SQM Torque Motor

Industry leading

with **smart** direct drive technology

High Performance
Unbeatable Efficiency
High Dynamics
No Water Cooling

EMF Motor®

EMF Motor

Only the Best wins ...

Every solution comes from a real understanding of the challenges facing designers and users.

EMF continues to be a company made up of innovative individuals striving to design, create and build products and solutions that improve industrial demands. We design our products for durability and we test them rigorously to ensure the highest of reliabity.

Our products are the **"next big thing"** in electric motors. Our patented technology provides the ground to attract world's most talented and motivated engineers. EMF products will benefit design engineers to innovate compact products that will respond to the increasing demand from customers.

"Precise motion" is our focus. SQM Torquemotor can distinctly differentiate your product, your efficiency and your operations and deliver a market place advantage by improving its performance. This means totally increased efficiency which is the expactation in every company. Perfectly deployed motion can make your product more reliable and efficient and enhance accuracy.

How is this all possible? What is so different with SQM Torquemotor?

SQM Torquemotor works with patented motor principle that is most suitable for high torque at low speed applications. SQM works synchronously and the windings have no influence on the pole number. The high pole number is achieved by intelligent magnetic field.

As a result SQM Torquemotor, as a direct drive, offers great advantages in all performance criterias, such as very high energy efficiency, high dynamics, high overload capacity, quiet and practically maintenance free operation.

SQM Torque Motor

Awarded, German Patented Direct Drive Technology

EMF Motor manufactures precision motors for decreasing the energy costs and reducing the manufacturing losses of its customers, as well as for increasing manufacturing speeds and providing high quality products.

Thanks to its patented motor design, EMF Motor offers the industry low speed and high torque motors which have high performance and high number of poles and which do not require gearboxes as if they feature a built-in magnetic gearbox. The motors of EMF, which are ideal for applications requiring top performance in different industries, can also be customized to meet the requirements of the customers.

The torque is constant from standstill to nominal speed regardless of the load. These motors are dynamic by owing to their low moments of inertia, and can be controlled with utmost precision thanks to their design with high number of poles; they run quietly, they do not require maintenance and they have the highest efficiency in entire electric motor segment. EMF Motors have excellent performance in direct drive servo applications, accelerate rapidly and run with high stability.

Characteristics

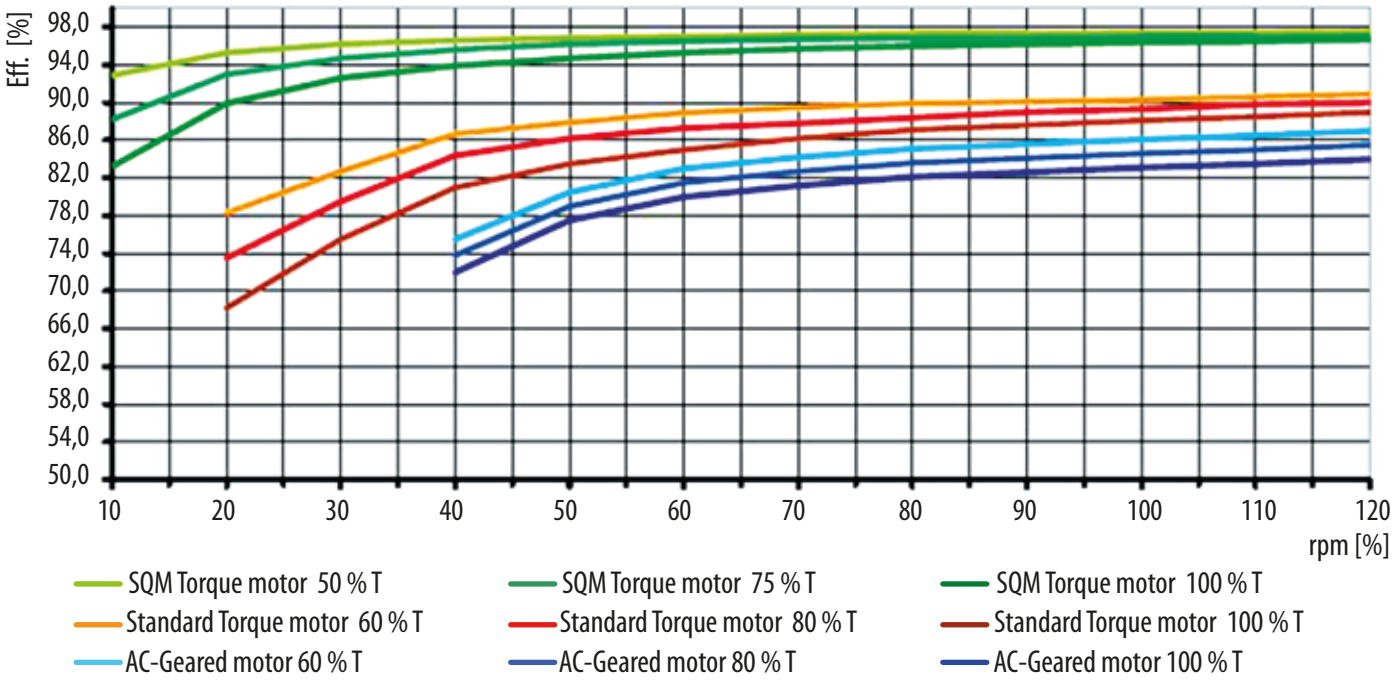
- **just direct drive, no gearbox, no water cooling**
- Use SQM Torque Motor for servo applications with absolute encoder
- Use SQM Torque Motor even with V/F controller
- Highest torque at low speed
- No maintenance
- Unbeatable Efficiency
- Quiet running
- Highest power density
- Highest efficiency
- Full torque over the full speed range
- High overload capacity
- Highest dynamics and controlability
- Cooling IC410 (convection)
- Protection class IP54
- Flange / foot mount
- No water cooling required

