

SQM TORQUE MOTOR

BEYOND THE FUTURE

No Gearbox
No Water Cooling
High Dynamics
Unbeatable Efficiency
High Performance



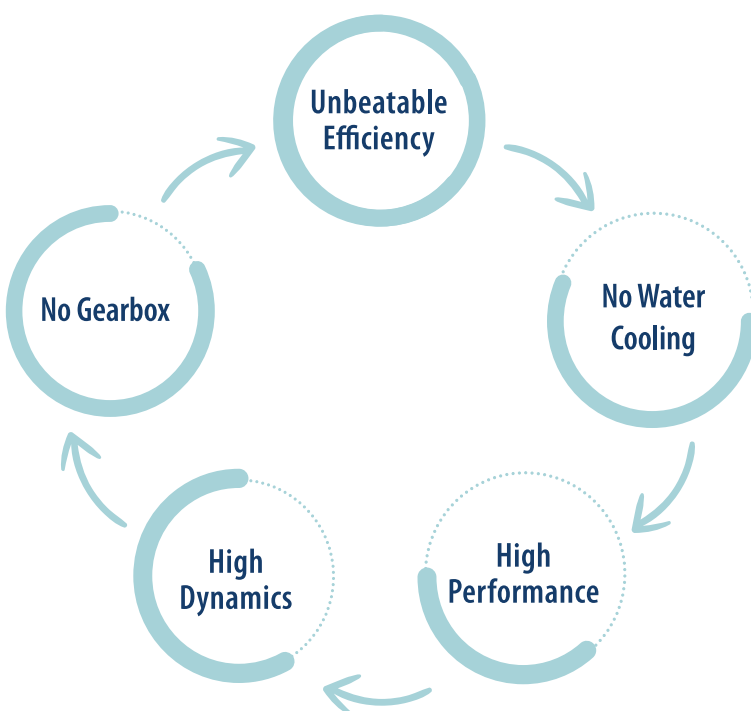
EMF Motor®

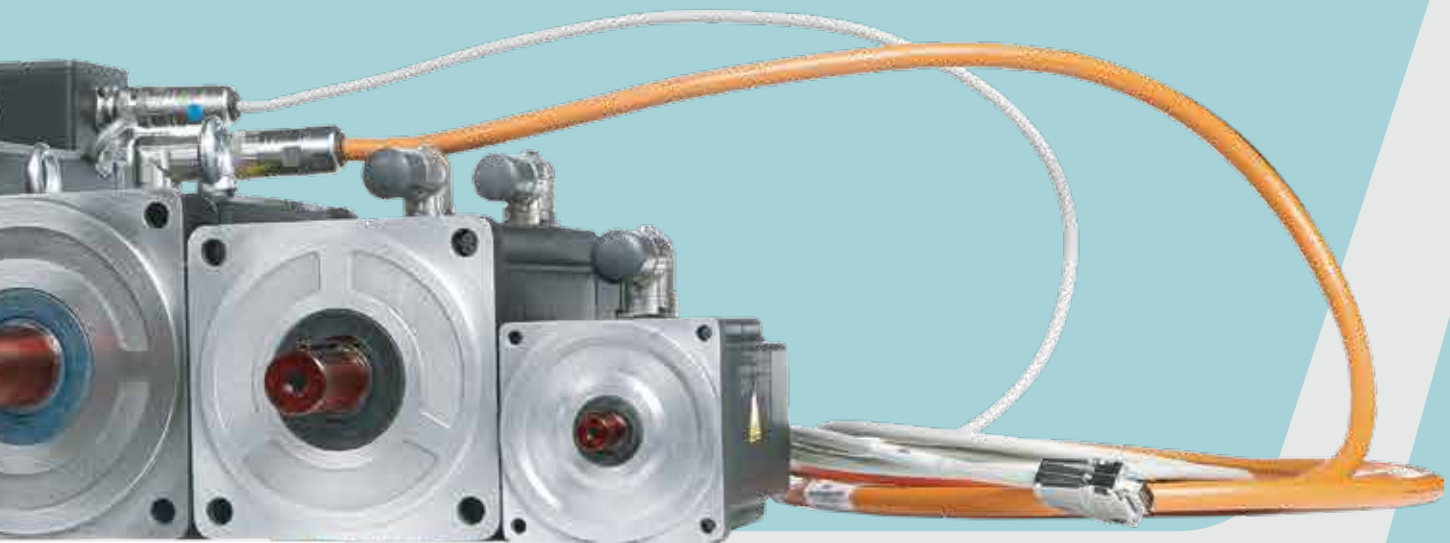
An Award Winning Innovation



Key Features

- Direct Drive, no Gearbox, no Water Cooling
- Exceptional Precision for Servo Applications
- Driveability even with V/f Driver
- Maximum Torque at Low Speeds
- No Maintenance
- Unbeatable Efficiency
- Quiet Operation
- Full Torque throughout the entire Speed Range
- High Overload Capacity
- Superior Dynamics and Controllability
- Cooling via IC410 (no forced air cooling or water cooling)
- Protection Class IP54





Technical Specifications

- | | |
|----------------------|---|
| • Motor Technology | Permanent Magnet Synchronous Motor |
| • Frame Size | 60, 73, 100, 132, 160, 200, 250 and 315 mm |
| • Torque Range | up to 13.000 Nm (*) |
| • Number of Poles | 66 - 88 - 110 |
| • Rated Voltage | 110 V - 220 V - 400 V - 460 V VAC Supply Voltage |
| • Cooling | None |
| • Protection Level | IP 54 (IP 55, IP 65, Exproof optional) |
| • Thermal Protection | PTO is standard (additionally PT100, PT1000, PTC, KTY84 are optional) |
| • Hollow Shaft | Customization is available on request |
| • Feedback Sensor | Hiperface, EnDat Encoder, Sensorless Control |
| • Marking | CE |
- (*) with the blower kit

