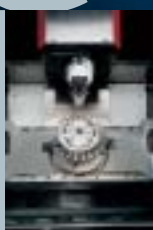**The right twist**
for your machine

Torque motors
1FW6

SIEMENS

Achieve higher dynamics and precision smoothly …

In the machine tool industry and other sectors, there is a constant demand for greater precision and higher torque. Siemens Linear Motor Systems unite these counter aims with their direct-drive cylindrical motors. The so-called torque motors, which function in the same way as synchronous motors, are ideally suited for use with swivel axes and round tables. They are also perfect for dynamic tool magazines and turning machine axes that run-up quickly. Torque motors consist of a stator and rotor with permanent magnets and distinguish themselves by extremely high precision and dynamics.

Less is more

Torque motors do not require mechanical transmission components such as couplings or gears. For this reason, they also need far less space. But this is certainly not the only advantage of their compact design: The small number of individual components reduces the number of interfaces and the outlay for maintenance and the stocking of spare parts. This in turn minimizes machine downtimes and increases availability.

Precise machining

The torque motor principle excludes mechanical transmission errors. In addition, direct integration into the machine structure prevents unnecessary elasticity and transmission problems. The advantage is clear: maximum precision.

Reduced auxiliary process times

Because forces are transmitted without mechanical transmission elements in torque motors, the total mass and forces due to friction are minimized. This in turn results in a reduction of auxiliary process times – in favor of higher dynamics.

No play

Because torque motors have no gears, they do not have the proverbial play problem either. This increases contour accuracy when the direction of motion changes. Repeat accuracy is also improved when a certain position is reached again.

... with sophisticated cooling concepts

Motors whose temperature increases beyond permitted limits always lose power. For this reason, they must always be cooled in a reliable way so that they can achieve their maximum power. Siemens Linear Motor Systems uses two different principles depending on the diameter, which also ensure precise heat dissipation at the mechanical interfaces to the machine.
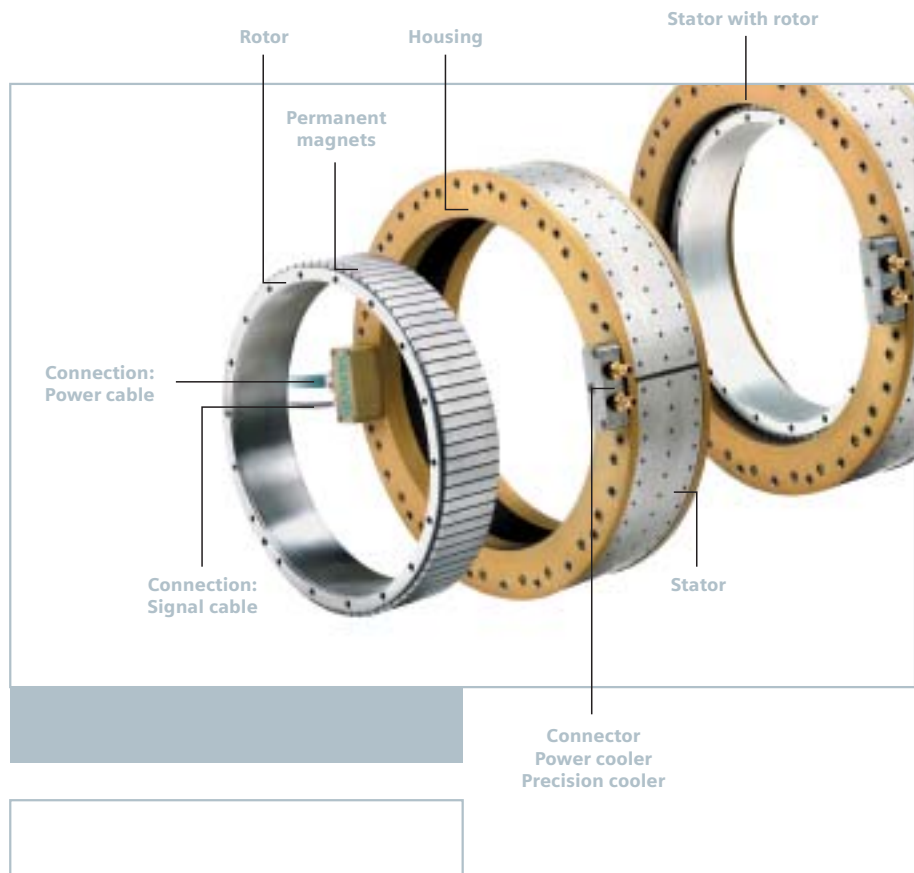
Torque motor with cooling jacket

For torque motors with a smaller diameter, Siemens Linear Motor Systems uses an effective and economic cooling system: An outer cooling jacket through which water is flowing ensures that the temperature constantly remains within the predefined range.

