary pulse encoder, brake, condition monitoring system or other mounted components					

The versatile range of trans-standard motors

Especially rugged motors are demanded for applications where power ratings above 200 kW are required, and where ambient conditions are predominantly harsh. This is where our trans-standard motors come into play. A comprehensive range of motors with a wide range of options addresses applications in the widest variety of sectors: Chemical, oil & gas, cement, mining, paper, water/wastewater, steel and marine engineering are just a few examples.

Designed and built for a long lifetime

Our trans-standard motors are designed and built so that they fulfill the highest technical demands. Further, they are attractive as a result of their reliability and long service life. This comes from our many decades of experience in building motors, and as a result of a very rugged design with cast iron bearing end shields and frames, high corrosion resistance, the winding insulation system and the squirrel-cage rotor manufactured out of die cast aluminum.

Cost effective in operation

The uniform cooling ensures a long motor service life, high power density and longer maintenance intervals for economic operation.

Trans-standard motor features:

- Especially rugged motors with inner and outer ribbing for high strength
- Two-circuit cooling system: An additional inner cooling circuit ensures even temperature distribution in the active motor area – and reduces the thermal load
- High power in a small space permits compact, space-saving equipment
- Long lifetime with corrosion protection for resistance against aggressive environments, e.g. high air humidity, high temperatures or dust and salt-laden air
- The terminal box that can be rotated is generously dimensioned, therefore simplifying commissioning
- Quiet operation as a result of the aerodynamically optimized air guidance paths
- High voltage strength of the insulation system for line and frequency converter operation

Data, facts, details – trans-standard motors

Frame sizes	315 – 560
Power range	200 – 3,500 kW
No. of poles	2 / 4 / 6 / 8
Motor/material	Frame: cast iron, terminal box: cast iron
Efficiency class	IE2, IE3 to 375 kW
Versions	Line motors specifically optimized for line operation – converter motors specifically optimized for converter operation
Marking	Classified according to IEC 60034-30 up to 375 kW: IE2, IE3, 2, 4, 6-pole (line motors), classified according to IEC 60034-25: 2 to 8-pole (converter motors)
Degree of protection	Standard: IP23, IP55, optional: IP56 non-heavy sea, IP65
Voltages	400 V to 690 V
Frequency	50 Hz and 60 Hz
Type of construction	IM B3, IM B 35, IM V1, IM V5, IM V6 acc. to DIN EN 60034-7
Cooling method	Surface cooled (IC411) Force ventilated (IC416) Open-circuit cooled (IC01) Water-jacket cooled (IC71W)
Temperature class	Line motors: 155(F) utilized to 130(B), converter motors: 155(F) utilized acc. to 155(F); a class 180(H) system is optionally available
Isolation system	DURIGNIT® IR 2000, standard insulation: Rated voltage ≤ 500 V special insulation: Rated voltage > 500 V up to 690 V
Modular mounting concept	Prepared for optional rotary pulse encoder, brake, external fan or other mounted components
Standard series concept	Terminal box, rotatable through 4 x 90°, converter motors: NDE bearings are insulated as standard

Low operating costs and highest availability with high-torque motors

With gearless high power torque motors, you can depend on a high degree of cost-effectiveness and low costs over the complete product lifecycle. SIMOTICS HT series HT-direct is being used in many applications, which require a very powerful drive without gearbox even at low speeds. Paper machines, presses and roller drives as well as applications in the steel industry are just some examples. It is precisely here that you can fully leverage the advantages of permanent-magnet synchronous motors.

High torques without gearbox

In many cases, permanent-magnet synchronous motors make gearboxes superfluous; as a consequence they reduce the costs over the complete lifecycle of the plant or system when compared to conventional drive concepts: from planning through installation, commissioning and operation up to maintenance. SINAMICS frequency converters and HT-direct motors – as coordinated low-voltage system – can fully utilize their advantages in all phases of the plant lifecycle.

Save energy using direct drives

Depending on the particular plant or system configuration, a drive train utilizing direct drives from the HT-direct series has on the average a 3 % higher overall efficiency than conventional systems. As a consequence, a significant amount of energy can be saved. The overall efficiency is increased as gearbox losses are eliminated and the higher motor efficiencies, especially in the partial load area.