| Motor Code | Pole Number | P _n (kW) | n _n (rpm) | M _n (Nm) | f _n (Hz) | kt (Nm/A) | I _n (A) | Efficiency (%) |
|------------|-------------|------------------------|-------------------------|------------------------|------------------------|--------------|-----------------------|-------------------|
| SQM60-40 | 66 | 0,16 | 150 | 10 | 83 | 13,9 | 0,7 | 67,5 |
| | | 0,24 | 250 | 9 | 138 | 9,0 | 1,0 | 75,3 |
| | | 0,47 | 500 | 9 | 275 | 5,1 | 1,8 | 81,8 |
| | | 0,63 | 750 | 8 | 413 | 3,6 | 2,3 | 84,3 |
| SQM60-60 | 66 | 0,22 | 150 | 14 | 83 | 16,5 | 0,9 | 72,5 |
| | | 0,34 | 250 | 13 | 138 | 10,8 | 1,2 | 80,0 |
| | | 0,63 | 500 | 12 | 275 | 5,9 | 2,1 | 85,8 |
| | | 0,86 | 750 | 11 | 413 | 4,2 | 2,6 | 87,8 |
| SQM60-100 | 66 | 0,35 | 150 | 22 | 83 | 18,6 | 1,2 | 78,3 |
| | | 0,52 | 250 | 20 | 138 | 11,6 | 1,7 | 84,5 |
| | | 0,94 | 500 | 18 | 275 | 6,6 | 2,7 | 88,9 |
| | | 1,26 | 750 | 16 | 413 | 4,3 | 3,7 | 90,3 |
| SQM73-60 | 66 | 0,46 | 150 | 29 | 83 | 22,1 | 1,3 | 82,2 |
| | | 0,71 | 250 | 27 | 138 | 13,9 | 1,9 | 85,6 |
| | | 1,20 | 500 | 23 | 275 | 7,5 | 3,1 | 90,5 |
| | | 1,41 | 750 | 18 | 413 | 5,1 | 3,6 | 92,0 |
| SQM73-100 | 66 | 0,75 | 150 | 48 | 83 | 22,9 | 2,1 | 85,7 |
| | | 1,15 | 250 | 44 | 138 | 15,2 | 2,9 | 89,2 |
| | | 1,83 | 500 | 35 | 275 | 8,2 | 4,3 | 92,5 |
| | | 2,12 | 750 | 27 | 413 | 5,7 | 4,7 | 93,5 |
| SQM73-140 | 66 | 1,07 | 150 | 68 | 83 | 22,7 | 3,0 | 87,5 |
| | | 1,57 | 250 | 60 | 138 | 14,9 | 4,0 | 91,4 |
| | | 2,41 | 500 | 46 | 275 | 8,5 | 5,4 | 94,0 |
| | | 2,83 | 750 | 36 | 413 | 6,2 | 5,8 | 93,9 |
| SQM73-180 | 66 | 1,38 | 150 | 88 | 83 | 22,0 | 4,0 | 88,8 |
| | | 2,02 | 250 | 77 | 138 | 16,0 | 4,8 | 92,1 |