Torque motor with internal cooling

Because of their greater diameter, high-performance torque motors produce more heat. For this reason, they require a more efficient cooling system. The solution is the Thermo-Sandwich® principle developed by Siemens Linear Motor Systems.
The heat development in the stator is compensated by an integrated power cooler which is supplemented with an outer precision cooler. This heat separation means that the interfaces to the machine are hardly affected by temperature changes: The increase is reliably limited to a few Kelvin.

Rotor   Housing   Stator with rotor

Permanent magnets

Connection: Power cable

Connection: Signal cable

Stator

Connector Power cooler Precision cooler

Torque motors

Range of motors according to torque / geometry

Maximum torque M_{MAX}	Rated torque M_{NS1}	1FW6 built-in motor with assembly bridge Order No.	External diameter of stator (including precision cooler) D	Internal diameter of rotor di	Stator length L	Moment of inertia of rotor	Weight of rotor and stator (including precision cooler)
Nm	Nm	*)	mm	mm	mm	kg m^2	kg
175	100	1FW6090-0Px05-xxC2	230	140	90	1.52E-2	13
250	140	1FW6090-0Px07-xxC2	230	140	110	2.20E-2	17
355	200	1FW6090-0Px10-xxC2	230	140	140	3.09E-2	22
530	295	1FW6090-0Px15-xxC2	230	140	190	4.65E-2	33
410	205	1FW6130-0Px05-xxC2	310	220	90	6.37E-2	18
575	285	1FW6130-0Px07-xxC2	310	220	110	8.92E-2	24
820	410	1FW6130-0Px10-xxC2	310	220	140	1.27E-1	31
1250	610	1FW6130-0Px15-xxC2	310	220	190	1.91E-1	45
740	410	1FW6160-0Wx05-xxC2	440	280	110	1.90E-1	37
1040	580	1FW6160-0Wx07-xxC2	440	280	130	2.58E-1	48
1480	820	1FW6160-0Wx10-xxx2	440	280	160	3.60E-1	63
2220	1230	1FW6160-0Wx15-xxC2	440	280	210	5.31E-1	89
1040	580	1FW6190-0Wx05-xxC2	502	342	110	3.58E-1	56
1460	810	1FW6190-0Wx07-xxC2	502	342	130	4.86E-1	70
2080	1150	1FW6190-0Wx10-xxC2	502	342	160	6.78E-1	92
3150	1730	1FW6190-0Wx15-xxC2	502	342	210	9.98E-1	130
1490	820	1FW6230-0Wx05-xxC2	576	416	110	6.22E-1	66
2090	1150	1FW6230-0Wx07-xxC2	576	416	130	8.43E-1	83
2980	1650	1FW6230-0Wx10-xxC2	576	416	160	1.18E+0	109
4470	2460	1FW6230-0Wx15-xxC2	576	416	210	1.73E+0	153
2480	1380	1FW6290-0Wx05-xxC2	730	524	130	1.42E+0	94
3470	1930	1FW6290-0Wx07-xxC2	730	524	150	1.93E+0	120
4950	2750	1FW6290-0Wx10-xxx2	730	524	180	2.69E+0	158
7430	4150	1FW6290-0Wx15-xxx2	730	524	230	3.97E+0	222

*) Versions:

P = Motor with cooling jacket, axial cable outlet (standard)
Q = Motor with cooling jacket, radial cable outlet (option)

W = Motor with power and precision cooler, axial cable outlet (standard)
V = Motor with power and precision cooler, radial cable outlet (option)

C = 2 m cable length (standard)/editional other cable length on request

... following easy integration

Siemens torque motors can be easily integrated into existing machine structures because the rotor and stator are preassembled and the connections are standardized.

High torque

Siemens torque motors achieve a maximum torque of 7430 Nm. This is due to the stator, which – usually fixed – transfers the torque across the air gap directly to the rotor, as in the case of linear motors.