Catalogue SQMC 2018 1EN

Patented **New** Direct Drive Technology for

Cooling Tower

SQMC Torque Motor

- Direct drive, no gearbox, no cooling
- Highly reliable
- Up to 97 % motor efficiency
- Lowest operating cost
- Quiet operation

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.

Direct Drive Technology

Gearless Motor for ***Cooling Tower***

EMF Motor presents ***the world's most efficient torque motor*** with patented PM technology which offers perfect solutions for cooling tower applications.

Our patented motor technology enables us to produce gearless, high pole number (66-88-110) and very efficienct motors. It offers reliable speed control, reduced maintenance, quieter operation and unbeatable high energy saving. The fan couples directly to the motor and can be controlled by sensorless flux vector drivers.

Due to the high number of magnetic poles, high torque is achieved with reduced rotational speed. The motor winding losses are much less than conventional high pole motors. The motor enables a high efficiency even at very low speeds.

Advantages

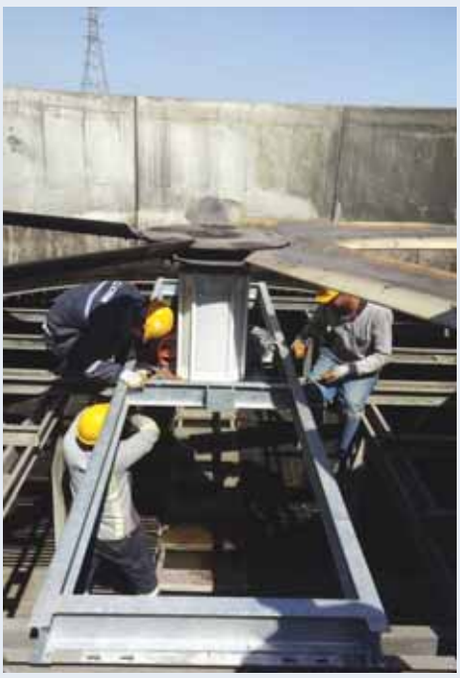
- Direct drive, no gearbox, no cooling
- Highly reliable
- Reduced maintenance
- Up to 97 % motor efficiency
- Lowest operating cost
- Highest pole number (88)
- Low vibration, less noise
- Environmentally friendly
- Adjustable speed with full torque
- Stable operation at low speed
- Compact and symmetric design
- Special bearing
- Sensorless controlled by flux vector drivers
- Wide voltage range (230 to 690 VAC)
- Specially painted against corrosion.
- Simple mounting
- No shaft and coupling adjustment
- No mounting hole on the fan stack
- No need for other components (shaft, gearbox, couplings)

Specifications

Mounting	Flange / Foot
Insulation	Class H (180˚C)
Protection Class	IP65
Vibration	A level according to IEC 60034-14
Ambient Temperature	-10˚C / +50˚C
Thermal protection	120˚C PTO
Cooling	Natural
Humidity	Up to 100 %

For other supply voltage, torque - speed values and IP Class, please contact EMF Motor.

Case Study



The old conventional system consisted of a 37 kW, **1.470 rpm**, IE2 AC motor and a gearbox with a ratio of i = 6,1. The motor and the gearbox is connected together with a shaft (3 meters) with couplings at each end. The propellar is mounted on the gearbox and the system runs at 241 rpm. The motor is operated by a SoftStarter, with no frequency adjustment. The angle of the propeller was set to 4 degrees. The motor had a consumption of 33.5 kW.

SQMC200-400 motor is choosen with 1150 Nm, 208 rpm, 25 kW. Its efficiency is 93 % and its nominal voltage is 354 V where the current is 62 A. Our motors are always driven by an inverter.

The existing system was dismantled and replaced by using the existing fan. The propeller angle was set to 8 degrees. **Both system has an air speed of 10,2 m/sec and air flow is 193 m3/sec.**