| | | 3,09 | 500 | 59 | 275 | 8,9 | 6,6 | 95,0 |
| | | 3,61 | 750 | 46 | 413 | 6,3 | 7,3 | 95,0 |
| SQM100-140 | 66 | 1,57 | 100 | 150 | 55 | 33,0 | 4,6 | 89,0 |
| | | 2,41 | 200 | 115 | 110 | 19,0 | 6,0 | 93,1 |
| | | 3,33 | 300 | 106 | 165 | 13,4 | 7,9 | 95,0 |
| | | 3,77 | 400 | 90 | 220 | 11,1 | 8,1 | 95,2 |
| SQM100-200 | 66 | 2,28 | 100 | 218 | 55 | 33,5 | 6,5 | 90,7 |
| | | 3,64 | 200 | 174 | 110 | 19,2 | 9,0 | 94,6 |
| | | 4,52 | 300 | 144 | 165 | 14,0 | 10,3 | 95,3 |
| | | 4,90 | 400 | 117 | 220 | 11,7 | 10,0 | 95,1 |
| SQM100-240 | 66 | 2,51 | 100 | 240 | 55 | 35,3 | 6,8 | 91,2 |
| | | 4,10 | 200 | 196 | 110 | 20,5 | 9,6 | 95,0 |
| | | 5,43 | 300 | 173 | 165 | 14,1 | 12,3 | 95,3 |
| | | 5,70 | 400 | 136 | 220 | 11,3 | 12,0 | 95,0 |
| SQM132-140 | 66 | 2,99 | 100 | 286 | 55 | 40,9 | 7,0 | 91,0 |
| | | 5,24 | 200 | 250 | 110 | 21,9 | 11,4 | 92,4 |
| | | 6,28 | 300 | 200 | 165 | 15,9 | 12,6 | 93,4 |
| | | 6,45 | 400 | 154 | 220 | 12,5 | 12,3 | 93,8 |
| SQM132-200 | 66 | 4,24 | 100 | 405 | 55 | 40,5 | 10,0 | 91,5 |
| | | 7,54 | 200 | 360 | 110 | 21,8 | 16,5 | 92,7 |
| | | 8,95 | 300 | 285 | 165 | 15,8 | 18,0 | 93,8 |
| | | 9,21 | 400 | 220 | 220 | 12,9 | 17,0 | 94,0 |
| SQM132-240 | 66 | 5,13 | 100 | 490 | 55 | 40,8 | 12,0 | 91,7 |
| | | 9,21 | 200 | 440 | 110 | 21,6 | 20,4 | 93,2 |
| | | 10,7 | 300 | 340 | 165 | 15,7 | 21,6 | 94,5 |
| | | 11,10 | 400 | 265 | 220 | 12,4 | 21,4 | 95,0 |
| SQM160-200 | 66 | 4,5 | 70 | 610 | 39 | 47,7 | 12,8 | 90,0 |
| | | 6,1 | 100 | 580 | 55 | 36,3 | 16,0 | 91,8 |
| | | 8,6 | 150 | 550 | 83 | 23,9 | 23,0 | 93,0 |
| | | 11,0 | 200 | 525 | 110 | 19,4 | 27,0 | 93,3 |
| | | 15,4 | 300* | 490 | 165 | 13,1 | 37,5 | 93,7 |

