Catalogue 2018 2EN

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

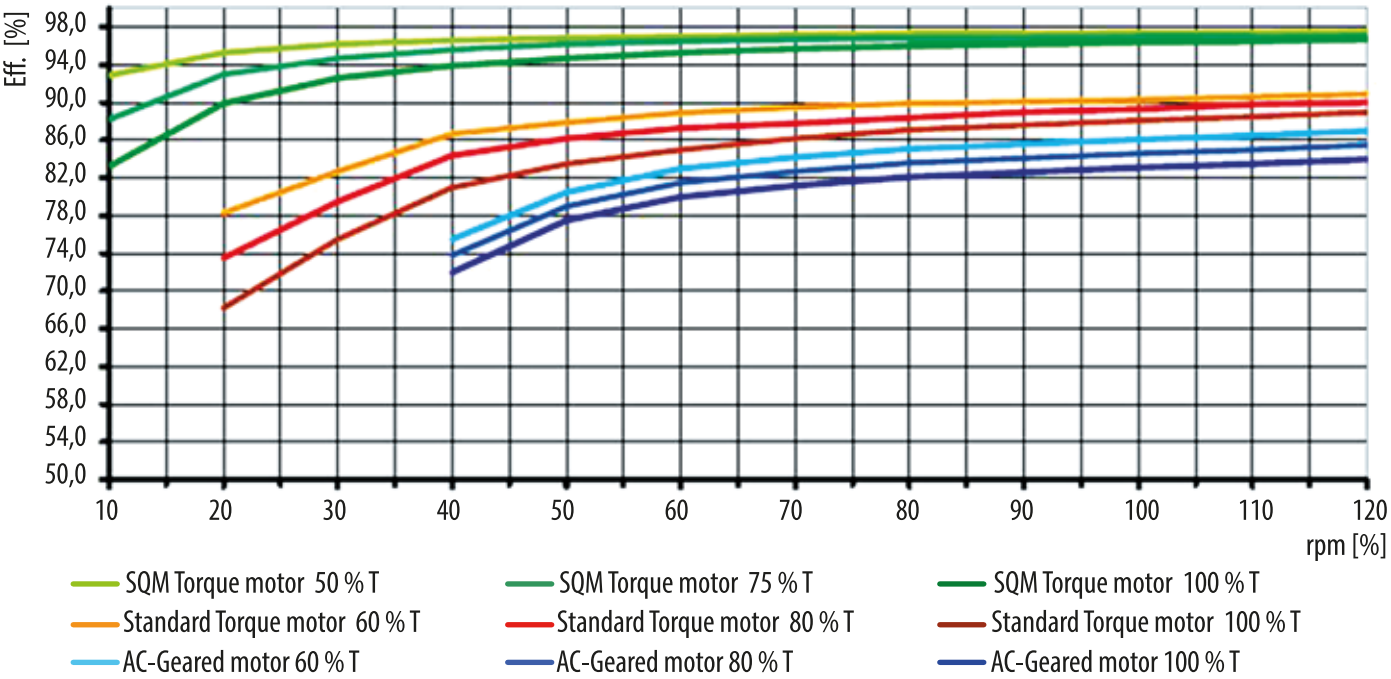
- **just direct drive, no gearbox, no water cooling**
- Use SQM Torque Motor for servo applications with absolute encoder
- Use SQM Torque Motor even with V/F controller
- Highest torque at low speed
- No maintenance
- Unbeatable Efficiency
- Quiet running
- Highest power density
- Highest efficiency
- 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

