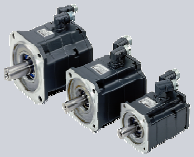
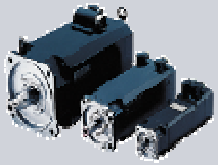
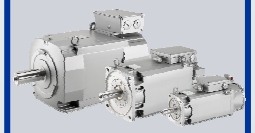
GMC Servomotors
Induction Motor

SIEMENS

induction motors				
	1PH7	1PH4	1PL6	New 1PH8 series
	Compact motor for high power ratings	Compact motor for high power ratings	Compact motor for high power ratings	Compact motor for high power ratings
Cooling method	Forced ventilation	Water cooling	Open-circuit air cooling	Forced ventilation, open-circuit air cooling, water cooling
				
Rated Output P_{rated}	3.7 to 385 kW	7.5 to 65 kW	20.5 to 630 kW	2.8 to 1340 kW
Rated Speed n_{rated}	400 to 2900 rpm	1500 to 2000 rpm	400 to 2900 rpm	400 to 3600 rpm
Max. Speed n_{max}	upto 12,000 rpm *)	upto 12,000 rpm *)	upto 7000 rpm *)	upto 20,000 rpm *)
Rated Torque M_{rated}	22 to 2480 Nm	45 to 333 Nm	370 to 3600 Nm	13 to 12,475 Nm

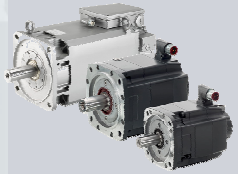
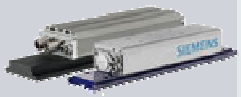
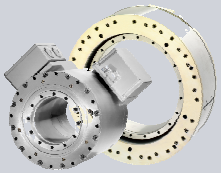
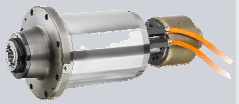
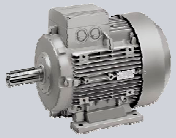
GMC Servomotors
Synchronous Motor

SIEMENS

Synchronous motors				
	1FK7	**1FT6**	**1FT7**	**New 1PH8 series**
	Standard for applications with a low power rating	High Performance for applications with low up to average power ratings	High Performance for applications with low up to average power ratings	Compact motor for high power ratings
Cooling method	Non-ventilated	Non-ventilated, forced ventilation, water cooled	Non-ventilated, forced ventilation, water cooled	Forced ventilation, water cooling
				
Rated Output P_{rated}	0.05 to 8.2 kW	0.2 to 118 kW	0.9 to 34.2 kW	15.7 to (300) kW
Rated Speed n_{rated}	2000 to 6000 rpm	1500 to 6000 rpm	1500 to 6000 rpm	1500 to 3200 rpm
Max. Speed n_{max}	upto 10,000 rpm *)	upto 12,000 rpm *)	upto 10,000 rpm *)	upto 4500 rpm *)
Rated Torque M_{rated}	0.08 to 37 Nm	0.3 to 690 Nm	1.4 to 125 Nm	94 to (1650) Nm

GMC Motors
for motion control applications

SIEMENS

Main-motors	Servo geared motors	Linear motors	Torque motors	Motor spindles	Special motors
Conventional rotating motors, synchronous and induction motor technology	Servomotors with ▪ Helical gears ▪ Parallel shaft gears ▪ Bevel gears ▪ Worm gears ▪ Planetary gears	Direct drives for positioning and motion control applications in linear axes demanding a high dynamic performance	Direct drives for rotary axes	Spindles and spindle drives for machine tools	Motors for sector / customer-specific applications
					

SIEMENS offers the optimum motors for each and every motion control application

LD Drives
MTO (Market to Order)