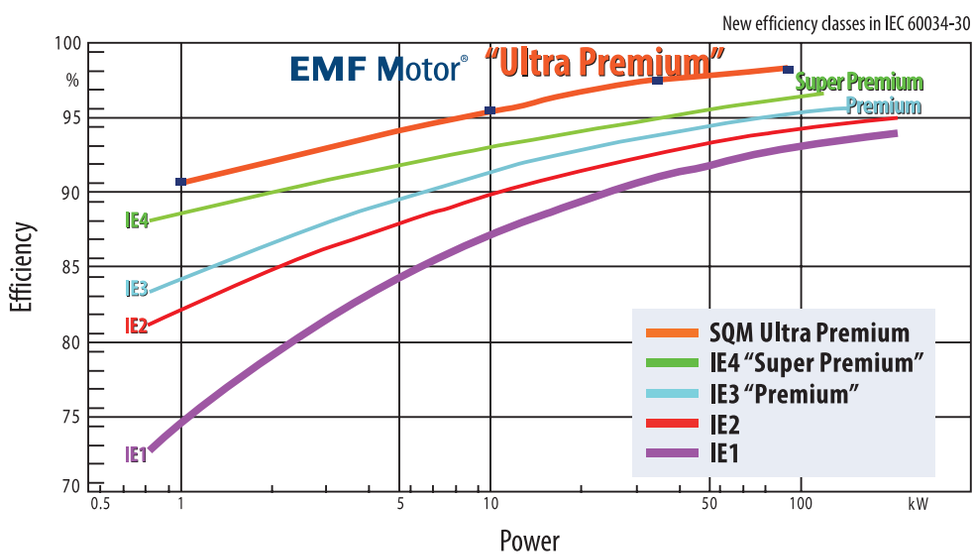
SQMC torque motors considerably reduces maintenance time and costs. Additionally, it works more reliable, more quiet (6 dB less) and can be installed very easily due to its compact design. The conventional system consume **27,6 %** more energy than these environment friendly motor and so, our new system pays back very shortly. **Only electrical cost saving is 4.500 € / year (electricity price: 0,06 €/h, 24 hours/360 days).**

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 IE3-"Premium" motor and even better than an IE4-"Super Premium" motor.

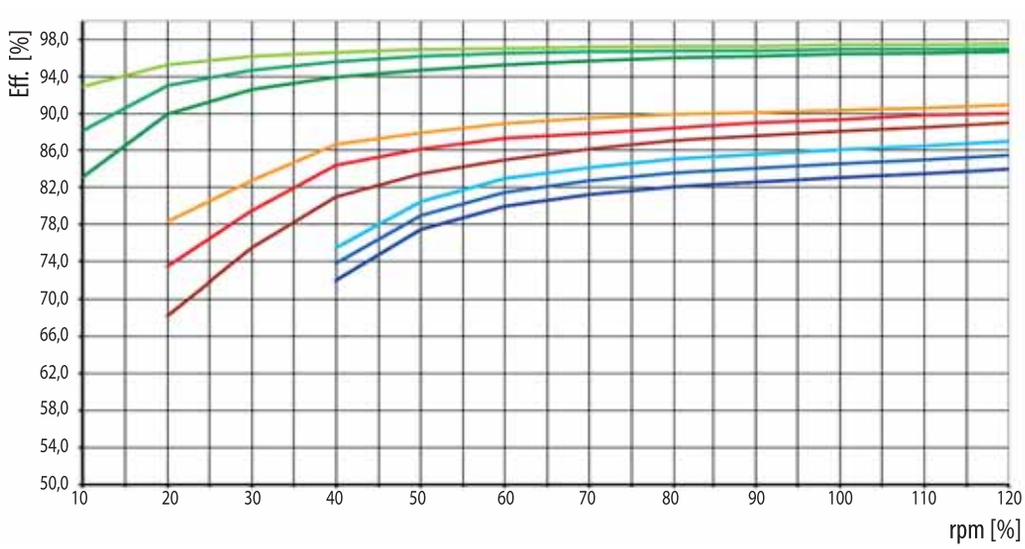
Since SQM motors are driven by an inverter without a gearbox, the total efficiency will be even higher.