With SE and forced ventilation, M = +30% up to 100rpm and M = +40% from 150 rpm

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

* with axial fan

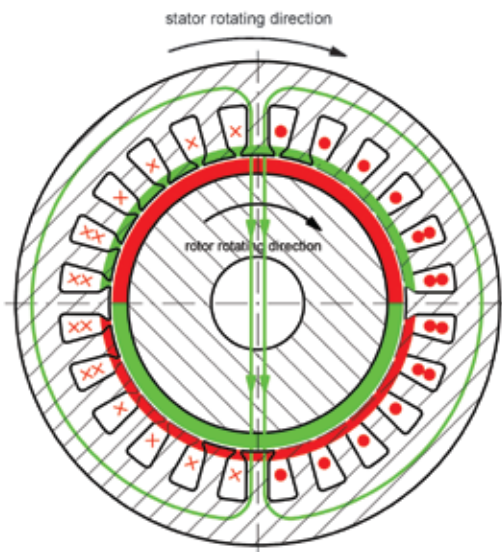
| Motor Code | Pole Number | P _n (kW) | n _n (rpm) | M _n (Nm) | f _n (Hz) | kt (Nm/A) | I _n (A) | Efficiency (%) |
|---------------|-------------|------------------------|-------------------------|------------------------|------------------------|--------------|-----------------------|-------------------|
| SQM160-300 | 66 | 6,7 | 70 | 920 | 39 | 49,2 | 18,7 | 91,0 |
| | | 9,1 | 100 | 870 | 55 | 35,5 | 24,5 | 92,9 |
| | | 11,9 | 150 | 760 | 83 | 25,8 | 29,5 | 94,0 |
| | | 14,3 | 200 | 685 | 110 | 21,1 | 32,5 | 94,2 |
| | | 20,1 | 300* | 640 | 165 | 14,0 | 45,8 | 94,5 |
| SQM160-400 | 66 | 8,9 | 70 | 1220 | 39 | 49,2 | 24,8 | 91,9 |
| | | 12,1 | 100 | 1160 | 55 | 36,1 | 32,1 | 93,3 |
| | | 14,9 | 150 | 950 | 83 | 26,5 | 35,8 | 94,3 |
| | | 17,6 | 200 | 840 | 110 | 22,6 | 37,2 | 94,5 |
| | | 24,7 | 300* | 785 | 165 | 14,8 | 53,0 | 94,5 |
| SQM160-500 | 66 | 11,2 | 70 | 1530 | 39 | 49,4 | 31,0 | 92,2 |
| | | 15,2 | 100 | 1450 | 55 | 23,9 | 60,6 | 93,8 |
| | | 17,6 | 150 | 1120 | 83 | 28,1 | 39,8 | 94,8 |
| | | 20,1 | 200 | 960 | 110 | 23,6 | 40,7 | 94,8 |
| | | 28,3 | 300* | 900 | 165 | 14,0 | 64,1 | 95,0 |
| SQM200-300SE | 88 | 11,0 | 70 | 1500 | 51 | 51,4 | 29,2 | 93,0 |
| | | 14,1 | 100 | 1350 | 73 | 37,3 | 36,2 | 94,3 |
| | | 18,1 | 150 | 1150 | 110 | 27,9 | 41,2 | 95,0 |
| | | 23,0 | 200* | 1100 | 147 | 20,9 | 52,7 | 95,1 |
| SQM200-400SE | 88 | 14,7 | 70 | 2000 | 51 | 50,0 | 40,0 | 93,8 |
| | | 18,8 | 100 | 1800 | 73 | 37,4 | 48,1 | 94,7 |
| | | 23,6 | 150 | 1500 | 110 | 27,9 | 53,7 | 95,3 |
| | | 30,4 | 200* | 1450 | 147 | 21,7 | 66,9 | 95,4 |
| SQM200-500SE | 88 | 18,3 | 70 | 2500 | 51 | 50,8 | 49,2 | 93,9 |
| | | 23,0 | 100 | 2200 | 73 | 39,0 | 56,4 | 95,0 |
| | | 28,3 | 150 | 1800 | 110 | 27,2 | 66,2 | 95,5 |
