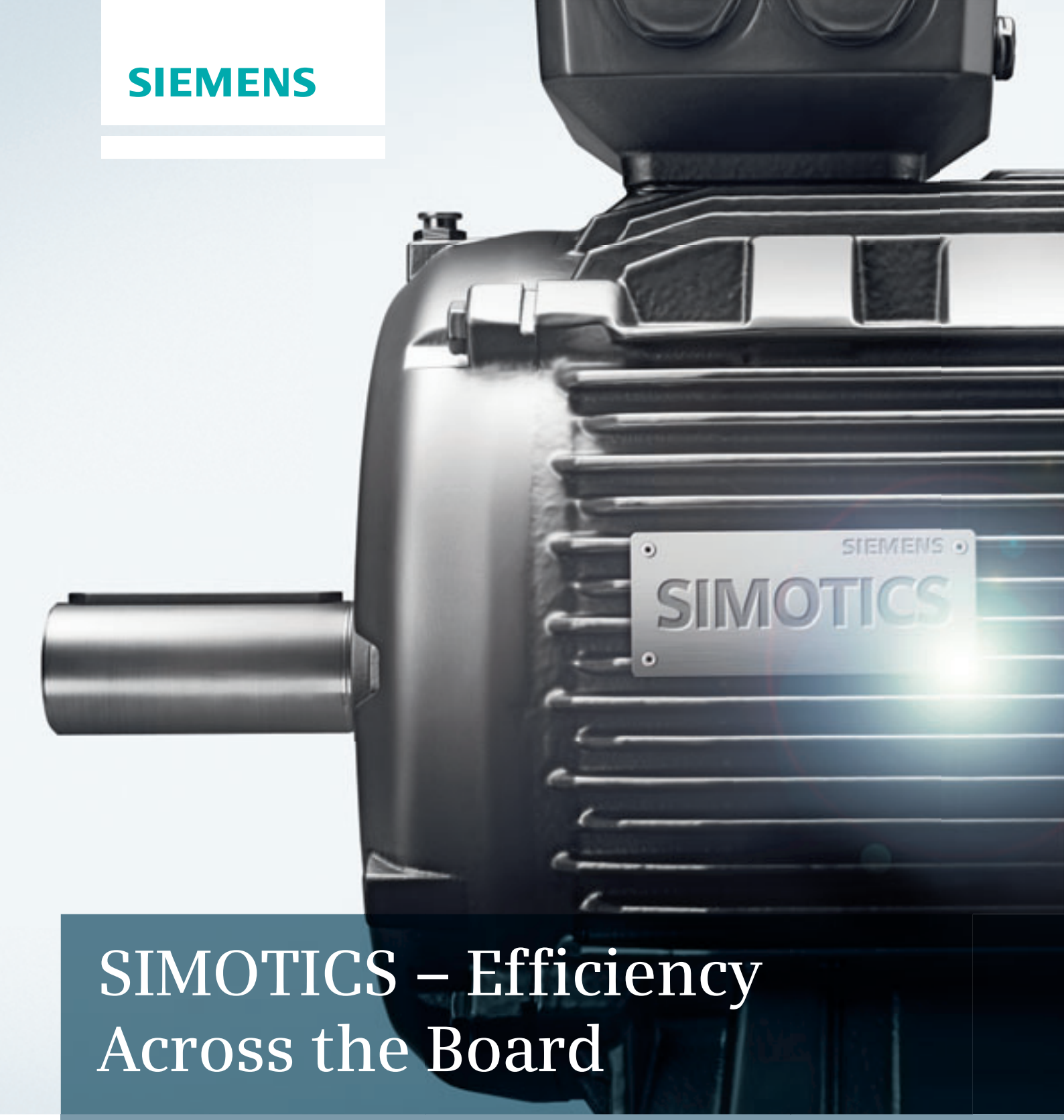
SIEMENS



SIMOTICS – Efficiency Across the Board

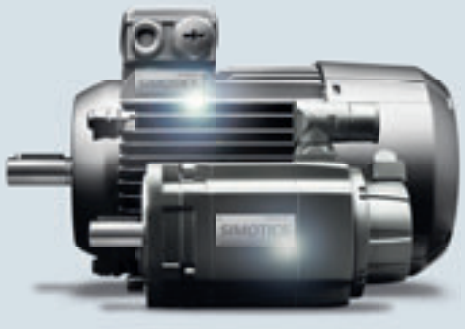
Low-voltage motors for industrial applications up to 1250 kW

siemens.com/simotics

Whatever proves itself in the line duty also deserves a name – SIMOTICS

The history of today's most comprehensive range of motors worldwide started approximately 150 years ago as Werner von Siemens developed the dynamo-electric principle in 1866. This formed the basis for designing powerful electric motors, therefore allowing them to become widely established in industry. Since then, motor development has remained a core business of the company – and Siemens with more than 100 years of experience is still the pacesetter when it comes to innovative motor technology.

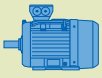
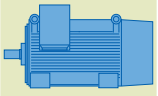
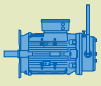
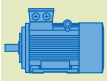
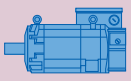
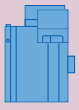
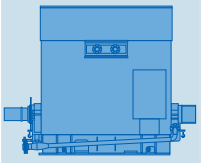
Today, in industrial plants and systems around the world, many millions of Siemens motors are ensuring motion and efficient operation. In all sectors, applications and performance classes. Starting with energy-efficient low-voltage motors through motion control motors with a high dynamic performance up to DC motors and powerful high-voltage motors. Through ongoing and persistent innovation, Siemens has always been able to prove its competence when it comes to electric motors. For instance, just recently with the development of a high-speed, high-voltage motor with up to 15,000 revolutions per minute in the Megawatt range. Or the presentation of the new motors for motion control main drives in the power range from 2.8 up to 1340 kW. As a result of employing a completely new modular system, these motors can be flexibly and optimally adapted to each and every application. These are just two examples of motors, which constantly prove themselves in use and are convincing through their quality, efficiency and compactness. For all of the motors, the only thing that was missing up until now was a name that reflected their outstanding performance. Now they have it: SIMOTICS.