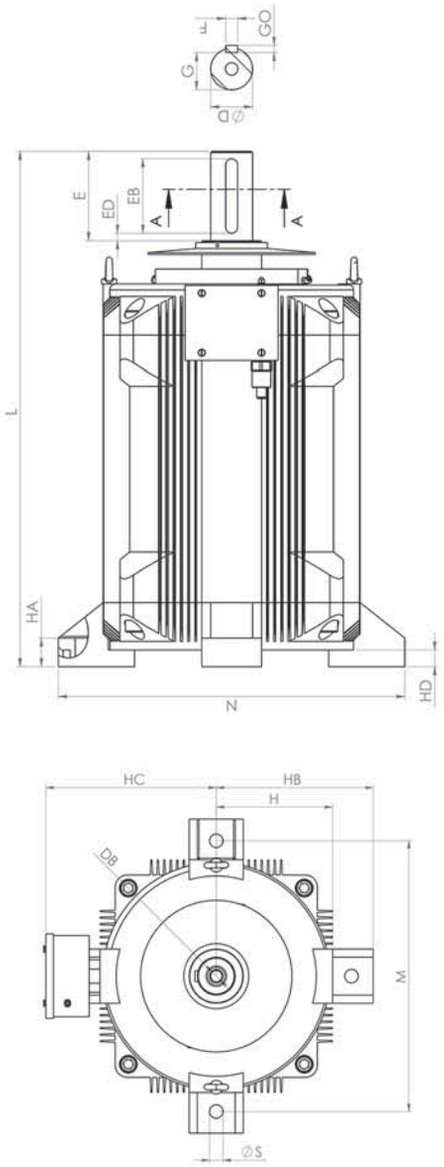
Motor Code	Pole Number	P_n (kW)	n_n (rpm)	M_n (Nm)	f_n (Hz)	k_t (Nm/A)	I_n (A) (350 VAC)	W (kg)	Eff.(*) (%)
SQMC 200 - 200	88	9,8	100	940	73,3	31,3	30	455	93,5
		12,9	150	820	110,0	23,4	35		95,0
		14,5	200	690	146,7	19,7	35		95,5
		16,1	250	615	183,3	17,1	36		96,0
		17,4	300	555	220,0	14,2	39		96,0
		18,7	350	510	256,7	13,1	39		96,0
SQMC 200 - 300	88	14,5	100	1380	73,3	33,7	41	565	94,0
		19,3	150	1230	110,0	23,7	52		95,5
		21,6	200	1030	146,7	19,8	52		96,0
		24,1	250	920	183,3	15,9	58		96,5
		26,2	300	835	220,0	13,7	61		96,5
		28,0	350	765	256,7	11,8	65		96,5
SQMC 200 - 400	88	19,3	100	1840	73,3	31,2	59	675	94,5
		25,7	150	1635	110,0	23,7	69		95,5
		29,3	200	1400	146,7	18,4	76		96,0
		32,1	250	1225	183,3	15,7	78		96,5
		34,9	300	1110	220,0	13,5	82		96,5
		37,4	350	1020	256,7	13,1	78		96,5
SQMC 200 - 500	88	23,0	100	2200	73,3	31,9	69	785	95,0
		32,1	150	2045	110,0	23,0	89		96,0
		36,0	200	1720	146,7	19,8	87		96,5
		40,1	250	1530	183,3	16,5	93		96,5
		43,7	300	1390	220,0	13,1	106		97,0
		46,7	350	1275	256,7	13,0	98		97,0

For other supply voltage, torque-speed values and IP class, please contact EMF Motor.
(*) Special bearing types may effect efficiency values.

Efficiency Diagram in full range of speed and torque



Dimensions



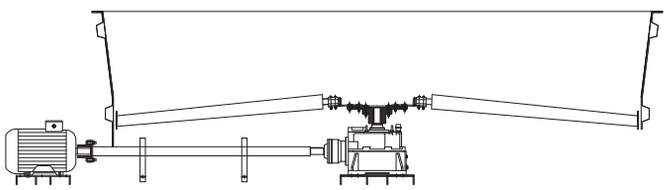
	nD	DB	E	EB	ED	F	G	GO	H	HB	HC	HD	L	M	N	nS
SQMC 200 - 200	70	M24	150	125	12,5	20	62,5	12	215	290	315	28	665	500	580	25
SQMC 200 - 300													765			
SQMC 200 - 400													865			
SQMC 200 - 500													965			

Design Features

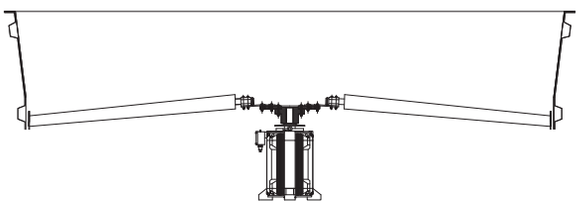
The motor is regularly assambled with two ball bearings according to the customer needs. It can be used optionally a tapered roller bearing at high axial force applications.

The motor shaft can be mounted up and down in vertical position according to the design and the bearings are selected to meet the axial fan force. Motors are available with either foot or flange connection.

Pre-heating element and vibration sensor can be added in optionally. Motor thermal protection is made by thermostats one per phase normally closed. Pt100 or KTY84 sensor can be selected as optional.