| | | 36,6 | 200* | 1750 | 147 | 20,1 | 86,9 | 95,5 |
| SQM200-600SE | 88 | 22,0 | 70 | 3000 | 51 | 48,8 | 61,5 | 94,1 |
| | | 27,2 | 100 | 2600 | 73 | 37,5 | 69,4 | 95,1 |
| | | 33,0 | 150 | 2100 | 110 | 28,0 | 75,0 | 95,6 |
| | | 44,0 | 200* | 2100 | 147 | 18,6 | 112,8 | 95,6 |
| SQM200-700SE | 88 | 25,7 | 70 | 3500 | 51 | 49,3 | 71,0 | 94,3 |
| | | 31,9 | 100 | 3050 | 73 | 38,4 | 79,5 | 95,3 |
| | | 38,5 | 150 | 2450 | 110 | 27,3 | 89,8 | 95,7 |
| | | 51,3 | 200* | 2450 | 147 | 21,8 | 112,5 | 95,7 |
| SQM250-400SE | 88 | 24,2 | 70 | 3300 | 51 | 50,3 | 65,6 | 94,9 |
| | | 30,9 | 100 | 2950 | 73 | 38,6 | 76,4 | 95,7 |
| | | 34,6 | 150 | 2200 | 110 | 26,9 | 81,9 | 96,0 |
| | | 48,2 | 200* | 2300 | 147 | 19,9 | 115,5 | 96,0 |
| SQM250-600SE | 88 | 35,9 | 70 | 4900 | 51 | 50,3 | 97,5 | 95,2 |
| | | 45,5 | 100 | 4350 | 73 | 34,8 | 125,0 | 95,9 |
| | | 51,8 | 150 | 3300 | 110 | 28,8 | 114,5 | 96,2 |
| | | 71,2 | 200* | 3400 | 147 | 19,9 | 170,6 | 96,2 |
| SQM250-800SE | 88 | 48,4 | 70 | 6600 | 51 | 46,4 | 142,2 | 95,5 |
| | | 60,7 | 100 | 5800 | 73 | 38,7 | 150,0 | 96,1 |
| | | 67,5 | 150 | 4300 | 110 | 30,7 | 140,0 | 96,2 |
| | | 94,2 | 200* | 4500 | 147 | 23,0 | 195,5 | 96,2 |
| SQM315- 700SE | 110 | 61,6 | 70 | 8400 | 64 | 50,9 | 165,0 | 93,2 |
| | | 82,7 | 100 | 7900 | 92 | 40,5 | 195,0 | 94,8 |
| | | 102,1 | 150 | 6500 | 138 | 20,4 | 318,0 | 95,0 |
| | | 130,7 | 200* | 6240 | 183 | 20,1 | 310,0 | 95,2 |
| SQM315- 900SE | 110 | 72,9 | 70 | 9950 | 64 | 52,4 | 190,0 | 93,5 |
| | | 92,1 | 100 | 8800 | 92 | 39,1 | 225,0 | 94,5 |
| | | 119,4 | 150 | 7600 | 138 | 26,2 | 290,0 | 95,0 |
| | | 150,8 | 200* | 7200 | 183 | 22,8 | 316,0 | 95,3 |
| SQM315-1100SE | 110 | 80,6 | 70 | 11000 | 64 | 55,0 | 200,0 | 94,0 |
| | | 103,7 | 100 | 9900 | 92 | 32,2 | 307,0 | 95,0 |
| | | 131,9 | 150 | 8400 | 138 | 27,9 | 301,0 | 95,2 |
| | | 169,6 | 200* | 8100 | 183 | 16,1 | 503,0 | 95,5 |

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.