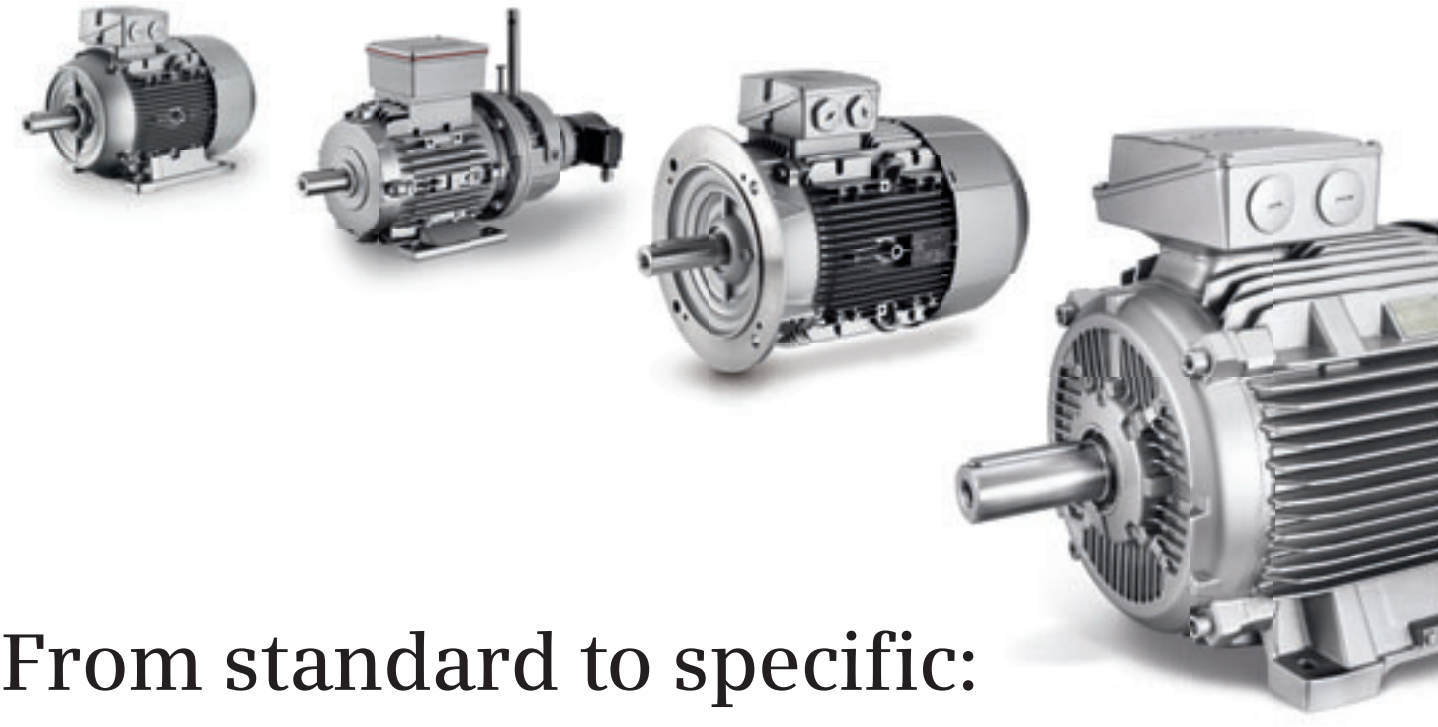


SIMOTICS stands for

- 125 years of experience in building electric motors
- The most comprehensive range of motors worldwide
- Optimum solutions in all sectors, regions and performance classes
- Innovative motor technologies with the highest quality and reliability
- Highest dynamic performance, precision and efficiency – but still extremely compact
- Motor-side system integration in the drive train
- A global network of competence and worldwide service 24/7

SIMOTICS

Low-voltage motors for line and inverter operation					Motors for motion control				DC motors	High-voltage motors
General Purpose	Severe Duty	Trans Standard	Definite Purpose	Explosion detected	Servo	Main	Linear	Torque		
GP	SD	TN	DP	XP	S	M	L	T	DC	
										



From standard to specific: SIMOTICS motors for unlimited possibilities

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, seamless and especially sustainable solution. We can offer you this solution with products for the complete drive train: From gearboxes through couplings up to motor starters or frequency converters and control systems – and user-friendly tools support you when selecting and dimensioning all of the components in the drive train. Our seamless range of low-voltage induction 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, for every 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 1250 kW, our low-voltage motors drive simply everything. Depending on the requirement, we can offer you efficient motors in graduated efficiency classes in compliance with current legislation and standards for a positive energy balance – also to comply with various local standards. Beyond this, we have explosion-protected motors that fulfill the highest safety standards, as well as sector and customized motors in graduated efficiencies to address your drive applications. All of these motors have a wide range of features as standard to achieve the highest degree of cost effectiveness. This includes 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

Extremely compact motor designs have been achieved by using innovative rotor and production technology in the high-efficiency (IE2) and Premium versions (IE3). This makes it easier to change to a higher efficiency class. This is because, in many cases, machines and plants do not have to be mechanically modified: a decisive advantage when introducing minimum efficiencies. And even more: You can save a lot of energy when using IE2 or IE3 motors. Frequently, the payback time is not even two years. And after this, not only is energy saved, but also costs reduced.

The lightweights 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 hoisting devices.

Little space, lots of power

If the motor must be extremely compact as there is not sufficient space available for a conventional standard motor, then increased power motors 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