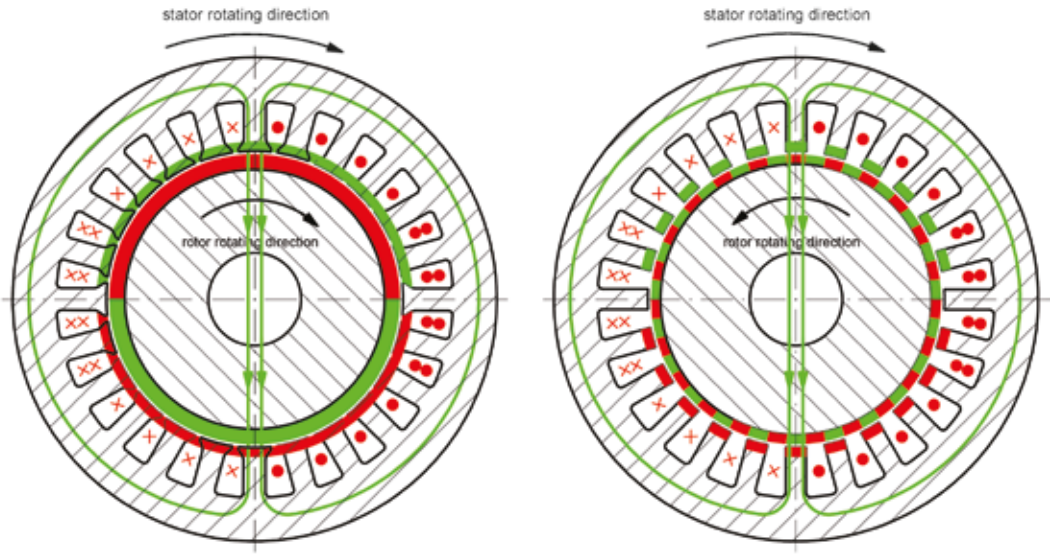


Electrically driven systems are consuming, roughly 70% of all electrical energy used in industry today. To help save the environment and make cost savings along the way, it is necessary to increase the efficiency of all electrical drives.

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

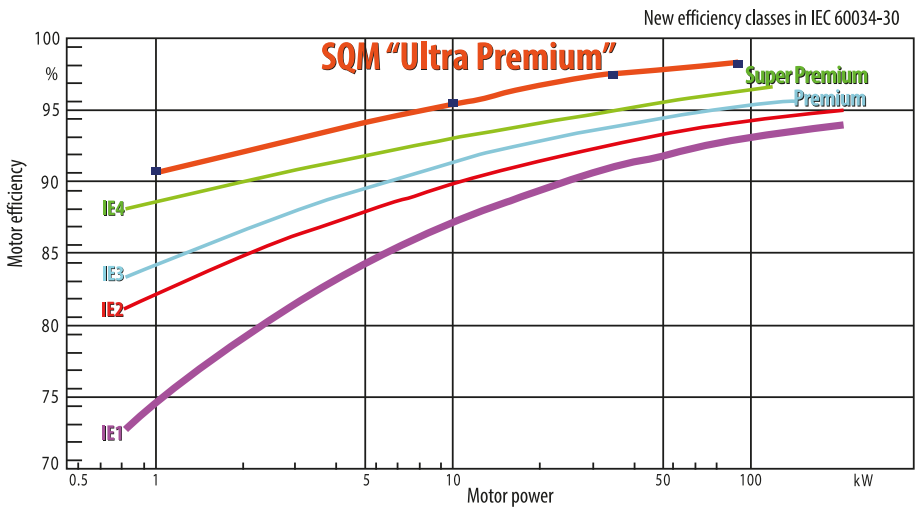
With this new motor principle a very high torque is created by low pole winding. The copper losses and hysteresis losses are very low which allows extremely high efficiency values.

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.