Features of high torque motors:

- Gearless, therefore:
  - Higher overall efficiency when compared to drive systems with gearbox
  - Lower maintenance costs
  - No failures as a result of gearbox damage
  - Space-saving arrangement as a result of the direct drive
  - Lower installation and commissioning costs
  - Quiet
- Long service intervals as a result of the long bearing service life
- Many years experience with permanent magnet motor technology
- Standard and seamless product series up into the high power ranges
- Coordinated system comprising HT-direct motor and SINAMICS frequency converter

Low maintenance and environmentally friendly with a high degree of availability

Expensive maintenance and the use of oil is eliminated as there are no gearboxes. This not only means lower maintenance costs, but also significantly longer maintenance intervals. Further, direct drives not only reduce the costs, but they also reduce the stress on the environment as there is no old oil to be disposed of and low energy usage. Gearbox damage can result in non-scheduled plant/system downtimes. With HT-direct motors, production failures and the resulting costs associated with gearbox damage are a thing of the past. As a consequence, the high availability increases the productivity and cost effectiveness of the plant or system.

Powerful in many applications

The motors have proven themselves in many applications as they are quiet, powerful and require little maintenance. Application examples include presses in paper machines, roller drives, shears and edgers in the steel industry, bow thrusters, winches and main drives in ships and mills/crushers in the mining and cement industry.

Data, facts, details – High Torque motors

Frame sizes	400, 450, 500 mm iin a solid shaft version
Power	150 – 2,100 kW
Torque	6,000 – 42,000 Nm
Speed	0 – 800 rpm
Voltages	400 V to 690 V
Protection	IP55
Cooling	Rib cooled, water jacket cooled with forced ventilation
Frame	Steel or cast iron

Motoren according to NEMA standard

In addition to IEC motors, this comprehensive range of motors also includes motors produced according to NEMA for the North American marketplace. They comply both electrically as well as mechanically to NEMA MG1. A complete range of GP, SD and XP motors are available.

Especially efficient

Energy saving motors with the NEMA Premium efficiency class comply with US EISA legislation (Energy Independence and Security Act) for minimum efficiencies. In some instances, Siemens NEMA motors have a higher efficiency than NEMA Premium.

In addition to the minimum efficiencies specified in the US, these motors also comply with minimum efficiency requirements in Canada (CSA) and Mexico (NOM).

A design that addresses each and every requirement

A precise fit for every application, the motors are available in a lightweight aluminum design – or a rugged cast iron frame. A precise fit for every operating period.

Can be easily modified for versatility

Mounting feet that can be relocated for aluminum frames, or 8-hole foot mounting for cast iron frames make it simple to modify the motors. This allows them to be flexibly used and reduces stocking costs for the machine manufacturer as well as for service and maintenance.

Typical application areas

NEMA motors are suitable for the whole of industry and the trades, in sectors such as automotive, textiles, printing, chemical, oil & gas – as well as in higher-level applications, for instance conveyor technology. General Purpose motors are preferably used for HVAC applications as they are very light. As a result of their ruggedness, Severe Duty motors are suitable, for instance, in the pulp and paper industry. The Severe Duty motor version SD100 IEEE 841 even surpasses the demanding IEEE 841 standards for use in the oil and chemical industry.

An overview of the technical data – NEMA motors

	GP100A / GP100	SD100 / SD100 IEEE841	XP100
Efficiency	NEMA Premium, NEMA MG1, Table 12-12		
Frame	Aluminum / cast iron	Cast iron	
Power range	Aluminum: 1 – 20 Cast iron: 1 – 200 HP	1 – 400 HP	1 – 300 HP
Voltage range	208 – 230 / 460 V, 460 V, 575 V at 60 Hz		230, 460, 575 V at 60 Hz
NEMA frame size	Aluminum: 140 – 250 Cast iron 140 – 440	140 – 440	
Rated speed	900 / 1,200 / 1,800 / 3,600 rpm		
Torques	2 – 883 lb-ft	1,5 – 1,776 lb-ft	1,5 – 1,772 lb-ft
Degree of protection	TEFC		
Certification	CE, CSA, RU, ee, cc		CSA, RU, ee, cc
Applications/ type of protection	Pumps, compressors, fans, conveyor technology, general industrial applications	Chemical and petrochemical industry, mining industry, paper and printing industries	Class I, Group D, Class II, Groups F&G Division 1 Hazardous Zones

Tools for selecting and engineering drives

Our tools support you in all phases of the life cycle of your drive solution, from calculating the payback time of energy-efficient motors, through selecting, dimensioning and engineering products and drive systems including comprehensive documentation all the way up to ordering.