Technical Specifications

• Motor Technology	Permanent magnet synchronous motor
• Frame Size	47, 71, 80, 100, 132, 160, 200, 250 and 315 mm
• Torque Range	up to 13.000 Nm (*)
• Number of Poles	44 - 110
• Rated voltage	up to 690 VAC supply voltage
Cooling	IC410 - water cooling is not required for standard motors. IC416 - optional for special projects
• Protection level	IP 54, IP 55
• Thermal protection	PTO, PTC, PT100 or KTY
• Hollow shaft	Customized mechanical interfaces available on request
• Feedback sensor	Contact for the encoder options
• Marking	CE

(*) with the blower kit

Efficiency Diagram in full range of speed and torque

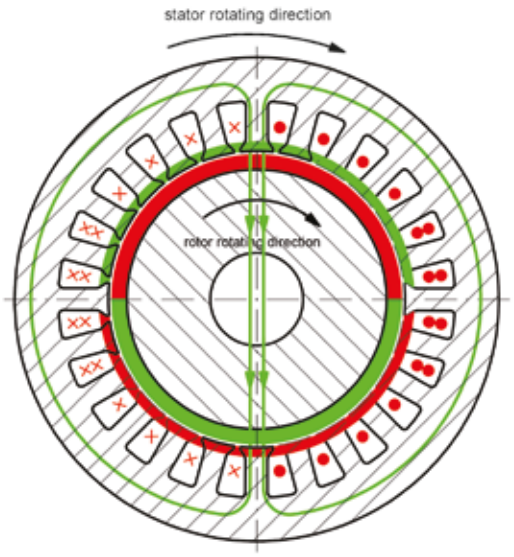


Electrically driven systems are consuming, roughly 70% of all electrical energy used in industry today. To help save the environment and make cost savings along the way, it is necessary to increase the efficiency of all electrical drives.

The purchase cost of an electric motor is only 1 % of the total operational cost during its lifetime or from another angle, approximately the cost of energy consumed in 8- 12 weeks of operation. These facts show very clearly the need to build electric motors with higher efficiency.