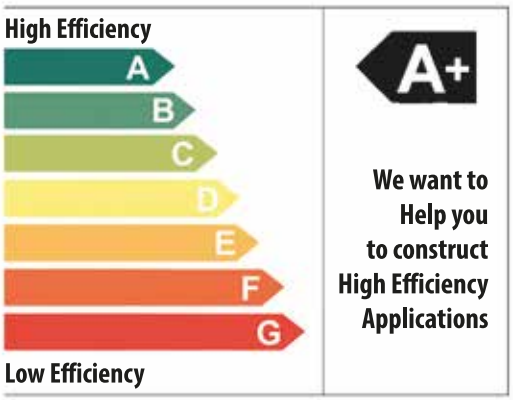
The diagram shows the efficiency values for SQM motors. The efficiency of an **SQM motor is far better than an IE 3- " Premium" motor and even better than an IE 4- " Super Premium" motor.**

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

SQM Series

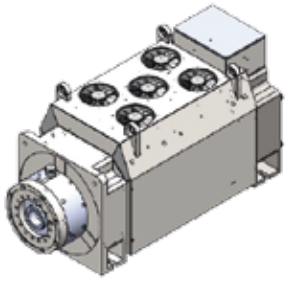
The SQM Series is a square frame design incorporating the latest LiProKa motor technology. The motors have almost zero losses in efficiency with surprisingly high torques considering their compact frame design.
We guarantee high dynamic performance , high torque at low speeds with the very highest efficiency 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



