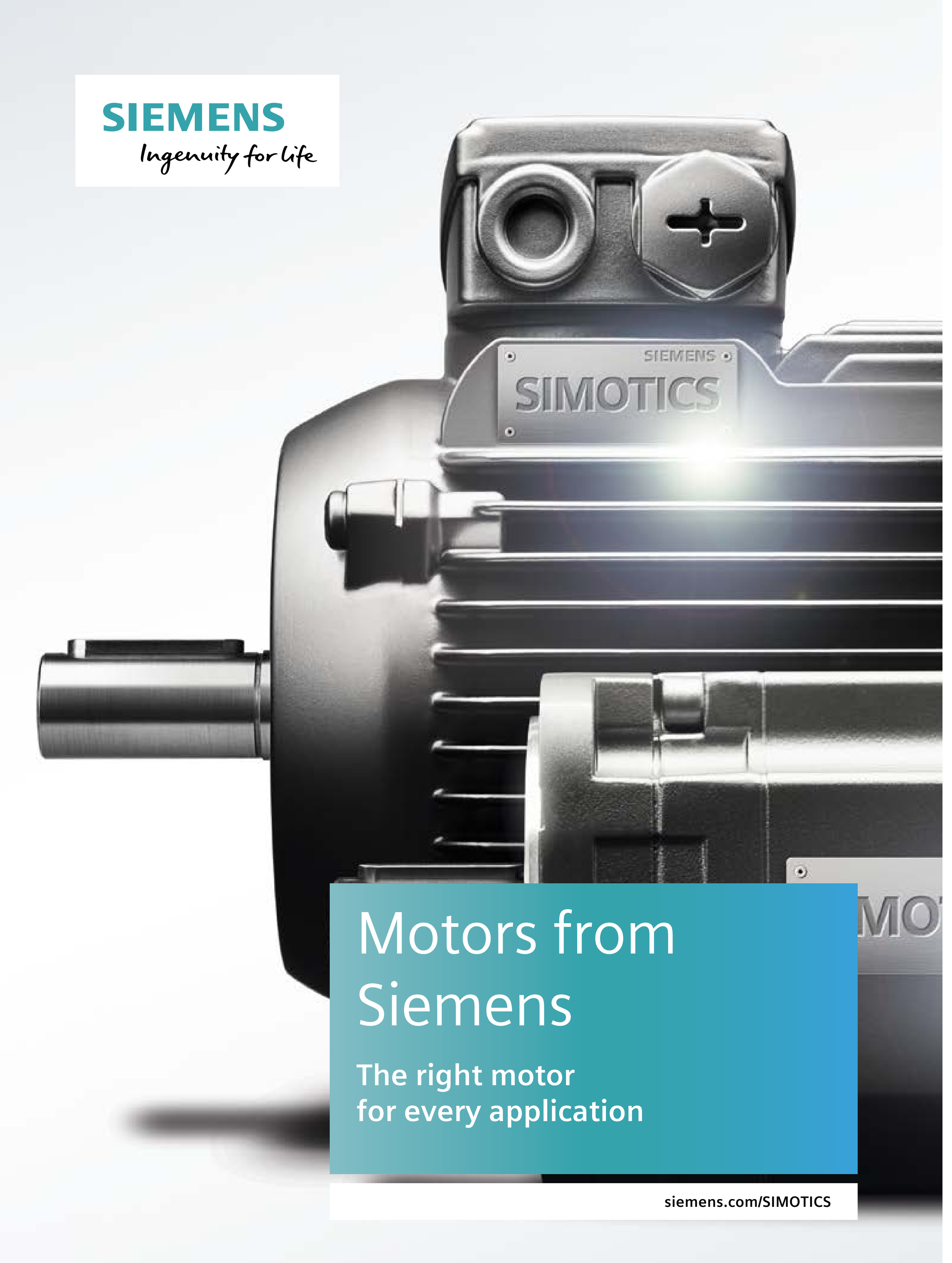

Motors from Siemens

The right motor for every application

siemens.com/SIMOTICS

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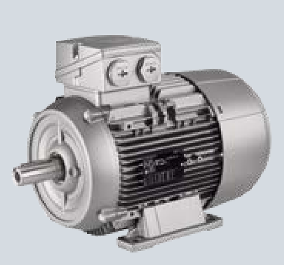
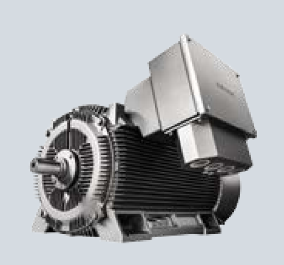
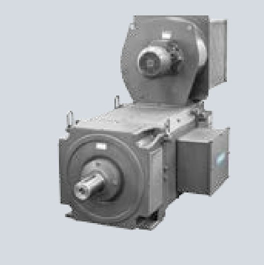
	SIMOTICS														
Motors	Low-voltage motors for line and inverter operation							Motion control motors					Direct-current motors	High-voltage motors	
The right motor for every application	General Purpose SIMOTICS GP	Severe Duty SIMOTICS SD	Explosion Proof SIMOTICS XP	Definite Purpose SIMOTICS DP	Transnorm SIMOTICS TN	Flexible Duty SIMOTICS FD	High Torque SIMOTICS HT	Servomotors SIMOTICS S		Main Motors SIMOTICS M	Linear Motors SIMOTICS L	Torque Motors SIMOTICS T	SIMOTICS DC	SIMOTICS HV	
															
Summary description	Asynchronous/synchronous-reluctance motors with aluminum frame: light, reliable, compact and optimized for converter operation: VSD10 asynchronous motors, VSD4000 synchronous reluc-tance motors; NEMA and APAC motors for applications in the USA and ASEAN markets	Asynchronous/synchronous-reluctance motors with gray cast-iron frame: robust, reliable, compact and optimized for converter operation: VSD10 asynchronous motors, VSD4000 synchronous reluc-tance motors; NEMA and APAC motors for applications in the USA and ASEAN markets; pole-changing motors	Explosion-proof asynchronous motors for reliable operation in Ex-Zones 1, 2, 21 and 22 or Division 1 (Class 1 and 2) and Division 2 (Class 1 and 2)	Marine motors, roller table and steel plant motors, smoke extraction motors, crane motors, and customized motors in asynchronous technology	Asynchronous motors with gray cast-iron frame for standard and harsh ambient conditions	Asynchronous motors with gray cast-iron frame optimized for converter operation, including explosion-proof motors and industry solutions for marine motors, crane motors and energy storage motors	Multi-pole torque motor for gearless use in applications requiring high torques	Servomotors with highly dynamic positioning and precise motion sequences	Servo geared motors with highly dynamic positioning and precise motion sequences	Main motors offering the largest performance range of any vendor worldwide and flexibility of selection thanks to our modular system principle	Linear motors for maximum dynamics, maximum force rating and precision in linear travel movements	Torque motors offering the highest precision across the entire torque range in an extremely compact design with round shafts	DC motors for variable speed operation with low shaft heights at high torque; reli-able and low-noise	High-voltage asynchronous motors for line and inverter operation: compact, flexible, high availability	High-voltage synchronous motors for line and inverter operation: compact, flexible, high availability
Efficiency / Motor efficiency class	IE4, IE3, IE2, IE1, NEE, NPE	IE4, IE3, IE2, IE1, NEE, NPE	IE3, IE2, IE1 NEE, NPE	IE4, IE3, IE2, IE1 NEE, NPE	IE2, IE3, NPE	Water-cooled motors for line operation: IE2, IE3			up to approx. 0.85					up to 98.2%	up to 98.8%
System efficiency class with Sinamics G (EN 50598-2)	IES1/IES2	IES1/IES2	IES1/IES2	IES1/IES2		IES2		–	–	–	–	–	–	–	–
IEC – shaft height / NEMA – frame size	IEC: 63 to 200 Reluctance: 80, 112 to 200 NEMA: 140 to 250	IEC: 71 to 315 Reluctance: 80, 112 to 200 NEMA: 140 to 440	IEC: 63 to 450 NEMA: 140 to 440	IEC: 63 to 315 NEMA: 140 to 440	315 to 560	315 to 450	400 to 500	20 to 132	Gear sizes 29–149	80 to 355 (shaft height of M-1PH8 complete motor) 40 to 180 (size of M-1FE built-in motor)	–	150 to 280 (shaft height of 1FW3) /159 to 730 (stator outside diameter of 1FW6)	160 to 630	315 to 1,600	up to 1,600
Rated torque M_N, Feed force F_N	IEC: 0.61 to 293.8 Nm Reluctance: 3.5 to 191 Nm NEMA: 1.5 to 60 lb-ft	IEC: 1.3 to 2,070 Nm Reluctance: 3.5 to 191 Nm NEMA: 1.5 to 1,483 lb-ft	IEC: 0.61 to 8,090 Nm NEMA: 1.5 to 1,187 lb-ft	IEC: 2.5 to 3,142 Nm NEMA: 1.5 to 1,104 lb-ft	800 to 22,500 Nm	610 to 14,600 Nm	6,000 to 42,000 Nm	0.08 to 125 Nm	---	2.9 to 12,435 Nm	150 to 10,375 Nm	10 to 7,000 Nm	256 to 44,500 Nm	up to 370 kNm	up to 2,460 kNm
Max. torque M_{max}, Max. force F_{max}							42,000 Nm	330 Nm	Depending on geared motor up to 8,160 Nm	31,000 Nm	20,700 N	10,900 Nm			
Rated speed n_N, Speed at rated force	IEC: 750 to 3,000 min^{-1} (at 50 Hz) Reluctance:1,500/1,800/ 2,610 min^{-1} NEMA: 900 to 3,600 min^{-1} (at 60 Hz)	IEC: 750 to 3,000 min^{-1} (at 50 Hz) NEMA: 900 to 3,600 min^{-1} (at 60 Hz)	IEC: 750 to 3,000 min^{-1} (at 50 Hz)	IEC: 750 to 3,000 min^{-1} (at 50 Hz) NEMA: 900 to 3,600 min^{-1} (at 60 Hz)	IEC: 750 to 3,000 min^{-1} (at 50 Hz)	IEC: 750 to 3,000 min^{-1} (at 50 Hz)	IEC: 200 to 800 min^{-1} (at 50 Hz)	1,500 to 6,000 min^{-1}	---	400 to 25,000 min^{-1}	up to 836 m/min (at F_{max})	38 to 1,450 min^{-1}	up to 4,500 min^{-1}	Line operation: up to 3,600 min^{-1}	Line operation: up to 3,600 min^{-1}
Maximum speed n_{Max}/ Max. speed	Asynchronous: up to 6,000 min^{-1} Reluctance: up to 4,500 min^{-1}	Asynchronous: up to 6,000 min^{-1} Reluctance: up to 4,500 min^{-1}	up to 6,000 min^{-1}	up to 10,000 min^{-1}	up to 5,000 min^{-1}	up to 3,600 min^{-1}	up to 1,000 min^{-1}	10,000 min^{-1}	10 to 1,280 min^{-1}	40,000 min^{-1}	–	2,900 min^{-1}	up to 4,500 min^{-1}	Converter operation: up to 15,900 min^{-1}	Converter operation: 7 to 7,000 min^{-1}
Overload capability	up to 2 * M_N	up to 2 * M_N	up to 2 * M_N	up to 2 * M_N	up to 2 * M_N	up to 3 * M_N	up to 1.5 * M_0	up to 4.6 x M_0	–	up to 2.5 x M_0	up to 2.75 x F_N	up to 2 x M_0	2.2 for short duration	–	–
Type of protection (rating)	IEC: IP55, IP56, IP65 NEMA: IP54	IEC: IP55, IP56, IP65 NEMA: IP55	IEC: IP55, IP56, IP65 NEMA: IP65	IP55, IP56, IP65 NEMA: IP55	IP23, IP55, IP56, IP65	IP23, IP55, IP56, IP65	IP55	IP64, IP65, IP67	IP65/IP66	IP23, IP55 ,IP65, IP55/fan IP54 or as indicated by equipment manufacturer	IP65 or as indicated by equipment manufacturer	IP55, IP54, IP23 or as indicated by equipment manufacturer	IP23, IP54, optionally IP55	IP23 to IP66 (special designs up to IP68)	IP23–IP56
Explosion protection	–	NEMA: Division 2, Groups F&G, Class I	IEC: Ex e IIC, Ex de IIC, Ex d IIC, Ex nA, Ex tb, Ex tc and double protection Ex nA / Ex tc NEMA: Division 1, Groups C and D, Class I, Division 1, Groups F and G, Class II, Division 1, Group D, Class I	–	Ex n, Ex t, Ex p, Division 2, Class I	Ex nA IIC (Zone 2), Ex tc IIIB (Zone 22)	–	optional Zone 2 to IEC 60079-15 optional Zone 22 to IEC 61241-1	–	optional Zone 2 (up to AH 160) to IEC 60079-15 optional Zone 22 (up to AH225) to IEC 61241-1	–	–	–	Ex nA, Ex d, Ex e, Ex p, Ex t	Ex nA, Ex p
Cooling method	IEC: self-cooling, forced-air cooled NEMA: totally enclosed fan cooled (TEFC)	IEC: self-cooling, forced-air cooled NEMA: totally enclosed fan cooled (TEFC)	IEC: self-cooling, forced-air cooled NEMA: totally enclosed fan cooled (TEFC)	Self-cooling, forced-air cooled NEMA: totally enclosed fan cooled (TEFC), totally enclosed blower cooled (TEBC)	Self-cooling, forced-air cooled, through ventilation, water-jacket cooled, air-to-air heat exchanger, air-to-water heat exchanger	Self-cooling, forced-air cooled, through ventilation, water-jacket cooled, air-to-water heat exchanger	Rib-cooled with forced-air cooling, water-jacket cooled	Self-cooling, forced-air cooled, water-cooled	Self-cooling	Forced-air cooled, water-cooled, through ventilation	Self-cooling, water-cooled	Self-cooling, water-cooled	Forced-air cooled, air-to-air heat exchanger, air-to-water heat exchanger, through ventilation	Self-cooling, forced-air cooled, air-to-air heat exchanger, air-to-water heat exchanger, through ventilation	Self-cooling, forced-air cooled, air-to-air heat exchanger, air-to-water heat exchanger, through ventilation
Encoders	Optional: HTL pulse encoder TTL pulse encoder	Optional: HTL pulse encoder, TTL pulse encoder NEMA: 1024PPR stub shaft encoder	Optional: HTL pulse encoder	Optional: HTL or TTL pulse encoder (type-dependent) NEMA: 1024PPR stub shaft encoder	Optional: HTL pulse encoder, TTL pulse encoder, EnDat absolute encoder	Optional: HTL pulse encoder TTL pulse encoder	Optional: HTL pulse encoder, TTL pulse encoder, EnDat absolute encoder	High-resolution incremental encoder, simple and high-resolution absolute encoder, resolver	Single- and multi-turn absolute encoder as well as resolver with DRIVE-CLiQ interface	HTL incremental encoder, sin/cos EnDat absolute encoder Built-on encoder (SIMOTICS M-1PH835.) Hollow shaft encoder optional without encoder	External encoder, depending on the machinery/equipment design	Complete torque motors: high-resolution incremental encoder, high-resolution absolute encoder, 8-pole resolver/optional coaxial build-on encoder inte-grated torque motors: External encoder, depending on the machinery/equipment design	Encoderless operation, resolver (on request), incremental encoder (sin/cos, 1Vpp) (on request), EnDat absolute encoder (on request), HTL pulse encoder, TTL pulse encoder	Encoderless operation, resolver, incremental encoder (sin/cos, 1Vpp), EnDat abso-lute encoder, HTL pulse encoder, TTL pulse encoder	Encoderless operation, resolver, incremental encoder (sin/cos, 1Vpp), EnDat absolute encoder, TTL pulse encoder
Option – Moter brake	Yes	Yes	On request	Type-dependent	Yes	Yes	–	Yes	Holding brake as a permanent magnet or spring-loaded brake	Yes	–	–	Yes	Yes	Yes
Option – DRIVE-CLiQ interface	–	–	–	–	–	–	–	Yes	Yes	Yes	–	Yes (1FW3) / - (1FW6)	–	–	–
Option – Forced-air fan	Yes	Yes	Type-dependent	Yes	Yes	Yes		Yes		Yes				Type-dependent	Type-dependent
Option – 2nd shaft end	Yes	Type-dependent	Yes	Type-dependent	Yes	Yes	–						Yes	On request	On request
Typical applications	Pumps, fans, compressors with specific requirements relating to low weight	Pumps, fans, compressors, marine applications, offshore, mixers, crushers, extruders, rolling mills with special require-ments regarding the ruggedness, especially in the chemical and petrochemical industries	General industrial applications with special requirements relating to explosion protection in zone 1, 2, 21 and 22, e.g. in the process industries	Marine applications, transport and working roller tables, venti-lating tunnels, parking garages, shopping malls, port cranes, container terminals as well as customized motors, adapted for special applications	Pumps, fans, compressors, conveyor belts, mixers, extruders in the chemical and petrochemi-cal industries, paper machines, mining, cement, steel industry and marine applications, including