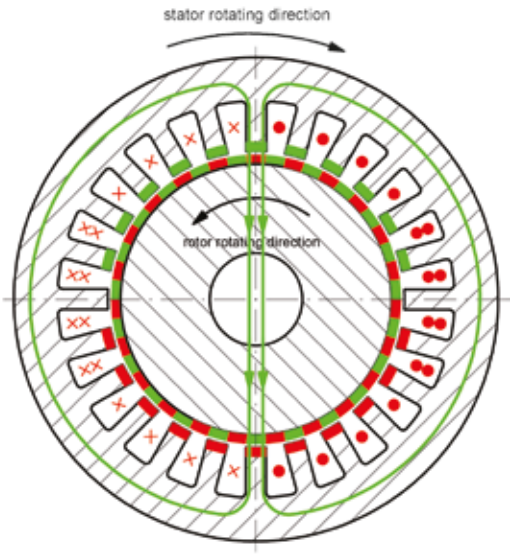
The new EMF motor principle

The stator of the EMF Motor® is very similar to a conventional motor. Permanent magnets are glued to the rotor. When the motor is supplied with zero voltage and frequency, magnetic flux which magnetizes the motor, is formed. When the frequency is increased, the rotating field starts to turn. The two magnetic systems, permanent magnets and magnetization created by the rotating field, start to pull and push each other over the whole circumference. The direction of rotation of the rotor is opposite to the rotating field and the rotor turns much more slowly than the rotating field. The permanent magnets and motor geometry define the speed reduction ratio.



Standard synchronous motor principle

2 pole stator winding
2 poles on the stator
2 poles on the rotor
stator rotating speed is 3000 rpm at 50 Hz
also the rotor speed is 3000 rpm at 50 Hz
ratio is 1



EMFMotor synchronous torque principle

2 pole stator winding
48 poles on the stator
46 poles on the rotor
stator rotating speed is 3000 rpm at 50 Hz
rotor speed is 130,43 rpm at 50 Hz
ratio is -23

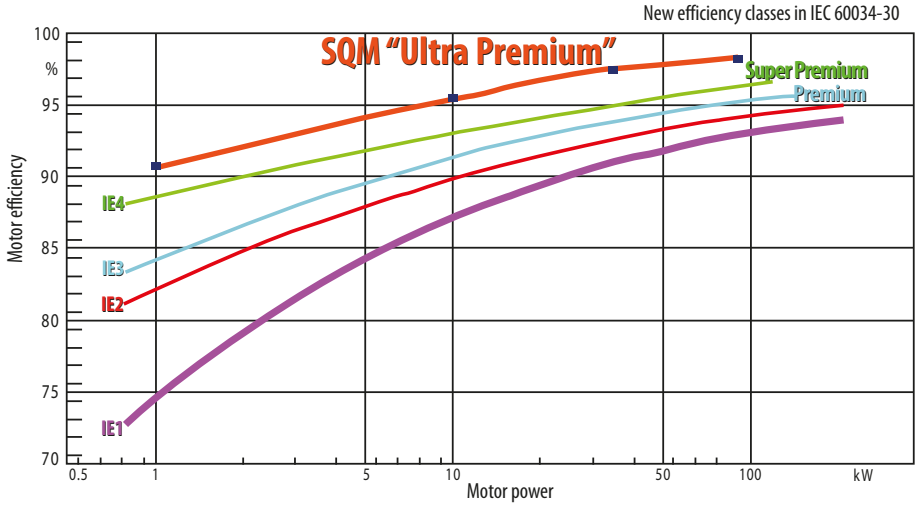
With this new motor principle a very high torque is created by low pole winding. The copper losses and hysteresis losses are very low which allows extremely high efficiency values.

Due to the high number of magnetic poles, rotation is very slow and a high torque achieved.

In most cases, no additional blower or water cooling is required for these motors.

The results show there is no other motor principle or design that even gets close to the level of efficiency achieved by SQM or the level of torque to weight ratio of the SQM design.

Efficiency comparison with IEC 60034-30



Due to the direct drive application, gearbox efficiency losses are eliminated.

The diagram shows the efficiency values for SQM motors. The efficiency of an **SQM motor is far better than an IE 3- " Premium" motor and even better than an IE 4- " Super Premium" motor.**

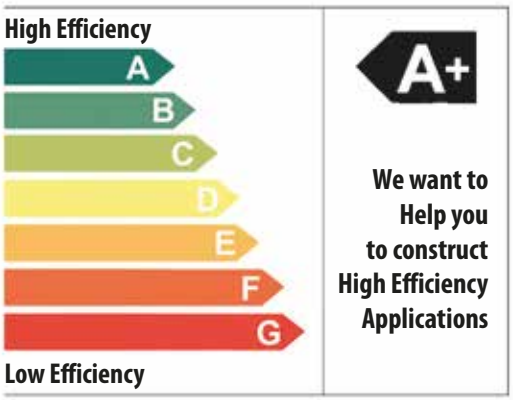
Since SQM motors are driven by an inverter without a gearbox, the total efficiency will be even higher.