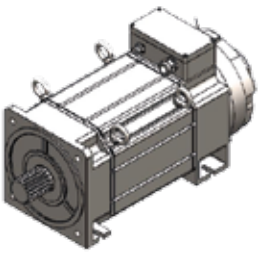
Solutions regarding the customer needs

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

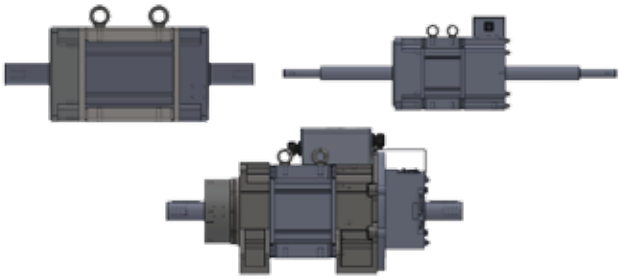


Hollow shaft high performance

Spline shaft and brake



Double shaft

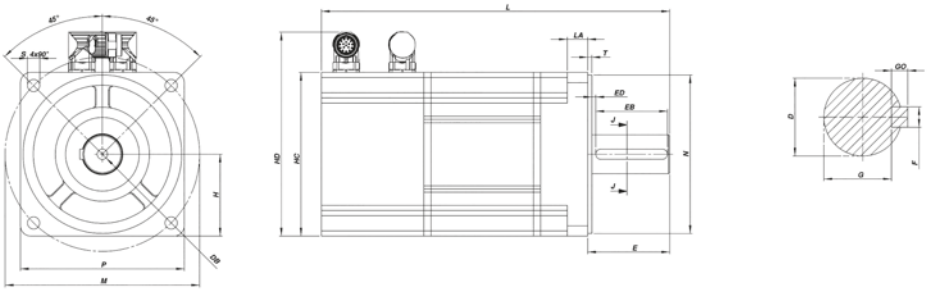


We customize your SQM exactly according to your torque and speed need

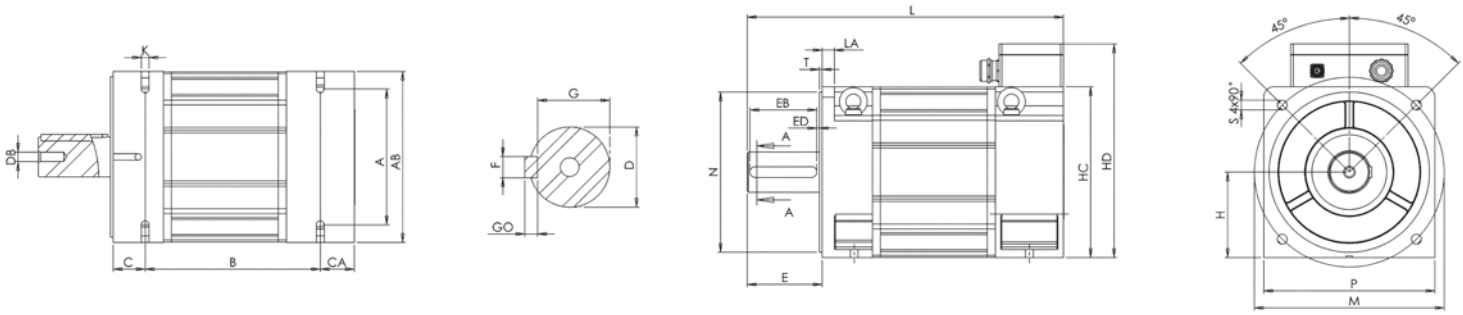
Motor Code	Pole Number	P_n (kW)	n_n (rpm)	M_n (Nm)	f_n (Hz)	kt	I_n (A)	Efficiency (%)	J (kgm^2)	W (kg) No Brake Fitted
SQM 47-40	44	0.15	350	4.1	128	4.6	0.90	71	0.000266	4.5
		0.20	500	3.9	183	4.9	0.80	78		
		0.23	600	3.6	220	4.0	0.90	81		
		0.27	750	3.5	275	3.6	1.00	82		
SQM 47-70	44	0.22	350	6.1	128	5.5	1.10	72	0.000434	6.0
		0.31	500	5.9	183	5.4	1.10	79		
		0.34	600	5.4	220	4.5	1.20	81		
		0.41	750	5.2	275	4.1	1.30	83		
SQM 47-100	44	0.27	350	7.5	128	6.5	1.20	78	0.000602	7.5
		0.38	500	7.2	183	6.2	1.20	81		
		0.43	600	6.9	220	4.6	1.50	82		
		0.53	750	6.7	275	4.2	1.60	85		
SQM 71-90	68	0.41	150	26	85	14.4	1.8	77	0.004898	18.0
		0.63	250	24	142	9.2	2.6	83		
		0.99	500	19	283	5.4	3.5	90		
		1.10	750	14	425	3.9	3,6	91		
SQM 71-130	68	0.64	150	41	85	13.2	3.1	79	0.006907	23.0
		0.97	250	37	142	8.4	4.4	84		
		1.47	500	28	283	5.5	5.1	90		
		1.65	750	21	425	4.1	5.1	92		
SQM 71-170	68	0.88	150	56	85	12.7	4.4	81	0.008917	28.0
		1.34	250	51	142	8.1	6.3	86		
		2.04	500	39	283	5.6	7.0	90		
		2.20	750	28	425	4.2	6.7	92		
SQM80-150	68	0.73	100	70	57	20.6	3.4	81	0.014969	43.6
		1.24	200	59	113	12.0	4.9	83		
		1.48	300	47	170	9.6	4.9	85		
		1.42	400	34	227	9.2	3.7	88		
SQM80-200	68	0.94	100	90	57	21.4	4.2	82	0.019623	54.0
		1.63	200	78	113	12.4	6.3	84		
		1.95	300	62	170	9.8	6.3	86		
		1.88	400	45	227	9.2	4.9	88		
SQM80-240	68	1.10	100	105	57	22.3	4.7	83	0.023346	62.3
		1.88	200	90	113	12.5	7.2	87		
		2.20	300	70	170	10.3	6.8	89		
		2.22	400	53	227	9.6	5.5	91		
SQM 100-140	66	1.47	100	140	55	35.0	4.0	86	0.036692	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	0.051189	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	0.060847	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	0.456095	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	0.669536	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	0.876796	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	1.100037	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 200-300	88	10.04	70	1370	51	45.7	30.0	92	1,232997	512
		12.04	100	1150	73	35.4	32.5	93		
		16.02	150	1020	110	25.1	40.6	95		
		18.01	200	860	147	21.3	40.3	96		
SQM 200-400	88	13.39	70	1827	51	44.6	41.0	92	1,610062	622
		16.05	100	1533	73	35.9	42.7	94		
		20.58	150	1310	110	24.7	53.0	95		
		21.99	200	1050	147	21.9	48.0	96		
SQM 200-500	88	15.98	70	2180	51	45.4	48.0	93	1,987126	731
		19.16	100	1830	73	35.9	51.0	95		
		27.33	150	1740	110	23.8	73.0	95		
		28.27	200	1350	147	20.7	65.1	96		
SQM 200-600	88	19.18	70	2617	51	45.6	57.4	93	2,364141	840
		23.04	100	2200	73	37.3	59.0	94		
		32.20	150	2050	110	24.7	83.0	95		
		34.14	200	1630	147	21.2	77.0	96		
SQM 200-700	88	22.38	70	3053	51	43.6	70.0	93	2,741254	950
		26.81	100	2560	73	33.7	76.0	95		
		36.60	150	2330	110	24.5	95.2	96		
		39.79	200	1900	147	19.3	98.5	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	52.0	70	7100	64,2	51.1	139	95	32,5661	2500
		69.6	100	6650	91.7	35.4	188	95		
		86.4	150	5500	138	26.4	208	96		
		91.1	200	4350	183	20.3	214	96		
SQM 315-900SE	110	61.6	70	8400	64.2	52.5	160	96	41,4781	3030
		77.5	100	7400	91.7	39.4	188	96		
		100.5	150	6400	138	26.2	244	96		
		106.8	200	5100	183	22.7	225	96		
SQM 315-1100SE	110	68.9	70	9400	64.2	55.3	170	96	50,3931	3560
		88.0	100	8400	91.7	41.6	202	96		
		111.5	150	7100	138	27.7	256	96		
		119.4	200	5700	183	23.9	238	96		

