

Appendix



8/2	Frequency inverters for SIMATIC ET 200 distributed I/O
8/4	Frequency converters MICROMASTER 410/420/430/440
8/5	Distributed drive solution – Converters MICROMASTER 411/ COMBIMASTER 411
8/6	Low-voltage motors
8/6	IEC squirrel-cage motors
8/8	IEC squirrel-cage motors – new generation 1LE1
8/9	Customized motors
8/10	NEMA motors
8/11	Siemens Contacts Worldwide
8/12	Information and Ordering on the Internet and on CD-ROM
8/12	Siemens Industry Automation and Drive Technologies in the WWW
8/12	Product Selection Using the Offline Mall
8/12	Easy Shopping with the A&D Mall
8/13	Subject index
8/15	Order number index
8/16	Conditions of sale and delivery
8/16	Export regulations

SINAMICS G110, SINAMICS G120, SINAMICS G120D

Appendix

Frequency inverters for SIMATIC ET 200 distributed I/O

Frequency inverters are available for the SIMATIC ET 200 distributed I/O that are fully system-integrated modules. Inverters are available for the finely modular SIMATIC ET 200S FC system to the IP20 degree of protection as well as for the cabinet-free SIMATIC ET 200pro FC system to the IP65 degree of protection. With a broad range of possibilities, the frequency inverters expand the functional scope of the modular modules that are available in both systems (e.g. inputs and outputs, technology modules, direct and soft starters). With suitable interface modules, connection to PROFIBUS and PROFINET is possible via the ET 200 system bus as well as integration of PLC functionality into the system. Fail-safe frequency inverter functions can be activated locally or via PROFIsafe.

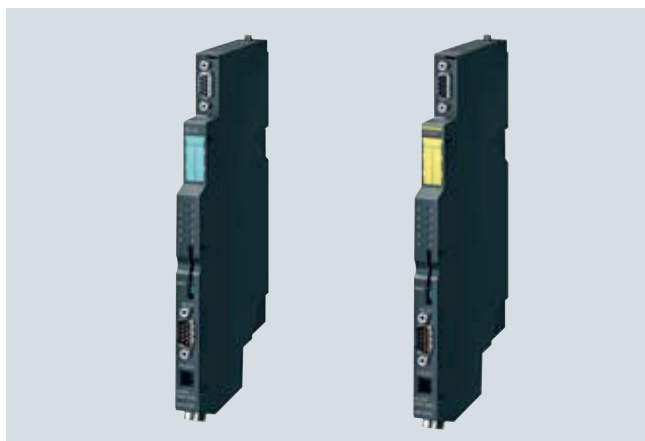
An overview of the features of the SIMATIC ET 200S FC frequency inverter series is given in the table below. The complete product spectrum including ordering data, technical data and explanations can be found in Catalog IK PI "Industrial Communication for Automation and Drives" and on the Internet at