SQM Series

The SQM Series is a square frame design incorporating the latest LiProKa motor technology. The motors have almost zero losses in efficiency with surprisingly high torques considering their compact frame design.
We guarantee high dynamic performance , high torque at low speeds with the very highest efficiency and without any additional cooling!

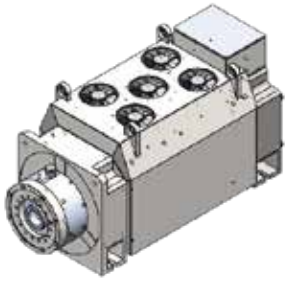
SQM 160 - 20 500 B 00 2 S 2 068

SQM - - -	SQM Square Framed Synchronous Torque Motor
160	Motor Frame Size
20	Iron Core Length x 10 mm
0500	Motor Rated Speed (rpm)
B	B=Mechanical Brake, X=without Brake SE=Surface Extension
00	Special Code
2	Thermal Protection 1=PT100, 2=PTO, 3=PT100+Thermistor
S	Feedback D=Digital Enc., R=Resolver, S=SinCos, B=Biss E=EnDat Enc., H=Hiperface X=without feedback
2	Motor Rated Voltage 1=230 VAC, 2=400 VAC, 3=460 VAC
068	Motor Pole Number



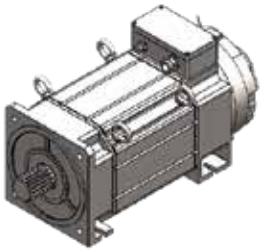
Solutions regarding the customer needs

Extruder motor with thrust bearing, hollow shaft, cooling jacket
Solution with cooling jacket: **30% higher performance**

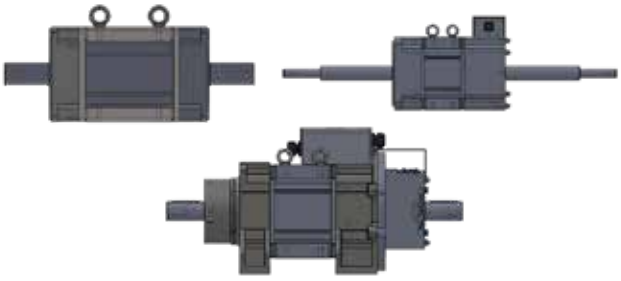


Hollow shaft high performance

Spline shaft and brake



Double shaft



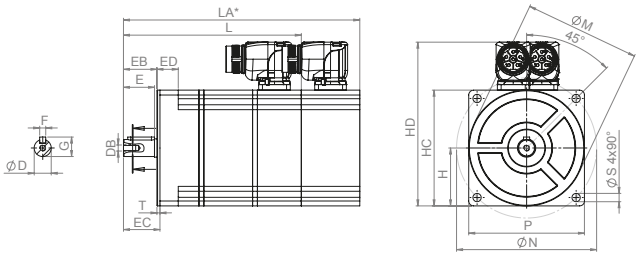
We customize your SQM exactly according to your torque and speed need

Motor Code	Pole Number	P_n (kW)	n_n (rpm)	M_n (Nm)	f_n (Hz)	kt	I_n (A)	Efficiency (%)	J (kgm^2)	W (kg) No Brake Fitted
SQM73-60	66	0.50	150	32	83	22.9	1.4	80	0.0051	18.5
		0.79	250	30	138	15.4	2.0	86		
		1.31	500	25	275	8.3	3.0	90		
		1.57	750	20	413	5.9	3.4	92		
SQM73-100	66	0.85	150	54	83	23.5	2.3	85	0.008	23.0
		1.31	250	50	138	15.6	3.2	89		
		2.04	500	39	275	8.9	4.4	93		
		2.36	750	30	413	6.5	4.6	94		
SQM73-140	66	1.18	150	75	83	25.0	3.0	86	0.011	27.0
		1.75	250	67	138	16.3	4.1	91		
		2.67	500	51	275	9.3	5.5	94		
		3.14	750	40	413	6.3	6.3	94		
SQM73-180	66	1.54	150	98	83	24.5	4.0	88	0.014	32.0
		2.25	250	86	138	16.2	5.3	92		
		3.40	500	65	275	9.4	6.9	95		
		4.01	750	51	413	6.7	7.6	95		
SQM 100-140	66	1.47	100	140	55	35.0	4.0	86	0.0489	60.4
		2.26	200	108	110	20.4	5.3	90		
		3.08	300	98	165	14.6	6.7	92		
		3.48	400	83	220	11.9	7.0	93		
SQM 100-200	66	2.09	100	200	55	35.1	5.7	88	0.0685	78.2
		3.35	200	160	110	19.8	8.1	91		
		4.18	300	133	165	15.1	8.8	93		
		4.52	400	108	220	12.3	8.8	94		
SQM 100-240	66	2.30	100	220	55	35.5	6.2	88	0.0816	90.0
		3.77	200	180	110	20.5	8.8	93		
		4.90	300	156	165	16.4	9.5	94		
		5.24	400	125	220	12.9	9.7	94		
SQM 132-140	66	2.72	100	260	55	41.3	6.3	89	0.166800	145
		4.77	200	228	110	22.1	10.3	93		
		5.75	300	183	165	16.1	11.4	94		
		5.86	400	140	220	13.0	10.8	95		
SQM 132-200	66	3.87	100	370	55	41.1	9.0	90	0.230455	175
		6.91	200	330	110	22.0	15.0	93		
		8.17	300	260	165	15.9	16.4	94		
		8.38	400	200	220	13.2	15.2	95		
SQM 132-240	66	4.66	100	445	55	41.2	10.8	90	0.272891	195
		8.17	200	390	110	22.2	17.6	93		
		9.74	300	310	165	15.8	19.6	94		
		10.05	400	240	220	12.6	19.0	95		