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



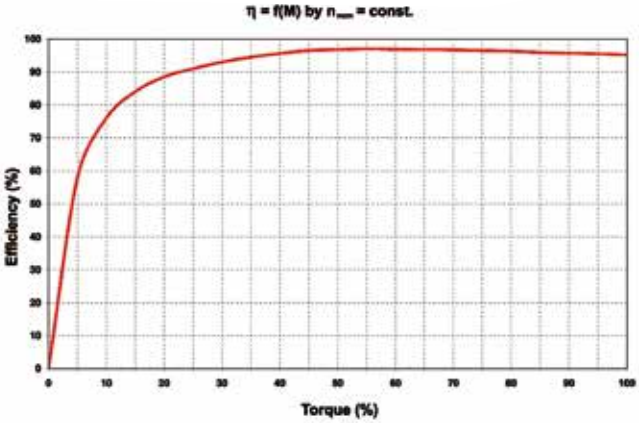
	D	DB	E	EB	ED	F	G	GO	H	HC	HD	L	LA	M	N	P	S	T
SQM47-40 SQM47-70 SQM47-100	14j6	M5	30.00	22.00	1.40	5h6	11.00	5.00	47.50	95.00	134.00	192.00 222.00 252.00	15.00	115.00	95j6	95.00	6.80	3.00
SQM71-90 SQM71-130 SQM71-170	28j6	M10	60.00	50.00	2.70	8h6	24.00	7.00	71.00	142.00	181.00	317.50 357.50 397.50	15.00	165.00	130j6	142.00	11.00	3.50
SQM80-150 SQM80-200 SQM80-240	38k6	M12	80.00	70.00	4.20	10h6	33.00	8.00	80.00	160.00	199.00	396.00 446.00 486.00	20.00	190.00	155j6	160.00	12.00	4.00
SQM100-140 SQM100-200 SQM100-240	48k6	M16	110.00	100.00	3.00	14h6	42.50	9.00	100.00	200.00	239.50	454.00 514.00 554.00	20.00	230.00	180j6	200.00	14.50	4.00