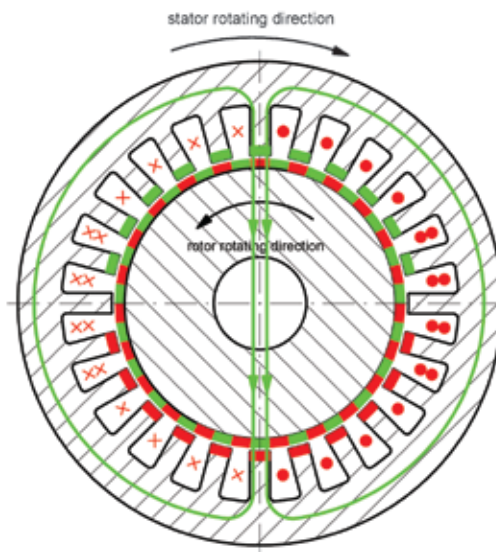
The new EMF motor principle

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

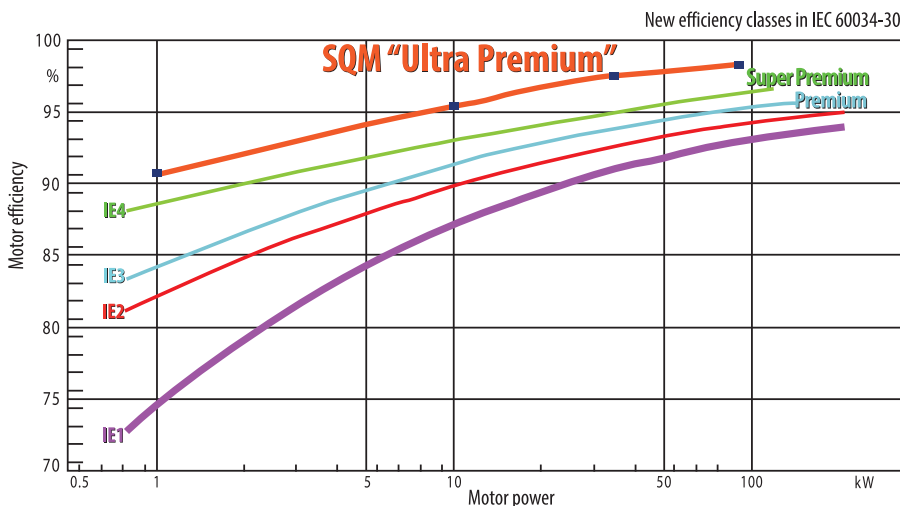
With this new motor principle a very high torque is created by low pole winding. The copper losses and hysteresis losses are very low which allows extremely high efficiency values.

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



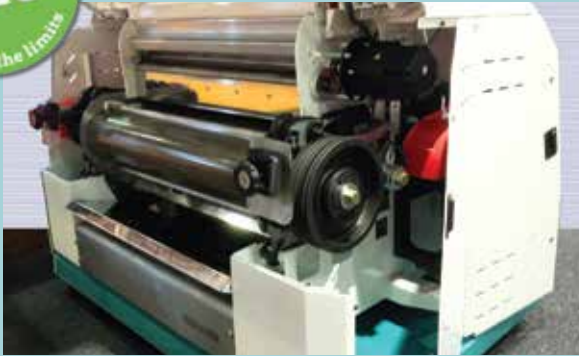
Due to the direct drive application, gearbox efficiency losses are eliminated.

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.



Efficiency is better than
IE5
We put the limits





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