

TOSHIBA

TOSHIBA INTERNATIONAL CORPORATION

LOW VOLTAGE MOTORS & DRIVES

Permanent Magnet Motor Drive System



**SUPER
PREMIUM**

MEETS OR EXCEEDS IE4 EFFICIENCY LEVELS

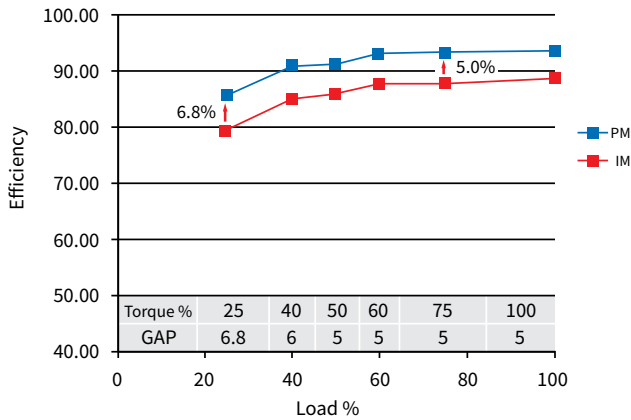
Toshiba's permanent magnet (PM) motor drive system is a highly efficient motor and drive solution ideal for maximizing energy cost savings. Permanent magnet motor technology offers the highest motor efficiencies, power density, torque output, and speed accuracy on the market. Toshiba's Tosh-ECO® PM motor paired with Toshiba's state-of-the-art AS3® or S15 adjustable speed drive offers on average 7% efficiency improvement when compared to an induction motor drive system.



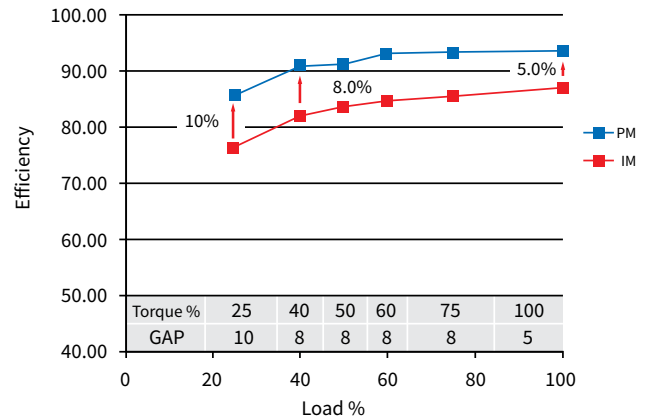
High-End Application	Precisely metered torque, speed, and position are obtainable with Toshiba's Tosh-ECO PM motor when paired with a Toshiba ASD
Systematic Control	Can operate as an open-loop system in mid-range performance applications requiring speed and torque control
Protection	Provides a reduction in risk of high-current demagnetization with over-current protection
Compact Design	Delivers high power efficiency and power density levels allowing for a compact and lightweight solution
Energy Savings	Maximize energy cost savings by pairing Toshiba's Tosh-ECO PM motor with a AS3 or S15 drive
AS3 Drive	Designed with an emphasis on built-in communications, it allows end-users to access real-time data and refined controls
S15 Drive	Compact and high performing ASD, capable of controlling a wide range of variable and constant torque applications

SUPER PREMIUM EFFICIENCY WITH TOSH-ECO PM MOTOR

Toshiba's Tosh-ECO PM motor provides a higher efficiency across all operating conditions when compared to an induction motor. The Tosh-ECO PM motor maintains nearly the same efficiency at half speed and full speed, while the induction motor's efficiency drops at full load operation.



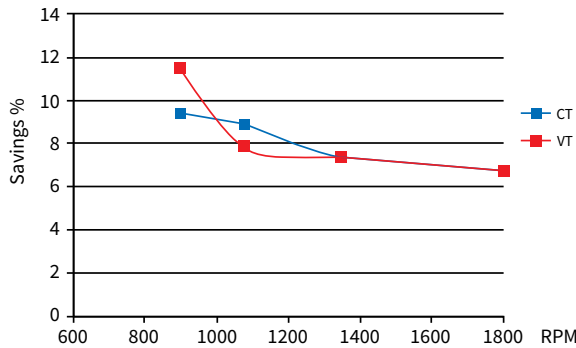
Motors Efficiency at Full Speed: Induction Motor vs. Permanent Magnet Motor



Motors Efficiency at Half Speed: Induction Motor vs. Permanent Magnet Motor

GREATER POWER SAVINGS WITH THE TOSH-ECO PM MOTOR

Toshiba's Tosh-ECO PM motor yields greater power savings, compared to induction motors, especially on lower speed conditions for constant torque applications. Additional power savings of up to 9.5% for constant torque and up to 12% for variable torque loads can be achieved by using a permanent magnet motor drive system. (Test Results Based on 7.5 kW Motor-Drive System)



PERMANENT MAGNET MOTORS: A SMART DECISION

On average, the ROI for selecting a permanent magnet motor over an induction motor is less than four months. With the life of a motor reaching 20 years, permanent magnet motors provide substantial savings.