<http://www.siemens.com/et200s-fc>

and

<http://www.siemens.com/et200pro-fc>

SIMATIC ET 200S FC	
Main features	<ul style="list-style-type: none"> • Complete embedding of a frequency inverter into a distributed I/O system to IP20 degree of protection • Easy assembly and low susceptibility to errors thanks to self-assembling energy and communications bus • Space-saving assembly thanks to compact dimensions and common protection • Fast, tool-free replacement of the frequency inverter for a servicing requirement (hot swapping) • Frequency control (V/f), vector control with and without encoders • Line-commutated regenerative feedback by power electronics of the latest generation • Modular structure with Control Unit (closed-loop control module) and Power Module (power section) • Frequency inverter variant with integrated, autonomous, fail-safe functions without the need for complex external wiring
Rated outputs	0.75 kW (1.0 hp) 2.2 kW (3.0 hp) 4.0 kW (5.0 hp)
Input voltage	380 ... 480 V 3 AC +10 % -10 %
Overall width	Control Unit + Power Module up to 0.75 kW (1.0 hp): 80 mm, otherwise 145 mm
Mains frequency	47 ... 63 Hz
Overload capability	<ul style="list-style-type: none"> • Overload current 1.5 x rated output current (i.e. 150 % overload) over 60 s, cycle time 300 s • Overload current 2 x rated output current (i.e. 200 % overload) over 3 s, cycle time 300 s
Output frequency	0 ... 650 Hz
Pulse frequency	8 kHz (standard) 2 ... 16 kHz (in steps of 2 kHz)
Frequency bands that can be skipped	1, programmable
Efficiency	≥ 96 %
Interfaces	<ul style="list-style-type: none"> • Connection to PROFIBUS via IM151 interface module • Connection to PROFINET via IM151-3PN interface module • Integration of PLC functionality through IM151 CPU and IM151-7 F CPU interface modules • RS232 interface with USS protocol for commissioning on the PC with the STARTER commissioning software • Slot for an optional Micro Memory Card for uploading or downloading parameter settings • PTC/KTY84 interface for motor monitoring • Speed sensor interface (Sub-D connector) for unipolar HTL incremental encoder • Activation of the integrated safety functions over PROFIsafe (using the PM-D F PROFIsafe Power Module) or terminals (using the Safety Local Power Module PM-D F X1)
Standards conformance	UL, cUL, CE and c-tick, Low-Voltage Directive 73/23/EEC, EMC Directive 89/336/EEC
Functional safety	<p>Closed-loop control module with Integral safety functions to Category 3 of EN 954-1 and SIL2 of IEC 61508:</p> <ul style="list-style-type: none"> • Safe Torque Off • Safely Limited Speed • Safe Stop 1 <p>The safety functions "Safely Limited Speed" and "Safe Stop 1" are certified for encoderless asynchronous motors. These safety functions are not approved for pull-through loads as in the case of lifting gear and winders.</p>
Degree of protection	IP20



SIMATIC ET 200S FC
Control Units



SIMATIC ET 200S FC
Power Modules

SINAMICS G110, SINAMICS G120, SINAMICS G120D

Appendix

Frequency inverters for SIMATIC ET 200 distributed I/O

SIMATIC ET 200pro FC	
Main features	<ul style="list-style-type: none"> • Complete embedding of a frequency inverter into a distributed I/O system to IP65 degree of protection • Easy assembly and low susceptibility to errors thanks to self-assembling energy and communications bus • Fast replacement of the frequency inverter during servicing without interruption of the bus communication to other modules within the SIMATIC ET 200pro FC • Frequency control (V/f), vector control without encoders • Line-commutated regenerative feedback by power electronics of the latest generation • Frequency inverter variant with integrated, autonomous, fail-safe functions without the need for complex external wiring
Rated outputs	1.1 kW (1.5 hp) (at 0 ... 55 °C ambient temperature) 1.5 kW (2.0 hp) (at 0 ... 45 °C ambient temperature)
Input voltage	380 ... 480 V 3 AC +10 % -10 %
Overall width	155 mm
Mains frequency	47 ... 63 Hz
Overload capability	<ul style="list-style-type: none"> • Overload current 1.5 × rated output current (i.e. 150 % overload) over 60 s, cycle time 300 s • Overload current 2 × rated output current (i.e. 200 % overload) over 3 s, cycle time 300 s
Output frequency	0 ... 650 Hz
Pulse frequency	4 kHz (standard) 2 ... 16 kHz (in steps of 2 kHz)
Frequency bands that can be skipped	1, programmable
Efficiency	≥ 96 %
Interfaces	<ul style="list-style-type: none"> • Connection to PROFIBUS via IM154-1 and IM154-2 interface modules • Available soon: connection to PROFINET over IM154-4PN interface modules and connection to IM154-8 CPU interface modules • Optical interface with USS protocol for fiber-optic RS232 connecting cable • Control signal for 180 V DC electromagnetic motor brake • Slot for an optional memory card (MMC) for uploading or downloading parameter settings • PTC/KTY84 interface for motor temperature monitoring • Activation of the integrated safety functions through the Safety Local Isolator Module F RSM or through F-Switch PROFIsafe
Standards conformance	UL, cUL, CE, Low-Voltage Directive 73/23/EEC, EMC Directive 89/336/EEC
Functional safety	<p>Variant with Integral safety functions to Category 3 of EN 954-1 and SIL2 of IEC 61508:</p> <ul style="list-style-type: none"> • Safe Torque Off • Safely Limited Speed • Safe Stop 1 <p>The safety functions "Safely Limited Speed" and "Safe Stop 1" are certified for encoderless asynchronous motors. These safety functions are not approved for pull-through loads as in the case of lifting gear and winders.</p>
Degree of protection	IP65