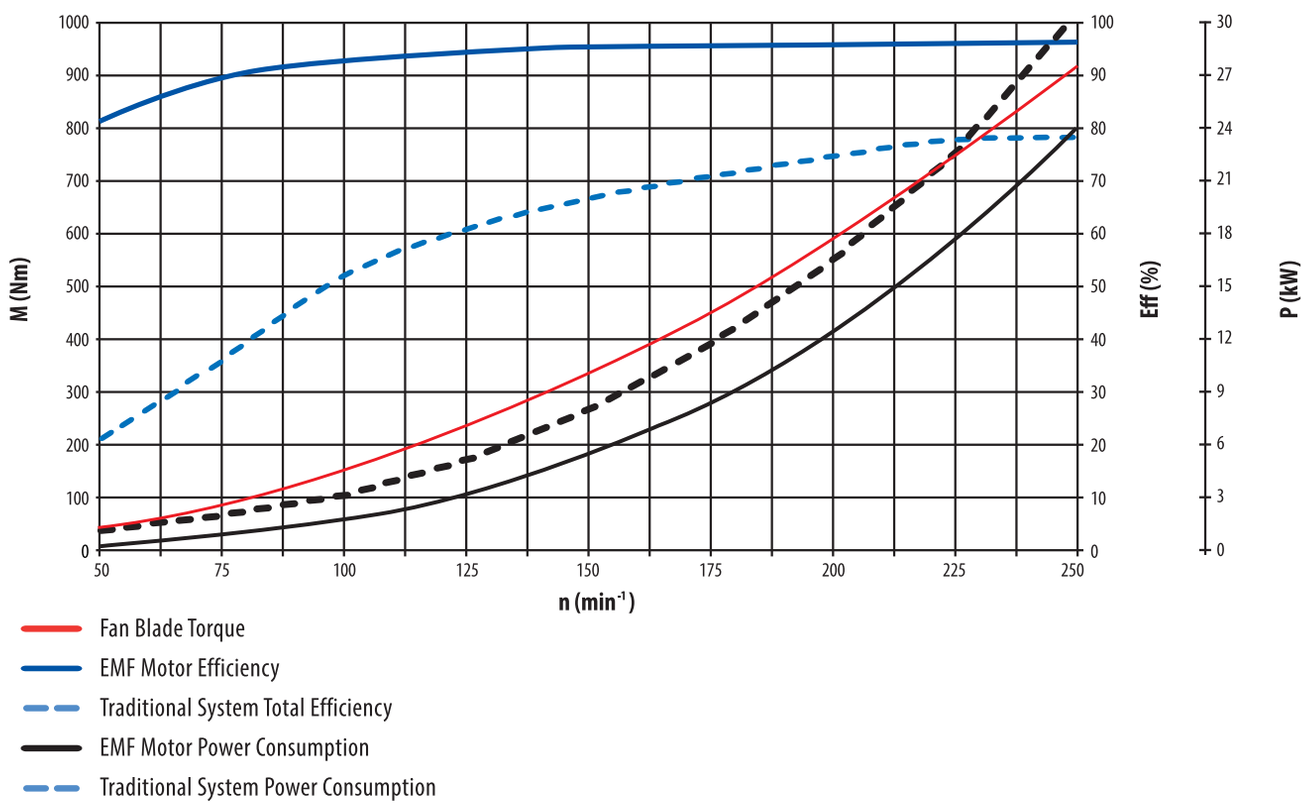


Traditional cooling tower system



Direct drive cooling tower system with EMF Motor

SQMC vs. AC Motor & Gearbox Comparison Diagram



Direct Drive Technology

Gearless Motor for ***Cooling Tower***

Comparison	IE2 MOTOR + GEARBOX	DD MOTOR	EMF MOTOR
Energy Efficiency	☹	☺	☺☺ ★
Maintenance	☹	☺	☺
High Pole Number	☹	😐	☺☺ ★
Full Torque at all Speed	☹	☺	☺
Low Speed Efficiency	☹	☹	☺
Noise	☹	☺	☺
Vibration	☹	☺	☺
Environmentally Friendly	☹	☺	☺
Easy Installation	☹	☺	☺
Bearing Life	☹	😐	☺

EMF Motor®

info@emfmotor.com **www.emfmotor.com**

Germany
EMF 97 GmbH
Horchheimer StraBe 74-78
D 67547 Worms

T. +49 6241 935 210
F. +49 6241 935 215

Turkey
EMF Motor A.Ş.
Ramazanoğlu Mah. Sanayi Cad. No:9
TR 34906 İstanbul - Pendik / Türkiye

T. +90 216 595 19 00
F. +90 216 595 19 01