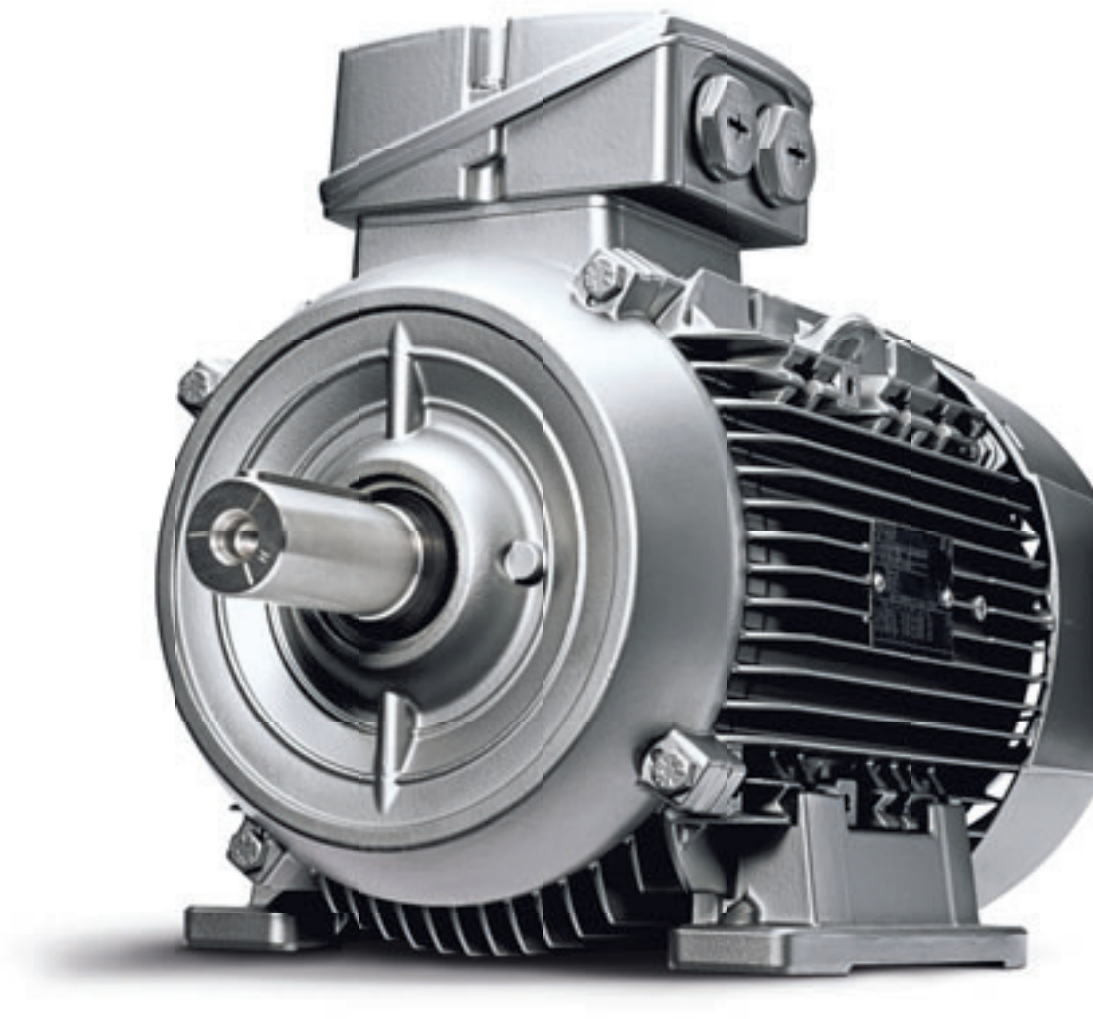
Motors drive machines around the world. We offer export lines that address regional efficiency requirements.

Maximum flexibility, minimum costs

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

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 energy-efficient motors with optimized efficiency
- Positive eco-balance of the high-efficiency and premium efficiency motors and relieving the environment as a result of the CO_2 reduction
- Easy to modify using modular retrofit kits
- Suitable for drive 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 box: Aluminum Fan cover: Plastic	
Efficiency classes	IE1 = Standard Efficiency IE2 = High Efficiency IE3 = Premium Efficiency	NEE = NEMA Energy Efficient NPE = NEMA Premium Efficiency
Versions	> Standard motors in IE1, IE2 and IE3 > Increased Power Line: Motors with increased output power in IE2 with one standard power increment higher	> US Export Line (Eagle Line) in NEE and NPE > Force ventilated without external fan and fan cover > Non-ventilated without external fan and fan cover
Marking	Classification according to DIN IEC 60034-30: IE1, IE2, IE3, 2-, 4-, 6-pole	
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 type	Surface cooled (TEFC)	
Temperature class	155(F) utilized to 130(B)	
Insulation system	DURIGNIT® IR 2000, inverter-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-on mounting feet, can be optionally bolted-on and retrofitted Terminal box is diagonally split and can be rotated through 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 the 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. Of course, it goes without saying that the efficiency classes have the same shaft height. 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. The motors are available in IE2, IE3 and in the export version, in NEE and NPE.

Power efficiency

The Severe Duty motors with increased output power 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 under aggressive ambient conditions:
  - Basic Line 1LE15 with cast iron frame, bearing size 62 and plastic fan cover
  - Performance Line 1LE16 in an especially rugged design with cast-iron frame with bearing size 63, steel fan cover, high service factor and 36 months warranty
- Compact series facilitate 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 and relieving the environment as a result of the CO_2 reduction
- Easy to modify using modular retrofit kits
- Up to 460 V inverter-proof as standard, up to 690 V dedicated versions available for inverter operation
- Suitable for inverter operation

Data, facts, details – Severe Duty motors

Frame size	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 Efficient NPE = NEMA Premium Efficiency
Versions	> Basic Line in IE2 and IE3 > Performance Line in IE2 and IE3	> Increased Power Line: one standard power increment higher in IE2 > US Export Line (Eagle Line) in NEE and NPE
Marking	Classification according to DIN IEC 60034-30: IE1, IE2, IE3, 2-, 4-, 6-pole	
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 type	Surface cooled (TEFC)	
Temperature class	155(F) utilized to 130(B)	
Insulation system	DURIGNIT® IR 2000, inverter-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-on mounting feet, can be optionally bolted-on and retrofitted Terminal box diagonally split and able to be rotated through 90° steps Bearings are identical at the DE and NDE, optional reinforced bearings	

The variety 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 are used. 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