SIEMENS

DC drives	AC Low voltage						
SINAMICS DCM	SIMOVERT Masterdrives	SINAMICS					
		SINAMICS G		SINAMICS S			
		G130	G150	S150	S120		
					Chassis air cooled	Chassis Liquid Cooled	Cabinet Modules
Compact units: 15 – 3000 A Cabinet units: up to 30 MW	45–4500 kW	75–800 kW	75–1500 kW	75–1200 kW	75–4500 kW	90–4500 kW	1.6–4500 kW
Connection voltage can be configured 3 AC 380 - 950 V (cabinet units also > 1000 V)	Low voltage 380 - 690 V	Low voltage 380 - 690 V		Low voltage 380 - 690 V	Low voltage 380 - 690 V		
DC converter for 2Q and 4Q operation	Voltage-source DC link converter	Voltage-source DC link converter		Voltage-source DC link converter	Voltage-source DC link converter		
air cooled	LV-IGBT	LV-IGBT		LV-IGBT	LV-IGBT		
	2Q and 4Q operation	2Q operation		4Q operation	2Q and 4Q operation		
	air/water cooled	air cooled		air cooled	air/liquid cooled		
							

LD Drives
ETO (Engineered to Order)

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AC Low voltage - Loher

DYNAVERT

Dynavert T

2.2 - 3900 kW

Low voltage
230 - 690 V

PWM-Inverter

LV-IGBT

2Q operation

Air- / Water-
cooled

Dynavert L (Aufzüge)

2.2 - 150 kW

Low voltage
400 - 500 V

PWM-Inverter

LV-IGBT

2Q operation

Air-cooled

Dynavert XL (Windumrichter)

750 - 5500 kW

Low voltage
690 V

PWM-Inverter

LV-IGBT

4Q operation

Air- / Water-
cooled

Dynavert I

15 - 6000 kW

Low voltage
400 - 1140 V

Current-DC-link-Converter

LV-Tyristor

4Q operation

Air- / Water-
cooled

LD Drives
ETO (Engineered to Order)

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AC Medium voltage

ROBICON Perfect Harmony
200–40000 HP

Medium voltage
2.3 – 13.8 kV

Multi Cell Voltage Source Inverter

LV-IGBT
HV-IGBT

Air-/Water-cooled

SINAMICS GM150
0.6–30 MVA

Medium voltage
2.3 – 4.16 kV

3-level NPC Voltage Source Inverter

HV-IGBT
IGCT

Air-/Water-cooled

SINAMICS SM150
5–30 MVA

Medium voltage
3.3 kV

3-level NPC Voltage Source Inverter

IGCT

Water-cooled

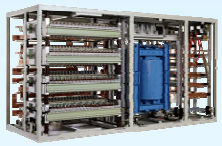
SINAMICS GL150
2.5–70 MVA

Medium voltage
1.8 – 13.4 kV

Load Commutated Inverter (LCI)

Thyristor

Air-/Water-cooled



SINAMICS SL150
3–25 MVA

Medium voltage
1 – 4 kV

Cyclo Converter (CC)

Thyristor

Air-/Water-cooled

LD Motors
MTO/ MTS (Market to Order/ Market to Stock)

SIEMENS

AC motors

Low-voltage AC motors

120 W - 1000 kW
Up to 1000 V
63M ... 450
IE1 / IE2 / IE3
Aluminium/Cast iron

1 LE1 IEC motors High Efficiency

750 W - 22 kW
690 V
100M ... 160
IE1 / IE2
Aluminium

ATEX motors

120W - 1000 kW
All of the usual voltages
63M ... 450
Aluminium/Cast iron

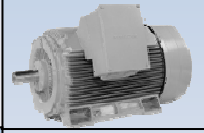
N-compact IEC

Standard	Highspeed
200 - 1000 kW	250 - 1250 kW 0-5000 min^{-1}
400 - 690 V 2 – 8 Pole	400 - 690 V 2 Pole

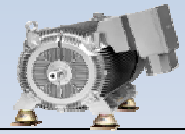
squirrel-cage rotor

caste frame with cooling ribs

IP23, IP55



IP55



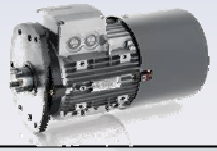
NEMA motors

NEMA 140 ... 440
1 ... 400 HP
3-Phase
EPAct/NEMA Premium
Aluminium/Cast iron

Customized motors

The technical specifications fulfill your requirements

Aluminium/Cast iron



Motors for specific sectors

Smoke extraction motors
0.37 kW to 200 kW

Ship's motors	0.06 kW - 1000 kW
Roller table motors	4 kW - 66 kW
Crane motors	1,1kW - 481 kW