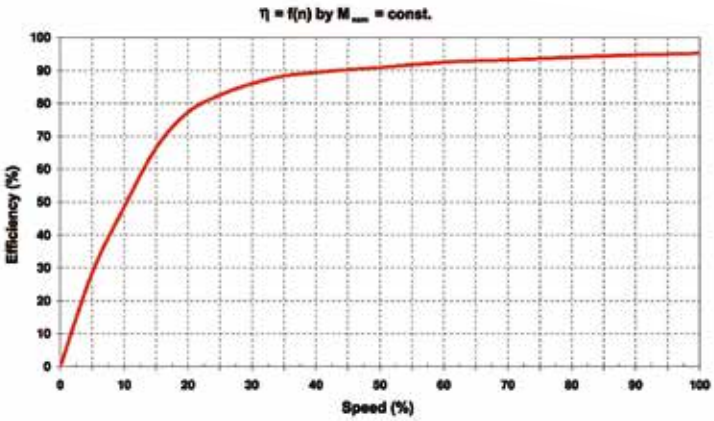


	A	AB	B	C	CA	D	DB	E	EB	ED	F	G	GO	H	HC	HD	K	L	LA	M	N	P	S	T
SQM132-140 SQM132-200 SQM132-240	216.00	264.00	255.00 315.00 355.00	56.00	63.00	65m6	M20	140.00	125.00	5.00	18h6	58.00	11.00	132.00	264.00	345.00	14.50	514.00 574.00 614.00	25.00	300.00	250j6	264.00	18.50	5.00
SQM160-200 SQM160-300 SQM160-400 SQM160-500	254.00	320.00	327.50 427.50 527.50 627.50	60.00	63.50	75m6	M20	140.00	125.00	5.00	20h6	67.50	12.00	160.00	320.00	400.00	14.50	592.00 692.00 792.00 892.00	25.00	355.00	300h6	320.00	18.50	5.00
SQM200-300 SQM200-400 SQM200-500 SQM200-600 SQM200-700	318.00	400.00	477.50 577.50 677.50 777.50 877.50	74.50	75.00	90m6	M24	170.00	140.00	5.00	25h6	81.00	14.00	200.00	400.00	509.00	20.00	797.00 897.00 997.00 1097.00 1197.00	25.00	480.00	450h6	400.00	18.50	5.00
SQM 250-400SE SQM 250-600SE SQM 250-800SE	426.00	500.00	591.00 791.00 991.00	67.00	83.00	120m6	M24	216.00	180.00	17.00	32h6	109.00	18.00	275.00	522.00	635.20	25.00	992.00 1192.00 1392.00	28.00	580.00	530h6	500.00	25.00	4.00
SQM 315-700SE SQM 315-900SE SQM 315-1100SE	508.00	630.00	947.50 1147.50 1347.50	95.00	102.50	120m6	M24	250.00	220.00	10.00	32h6	109.00	18.00	315.00	630.00	830.00	28.00	1395.00 1595.00 1795.00	40.00	740.00	680h6	630.00	24.00	5.00

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.