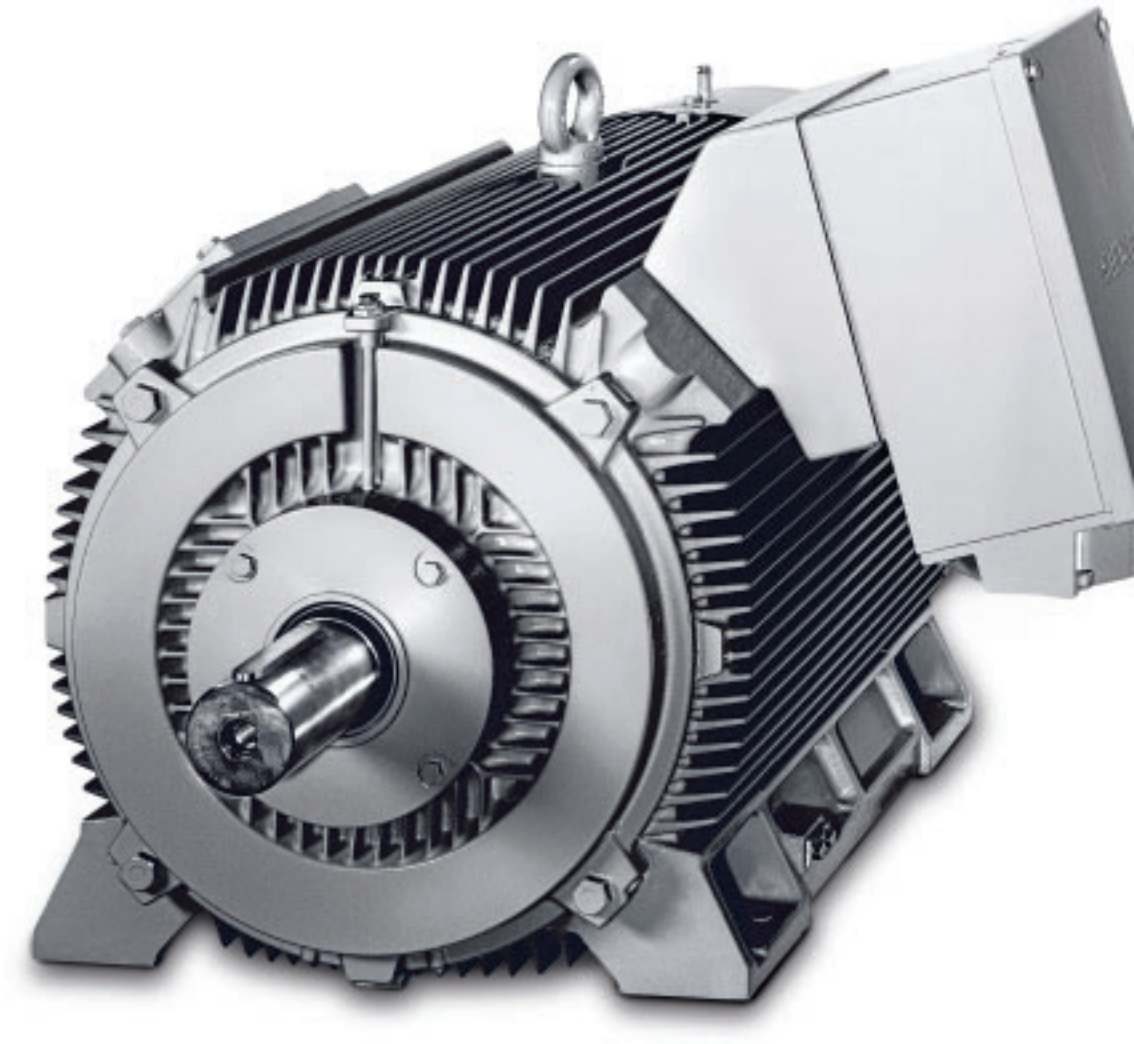
Our trans-standard motors are designed and built so that they fulfill the highest technical demands. Further, they are attractive as a result of their reliability and long service life. This comes, on one hand, from our many decades of experience in building motors, and on the other hand, as a result 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 rotatable terminal box is generously dimensioned and therefore simplifies commissioning
- Quiet operation using aerodynamically optimized air guidance parts
- High voltage strength of the insulation system for line and inverter operation



Data, facts, details – trans-standard motors

Frame size	315 to 450
Power range	200 kW to 1250 kW
No. of poles	2/4/6/8
Motor/material	Frame: Cast iron Terminal box: Cast iron
Efficiency classes	IE2, IE3 to 375 kW
Versions	Line motors specifically optimized for line operation Inverter motors specifically optimized for variable-speed drive operation
Marking	Classification according to IEC 60034-30 up to 375 kW: IE2, IE3, 2-, 4-, 6-pole (line motors) Classification according to IEC 60034-25: 2 to 8-pole (inverter 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 B35, IM B5, IM V5, IM V6 and IM V1 according to DIN EN 60034-7
Cooling type	Surface cooled (IC411) Force ventilated (IC416) Open-circuit cooled (IC01) Water-jacket cooled (IC71W)
Temperature class	Line motors: 155(F) utilized to 130(B), Inverter motors: 155(F) utilized to 155(F); optionally, a class 180(H) system is available
Insulation system	DURIGNIT® IR 2000, standard insulation: Rated voltage ≤ 500 V Special insulation: Rated voltage > 500 V up to 690 V
Modular mounting concept	Optional rotary pulse encoder, brake, external fan or prepared for other components to be mounted
Standard series concept	Terminal box, rotatable through 90° steps, inverter motors: NDE bearings are insulated as standard

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, machines and the environment. With our explosion-protected motors, you decide in favor of maximum safety.

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 as result of their global use. And not only that: Our range of explosion-protected motors is seamless and covers all requirements with maximum safety and efficiency during operation.

Extremely safe

The SIMOTICS portfolio has the optimum motor, no matter whether with dust explosion protection, flameproof enclosure (Ex d) or increased safety (Ex e). To meet exceptional requirements, customized drive solutions are available with double protection – this is a combination of gas and dust explosion protection or the combination of Ex d and Ex e from the family of Loher motors. The motors are suitable for inverter operation and in some cases are available in graduated efficiency classes.

IEC type spectrum

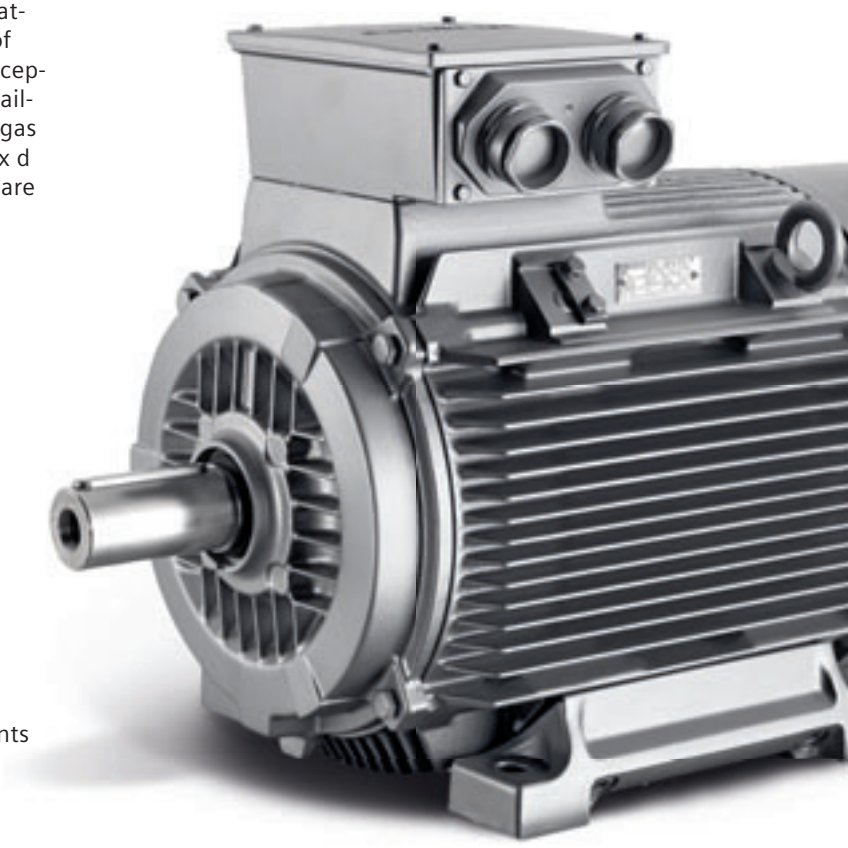
Our explosion-protected motors fulfill the ATEX 95 Directive:

- Motors in type of protection
  - Increased safety “e” (Ex e II)
  - Flameproof enclosure “d” (Ex de IIC)
  - Non-Sparking “n” (Ex nA II T3)
  - Dust explosion protection “t” (Ex tD, Zone 21/22)
- Seamless series of explosion-protected motors
- VIK versions optionally possible

NEMA type spectrum

Explosion-protected motors fulfill the strict requirements according to

- Class I, Groups C&D
- Class I, Group D, Div. 1
- Class II, Groups F&G
- Division 1, hazardous areas



Quality-tested

The explosion-protected NEMA motors are certified in accordance with NEMA MG1 and UL. Our explosion-protected motors for the IEC market are developed, produced and certified in accordance with the 94/9/EC (ATEX 95) Directive. Furthermore, they are tested and certified by the German Physical-Technical Federal Institute (PTB) and the German Montan Technologie GmbH (DMT). As a consequence they offer certified reliability and efficiency for each and every drive application.

Sector-specific motors: Individual requirements, tailored solutions

Every sector has its own particular requirements when it comes to drive technology. As complete supplier 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.

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 & performance even when things get rough and stormy

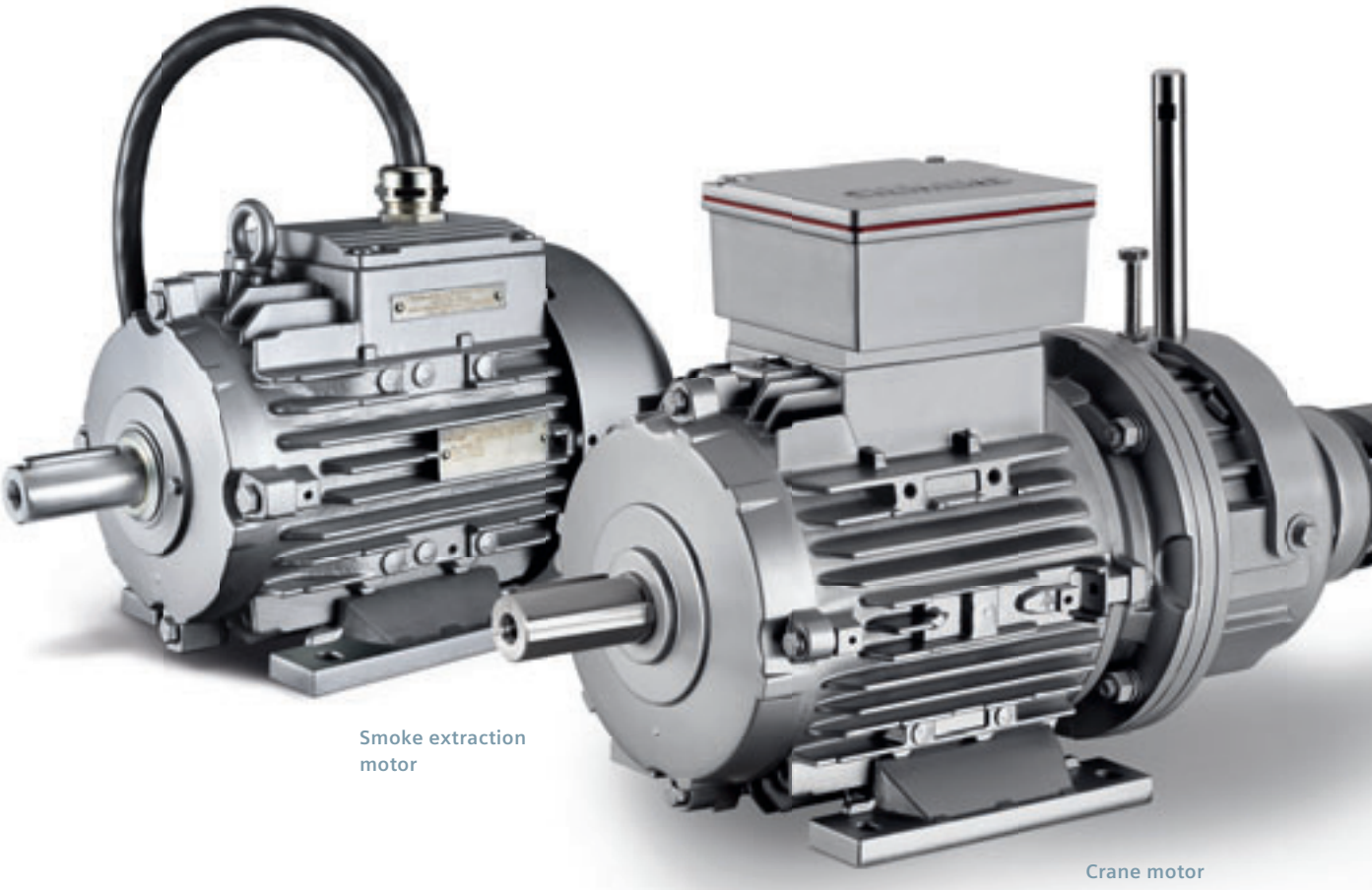
Just the same as ship motors, crane motors are often exposed to extreme weather conditions – and at the same time high operational requirements. They have to withstand high humidity, salty air and high wind speeds while ensuring a high overload capability and a wide speed control range. Our crane motors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

Application areas

The 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 range up to 200 kW in accordance with EN 12101-3/June 2002 certified for operation under emergency conditions
- F200/300, 200/300 °C for 120 minutes and F400, 400 °C for 120 minutes
- Provide safe and reliable ventilation in case of accidents
- In the case of accidents, these 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
- Inverter operation is possible



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 humidity up to 100 % and salty atmosphere
- As accelerating drives, have an overload capability of up to 230 %
- One motor version covers all conventional operating modes (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 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 inverter-fed crane systems
- Special versions on request

Extremely rugged and tested for the harshest conditions

Marine 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 specify strict requirements for the additional qualification of motors.

Our marine 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. These motors are always adapted to the higher ambient temperatures that prevail 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 marine motors are especially designed for below-deck applications on ships and for the offshore industry, e.g. on oil platforms. Drives for ships:

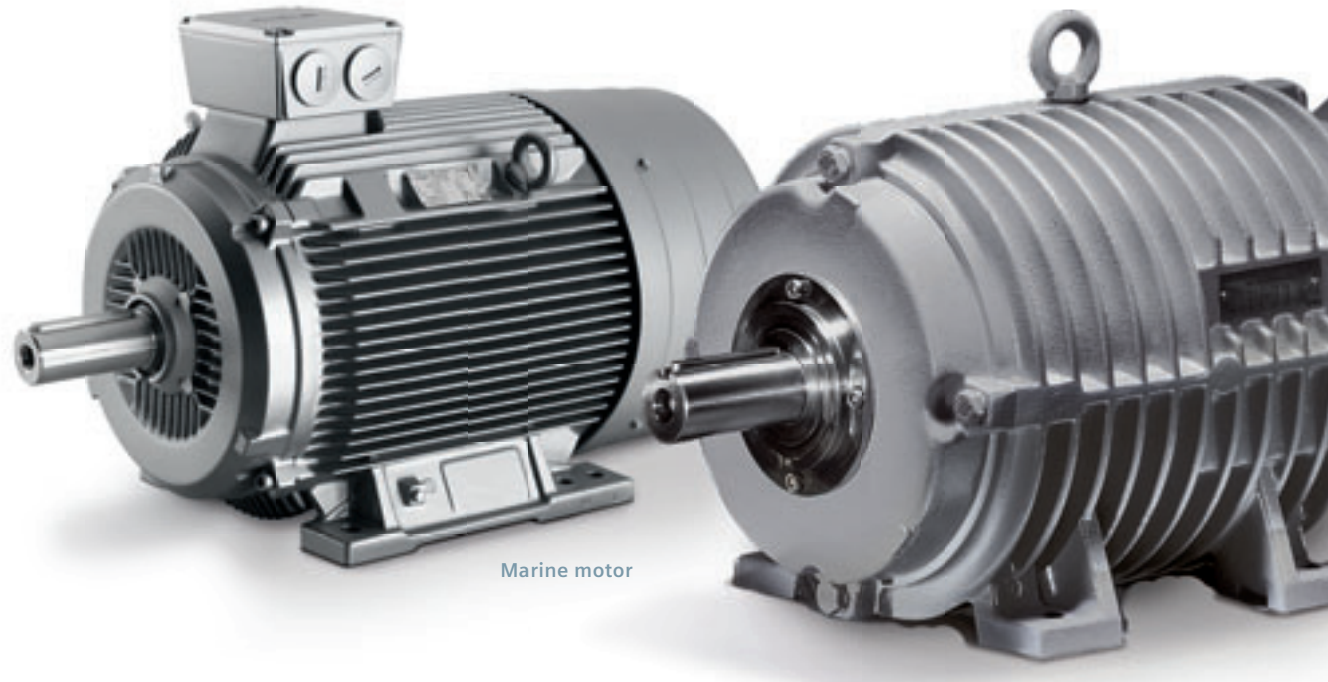
- Fans (e.g. for air-conditioning and cooling systems)
- Feed pumps (for fire-fighting and cooling water, fuels, oils)
- Winches (anchor and mooring winches, lifting gear)
- Compressors
- Bow thruster drives

Ondeck motors

Drive systems on ships' decks have to withstand wind and weather. They must not be affected by spray, flooding and icing. Special ondeck motors from Loher are precisely designed for these application conditions and, for example, guarantee continued smooth operation even in case of complete flooding. A special offshore paint finish ensures additional corrosion protection. Further, specifically designed fan covers and an ice-proof design are available.

Features of marine motors

- Manufactured and type-tested (type approved) according to the regulations of internationally leading 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)
- 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 in accordance with the requirements of the classification societies ABS (American Bureau of Shipping, USA), RINA (Registro Italiano Navale, Italy), CCS (Chinese Classification Society, China); type examination certificate only for individual acceptance procedures
- Special versions are available on request



Marine motor

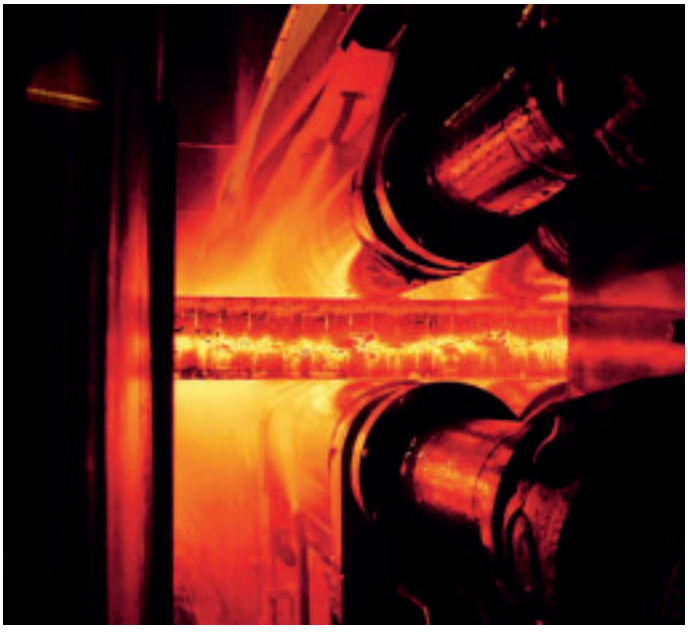
Roller table motor

Roller table motors: Powerful drive, 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 inverter 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 under extreme application conditions, in working and transport roller tables, at high ambient temperatures, high air humidity and 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 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)
- Inverter-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 inverter 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

Tools to select and engineer 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: Determining energy-saving potential – fast and simply

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 on this topic at **siemens.com/dt-konfigurator.**

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 inverters for your projects. Comprehensive documentation, such as data sheets, starting calculations and dimension drawings, are fixed components of the tool. The result: Individual solutions for your drive applications. You can enter at **www.siemens.com/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 on this topic at **siemens.com/sizer.**

SinaSave

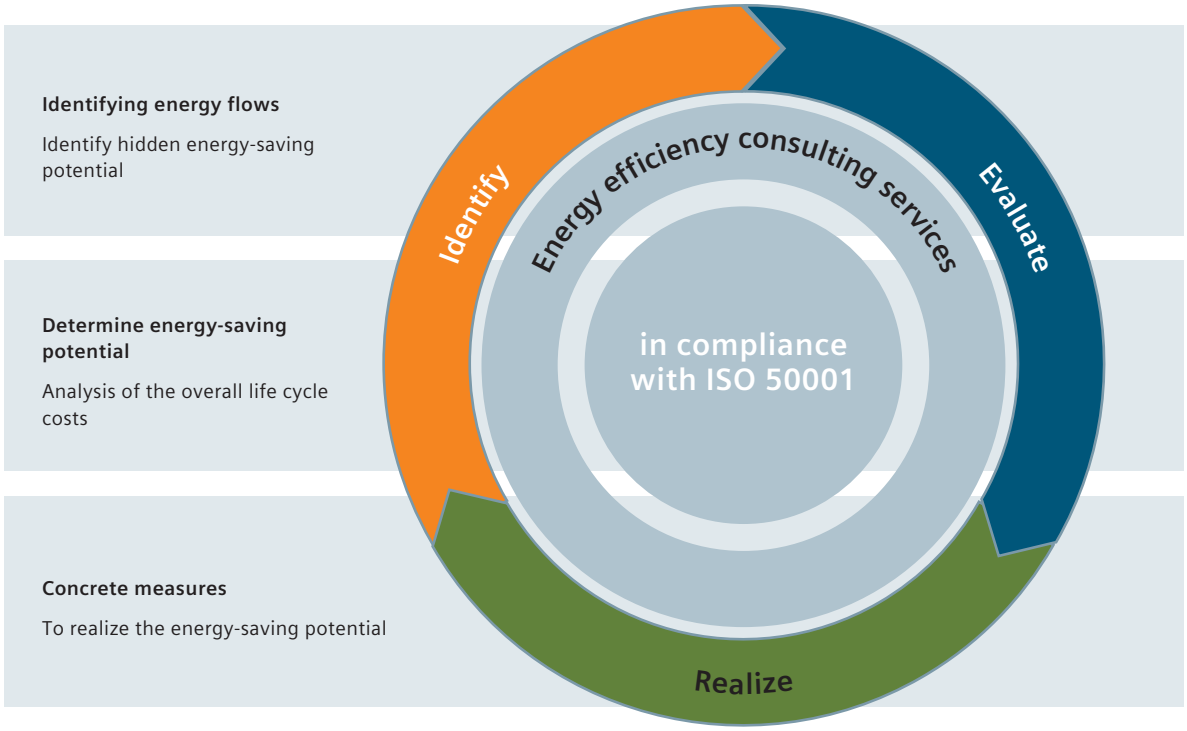
DT Configurator

SIZER

Energy efficiency: Project “Future”

For machine and plant construction, energy efficiency is becoming an increasingly important topic: On one hand, because energy is increasingly becoming a significant cost factor for the manufacturing industry, and on the other hand, as a result of domestic as well as international standards and legislation that are becoming more and more stringent.

We can offer you everything that is required for focused energy management: Products and systems that play a decisive role in significantly reducing operating costs, and at the same time reducing the stress on our climate and environment. As continuous process, our well thought-out concept ensures that your energy usage is continuously reduced. Our energy management is based on the phases Identify, Evaluate and Realize. We offer you the perfect solutions for each one of these phases.



Overview of the low-voltage motors

Application	General Purpose	Severe Duty	Trans-standard	General Purpose	Severe Duty	Explosion proof
	Energy-saving motors according to IEC			Energy-saving motors according to NEMA		Ex-motors IEC
Frame material	**Al**	**Cast iron**	**Cast iron**	**Al, cast iron**	**Cast iron**	**Al, cast iron**
						Type of protection e
Applications	Standard	Standard, harsh ambient conditions	Standard and harsh ambient conditions	General Purpose	Severe Duty	Ex-Zone 1 II 2G Ex e II T1-T3
Rated power	0.09 kW – 45 kW	0.37 kW – 315 kW	200 kW – 1250 kW	1–20 / 1–200 HP	1 – 400 HP	0.12 – 220 kW
Frame size	63M – 225	100 – 315	315 – 450	140 – 250/140 – 440	140 – 440	63M – 355L
Rated speed	750 – 3600 rpm	750 – 3600 rpm	750 – 5000 rpm	900 – 3600 rpm	900 – 3600 rpm	750 – 3600 rpm
Rated torque	0.61 – 293 Nm	10 – 2022 Nm	800 – 8500 Nm	2 – 883 lb-ft	1.5 – 1776 lb-ft	0.61 – 2205 Nm
Rated voltage	All of the usual voltages	All of the usual voltages	400 – 690 V	208–230/460 V, 460 V, 575 V at 60 Hz	208–230/460 V, 460 V, 575 V at 60 Hz	All of the usual voltages
Efficiency	IE1, IE2, IE3; NEMA Energy efficiency MG1 Table 12-11; NEMA Premium Efficiency MG1 Table 12-12	IE1, IE2, IE3; NEMA Energy efficiency MG1 Table 12-11; NEMA Premium Efficiency MG1 Table 12-12	IE2, IE3 to 375 kW	NEMA Premium NEMA Premium Plus	NEMA Premium NEMA Premium Plus	see Catalog D81.1/IM01
Degree of protection	IP55, IP56, IP65	IP55, IP56, IP65	Standard: IP23, IP55 Optionally: IP56, non-heavy sea, IP65	IP54	IP54/IP55	IP55, IP56, IP65
Cooling type	Self-ventilated	Self-ventilated, TEFC, TEAO, TENV	Self-ventilated, force-ventilated, open-circuit ventilated, water-jacket cooled	TEFC	TEFC	Self-ventilated
Type of construction	All of the usual types of construction	All of the usual types of construction	IM B3, IM B35, IM B5, IM V5, IM V6 and IM V1 acc. to DINA EN 60034-7	Usual NEMA designs	Usual NEMA designs	All of the usual types of construction
Temperature class	155(F) utilized to 130(B)/155(F)	155(F) utilized to 130(B)/155(F)	155(F) utilized to 130(B), line motors (DOL); 155(F) utilized to 155(F), converter motors (VSD)	Class B @1.0 SF, Class F @1.15SF	Class B @1.0 SF, Class F @1.15SF	155(F) utilized to 130(B)/155(F)
For inverter operation up to 460 V (type tested for Siemens inverters)	Standard	Standard	Standard	Yes	Yes	Yes (type test required)
For inverter operation up to 690 V	Special insulation	Special insulation	Standard insulation up to 500 V; special insulation up to 690 V	No	No	on req.
Approvals*	CE, CCC, UL, CSA CNS14400, KEMKO, ABNT/INMETRO, SE-Mark Japan	CE, CCC, UL, CSA CNS14400, KEMKO, ABNT/INMETRO, PSE-Mark Japan	CE, CC, UL, CSA	CE, CSA, UL, ee, NOM	CE, CSA, UL, ee, NOM	CE, CCC, GOST, ATEX, Rostekhnadzor
Approvals for ship drives	Below-deck applications: BV, DNV, GL, LR, RS	Below-deck applications: BV, DNV, GL, LR, RS	BV, DNV, GL, LR, RS, BS, CCS, JR, KR	No	No	Below-deck applications: BV, DNV, GL, LR, RS
Encoder	Yes	Yes	Yes	No	Yes	on req.
Brake	Yes	Yes	Yes	No	No	on req.
External fan	Yes	Yes	Yes	No	Yes	on req.
Typical applications	Pumps, fans, compressors, marine applications with special demands regarding low weight and the highest efficiency	Pumps, fans, compressors, marine applications, mixers, extruders in the chemical and petrochemical industry	Pumps, fans, compressors, mixers, extruders in the chemical and petrochemical industry, paper machines, mining, cement, steel industry, marine applications	Pumps, compressors, fans, conveyor technology, industrial applications	– Chemical and petrochemical industry – Mining industry – Printing and paper industry	Occasionally occurring explosive gases in the – Chemical & petrochemical industry – Oil & gas etc.
Catalog	D81.1	D81.1	D81.1, IM01	D81.2, U.S./Canada	D81.2, U.S./Canada	D81.1, IM01 Loher

* CE – EC declaration of conformity
CSA – Canadian Standard Association
NOM – Norma Oficial Mexicana
CCC – China Compulsory Certification

CNS – 14400 Chinese National Standard, Taiwan
KEMKO – Korean Energy Management Corporation
ABNT – Associação Brasileira de Normas Técnica
RS – Russian Maritime Register of Shipping

				Definite Purpose		
			Explosion-protected motors NEMA	Roller tables	Smoke extraction	Crane
Cast iron, steel	**Al, cast iron**	**Al, cast iron**	**Cast iron**	**Cast iron**	**Al, cast iron**	**Cast iron**
Type of protection d	Type of protection n	Dust Ex				
Hazardous zone 1 II 2G Ex d/de IIC T1–T6 Optional, hazardous zone 21 II 2D Ex tDA21 IP65 135 °C	Hazardous zone 2 II 3G Ex nA II T3 optional Hazardous Zone 22: II 3D Ex tD A22 IP55 125 °C	Hazardous Zone 21/22 Zone 21: II 2D Ex tD A21 IP65 T125 °C Zone 22: II 3D Ex tD A22 IP55 T125 °C	Class I, Group C&D Class II, Groups F&G, Division 1 hazardous areas Class I, Group D, Div. 1	Steel industry	Building and tunnel ventilation	Gantry, rubber tired gantry, rail mounted gantry, stacking cranes – indoor/ outdoor
0.25 – 950 kW	0.09 – 1000 kW	0.09 – 1000 kW	1 – 300 HP	2.5 – 66 kW	0.37 – 200 kW	1.1 – 481 kW
71M – 450	63M – 450	63M – 450	140 – 440	112M...400	80M – 315L	132S – 315L
750 – 3600 rpm	750 – 3600 rpm	750 – 3600 rpm	900 – 3600 rpm	295 – 1460 rpm	750 – 3600 rpm	727 – 1726 rpm
1 – 8579 Nm	1 – 8090 Nm	0.61 – 8090 Nm	1.5 – 1187 lb-ft	16 – 2135 Nm	2.5 – 1546 Nm	10.6 – 3142 Nm
All of the usual voltages	All of the usual voltages	All of the usual voltages	208 – 230/460 V, 230/460 V, 460 V, 575 V, at 60 Hz	All of the usual voltages	All of the usual voltages	All of the usual voltages
see Catalog D81.1/IM01	E1/IE2	IE1/IE2	NEMA Premium	on request	on request	See Catalog CR1-2011
IP55, IP56, IP65	IP55, IP56, IP65	Zone 21: IP65 Zone 22: IP55	IP54	IP55, IP56 (non-heavy sea), IP65	IP55, IP56	IP55, IP56, IP65
Surface cooled (t.e.f.c.)	Self-ventilated	Self-ventilated	TEFC	Non-ventilated	Self/non-ventilated	Self/non-ventilated
All of the usual types of construction	All of the usual types of construction	All of the usual types of construction	All of the usual NEMA designs	IMB3, IMB5, IMB35	All of the usual types of construction	All of the usual types of construction
155(F) utilized to 130(B) (line operation); 155(F) utilized to 155(F) (converter operation)	155(F) utilized to 130(B)	155(F) utilized to 130(B)	Class B @1.0 SF Class F @1.15SF	155(F) utilized to 155(F)	180(H) utilized to 130(B), 155(F)	155(F) utilized to 130(B), 155(F)
Yes	Yes	Yes	Yes	Yes	Yes	Yes, converter operation up to 100 Hz
on req.	on req.	on req.	No	Special insulation	on req.	Yes, converter operation up to 100 Hz with special insulation
CE, CCC, GOST, ATEX, NEPSI, Rostekhnadzor	CE, CCC, GOST, ATEX, NEPSI, Rostekhnadzor	CE, CCC, GOST, ATEX, Rostekhnadzor	CSA, UL, UR, ee, NOM	CE	CE	CE
Below-deck applications: BV, DNV, GL,LR, RS	Below-deck applications: BV, DNV, GL, LR, RS	Below-deck applications: BV, DNV, GL, LR, RS	No	No	No	BV, DNV, GL, LR, RS
Yes	Yes	Yes	No	Yes	No	Yes
on req.	on req.	No	No	on req.	No	Yes
Yes	Yes	Yes	No	No	No	No
Occasionally occurring explosive gases in – Chemical & petrochemical industry – Oil & gas etc.	Infrequently and briefly occurring explosive gases in – Chemical & petrochemical industry – Oil & gas etc.	Explosive dusts in – Wood processing – Chemical industry – Plastics processing – Agriculture	– Chemical and petrochemical industry – Mining industry – Printing and paper industry or corresponding to the paper industry	Cold and hot rolling mills as operating and transport roller tables	Ventilating tunnels, parking garages, shopping malls	Harbor cranes, container terminals, indoor/outdoor
D81.1, IM01 Loher	D81.1, IM01 Loher	D81.1, IM01 Loher	D81.2, U.S./Canada	Technical list	D81.1, IM01 Loher	CR1-2011

ATEX – Atmosphère Explosible
NEPSI – Nat. Supervision and Inspection Center for Explosion Protection & Safety of Instrumentation, China
NEMA – National Electrical Manufacturers Association
GOST – Gossudarstwenny Standart, Russia
UL – Underwriters Laboratories
ee – Energy Efficiency

More information:
www.siemens.com/simotics
www.siemens.com/low-voltage-motors

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For more information and technical descriptions,
click on the "Support" navigation point on our Website.

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Order No. E20001-A450-P220-V2-7600
Dispo 21503
BOLL/35594 GD.LD.XX.LDNM.52.2.02
WS 11113.0
Printed in Germany