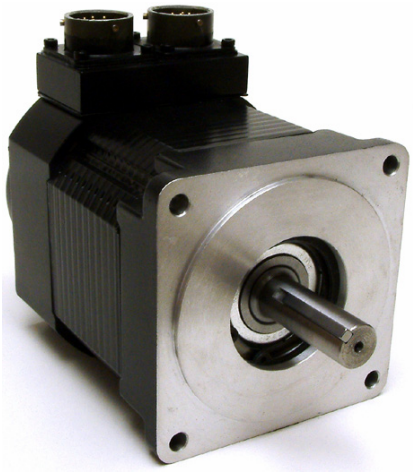
M-3483 ServoMotor

Brushless, Permanent Magnet, Rotary Motor

Teknic's industrial grade servomotors are brushless, rotary motors engineered specifically for OEM machinery. They provide a rugged design, high power density and excellent value.



Borrowing a page from Teknic's high-value, instrument grade motor line, the latest generation industrial servomotors have been value engineered by removing a few costly features required only in submerged environments, and been upgraded in critical areas such as bearings, shaft design, and feedback accuracy. The result is a highly rugged and reliable industrial servomotor. In dirty or moist environments (packaging, grinding, routing, plasma cutting, are typical), the M-3483 is an exceptional value. For example, the M-3483 has class H windings; oversized, precision-grade motor bearings; rare-earth magnetics; a mechanically-floating differential encoder; on-body, military-style bayonet connectors with gaskets; and the entire line has been carefully refined to provide outstanding field reliability.

PERFORMANCE FEATURES

- Neodymium-Iron-Boron magnets provide high power-density and fade-free performance.
- Direct winding on electrostatically powder-coated stators gives high thermal conductivity for better RMS ratings.
- Windings are rated to 135ºC, improving thermal range.
- Low electrical time constant increases responsiveness.
- High power to rotor inertia ratio for rapid acceleration.
- Low-distortion, sinusoidal back-EMF improves motor smoothness and lowers audible noise.
- Precision, maintenance-free oversized bearings reduce viscous friction and motor noise while smoothing motion and improving motor side-loading capability.
- Finite element analysis and precision machining yield high-strength shafts to improve radial load capability.
- Low detent torque allows smooth motion.

PERFORMANCE SPECIFICATIONS

There is no standardized way to specify a motor, so a comparative analysis is difficult. Teknic specs are conservative and real-world. There are no surprises.

- The torque/speed curves show true motor shaft output, not theoretical motor output.
- The continuous ratings are with the motor in free air, not mounted to a sizable heat sink.
- Wattage ratings are based on useable motor *output* power, not *input* power.
- Peak torque can be sustained for three seconds. And continuous torque is a healthy percentage of peak torque. So peak torque is actually *useable* in high duty cycle applications.
- The torque and back EMF constant (Kt and Ke) are conservatively stated to require *peak* sine output, not RMS sine output. This lowers amplifier demand by 40%.

LOW COST OF OWNERSHIP

Although the price of the M-3483 is attractive, price is not the only factor that determines true motor cost. M-series motors are built and engineered to be inexpensive to own.

Terminated Leads Eliminates Harnessing

The M-3483 servomotor comes with military style bayonet body connectors to avoid the cost, time and reliability factors associated with assembling flying leads. In addition to eliminating manual harnessing and improving motor reliability, the connector style allows the use of commonly available, robust motor cables that can be built and functionally tested in an automated environment to improve cable reliability. Moreover, the connectors provide pressure-locked, thread-in assembly for added protection from the environment and ease of production.

Motor Testing

To ensure out-of-the box reliability, every Teknic motor is thoroughly tested before shipment. The tests include:

- Mechanical compliance test.
- Encoder integrity test.
- Hall angle alignment test.
- Full electrical compliance test.
- Full, extended functional test on a vector torque fixture.

Delivery

The M-3483 servomotor is manufactured in high volume using standardized methods. The standardized methods provide repeatable build quality, dependable motor performance and reliable lead-time. These standardized methods also include tight controls over the source of materials and other issues that affect long-term availability. Teknic works exclusively with OEM machine designers, so we understand the value of ensured availability over the entire life of a machine.

RELIABILITY AND COST IN CONCERT

There is an art to achieving both low cost *and* high reliability in a product.

Teknic's industrial motors have achieved low cost because of exclusive focus on the needs of OEMs in industrial automation. Teknic has carefully engineered unnecesary and expensive features out of the M-series motors and removed ineffective add-ons (like intertia slugs or inline inductors), eliminating costly waste.

Reliability is achieved through evolutionary enhancements accumulated over many years of in-field experience.

So for OEMs with applications requiring rugged design, high performance, and low cost, Teknic's industrial servomotors are an excellent solution.

The refinements that apply to all M-series servomotors include...

PINNED STATOR DESIGN

The stators are mechanically locked and chemically bonded to eliminate slippage.