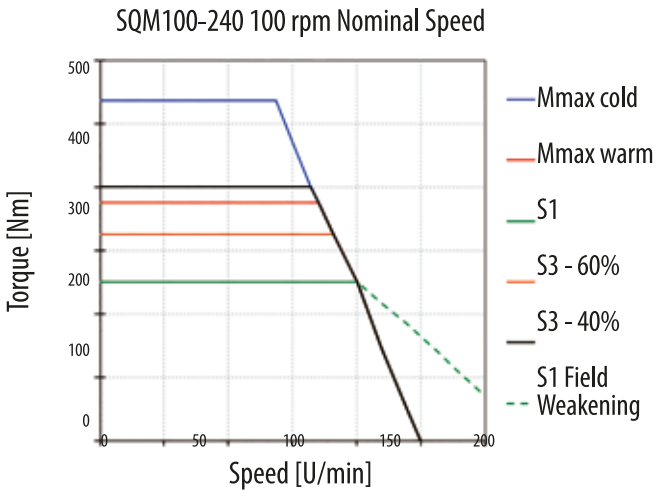
SQM Typical Efficiency Trend

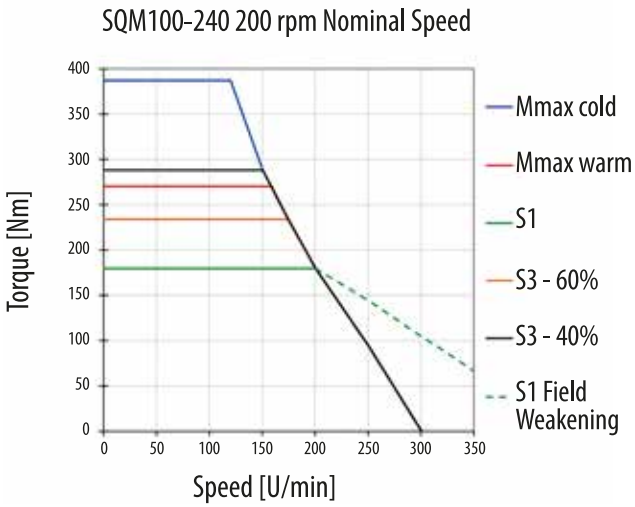


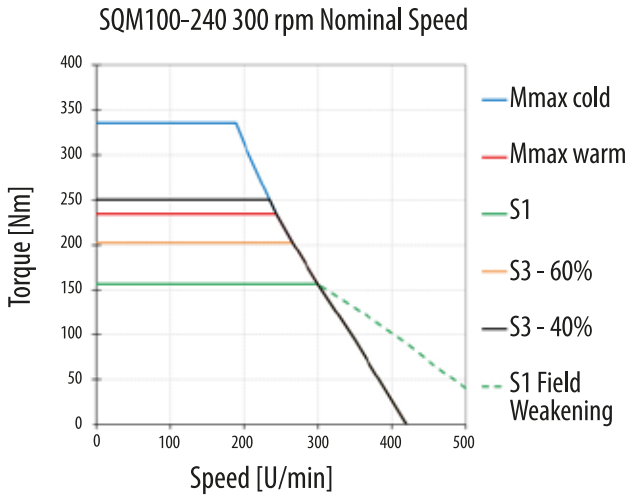


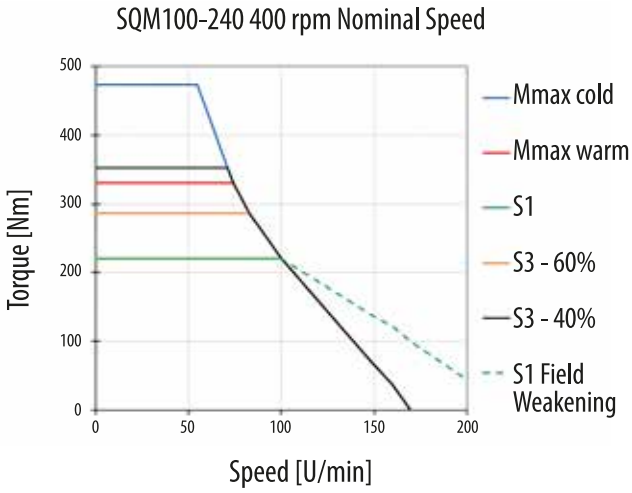
An important feature of the SQM motor design is that the efficiency is nearly constant from 20% partial load and 20% nominal speed.

SQM100-240 Performance Curves









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

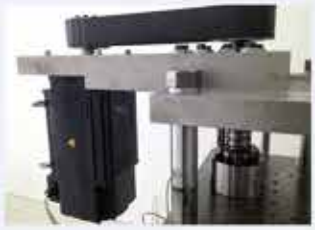
Flour mill

Mixer

Servo Applications

Indexing Table

Roller screw



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Grand Prize

Istanbul Chamber of Industry Energy Efficient Product
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Smart Transportation Category

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Innovation Award 2017

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