Aluminium/Cast iron

ANEMA

150 - 1340 HP

460 – 575 V
2 – 8 pole

squirrel-cage rotor

caste frame with cooling ribs
IP55/TEFC
ODP, WP I, WP II, TEAAC/TEWAC

(high-voltage motor frame with low-voltage winding)

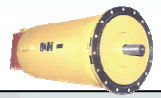
LD Motors
MTO/ MTS (Market to Order/ Market to Stock)

SIEMENS

DC motors	AC motors				
Series 5/6/7 IEC 31,5 – 1610 kW 256 – 42000 Nm	**1PH8- Shaft heigth 355** 600 – 1200 kW 400 – 690 V squirrel-cage rotor frameless IP 23/IP 55	**H-compact IEC** 200 - 3000 kW 690 V - 11 kV squirrel-cage rotor caste frame with cooling ribs IP55	**H-compact PLUS IEC, NEMA** Standard: 1000 - 11700 kW; 1340 - 18000 HP; 690 V – 13,2 kV Highspeed: 1000 - 7000 kW; 1000-4800 min; 2 – 13,2 kV squirrel-cage rotor caste/steel frame top-mounted cooler IP23, IP55, WP II	**Serie 1R.5 IEC** 300 - 6000 kW 3.3 - 10 kV slipring motor caste/steel frame top-mounted cooler IP55	**HT-direct Torque motors** 5 - 42 kNm 0-800 min^{-1} 400 - 690 V permanent-Magnet synchronous motor caste/ steel frame
		ANEMA 150 - 2500 HP 0.2 - 11 kV 2 – 16 Pole squirrel-cage rotor caste frame with cooling ribs IP55/TEFC	**ANEMA** 200 - 10000 HP 0.2 – 13.8 kV 2 – 16 Pole squirrel-cage rotor caste frame Top-mounted cooler ODP, WP I, WP II, TEAAC/TEWAC		

LD Motors
ETO (Engineered to Order)

SIEMENS

Loher GmbH					DT LD S			
Industrial motors	**Vario**	**Tube-cooled motor**	**J series**	**Special motors Loher**	**H-modyn, IEC, ANEMA**	**A-modyn, NEMA**	**HS-modyn, NEMA**	**Special machines**
0.1 – 315 kW	315 - 1900 kW	2000- 5600 kW	500 - 10000 kW	Explosion protected motors	7000 - 50000 kW 9390 - 67000HP	5000 – 30000kW	4000 – 16000kW	2000 - 100000 kW
400 – 690 V 4,15 kV	400V - 11 kV	400V - 11 kV	400V - 11 kV	in deg. of prot. Ex d, e, n, p	6 - 13.2 kV	10 kV / 13.,2 kV	3,3 kV / 13,2 kV	690 V - 13.2 kV
sq.-cage rotor aluminium or cropper	sq.-cage rotor slipring rotor	sq.-cage rotor slipring rotor	sq.-cage rotor slipring rotor	▪Smoke extr.motors (Tunnel ventilation)	sq.-cage rotor synchronous	sq.-cage rotor synchronous	Massive rotor induction	sq.-cage rotor synchronous
cast frame with cooling ribs or steel frame water cooling	steel frame with cooling ribs steel frame with Water-jacked cooling	steel frame	steel frame cooler assembly	▪Subsea- and submersible pump motors ▪Mining motors ▪Retrofit/ Dimensional Adaptions ▪Ship motors ▪Gas-tight motors ▪Lift motors	steel frame water cooler	steel frame water cooler	steel frame water cooler	Example: main cooling med. pump drive high-speed IM
IP55-IP66	IP56	IP55	IP23, IP56		IP55, WP II	IP54	IP54	
								

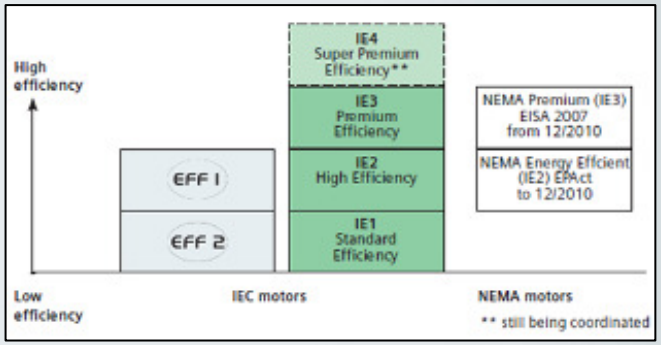
SIEMENS

IE Changeover

Why do we need the IE changeover?