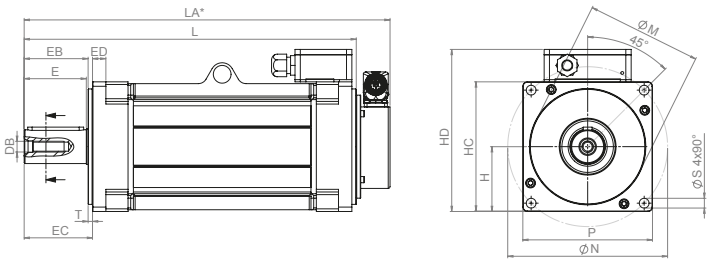
Motor Code	Pole Number	P_n (kW)	n_n (rpm)	M_n (Nm)	f_n (Hz)	kt	I_n (A)	Efficiency (%)	J (kgm^2)	W (kg) No Brake Fitted
SQM 160-200	66	3.74	70	510	39	49.5	10.3	90	0.4387	225
		5.08	100	485	55	35.9	13.5	92		
		7.23	150	460	83	24.9	18.5	93		
		9.21	200	440	110	19.5	22.6	94		
SQM 160-300	66	5.61	70	765	39	49.4	15.5	91	0.6452	302
		7.61	100	727	55	35.0	20.8	93		
		9.97	150	635	83	25.9	24.5	95		
		11.94	200	570	110	20.2	28.2	95		
SQM 160-400	66	7.48	70	1020	39	46.6	21.9	91	0.8518	379
		10.16	100	970	55	36.3	26.7	93		
		12.49	150	795	83	26.8	29.7	94		
		14.66	200	700	110	22.4	31.2	95		
SQM 160-500	66	9.35	70	1275	39	49.0	26.0	91	1.0583	456
		12.69	100	1212	55	36.7	33.0	94		
		14.67	150	934	83	28.2	33.1	95		
		16.82	200	803	110	22.4	35.8	96		
SQM 200-300SE	88	11.87	70	1620	51	45.0	36	93	1.9235	494
		15.92	100	1520	73	33.8	45	95		
		21.68	150	1380	110	24.6	56	95		
		25.97	200	1240	147	19.4	64	96		
SQM 200-400SE	88	16.13	70	2200	51	45.8	48	93	2.5419	605
		20.42	100	1950	73	36.1	54	94		
		27.49	150	1750	110	24.0	73	95		
		31.83	200	1520	147	20.8	73	96		
SQM 200-500SE	88	19.79	70	2700	51	45.8	59	93	3.1603	710
		25.13	100	2400	73	34.3	70	95		
		32.98	150	2100	110	26.3	80	95		
		38.74	200	1850	147	18.9	98	96		
SQM 200-600SE	88	22.87	70	3120	51	47.3	66	94	3.7787	820
		30.05	100	2870	73	36.3	79	95		
		39.27	150	2500	110	23.6	106	96		
		45.03	200	2150	147	18.2	118	97		
SQM 200-700SE	88	26.75	70	3650	51	48.0	76	94	4.3971	930
		34.55	100	3300	73	37.1	89	95		
		44.92	150	2860	110	26.5	108	96		
		51.73	200	2470	147	21.1	117	97		
SQM 250-400SE	88	24.9	70	3400	51.3	43.6	78	93	6.5632	960
		30.9	100	2950	73.3	32.4	91	94		
		37.7	150	2400	110	25.0	96	95		
		40.8	200	1950	147	21.7	90	95		
SQM 250-600SE	88	35.2	70	4800	51.3	47.1	102	94	9.6968	1350
		42.9	100	4100	73.3	37.6	109	95		
		53.4	150	3400	110	28.1	121	96		
		57.6	200	2750	147	21.7	127	96		
SQM 250-800SE	88	48.4	70	6600	51.3	43.4	152	95	12.8275	1690
		61.8	100	5900	73.3	36.2	163	96		
		77.0	150	4900	110	25.0	196	96		
		82.7	200	3950	147	21.7	182	97		
SQM 315-700SE	110	56.21	70	7668	64	50.8	151	93	33.532	2500
		75.20	100	7182	92	40.6	177	95		
		93.30	150	5940	138	25.3	235	95		
		98.43	200	4700	183	20.1	234	96		
SQM 315-900SE	110	66.50	70	9072	64	52.1	174	93	41.4781	3030
		83.77	100	8000	92	39.0	205	94		
		108.57	150	6912	138	26.0	266	95		
		115.39	200	5510	183	21.6	255	96		
SQM 315-1100SE	110	74.41	70	10152	64	55.5	183	93	50.3931	3560
		94.99	100	9072	92	41.6	218	95		
		120.44	150	7668	138	32.6	235	96		
		128.92	200	6156	183	23.9	258	97		