FLOATING ENCODER

The M-3483 has a sealed, high-bandwidth, precision encoder to ensure reliable operation. To ensure ruggedness, Teknic uses a unique floating mount design. In the event of subtle axial shaft movement (within the bearings' compliance or from thermal expansion), the encoder moves with the motor shaft.

BEARING CAPTIVATION

The oversized, high-precision motor bearings are chemically *and* mechanically captivated to maintain proper preload and alignment under all rated load conditions.

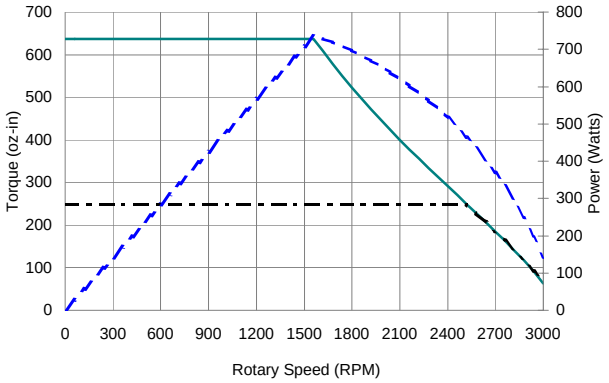
FEA DESIGNED SHAFTS

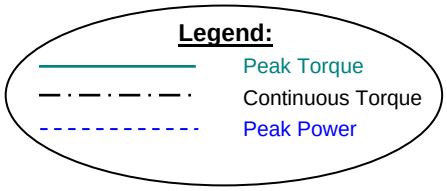
Finite element analysis is used to reduce stress concentrations on machined areas of the shaft. This allows the use of oversized bearings without reducing shaft strength. The result is rugged load-bearing capability.

SPECIFICATIONS

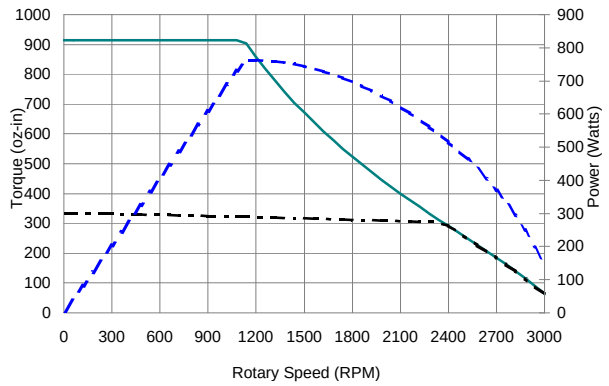
GENERAL	Type:	Brushless; rotary; rare-earth permanent magnet.
	Maintenance:	None.
	Dimensions, in (mm):	D=3.25 sq (63.5); L=5.04 (128).
	Weight, oz (g):	97 (2765).
	Winding options:	Series Wye (SW); Parallel Wye (PW).
ENVIRONMENTAL	Temperature:	0-60ºC (ambient temps > 40ºC lowers RMS).
	Humidity:	0-95%, non-condensing.
	Operating conditions:	Heavy dust/dirty/moist environments. Direct fluid wash down or underwater use not permitted. (Routing, robotic welding, plasma cutting, solvent print, are typical).
INPUT POWER	Input voltage:	20-400 VDC.
	Current, (SW):	6 A RMS (in free air), 33A peak.
	Current, (PW):	11.0 A RMS (in free air), 33A peak.
EXAMPLE OUTPUT POWER	Parallel Wye torque with ISC-1700:	915 oz-in peak. 332 oz-in continuous (no heat sink).
	Parallel Wye power with ISC-1700:	763 watts peak (@ 75VDC). 521 watts RMS.
	Series Wye torque with SSt-6000 servo drive:	1254 oz-in peak. 332 oz-in continuous (no heat sink).
	Series Wye power with SSt-6000 servo drive:	1965 watts peak (@ 300VDC). 795 watts RMS.
ENCODER	Type:	Differential, floating optical disk.
	Density:	20,000 counts/rev.
HALL EFFECTS	Type:	Angle-adjustable hall tracks, 120º spacing (Only used for initialization with SSt drives).
PHYSICAL MOUNTING	Motor mount:	NEMA 34.
	Shaft diameter:	0.5".
WIRING	Motor cable:	Motor leads are fully terminated with body mount, metal bayonet MS connectors.
BEARINGS	Type:	Oversized, single row, deep groove, radial.
ELECTRICAL SPECS	Winding rating:	135ºC.
	Electrical time constant:	4.6 mS.
	Winding resistance, PW:	0.64 ohms.
	Winding resistance, SW:	2.52 ohms.
	Inductance, PW:	3.02 mH.
	Inductance, SW:	11.7 mH.
	Back EMf (Ke), PW:	23.68 Vpeak/kRPM.
	Back EMf (Ke), SW:	46.58 Vpeak/kRPM.
MECHANICAL LOADING	Shaft side load:	200.0 lbs centered 1" from bearing face (for infinite shaft life with 99% reliability factor).
	Bearing life vs. load: (at 95% L5 life and 5 lbs. external axial load)	1 lb radial = 2,165,199,000,000 revs. 20 lbs radial = 1,304,538,000,000 revs. 50 lbs radial = 83,490,000,000 revs. 100 lbs radial = 10,436,000,000 revs. 150 lbs radial = 3,092,000,000 revs.