propulsion	Pumps, fans, compressors, conveyor belts, centrifuges, extruders, winches, lifting hoist and cranes, presses, paper machines, rolling mills and marine applications, including propulsion	Gearless motors with high torque for papermaking machinery, slow-running pumps, mills, industrial steel shears, bow thrusters, winches or main drives in ships	Packaging machinery, plastics and textile machinery, printing machines, wood, glass, ceramics and stone processing equipment, robots, materials handlings systems, conveyor systems, industrial feed and auxiliary shafts in machine tools	Packaging machinery, printing machines, machine building, wood and metal working, palettizers, storage and retrieval machinery, dosing pumps, applications similar to palettizers and storage and retrieval machinery involving, lifting, travel and forklift operations, dosing pumps and actuators	Applications subject to the highest standards governing precision in highly dynamic systems, e.g.: machine tools, packaging machinery, printing machines, servopresses, conveyor systems, materials handling systems, extruders, calenders, rubber spraying machines, stretch wrapping machines, nonwoven fabric machinery, wire pulling machines, presses, cable and rope stranding machines, winders, clock reels, hoists and lock works, continuously running goods conveyors, sheetmetal working, main spindles and shafts in machine tools	Applications subject to highly dynamic requirements: machine tool building, laser machining systems, materials handling systems Applications with continuous changes in acceleration: grinding, out-of-roundness machining, z-axes without weight compensation, tail spindles, handling operations, Cartesian robots	Highly precise and dynamic applications, rolling mills and winding, rotary tables, rotary indexing machines, swivel axes, spindles and shafts in machine tools	Drive applications in all industrial areas and in the infrastructure	Medium- and high-voltage applications, particularly pumps, compressors, fans, extruders, mixers, rolling mills, conveyor-belt systems, maritime propulsion systems and mills	Medium- and high-voltage applications, particularly com-pressors, blast-furnace fans, refiners, pumps, extruders, rolling mills, vertical lift con-veyors, conveyor-belt systems, mills and maritime propulsion systems
Catalog	IEC: D81.1 NEMA: D81.2	IEC: D81.1 NEMA: D81.2	IEC: D81.1, D83.1 NEMA: D81.2	D81.1, CR1-2015 NEMA: D81.2	D81.1, D84.1	D81.8	D86.2	D 21.4, D31, NC 62, NC 81, NC 82	D41	D 21.4, D31, NC 62, NC 82	D 21.4, NC 62	D 21.4, NC 62	DA12, DA12T	D84.1	–

NEE: NEMA Energy Efficient
NPE: NEMA Premium Efficient