These data are valid for 400V power supply. For other supply voltage, torque and speed values please contact EMF Motor.

SQM 47

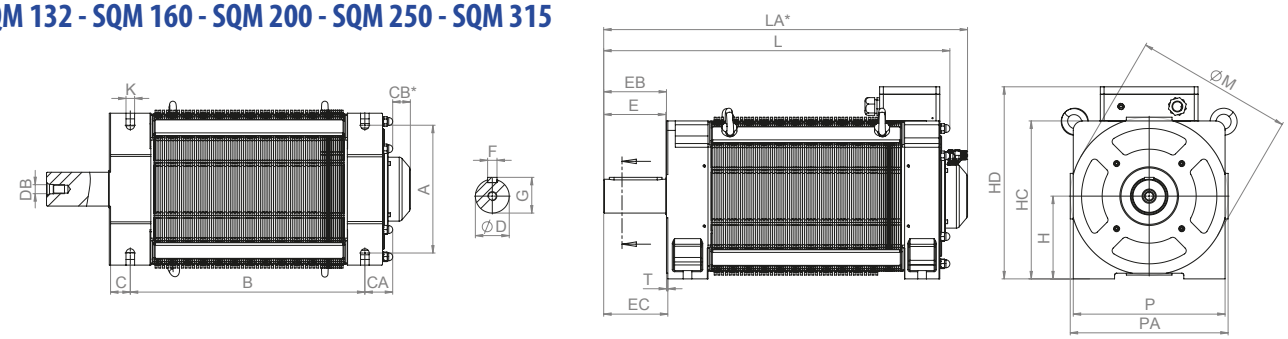


SQM 73 - SQM 100



	D	DB	E	EB	EC	ED	F	G	H	HC	HD	L	LA	M	P	N	S	T
SQM73-60	38k6	M12	70	72	77	15	10h6	41	73	146	182.5	234	272	130j6	146	180	11	5
SQM73-100												274	312					
SQM73-140												314	352					
SQM73-180												354	392					
SQM100-140	48k6	M16	104	106	110	20	14h6	51.5	100	200	259.7	470.6	-	180j6	200	230	14.5	4
SQM100-200												510.6	-					
SQM100-240												550.6	-					