3483 Parallel Wye with SSt-1500 Digital Servo Drive

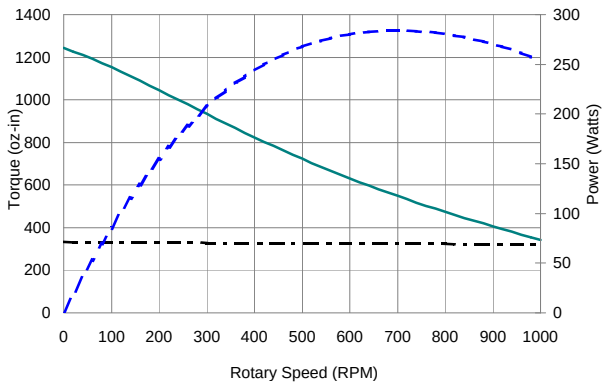




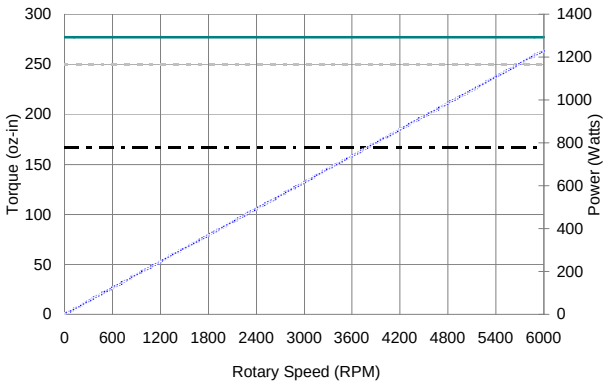
3483 Parallel Wye with ISC-1700 Integrated Drive/Controller



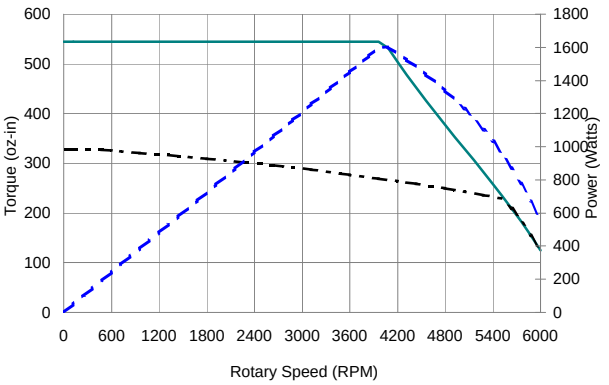
3483 Series Wye with ISC-1700 Integrated Drive/Controller



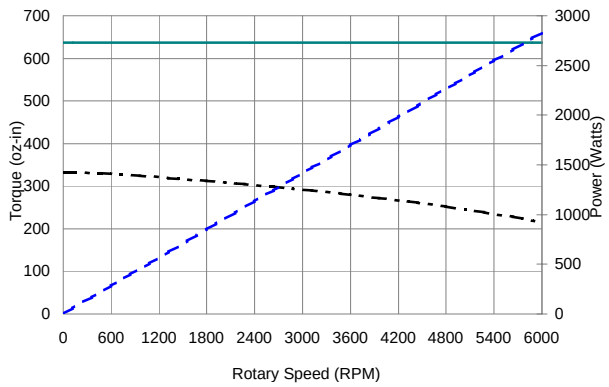
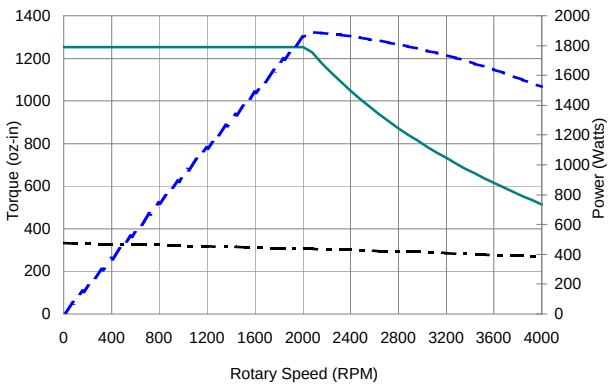
3483 Parallel Wye with SSt-3100 Digital Servo Drive



3483 Series Wye with SSt-3100 Digital Servo Drive



3483 Parallel Wye with SSt-6000 Digital Servo Drive



3483 Series Wye with SSt-6000 Digital Servo Drive