Annual Savings with a PM Motor	Constant Torque Load	Variable Torque Load
Energy Savings	7.44%	8.31%
Return on Investment	111 Days	108 Days
CO ² Reduction	1.72 Tons CO ²	1.77 Tons CO ²

*Annual savings calculated based on typical constant torque and variable torque load profiles, estimated at 8,568 operation hours, 10 cents/kWh. The carbon footprint (CO²) reduction is calculated at 0.525 kgCO².

DRIVE APPLICATIONS

- Constant Power Output in Field Weakened Range for Variable Torque Operation
- Overspeed Conditions
- Precision Speed Control Without Requiring an Encoder
- Full Torque Across the Rated Speed Range
- Suitable for Shaft Grounding and Bearing Protection
- Bi-Directional Designs
- Exclusively Operated on an ASD

INDUSTRIES SERVED

- Water & Wastewater
- Mining & Minerals
- Oil & Gas

APPLICATIONS

- Pumps
- Fans
- Compressors
- Centrifuges
- Conveyors
- Mixers

3 THREE YEAR WARRANTY



TOSH-ECO PM MOTOR

Power	.55 to 315 kW
Speed (50 Hz)	1800, 3600, & 4500 RPM
Voltage (50 Hz)	400 V
Service Factor	1.0
Enclosure	Totally Enclosed Fan Cooled
Frame Size	71 - 315 per IEC 60072
Ingress Protection	IP55
Insulation	Class F - Random Wound
Vibration	Grade A, Balanced with Half Key per ISO 8821
Environment	Severe Duty
Efficiency	Meets or Exceeds IE4 Efficiency Levels (As Defined by IEC60034-30-1)
Energy Savings	5-8% Typical Average Efficiency Improvement vs. Induction Motor
Operation	Suitable for High Speed Operation Up to 20% Above Rated Speed at Constant Power (Beyond NEMA Max Overspeed)

CONSTRUCTION

Frame	Aluminum Frame 71 - 132; Cast Iron Frame 160 - 315; Interchangeability/Drop-In Replacement with IEC Metric Frame Induction Motor Counterparts
Paint	Severe Duty, Corrosion Resistant Resin Primer Paint, with an Acrylic Enamel Finish (RAL 6012). Surpasses 96 Hour Salt Spray Test
Shaft Seals	Shaft V-Ring Protection System
Lifting	Eye Bolt or Cast in Lifting Mechanism for Frames >90L
Mounting	Suitable for Horizontal Mounting; All Mounting Orientations for <160 Frame; IEC Mounting and Flanges with Removable Feet
Fan Cover	Fabricated Steel
Conduit Box	Top Mount with Rotatable 90° Increments and 2 Ground Provisions (One Plastic Cable Gland & Plug)

INSULATION SYSTEM

Temperature Rise	Class B Rise @ 1.0 SF
Thermal Protection	Thermistor PTC Rated for 135°C for 160-315 Frames (Quantity 3, Single-Phase)

	AS3 DRIVE		S15 DRIVE			
Voltage	230 V	460 V	Single-Phase 230 V	230 V	460 V	600 V
Horsepower	1 to 100 HP ND (0.5 to 75HP HD)	1 to 500 HP ND (0.5 to 450 HP HD)	0.25 to 3 HP	0.5 to 20 HP	0.5 to 20 HP	2 to 20 HP
Overload Current Rating	120% for One Minute ND (150% for One Minute HD)		150% for One Minute			
Enclosure	NEMA 1 up to Frame A5 Built-In; NEMA 1 with Optional Conduit Box Frame A6 and above; NEMA 3R and Type 12/IP55 Enclosures Available		NEMA 1			
Ambient Temperature	-10°C to +50°C (60°C with Derate)		-10°C to +50°C (60°C with Derate)			
Terminal Strip I/O	Eight Digital Inputs, Three Digital Outputs (One Form C, Two Form A Relays), Three Analog Inputs (0 to 10 VDC, -10 to +10 VDC, 0 to 20 mADC), Two Analog Outputs (0 to 10 VDC or 0 to 20 mADC), STO (Safe Torque Off)		Six Digital Inputs, Three Digital Outputs (One Form C Relay, One Form A Relay, One Open Collector Output), Three Analog Inputs (0 to 10 VDC, -10 to +10 VDC, 0 to 20 mADC), One Analog Output (0 to 10 VDC or 0 to 20 mADC), STO (Safe Torque Off)			
Display	Advanced Full-English LCD Display		Seven-Segment LED Display			

ND - Normal Duty
HD - Heavy Duty

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TOSHIBA MOTORS & DRIVES DIVISION
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