SQM 132 - SQM 160 - SQM 200 - SQM 250 - SQM 315

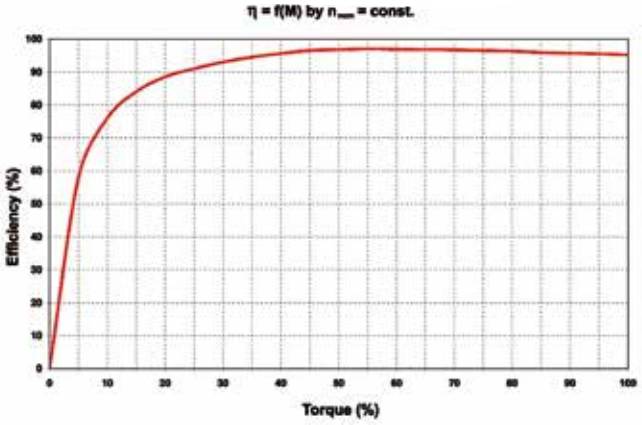


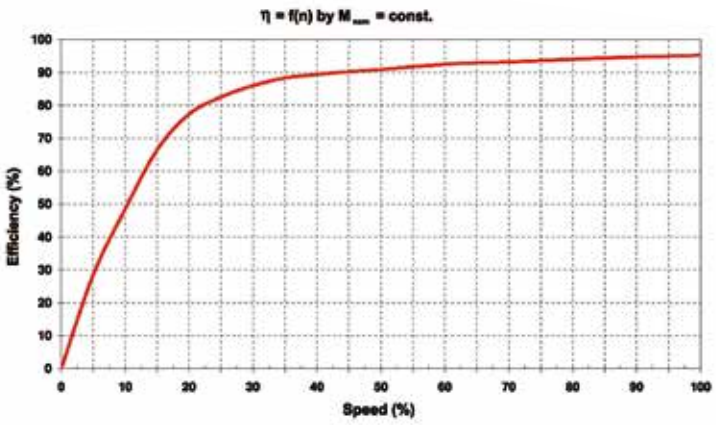
	A	B	C	CA	CB*	D	DB	E	EB	EC	F	G	H	HC	HD	K	L	LA*	M	P	PA	T
SQM132-140	216	255	56	82.8	-	65m6	M20	134	136	141	18h6	69	132	264	356.2	14.5	534.8	-	250	264	-	5
SQM132-200		315															594.8	-				
SQM132-240		355															634.8	-				
SQM160-200	254	327.5	60	81.5	-	75m6	M20	135	137	142	20h6	79.5	160	320	403.2	14.5	611	-	300	320	-	5
SQM160-300		427.5															711	-				
SQM160-400		527.5															811	-				
SQM160-500		627.5															911	-				
SQM200-300	340	424	52.5	74	47	90m6	M24	165	167	170.5	25h6	95	220	420	511	23	721	768	420	404	420	3.5
SQM200-400		524															821	868				
SQM200-500		624															921	968				
SQM200-600		724															1021	1068				
SQM200-700		824															1121	1168				
SQM250-400	426	593	63	103	-	120m6	M24	210	212	216	32h6	124	275	522	635.2	25	975	-	530	500	528	4
SQM250-600		793															1175	-				
SQM250-800		993															1375	-				
SQM315-700	508	947	95	144.5	-	125m6	M24	245	247	252	32h6	132	315	630	808	28	1442	-	740	630	658	5
SQM315-900		1147															1642	-				
SQM315-1100		1347															1842	-				

EMF Motor reserves the right to amend the dimensions, technical data and design specification without prior notification.
For detailed drawings and for 3D step files please contact EMF Motor.

