

TK - DIRECT DRIVE TORQUE MOTORS AND DRIVES

Phase Motion Control first introduced the concept of Direct Drive, to overcome the bandwidth, accuracy and speed limits of mechanical transmissions, back in the 90s. Over the years **DD became the standard** in all demanding applications from **turn-mill CNCs** to all sorts of **cutting, bending** and **forming NC machine tool**. From **1998** the concept found wide application also outside the machine tool field, from motion platforms to test systems to military and scientific projects.

Advantages

Stiff and linear: Direct connection from actuator to sensor and load eliminates resonance, backlash, stick slip, allowing order of magnitude improvement in control bandwidth.

High Servo Control Performance: Accuracy only limited by the sensor, minimized settling times shorter positioning cycle.

No transmission: Minimized lubrication, no wear and essentially maintenance free operation.

Wide Application Range: Adaptable to various torque, speed, and power needs.

High Torque Density: Compact design delivering very high torque output.

Mechanically Retained Magnets: Ensures reliability with no rotor failure risks.

High-Speed Capability: Suitable for demanding applications like electrospindles and electric propulsion.

Smooth Operation: Very low cogging and ripple for precise and reliable performance.

Key Features

Phase Motion Control offers tailored solutions based on a range of pre designed magnetic circuits. The specific features of the TK motors allow for simple mechanical adaptation to integrated systems through co-design, with a high degree of flexibility. Customized housings with complete cooling circuits, or subassemblies of machines without housing, bearings, or encoders, are produced on demand based on available magnetic circuits.

Applications

The TK range can power all motion applications: from low-speed accurate positioning to high speed machining, from a few Nm to hundreds of thousands of Nm, and from hundreds of watts to hundreds of kilowatts:

Machining: Machining tables, Tool heads, Electrospindles.

Forming: Servo Press, forging, lamination and hammering, drawing capstans.

Electric propulsion: Vehicles, boats, ships and now electric aviation.

Renewable energy: Wind and hydropower generators.

Precision automation: Positioning systems, DD robotics.

Technical highlights

Design: Designed to be integrated inside the application

Multiple diameters: From 50 mm to 3 m

Custom windings: Adapted to the application requirement to minimize drive requirements

Torque Range: From 2 Nm to over 500,000 Nm (with cylindrical air gap)

Performance: Very high torque density, power, and very low cogging

Constant power operation: Up to 1:10 speed range

High Speed: 30 krpm standard, higher on demand

Custom Adaptations: Options for windings and mechanical interfaces