SIMATIC ET 200pro FC
Standard frequency inverter



SIMATIC ET 200pro FC Fail-safe
Frequency inverter with integrated safety functions

SINAMICS G110, SINAMICS G120, SINAMICS G120D

Appendix

Frequency converters MICROMASTER 410/420/430/440

MICROMASTER converters from Siemens perfectly complement the motors. The table shows an overview of the features of these converters. For the full range of products complete with ordering data, technical details and explanations, see Catalog DA 51.2.

For up-to-date information on MICROMASTER 420/430/440 frequency converters, visit the Internet at <http://www.siemens.com/micromaster>

	MICROMASTER 410	MICROMASTER 420	MICROMASTER 430	MICROMASTER 440
Main characteristics	<p>“The low-price solution” for variable speeds with three-phase motors on single-phase networks, e.g. with pumps, fans, billboards, barriers, gate drives and automatic machines. Discontinued model ¹⁾</p>	<p>“The universal converter” for three-phase networks and optional fieldbus interfacing, e.g. for conveyor belts, material transport, pumps, fans and machine tools</p>	<p>“The specialist for pumps and fans” with optimized OP (manual/automatic changeover), adapted software functionality and optimized output utilization</p>	<p>“The all-rounder” with advanced vector control (with and without encoder feedback) for versatile applications in sectors such as conveyor systems, textiles, lifts, lifting gear and machine construction</p>
Output range	0.12 ... 0.75 kW (0.16 ... 1.0 hp)	0.12 ... 11 kW (0.16 ... 15 hp)	7.5 ... 250 kW (10 ... 350 hp)	0.12 ... 250 kW (0.16 ... 300 hp)
Voltage ranges	100 ... 120 V 1 AC 200 ... 240 V 1 AC	200 ... 240 V 1 AC 200 ... 240 V 3 AC 380 ... 480 V 3 AC	380 ... 480 V 3 AC	200 ... 240 V 1 AC 200 ... 240 V 3 AC 380 ... 480 V 3 AC 500 ... 600 V 3 AC
Closed-loop Control	<ul style="list-style-type: none"> • V/f characteristic • Multipoint characteristic (parameterizable V/f characteristic) • FCC (Flux Current Control) 	<ul style="list-style-type: none"> • V/f characteristic • Multipoint characteristic (parameterizable V/f characteristic) • FCC (Flux Current Control) 	<ul style="list-style-type: none"> • V/f characteristic • Multipoint characteristic (parameterizable V/f characteristic) • FCC (Flux Current Control) 	<ul style="list-style-type: none"> • V/f characteristic • Multipoint characteristic (parameterizable V/f characteristic) • FCC (Flux Current Control) • Vector control
Process control		Internal PI controller	Internal PID controller	Internal PID controller (autotuning)
Inputs	3 digital inputs 1 analog input	3 digital inputs 1 analog input	6 digital inputs 2 analog inputs 1 PTC/KTY input	6 digital inputs 2 analog inputs 1 PTC/KTY input
Outputs	1 relay output	1 analog output 1 relay output	2 analog outputs 3 relay outputs	2 analog outputs 3 relay outputs
Interfacing to automation system	The PLC partner for LOGO! and SIMATIC S7-200	The ideal partner for your automation tasks, whether with SIMATIC S7-200, SIMATIC S7-300/400 (TIA) or SIMOTION	The ideal partner for your automation tasks, whether with SIMATIC S7-200, SIMATIC S7-300/400 (TIA) or SIMOTION	The ideal partner for your automation tasks, whether with SIMATIC S7-200, SIMATIC S7-300/400 (TIA) or SIMOTION
Additional features	<ul style="list-style-type: none"> • Natural ventilation (no fan unit) • Position of connections as with conventional switching elements (e.g. contactors) • Variant with flat heat sink 	<ul style="list-style-type: none"> • BICO technology • Compound braking for controlled rapid braking 	<ul style="list-style-type: none"> • Energy-saving mode • Load torque monitoring (detects dry run of pumps) • Motor staging • Bypass mode • BICO technology 	<ul style="list-style-type: none"> • 3 selectable drive data records • Integrated brake chopper (up to 75 kW) • Torque control • BICO technology



Examples of MICROMASTER 410/420/430/440

¹⁾ Only available as spare part.