Emerging from the **Kyoto protocol**, the participating countries have agreed to massively reduce CO_2 emissions in their countries by 2020.

This commitment is to be achieved by applying an extremely wide range of measures.
With this purpose in mind, the EU has drawn-up and published **a Directive for "energy users"** – which has been documented in the EuP Directive (EuP = Energy Using Products).

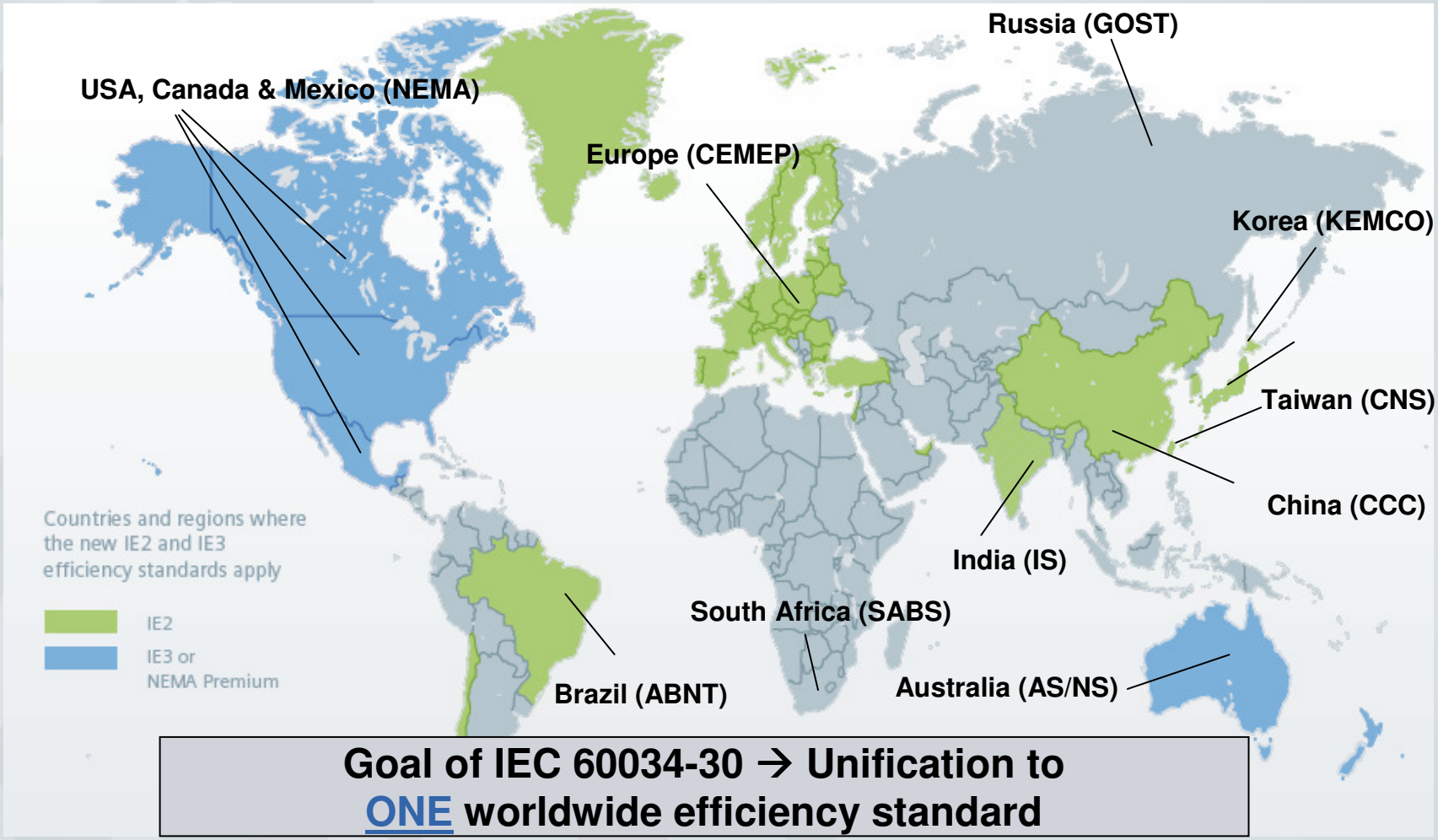


The EuP addresses the widest range of technologies and products, such as e.g. the power consumption of PCs, standby power consumption of entertainment electronics such as TV sets, charging devices, incandescent lamps, etc. The power consumption and the efficiency of induction motors is discussed in the 11th subsection of the EuP; the efficiency can be clearly defined using the efficiency data. Here, EuP is based on **standard IEC60034-30:2008** which regulates and defines efficiencies throughout Europe/worldwide.

SIEMENS

IE Changeover

Efficiencies – Initial situation worldwide



Goal of IEC 60034-30 → Unification to ONE worldwide efficiency standard

IE Changeover

	CEMEP Voluntary EU Agreement	EuP Directive Based on standard IEC 60034-30 (EuP Directive 07/2009 passed; EuP – Energy Using Products)
Description	Voluntary agreement between the EU Commission and the European Manufacturers Association CEMEP.	The EuP Directive must be implemented in domestic legislation in all EU countries. IEC 60034-2-1: 2007 is the basis for determining the losses and therefore the efficiency.
Number of poles	2, 4	2, 4, 6
Power range	1.1 – 90 kW	0.75 – 375 kW
Level	EFF3 - Standard EFF2 - Improved efficiency EFF1 - High efficiency	IE1 - Standard Efficiency IE2 - High Efficiency IE3 - Premium Efficiency mandatory from 16.06.2011
Voltage	400 V, 50 Hz	< 1000 V, 50/60 Hz
Degree of protection	IP5X	all
Motors with brake	no	no
Geared motors	no	yes
Ex motors	no	EuP Directive – NO Siemens stamps zone 2/21/22
Validity	Voluntary agreement; is withdrawn with the implementation of domestic legislation.	Standard IEC 60034-30, valid since October 2008, EuP Directive has already been passed, domestic legislation must be implemented at the latest by 16.06.2011. This means that manufacturers may no longer market IE1 motors in the European Union.

NEMA motors

The current energy legislation EPAct (Energy Policy Act) will be replaced effective 12.2010 by EISA (Energy Independence Security Act).

Currently, EPAct defines the minimum efficiency (IE2) for power ratings from 1 to 200 HP, 2/4/6-pole, voltages of 230 V and 460 V. A series of exceptions apply.

From 12.2010, EISA extends the legal minimum efficiency requirements and the following motors must fulfill the NEMA Premium Level (IE3):

- 1-200 HP
- 2/4/6 pole
- 230 V, 460 V

Further, for instance, the following motors must comply with the NEMA Energy Efficient Level (IE2):

- 201-500 HP
- 2/4/6 and **8 pole**
- All voltages < 600 V with the exception of 230 V and 460 V
- Footless motors (IM B5)
- NEMA Design C (increased starting torque)

For details, refer to NEMA MG1, Table 12-11.

SIEMENS

IE Changeover

Equipped for the future
from EFF2 (IE1) → IE2 (~EFF1) Siemens motor series

motor (IE1)	shaft height	changeover to (IE2)
1LA7	80-90	1LA9
1LA7/1LE1002	100-160	1LE1001
1LA5	180-200	1LA9
1LA5	225	1LG6
1LG4	180-315	1LG6
1LA8	315-355	1LA8 (the motors today already fulfill IE2)
Explosion-protected motors Zone 2, 21 + 22	80 -225	Minimum efficiencies for IE2 not by law (EuP) Siemens labels all shown FS regarding the new standard