LA* closed loop dimension

SQM Typical Efficiency Trend

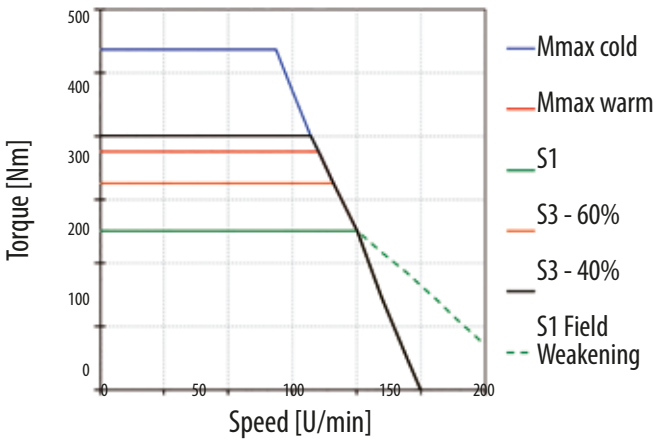




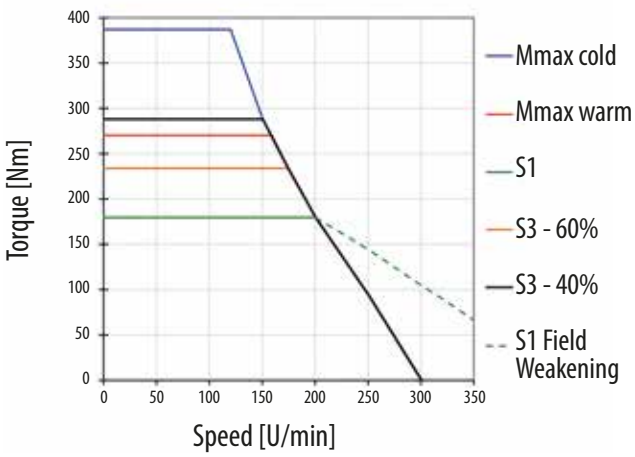
An important feature of the SQM motor design is that the efficiency is nearly constant from 20% partial load and 20% nominal speed.

SQM100-240 Performance Curves

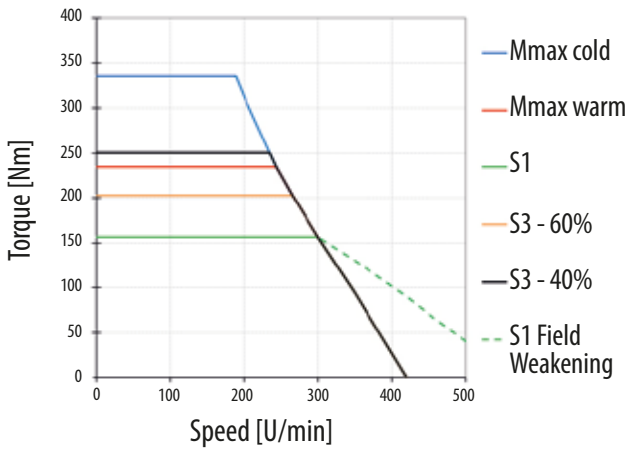
SQM100-240 100 rpm Nominal Speed



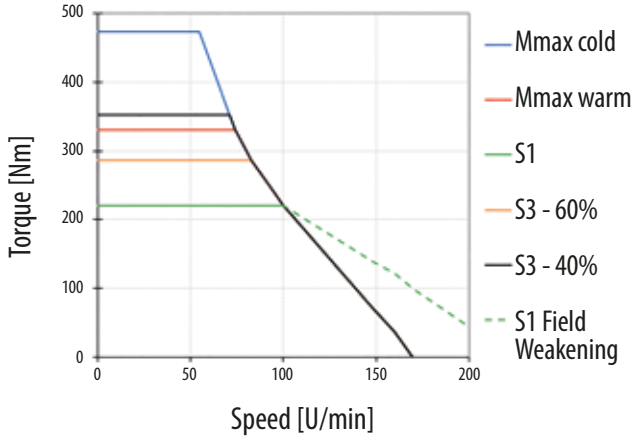
SQM100-240 200 rpm Nominal Speed



SQM100-240 300 rpm Nominal Speed



SQM100-240 400 rpm Nominal Speed



Mmax cold — Mmax warm — S1 — S3 - 60% — S3 - 40% — S1 Field Weakening

- S1, S3- 40% and S3- 60% are different windings.
- For other performance curves please contact EMF Motor.


Ceramic production


Ceramic conveyor


Hose production


Carpet production


Rotary Table


Indexing table


Roller table

Coiler and Traverse for Rope


Yarn production


Uncoiler 33 tons


Cogging Punch
0,02 mm Cutting Fault


Flexo Printing


Tire production


SQM Serving Stage


Carpet production


Extruder


Conveyor


Glazur Mixer - 185 Nm - 30 rpm

Plastic

Extruder

Injection

Elevator

Lift

Special designed homelift

Ceramic & Mining

Flotation

Mixer

Fan

HVLS Fans

Cooling towers

Packaging

Paper Cutting

Flexo Printing

Metal

Rolling mill

Rolling mill

Food

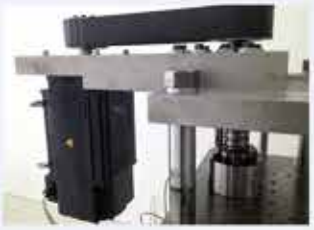
Flour mill

Mixer

Positioning Applications

Indexing Table

Roller screw



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