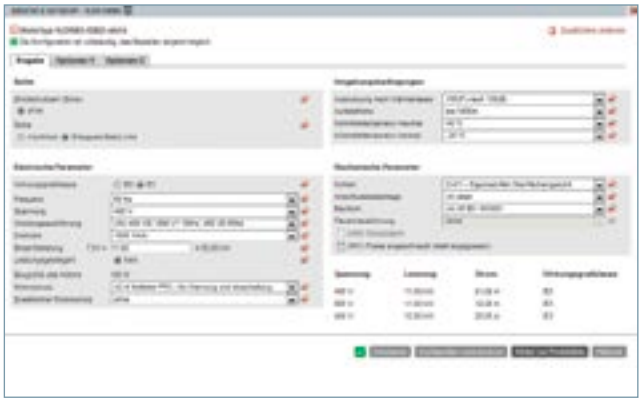
SinaSave: Simply and quickly determine the energy saving potential

Answers to questions such as "What is the payback time when investing in a more efficient motor?", "How high is the energy-saving potential when using variable-speed drives?", "Does it make sense to change over to direct drives?" – can all be found in the SinaSave web-based tool. Based on individual operating characteristics as well as system-specific parameters, SinaSave calculates the energy requirements of various drive products and systems, which are then compared with one another. Further, SinaSave tells you the payback time when investing in an energy-efficient drive solution. Based on the investment and operating costs as well as the energy-saving potential, this tool calculates the expected payback time. Not only this, it also provides fast and straightforward help for decision-making when it comes to financially assessing the investment in energy-efficient products. You can find SinaSave here: siemens.com/sinasave.

DT Configurator – selecting and configuring drive technology products

For the wide range of motors and options available, the "DT Configurator" is the tool that optimally supports you when selecting the optimum motor for your particular application. You can easily and quickly configure your particular drive by navigating through selection menus or by entering item numbers directly to select the products. Comprehensive documentation, starting with data sheets, through operating instructions up to 2D/3D dimension drawings and certificates can be called up. The products that you selected can be directly ordered by transferring a parts list into the shopping cart in the MALL. Also for retrofits, the optimum motor can be found, even if the motor previously used has an efficiency class that may no longer be supplied as a result of new efficiency legislation. More information at siemens.com/dt-configurator.

SinaSave



DT Configurator

SIZER WEB ENGINEERING – flexible, customized and user-friendly drive engineering

The solution for your drive application can be quickly found using the web-based tool: Menu-prompted workflows navigate you when selecting and dimensioning products and drive systems. Using an integrated inquiry function, SIZER WEB ENGINEERING also provides you with customized solutions for drive applications that cannot be addressed using "Standard products", i.e. where the focus is on flexibility and customized solutions. Further, in addition to low-voltage products, you can also configure high-voltage motors, medium-voltage systems and DC frequency converters for your projects. Comprehensive documentation, such as data sheets, starting calculations and dimension drawings, are fixed components of the tool. And if several different drive tasks have to be addressed in a project, then SIZER WEB ENGINEERING is the tool of choice, as the integrated project management supports your team of specialists using central document and data management and allows work to be carried out in parallel at any time. The result: customized solutions for all of your drive applications, from low voltage up to high-voltage technology. You can access the tool at **siemens.de/sizer-we**.

SIZER for Siemens Drives – fast and straightforward drive engineering

The engineering tool SIZER for Siemens Drives supports you when engineering the components required for your drive application. This tool guides you through all of the engineering steps, from the line supply through the motors up to the drive components and control systems. More information is available at **siemens.de/sizer**.

SIZER WEB ENGINEERING

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