



PRODUCTS GUIDE

FAST, ACCURATE, SMOOTH MOTION CONTROLLER

Ezi-SERVO[®]

Closed Loop Stepping System

Ezi-STEP[®]

Micro Stepping System

Ezi-LINEARSTEP[®]

Linear Step System with Closed Loop Control



Fast, Accurate, Smooth Motion

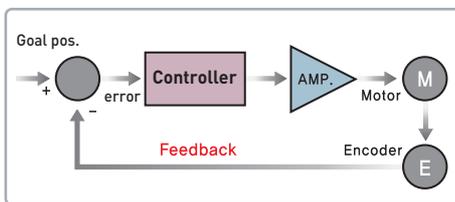
Advantages over Open-loop Control Stepping Drive

1. Reliable positioning without loss of synchronism.
2. Holding stable position and automatically recovering to the original position even after experiencing positioning error due to external forces, such as mechanical vibration or vertical positional holding.
3. Ezi-SERVO® utilizes 100% of the full range of rated motor torque, contrary to a conventional open-loop stepping driver that can use up to 50% of the rated motor torque due to the loss of synchronism.
4. Capability to operate at high speed due to load-dependant current control, open-loop stepper drivers use a constant current control at all speed ranges without considering load variations.

Advantages over Servo Motor Controller

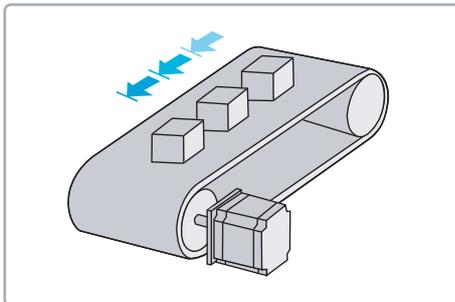
1. No gain tuning (Automatic adjustment of gain in response to a load change.)
2. Maintains the stable holding position without oscillation after completing positioning.
3. Fast positioning due to the independent control by on-board DSP.
4. Continuous operation during rapid short-stroke movement due to instantaneous positioning.

CLOSED LOOP SYSTEM



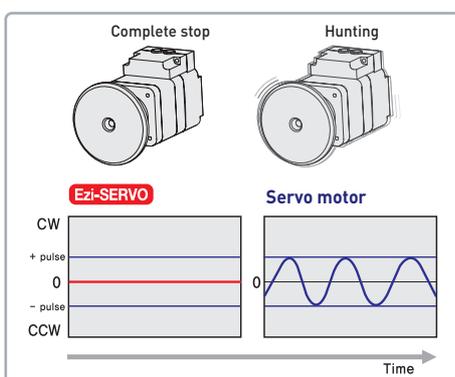
Ezi-SERVO® is an innovative closed loop stepping motor and controller that utilizes a high-resolution motor mounted encoder to constantly monitor the motor shaft position. The encoder feedback feature allows the Ezi-SERVO® to update the current motor shaft position information every 25 micro seconds. This allows the Ezi-SERVO® drive to compensate for the loss of position, ensuring accurate positioning. For example, due to a sudden load change, a conventional stepper motor and drive could lose a step creating a positioning error and a great deal of cost to the end user!

NO GAIN TUNING



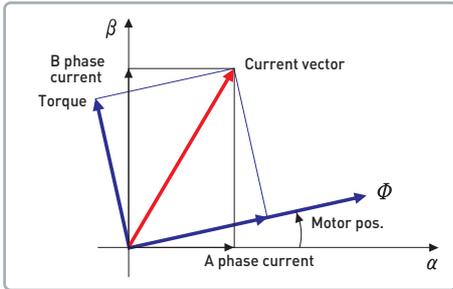
Conventional servo systems, to ensure machine performance, smoothness, positional error and low servo noise, require the adjustment of its servo gains as an initial crucial step. Even systems that employ auto-tuning require manual tweaking after the system is installed, especially if more than one axis are interdependent. Ezi-SERVO® employs the best characteristics of stepper and closed loop motion controls and algorithms to eliminate the need of tedious gain tuning required for conventional closed loop servo systems. This means that Ezi-SERVO® is optimized for the application and ready to work right out of the box! The Ezi-SERVO® system employs the unique characteristics of the closed loop stepping motor control, eliminating these cumbersome steps and giving the engineer a high performance servo system without wasting setup time. Ezi-SERVO® is especially well suited for low stiffness loads (for example, a belt and pulley system) that some-time require conventional servo systems to inertia match with the added expense and bulk of a gearbox. Ezi-SERVO also performs exceptionally, even under heavy loads and high speeds!

NO HUNTING



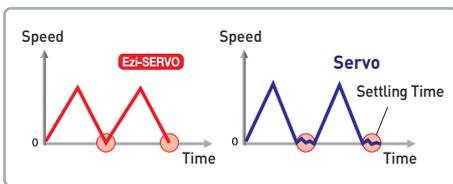
Traditional servo motor drives overshoot their position and try to correct by overshooting the opposite direction, especially in high gain applications. This is called null hunt and is especially prevalent in systems that the break away or static friction is significantly higher than the running friction. The cure is lowering the gain, which affects accuracy or using Ezi-SERVO® Motion Control System! Ezi-SERVO® utilizes the unique characteristics of stepping motors and locks itself into the desired target position, eliminating Null Hunt. This feature is especially useful in applications such as nanotech manufacturing, semiconductor fabrication, vision systems and inkjet printing in which system oscillation and vibration could be a problem.

SMOOTH AND ACCURATE



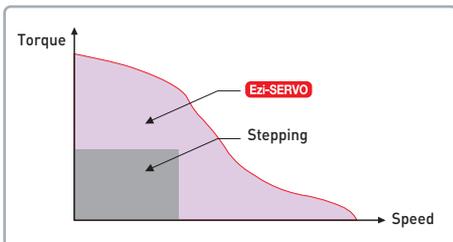
Ezi-SERVO® is a high-precision servo drive, using a high-resolution encoder with 32,000 pulses/revolution. Unlike a conventional Microstep drive, the on-board high performance DSP (Digital Signal Processor) performs vector control and filtering, producing a smooth rotational control with minimum ripples.

FAST RESPONSE



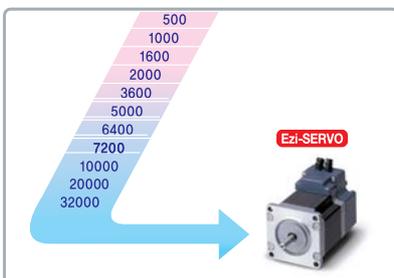
Similar to conventional stepping motors, Ezi-SERVO® instantly synchronizes with command pulses providing fast positional response. Ezi-SERVO® is the optimum choice when zero-speed stability and rapid motions within a short distance are required. Traditional servo motor systems have a natural delay between the commanding input signals and the resultant motion because of the constant monitoring of the current position, necessitating in a waiting time until it settles, called settling time.

HIGH TORQUE



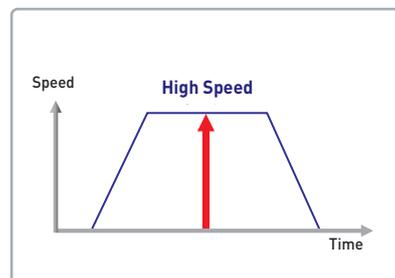
Compared with common step motors and drives, Ezi-SERVO® motion control systems can maintain a high torque state over relatively long period of time. This means that Ezi-SERVO continuously operates without loss of position under 100% of the load. Unlike conventional microstep drives, Ezi-SERVO® exploits continuous high-torque operation during high-speed motion due to its innovative optimum current phase control.

HIGH RESOLUTION



The unit of the position command can be divided precisely.
(Max. 32,000 pulses/revolution)

HIGH SPEED



The Ezi-SERVO® functions well at high speed without the loss of Synchronism or positioning error. Ezi-SERVO's ability of continuous monitoring of current position enables the stepping motor to generate high-torque, even under a 100% load condition.

LOAD-DEPENDANT CURRENT CONTROL



Since the drive controls the operating current depending on the variation of a load, it reduces the heat generation, improving efficiency.

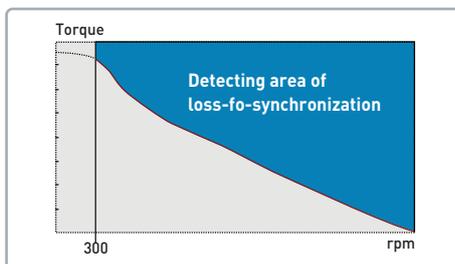
Ezi-STEP Characteristics

Ezi-STEP[®] is an all in one unit incorporating the stepper drive into the motor housing. This helps eliminate wiring, ensures reliability and provides a low cost compact package. Fastech's unique integrated software provides sensor-less detection of the loss of step synchronization, dampening that provides smooth motion, and no vibration at the low speed range.

High speed and precision are ensured by the high performance onboard DSP (digital signal processor) and proprietary algorithms constantly monitoring the motor's performance and making corrections.

The DSP even detects missed steps during high speed operation (over 300 RPM) and built in damping provides smooth operation at low speeds. The resolution of the Ezi-STEP[®]-BT can be adjusted from 1.8° motor step angle to 0.0072° step angle for super precision. Ezi-STEP[®] also generates alarms and running signals to monitor its operation remotely.

SENSORLESS STALL DETECTION



Step-Out Detection (Patent pending)

Ezi-STEP[®]-BT can detect step loss of the stepping motor without the addition of an external sensor. This is achieved by the DSP in conjunction with proprietary estimation algorithm constantly monitoring and comparing the voltage, current, and the back-emf. This enables the drive to detect the loss-of-synchronization of the motor rotor (an impossible task for conventional stepping motor drives) and increase voltage to the motor to prevent the step loss. This feature provides higher torque in high speed applications without the loss-of-synchronization*.

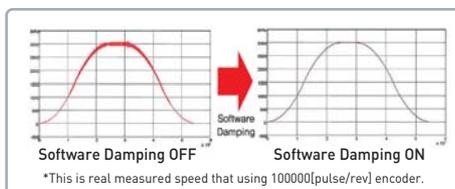
* effective only over 300 rpm

MICROSTEP AND FILTERING

Ezi-STEP[®]-BT features a High Precision Microstep function and Filtering (Patent pending)

The high-performance Digital Signal Processor (DSP) and proprietary algorithms improves the basic motor resolution of 1.8° up to maximum 0.0072° (1/250 steps). Ezi-STEP[®] adjusts the PWM control signal in every 25 μ sec, unlike conventional drivers, which makes it possible for more precise current control and provides high-precision microstep operation.

SOFTWARE DAMPENING



Vibration suppression and High-speed operation (Patent pending)

Motor vibration is created by magnetic flux variations of the motor, lower current from the drive due to back-emf from the motor at high speeds, and lowering of phase voltages from the drive. Ezi-STEP[®] drive detects these problems and the DSP adjusts the phase of the current according to the pole position of the motor, drastically suppressing vibration. This allows the smooth operation of the motor at high speeds.

DRIVE OUTPUT SIGNAL MONITORING

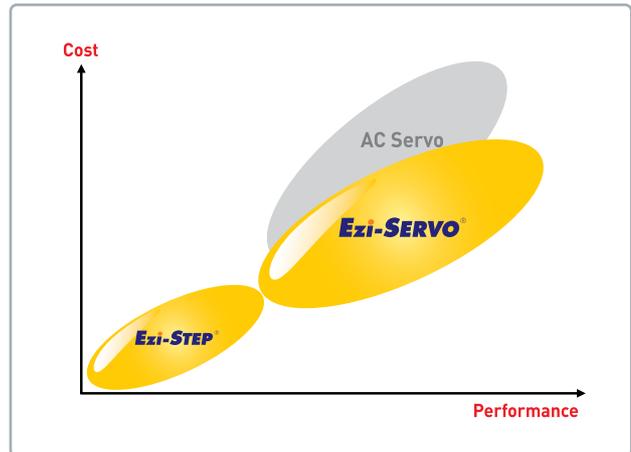
Ezi-STEP[®] provides loss of step, run/stop, over-current, over-heat, over-voltage, power, and motor connection alarms that can be monitored by the controller and visible by a motor-mounted flashing led indicator.

IMPROVED HIGH SPEED DRIVING

Depending on the speed of the stepping motor, Ezi-STEP[®] automatically increases the supply voltage and prevents torque lowering due to low operating voltage to the motor caused by back-emf voltage, this enables high-speed operation. Additionally, the software damping algorithm minimizes the vibration and prevents the loss-of-synchronization at high-speed.

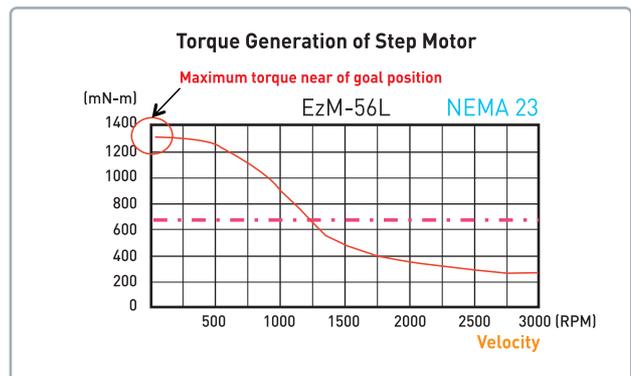
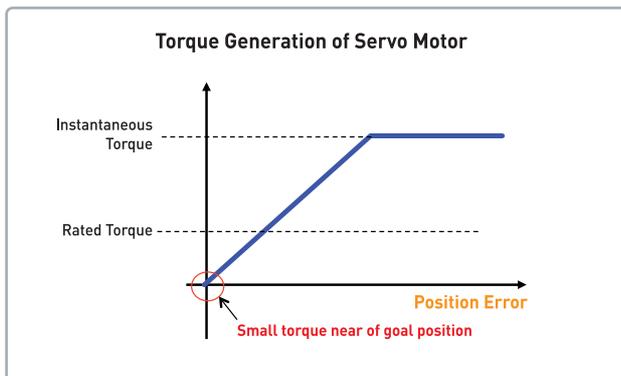
MARKET OF Ezi-SERVO®

Why the Closed Loop Stepping System has better performance than the Servo Systems?



TORQUE COMPARISON BETWEEN STEP AND SERVO MOTOR

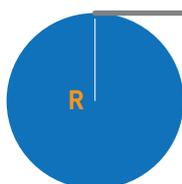
- