SIMOTICS overview

SIMOTICS – whatever proves itself of value also deserves a name!
SIMOTICS overview

The SIMOTICS name stands for:

- 160 years of experience in electric motors
- A leadership role when it comes to new motor technologies
- A global network of competence
- Sector know-how and understanding of specific regional requirements
- The matching portfolio for all sectors and applications
- The system partner on the motor side for the extensive Siemens product families
- A clearly structured portfolio
- An extensive range of motors that is second to none
- Maximum quality and reliability
- Highest dynamic performance, precision and efficiency with minimum space required
- Service – around the globe and 24/7

Low voltage line motors

<table>
<thead>
<tr>
<th>IEC motors</th>
<th>SIMOTICS GP General Purpose</th>
<th>SIMOTICS SD Siemens Duty</th>
<th>SIMOTICS XP Explosion protected</th>
<th>SIMOTICS DP Definitive Purpose</th>
<th>SIMOTICS TN Transnorm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picture</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Specific characteristics</td>
<td>Optimum for line operation</td>
<td>Optimum for line operation</td>
<td>Optimum for line operation</td>
<td>Service in-line motors, marine motors, roller table motors, crane motors, customized motors for specific applications</td>
<td>Available for line operation as well as for inverter duty</td>
</tr>
<tr>
<td>Applications/Industries</td>
<td>Pumps, fans, compressors with specific requirements related to low weight and highest efficiency</td>
<td>Pumps, fans, compressors, marine applications, offshore, viscous, mixers, with special requirements regarding ruggedness, especially in chemical and petrochemical industries</td>
<td>Pumps, fans, compressors with special requirements related to ruggedness, especially in chemical and petrochemical industries</td>
<td>Special motors, for example transport and working roller tables, paper machines, mining, cement, steel industry, marine applications</td>
<td>Pumps, fans, compressors, motors, ventilation in chemical and petrochemical industries, transport and handling, paper machines, mining, cement, steel industry, marine applications</td>
</tr>
<tr>
<td>Power</td>
<td>0.05 - 45 kW</td>
<td>0.09 - 2000 kW</td>
<td>0.12 - 1,000 kW</td>
<td>0.09 - 1,250 kW</td>
<td>0.09 - 5,000 kW</td>
</tr>
<tr>
<td>Voltage</td>
<td>Up to 690 V</td>
<td>400 - 690 V</td>
<td>400 - 690 V</td>
<td>400 - 690 V</td>
<td>400 - 690 V</td>
</tr>
<tr>
<td># of poles</td>
<td>2 - 8</td>
<td>2 - 6</td>
<td>2 - 8</td>
<td>2 - 8</td>
<td>2 - 8</td>
</tr>
<tr>
<td>Frame size</td>
<td>63 - 225</td>
<td>71 - 315</td>
<td>63 - 450</td>
<td>80 - 315</td>
<td>315 - 630</td>
</tr>
<tr>
<td>Type of motor</td>
<td>Squirrel-cage induction motor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficiency classes</td>
<td>E1, E2, E3, EE, MIE, MPE</td>
<td>E1, E2, E3</td>
<td>E2, E3</td>
<td>E2, E3</td>
<td>E2, E3 up to 375 kW</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP5</td>
<td>IP5, IP6</td>
<td>IP6, IP5, IP6</td>
<td>IP6, IP4, IP5, IP5, IP6</td>
<td>IP6, IP4, IP5, IP6</td>
</tr>
<tr>
<td>Cooling type</td>
<td>--</td>
<td>--</td>
<td></td>
<td></td>
<td>--</td>
</tr>
<tr>
<td>Enclosure</td>
<td>Aluminum</td>
<td>Cast iron</td>
<td>Aluminum / cast iron</td>
<td>Cast iron / steel</td>
<td>--</td>
</tr>
</tbody>
</table>
### Low voltage line motors

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>NEMA motors</th>
<th>APAC motors</th>
<th>ABNT Brazil</th>
<th>EAGLE USA, CAN, MEX</th>
<th>China motors</th>
<th>INDIA motors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available as</td>
<td>GP, SD, XP, DP</td>
<td>GP, SD</td>
<td>GP, SD</td>
<td>GP, SD</td>
<td>GP</td>
<td>GP</td>
</tr>
<tr>
<td>Power</td>
<td>0.75 - 200 kW</td>
<td>0.13 - 200 kW (0.16 - 400 CV)</td>
<td>0.75 - 315 kW (1HP - 400 HP)</td>
<td>0.18 - 315 kW</td>
<td>0.12 - 315 kW</td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>208 - 230 V / 460 V, 575 V (40 Hz)</td>
<td>Up to 690 V</td>
<td>220 - 660 V / 480 Hz</td>
<td>Up to 600 V</td>
<td>Up to 690 V</td>
<td></td>
</tr>
<tr>
<td>Frame size</td>
<td>140-440</td>
<td>80-315</td>
<td>63 - 315</td>
<td>80 - 315</td>
<td>63 - 355</td>
<td></td>
</tr>
<tr>
<td>Type of motor</td>
<td>Squirrel-cage induction motors</td>
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<td>Squirrel-cage induction motors</td>
<td></td>
</tr>
<tr>
<td>Efficiency classes</td>
<td>NEMA Premium (MG1, Table 12-12)</td>
<td>IE2, IE3, 60Hz</td>
<td>IE2, IE3, NEMA Premium (MG1, Table 12-12)</td>
<td>IE2, IE3</td>
<td>IE2, IE3, IS:12615-2011</td>
<td></td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP54, IP55</td>
<td>IP54, IP55, IP56</td>
<td>IP54</td>
<td>IP55, IP55, IP65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enclosure</td>
<td>Aluminum / cast iron</td>
<td>Cast iron</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Low voltage converter motor

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>SIMOTICS GP General Purpose</th>
<th>SIMOTICS GP General Purpose</th>
<th>SIMOTICS SD Severe Duty</th>
<th>SIMOTICS SD Severe Duty</th>
<th>SIMOTICS FD Flexible duty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>2.2 kW up to 15 kW</td>
<td>0.55 kW to 30 kW</td>
<td>0.25 kW up to 200 kW</td>
<td>5.5 kW to 30 kW</td>
<td>200 - 1,100 kW</td>
</tr>
<tr>
<td>Voltage</td>
<td>400 V / 480 V</td>
<td>400 - 690 V</td>
<td>400 V / 480 V</td>
<td>400 - 690 V</td>
<td>400 V / 480 V</td>
</tr>
<tr>
<td>Rated speed</td>
<td>750, 1000, 1200, 1500, 3000 / 3000 (2HP)</td>
<td>90, 112, 132 - 160</td>
<td>71 - 315</td>
<td>132 - 200</td>
<td>315 - 450</td>
</tr>
<tr>
<td>Frame size</td>
<td>90 - 160</td>
<td>90, 112, 132 - 160</td>
<td>71 - 315</td>
<td>132 - 200</td>
<td>315 - 450</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP54</td>
<td>IP54, IP55, IP65</td>
<td>IP54</td>
<td>IP55, IP55, IP65</td>
<td>IP55, IP55, IP65</td>
</tr>
<tr>
<td>Cooling type</td>
<td>IEC71W, IEC80W, IEC11, IEC26</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enclosure</td>
<td>Aluminum / cast iron</td>
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<td>Cast iron</td>
<td>Cast iron</td>
<td>Cast iron</td>
</tr>
</tbody>
</table>

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SIDRIVE IQ – What is it?

- SIDRIVE IQ is based on connected Drive Systems from Siemens.
- With SIDRIVE IQ, we get intelligent drive systems which deliver enhanced value in productivity, reliability and serviceability to our customers.
- SIDRIVE IQ leverages advancements in IoT, sensing, cloud computing, analytics, domain competence and cyber security to deliver innovation throughout our customers value chain.
- This is completed with the predefined services packages addressing specific customer needs.
SIMOTICS / SINAMICS CONNECT

SIMOTICS

- SIMOTICS (LV)
- SIMOTICS (LV & HV) (DOL Motors)
- SIMOTICS HV

SINAMICS

- SIMAMICS CONNECT LV
- SIMAMICS CONNECT 400
- SIMAMICS CONNECT 600
- CMS4000 Sleeve bearing

SIMOTICS CONNECT 500

SIMOTICS GP

General Purpose motors – 1LE10

General Purpose motors
- With IEC efficiency classes IE1, IE2, IE3, IE4
- Country-specific motor lines with certificates, e.g. for North America
- Innovative and optimized design

Advantages at a glance
- Short, compact motors
- Low weight with aluminum frame
- No shaft height jump for the same power rating within the IE classes
- Increased Power-Line: same shaft height
- Eagle-Line: IEC motors for export to the NEMA market with UL, CSA and DOE
- Modular mounting concept for encoder, brake, external fan
- Same look & feel across the whole 1LE1 family

Power: 0.12 kW to 37 kW
Voltage: up to 690 V
Frame size: 63 ... 225
Number of poles: 2, 4, 6, 8
SIMOTICS SD
Severe Duty motors – 1LE15/6

Severe Duty motors
- With IEC efficiency classes IE1, IE2, IE3, IE4
- Country-specific motor lines with certificates, e.g. for North America
- Innovative and rugged design

Advantages at a glance:
- Rugged cast-iron frame to cope with harsh environments
- Complies with the requirements of IE3&IE2 according to IEC 60034-30 and EU Regulation 640/2009
- Complies with NPE acc. to NEMA MG1 Table 12-12
- Basic-Line 1LE15 for general applications
- Performance-Line 1LE16 for applications in the process industry
- Can be fully modified with a wide range of options

- Power: 0.37 kW to 200 kW
- Voltage: to 690 V
- Frame size: 71 ... 315
- Number of poles: 2, 4, 6, 8

SIMOTICS SD
Severe Duty motors – China version

Severe Duty motors
- With IEC efficiency classes IE1, IE2, IE3 according to IEC 60034-30
- Country-specific motor lines with certificates, e.g. for China
- Innovative and rugged design

Advantages at a glance:
- Rugged cast-iron frame to cope with harsh environments
- Distribution-Line 1LE010 for general applications
- Option-Line 1LE002 for applications in the process industry, can be fully modified with a wide range of options

- Power: 0.55 kW to 315 kW
- Voltage: to 690 V
- Frame size: 80 ... 355
- Number of poles: 2, 4, 6
SIMOTICS SD
Severe Duty motors - next generation – 1LE5

Variant 1:
- Cloud-based data analysis with SIDRIVE IQ
- Converter-capable up to 480 V
- High starting and breakaway torque (Ma/MN)

Variant 2:
- Global certificates
- UL Safety and CSA Safety - material as standard
- Converter-capable up to 480 V
- Low starting currents (IA/IN):
  - Lower thermal loading
  - Lower network load
  - Reduced torque shocks

Variant 3:
- Multi-voltage capability at SH 315 – 355
- Stable efficiency levels at 50 Hz/60 Hz
- Global certificates
- UL Safety and CSA Safety - material as standard
- Converter-capable up to 690 V
- SH 315 – 355: High starting and breakaway torque (Ma/MN)
  - SH 400 – 450:
  - Low starting currents (IA/IN)

SIMOTICS TN
Trans-standard motors N-compact – China only

N-compact
- With efficiency classes IE2, IE3 to 375kW
- Rugged design and quiet operation

Advantages at a glance:
- Especially rugged motors with internal and external ribs for a high strength
- Two separate cooling circuits: Additional inner cooling circuit results in a uniform temperature distribution in the active motor area and reduces thermal stress – for longer life time and more reliability
- High power rating in a small space permits compact, space-saving machines and equipment
- With corrosion protection resistant against aggressive environments, e.g. high air humidity, high temperatures or dust and salt-laden atmospheres
- High voltage strength for line and converter operation

Power: 200 kW to 1250 kW
Voltage: 400 V – 690 V
Frame size: 315 ... 450
Pole number: 2, 4, 6, 8
SIMOTICS XP
from 0.09 up to 1000 kW – 1MB1

<table>
<thead>
<tr>
<th>Features / functions</th>
<th>User benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Standard platform regarding technology and design for all types of protection Ex db, Ex eb, Ex px, Ex tb. In addition, Ex ec and Ex tc extended up to 1000 kW</td>
<td>• The complete range of explosion-protected motors with the same look &amp; feel now available up to high power ratings from a single source. These are suitable for fixed speed systems as well as variable-speed solutions – and address both the product as well as project business.</td>
</tr>
<tr>
<td>• Based on the well-proven rib-cooled low-voltage motor platforms with the same power rating (0.09 – 1000 kW)</td>
<td>• Simplified stock inventory and spare part management – as well as attractive synergies when equipping and servicing complete plants and systems.</td>
</tr>
<tr>
<td>• Based on decades of experience and expertise in explosion protection</td>
<td>• Highest quality for maximum reliability and safety – even under the most extreme conditions.</td>
</tr>
<tr>
<td>• Standardized tools and processes</td>
<td>• Lower costs from the initial planning through engineering, procurement, integration and commissioning up to operation and maintenance.</td>
</tr>
<tr>
<td>• Additional options such as VIK design, lower starting/inrush currents, C2 – C5M paint finish, components manufactured out of stainless steel and the motors are painted inside</td>
<td>• Additional applications, especially in classic process industries – such as oil, gas and the chemical industry.</td>
</tr>
<tr>
<td>• All motors have efficiency Class IE3 – for Ex ec and tc motors, from shaft height 315, also IE4</td>
<td>• Low operating costs.</td>
</tr>
</tbody>
</table>

SIMOTICS DP
Definite Purpose motors

Roller table motors:
• Used in reversing rolling mills
• Transverse ribbed frame manufactured out of spheroidal cast-iron
• Converter proof up to 460V, optionally up to 690V

Smoke extraction motors:
• According to EN12101-3/June 2002 certified motors for fire classes F200/F300 and F400
• Motor series has been universally accepted for all axial and radial fan
• Standard power assignment unchanged!

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SIMOTICS DP
Definite Purpose motors

Ship motors for operation below deck and for the offshore industry

- EC type-examination with certificate up to 200 kW in compliance with internationally leading marine classification societies
  - Bureau Veritas (BV)
  - Germanischer Lloyd (GL)
  - Lloyds Register (LR)
  - Det Norske Veritas (DNV)
- Manufactured in compliance with additional classification societies: ABS, CCS, RS, RINA
- Energy-saving and explosion-protected motors, types of protection Ex e II T1-T3 and Ex de IIC T1-T4 have an EC type-examination with certificate
- Special motors for addressing individual drive applications (e.g., above deck operation) through Loher GmbH – the specialist for special solutions

Frame sizes: 63 to 450
Power: 0.9 kW to 1250 kW

SIMOTICS DP
Definite Purpose motors

Crane motors

- These have been developed for indoor and outdoor crane operation, for example, container cranes in ports. These motors are operating perfectly as travel, trolley and hoisting gear drives in many cranes around the world.
- Suitable for converter operation (690 V with special measures), with a torque characteristic adapted to crane applications
- Have a high overload capability
- Designed for extreme conditions such as high humidity, salt-laden air, high wind velocities etc..
- Suitable for mounting a seawater-proof disk brake in an encapsulated design with a high degree of protection; motor and brake form one compact unit

Power: 1.1 kW – 481 kW
Voltage: up to 1000 V
Frame size: 132S up to 315L
### SIMOTICS low voltage converter motors

**Reference class**
- Invest optimized

**Super efficiency class**
- Energy cost optimized (TCO)

**High flexibility class**
- Flexible, power optimized & efficient

<table>
<thead>
<tr>
<th>Power range: 2,2 kW - 200 kW</th>
<th>200 kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIMOTICS SD VSD10-line</td>
<td>SIMOTICS GP VSD4000-line</td>
</tr>
<tr>
<td>N-EUPEX Series</td>
<td>RuPEX Series</td>
</tr>
<tr>
<td>Frame size: 100 - 315</td>
<td>Frame size: 315</td>
</tr>
</tbody>
</table>

#### Highest efficiency and dynamic performance reluctance drive systems

System comprising SIMOTICS synchronous-reluctance motors VSD4000-Line and SINAMICS converters

<table>
<thead>
<tr>
<th>Features / functions</th>
<th>User benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on standard products: 1LE1 motor platform SINAMICS G120 converters &amp; S120</td>
<td>- Products widely established in the market, simple to use and selected using known tools</td>
</tr>
<tr>
<td>Very high efficiency under full and partial load conditions</td>
<td>- Efficient drive solution optimized to achieve low lifecycle costs in efficiency class IES2</td>
</tr>
<tr>
<td>System optimized for operation with SINAMICS G120 with sensorless vector control</td>
<td>- Dynamic operation and guaranteed operating data for optimum system utilization</td>
</tr>
<tr>
<td>From firmware V4.8 operation with the whole SINAMICS S120 portfolio possible</td>
<td>- Higher dynamic performance, operation optionally with and without encoders, regenerative feedback with ALM, safety functions</td>
</tr>
<tr>
<td>At the same time optimized for dynamic performance and efficiency – motor-driven and regenerative-driven</td>
<td>- Full range of applications possible: from simple applications with pumps, fans, compressors up to high requirements of coilers and extruders</td>
</tr>
</tbody>
</table>

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SIMOTICS FD
Flexible Duty motors - from 200kW and above

FD motors
- Converter-optimized low-voltage induction motor series
- Three product lines:
  - Enclosed air-cooled (IC411, IC416)
  - Water-cooled (IC71W, IC86W)
  - Open air-cooled (IC01, IC06)
- Power range from 200 kW up to over 1600 kW
- Shaft heights 315, 355, 400 and 450
- Rugged cast iron frame
- Water-cooled motors also available for direct online operation
- Explosion version: zone 2 and zone 22

DC motors - SIMOTICS DC

SIMOTICS DC
- Modular design with a wealth of options
- Self-ventilated or force ventilated with or without fan
- For harsh environments in degree of protection IP23, IP54 and IP55

Advantages at a glance:
- Rugged and low maintenance
- High mechanical stiffness ensures unique smooth running characteristics and balance quality
- Bearings, commutators and brush holders have an especially long service life
- Long brush lifetimes
- Smooth running characteristics ensure the highest machining precision
- Very low noise levels reduce costs for local noise dampening measures
- Can be optimally adapted to the specific project

Power: 31.5 kW to 1610 kW
Voltage: 420 to 810 V DC
Frame size: 160 to 630
**Tools**

- **Evaluation**: SinaSave
- **Configuring, engineering**: DT Configurator
- **Ordering**: SIZER for Siemens Drives
- **Commissioning**: Industry MALL
- **Support & service**: STAR DRIVE

**Links**

- www.siemens.com/simotics
- Tools Overview:
  - www.siemens.com/engineering-tools
  - www.siemens.com/sinasave
  - www.siemens.com/dt-configurator
  - www.siemens.com/sizer
  - www.siemens.com/industrymall
  - www.siemens.com/starter
9 motor plants around the world close to our customers

Servo motor

- **SIMOTICS S Servomotors**: Rotating motors for servo drive applications, synchronous motor technology
- **SIMOTICS M Main motors**: Rotating motors for main drive applications, synchronous and asynchronous motor technology
- **SIMOTICS L / T Direct motors**: Motors for direct drive applications, synchronous motor technology
- **Components**: Connection between drive and motor, Built-on encoders, DRIVE-CLIQ - the open interface for encoders

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Thank you for your attend!

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