SINAMICS G110, SINAMICS G120, SINAMICS G120D

Appendix

Distributed drive solution - Converters MICROMASTER 411/COMBIMASTER 411

The MICROMASTER 411/COMBIMASTER 411 converters and geared motors from Siemens are available as a distributed drives solution. The table shows an overview of the features of this product. The complete product spectrum with ordering data, technical details and descriptions can be found in Catalog DA 51.3 MICROMASTER 411/COMBIMASTER 411.

For up-to-date information on MICROMASTER 411 and COMBIMASTER 411 visit the Internet at <http://www.siemens.com/combimaster>

	MICROMASTER 411	COMBIMASTER 411
Main characteristics	"The distributed converter" for a wide drive range, for simple individual applications for pumps and fans through to multiple drives for conveyor systems in net-worked control systems.	
Output range	0.37 ... 3 kW (0.5 ... 4.0 hp)	
Voltage ranges	380 ... 480 V 3 AC	
Case/frame sizes	CSB CSC	71 ... 100 90/100
Types of construction		IMB3 IMB5 IMV1 (without protective cover) IMV1 (with protective cover) IMB14 (with standard flange) IMB14 (with special flange) IMB35
Degree of protection	IP65	IP55
Further technical characteristics	<ul style="list-style-type: none"> • V/f characteristic • Multipoint characteristic (parameterizable V/f characteristic) • FCC (Flux Current Control) • Internal PI controller • 3 digital inputs • 1 analog input • 1 relay output • Compound braking for controlled rapid braking • ECOFAST variants with plug connector for power supply, communication interfaces and motor connections to support quick and problem-free replacement. The ECOFAST variants are totally compatible with the ECOFAST technology systems. 	



Examples of MICROMASTER 411



Examples of COMBIMASTER 411

SINAMICS G110, SINAMICS G120, SINAMICS G120D

Appendix

Low-voltage motors IEC squirrel-cage motors

With an output range from 0.06 kW to 1250 kW, low-voltage motors are available for the widest range of requirements and applications that are harmonized and coordinated with the MICROMASTER and SINAMICS frequency inverters. In addition to energy-saving motors and explosion-proof motors, there are also sector and customer-specific motors such as smoke extrac-

tion motors. The table shows an overview of the technical features of these motors. You will find the available product range with ordering data, technical data and detailed explanations in Catalog D 81.1 "Low-Voltage Motors - IEC Squirrel-Cage Motors - Frame Sizes 56 to 450" and on the Internet under:

<http://www.siemens.com/motors>

IEC Squirrel-Cage Motors			
Versions	Energy-saving motors		
	Aluminum housing	Gray cast housing	Temp.-time classes F200/F300/F400
Rated power	0.06 ... 45 kW	0.75 ... 1250 kW	0.37 ... 200 kW
Frame sizes	56 M ... 225	100 L ... 450	80 M ... 315 L
Type of construction	All common types of construction	All common types of construction	All common types of construction
Speed	750 ... 3000 rpm	750 ... 3000 rpm	1000 ... 3000 rpm
Rated torque	0.3 ... 292 Nm	9.9 ... 10300 Nm	2.5 ... 1546 Nm
Rated voltages	All commonly used voltages	All commonly used voltages	230 VΔ/400 VY, 500 VΔ, 400 VΔ/690 VY, 500 VY
Designation	EFF1, EFF2	EFF1, EFF2	EFF1, EFF2
Degree of protection	IP55	IP55	IP55
Housing	Aluminum	Gray iron	Aluminum, Gray iron
Cooling type	Surface-cooled	Surface-cooled	Surface-cooled
Temperature class	155 (F) utilized to 130 (B) / 155 (F)	155 (F) utilized to 130 (B) / 155 (F)	155 (F) utilized to 130 (B)
Approvals	CE, CCC, UL, CSA	CE, CCC, UL, CSA	CE
Approvals for marine propulsion drives	Below deck use: BV, DNV, GL, LR	Below deck use: BV, DNV, GL, LR	No
Explosion protection (incl. temp. class)	Ex nA II T3 (Zone 2), Dust-Ex (Zone 21, 22)	Ex nA II T3 (Zone 2), Dust-Ex (Zone 21, 22)	No



Examples, energy-saving motors



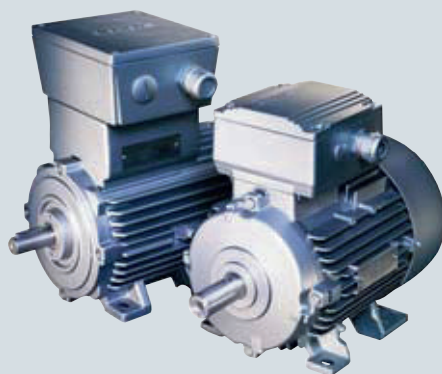
Example, smoke extraction motors

SINAMICS G110, SINAMICS G120, SINAMICS G120D

Appendix

Low-voltage motors IEC squirrel-cage motors

IEC Squirrel-Cage Motors				
Versions	Explosion-proof motors			
	Type of protection "e"	Type of protection "d"	Type of protection "n"	Dust explosion protection
Rated power	0.12 ... 165 kW	0.25 ... 950 kW	0.09 ... 1000 kW	0.06 ... 1000 kW
Frame sizes	63 M ... 315 L	71 M ... 450	63 M ... 450	Zone 21: 56 M ... 315 L Zone 22: 56 M ... 450
Type of construction	All common types of construction	All common types of construction	All common types of construction	All common types of construction
Speed	1000 ... 3000 rpm	750 ... 3000 rpm	750 ... 3000 rpm	750 ... 3000 rpm
Rated torque	0.61 ... 1300 Nm	1 ... 8579 Nm	1 ... 8090 Nm	0.3 ... 8090 Nm
Rated voltages	All commonly used voltages	All commonly used voltages	All commonly used voltages	All commonly used voltages
Designation	See Catalog D 81.1	See Catalog D 81.1	Analog energy-saving motors EFF1/EFF2	Analog energy-saving motors EFF1/EFF2
Degree of protection	IP55, IP56 (non-heavy-sea), IP65	IP55, IP56 (non-heavy-sea)	IP55, IP56 (non-heavy-sea), IP65	Zone 21: IP65 Zone 22: IP55
Housing	FS 63 ... 160 L Aluminum FS 100 L ... 315 L Gray iron	FS 71 M ... 315 L Gray iron FS 355 ... 450 Steel	FS 63 M ... 160 L Aluminum FS 100 L ... 450 Gray iron	FS 63 M ... 225 M Aluminum FS 100 L ... 450 Gray iron
Cooling type	Surface-cooled	Surface-cooled	Surface-cooled	Surface-cooled
Temperature class	155 (F) utilized to 130 (B) / 155 (F)	155 (F) utilized to 130 (B) (line operation); 155 (F) utilized to 155 (F) (frequency inverter operation)	155 (F) utilized to 130 (B)	155 (F) utilized to 130 (B)
Approvals	CE, CCC, GOST, ATEX	CE, CCC, GOST, ATEX, NEPSI	CE, CCC, GOST, ATEX, NEPSI	CE, CCC, GOST, ATEX
Approvals for marine propulsion drives	Below deck use: BV, DNV, GL, LR	Below deck use: BV, DNV, GL, LR	Below deck use: BV, DNV, GL, LR	Below deck use: BV, DNV, GL, LR
Explosion protection (incl. temp. class)	II 2G Ex e II T1-T3	II 2G Ex de IIC T1-T4	II 3G Ex nA II T3	Zone 21: II 2D Ex tD A21 IP65 T125 °C Zone 22: II 3D Ex tD A22 IP55 T125 °C



Examples, explosion-proof motors

SINAMICS G110, SINAMICS G120, SINAMICS G120D

Appendix

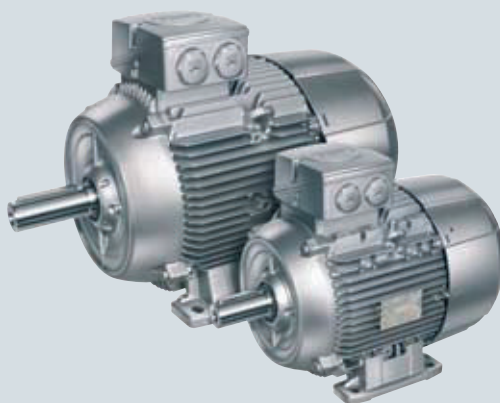
Low-voltage motors IEC squirrel-cage motors – new generation 1LE1

Increasing energy costs have resulted in greater emphasis on the power consumption of drive systems. It is extremely important to utilize the full potential for minimization here to secure competitiveness today and in the future. This is the reason that already today, Siemens is developing a new generation of low-voltage motors. Innovative copper rotors create the best requisites for motors with high efficiencies. The new motors for EFF1 (High Efficiency) offer considerable energy savings and protect

our environment. The table shows an overview of the technical features of these motors. The presently available product range with ordering data, technical data and detailed explanations are provided in the new Catalog News D 81.1 N "Low-Voltage Motors - IEC Squirrel-Cage Motors - New Generation 1LE1 - Frame Size 100 to 160" and on the Internet under:

<http://www.siemens.com/motors>

IEC Squirrel-Cage Motors - new generation 1LE1	
Versions	<p>Self-cooled energy-saving motors with:</p> <ul style="list-style-type: none"> • Improved efficiency (EFF2) • High efficiency (EFF1) <p>Self-cooled motors with increased output and:</p> <ul style="list-style-type: none"> • Improved efficiency (EFF2) • High efficiency (EFF1) <p>Forced-air-cooled motors without external fan and fan cover with:</p> <ul style="list-style-type: none"> • Improved efficiency (EFF2) • High efficiency (EFF1)
Rated power	0.75 ... 22 kW
Frame sizes	100 L ... 160 L
Type of construction	<p>Without flange: IM B3, IM B6, IM B7, IM B8, IM V5 without protective cover, IM V6, IM V5 with protective cover</p> <p>With flange: IM B5, IM V1 without protective cover, IM V1 with protective cover, IM V3, IM B35</p> <p>With standard flange: IM B14, IM V19, IM V18 without protective cover, IM V18 with protective cover, IM B34</p>
Speed	750 ... 3000 rpm
Rated torque	9.9 ... 150 Nm
Rated voltages	All commonly used voltages
Designation	EU/CEMEP efficiency classification: EFF1: 2-, 4-pole, EFF2: 2-, 4-pole US Energy Policy Act EPACK: 2-, 4-, 6-pole (available soon)
Degree of protection	IP55 as standard
Housing	Aluminum
Cooling type	<p>Self-cooled: Frame size 100 L ... 160 L (IC 411),</p> <p>Forced-air cooled: Frame size 100 L ... 160 L (IC 416)</p>
Temperature class	Temperature class 155 (F), utilized to temperature class 130 (B)
Approvals	CE



Examples, IEC squirrel-cage motors - new generation 1LE1, aluminum housing

SINAMICS G110, SINAMICS G120, SINAMICS G120D

Appendix

Low-voltage motors Customized motors

In addition to the products offered in the catalog, our range of motors also includes "Customized motors".

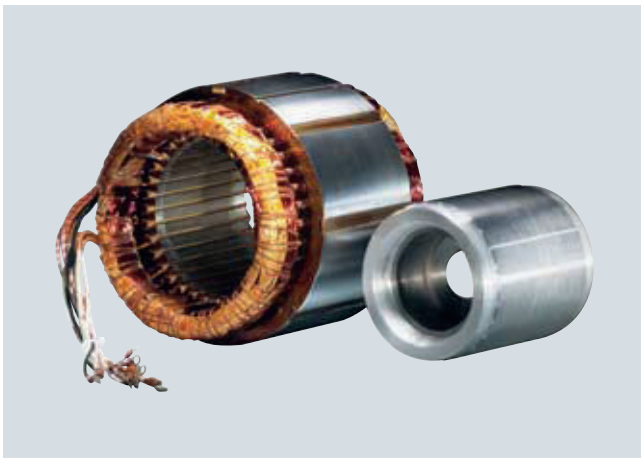
We can develop individual drive solutions for your special requirements, provide samples and supply them in accordance with your logistical requirements.

Our worldwide network of Siemens offices as well as our regional offices in Germany are, of course, at your disposal for advice (see "Siemens Contacts Worldwide").

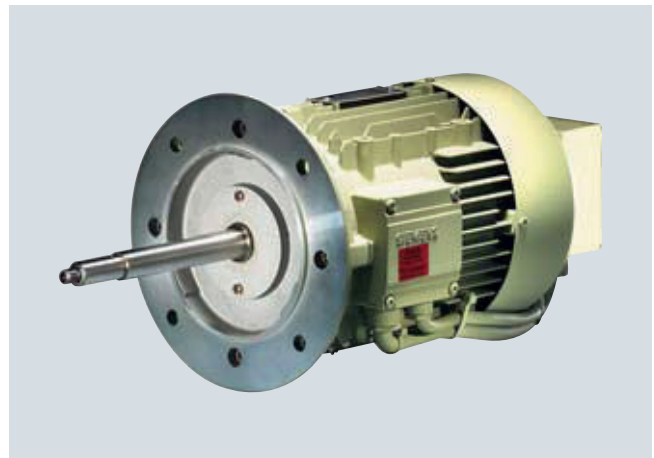
Please inquire for details.

We have listed below some of the "Customized solutions" already realised:

- High-speed motors for textile machines and compressors
- Motors with increased power density
- Liquid-cooled motors
- Synchronous generators for standby supply systems
- Motors for wood processing plants
- Built-in motors for refrigerating motors/compressors (freezer proof)
- Rolling motors for harsh conditions (e.g. roller drives)
- Pump motors with special shafts/special materials
- Single-phase motors for industrial applications
- Lifting gear motors



Built-in motor for refrigeration



Pump motor with special shaft/special materials



Roller motor for harsh conditions



Lifting gear motor

SINAMICS G110, SINAMICS G120, SINAMICS G120D

Appendix

Low-voltage motors NEMA motors

For compliance with the local specifications of the NAFTA markets (USA, Canada and Mexico), we manufacture low-voltage motors acc. to the NEMA standard for a wide range of different application areas. This includes motors designed in accordance with the US act, EPACT (specified minimum efficiency levels), as well as motors with NEMA premium efficiency levels: Our NEMA motor series provide the highest operating reliability and maximum service life. Designed and manufactured for rugged oper-

ation, our NEMA motors conquer even the harshest industrial conditions strictly in accordance with the ISO 9001 international quality standard; with maximum performance, reliability and efficiency.

You will find the complete product spectrum with ordering data, technical specifications and information in Catalog D 81.2

U.S./Canada on the Internet at <http://www.sea.siemens.com/motors>

NEMA motors (NEMA = National Electrical Manufacturers Association)	
Frame size	NEMA frame size 56 ... 449
Output range	0.25 HP ... 500 HP
Number of poles	2/4/6/8
Voltages	230/460/575 V 3 AC
Frequency	60 Hz, 50 Hz on request
Type of construction	Foot-mounted, D flange, C flange, P flange
Housing	Cast-iron, aluminum or steel depending on the version
Cooling method	Surface-cooling or internal ventilation depending on the version
Temperature class	F used acc. to B
Type spectrum	<p>General purpose motors</p> <ul style="list-style-type: none"> • Legally specified minimum efficiency levels or NEMA premium efficiency levels • Standard motors for general industrial use • Aluminum or cast-iron case depending on the version <p>Severe duty motors</p> <ul style="list-style-type: none"> • Legally specified minimum efficiency levels or NEMA premium efficiency levels • Cast-iron case • Motors for use under extremely difficult environmental conditions <p>Severe duty IEEE841 motors</p> <ul style="list-style-type: none"> • Efficiency levels required by IEEE that exceed the EPACT act • Motors with increased requirements for use in the petrochemical industry (according to IEEE841) • Cast-iron case <p>Explosion-proof motors</p> <ul style="list-style-type: none"> • Efficiency levels better than or equal to EPACT • Multi label according to Division 1, Class I, Group D and Class II, Groups F&G • Single label according to Division 1, Class I, Groups C&D



Example of NEMA motor, Severe Duty SD100, cast-iron case



Example of NEMA motor, General Purpose GP10A, aluminum case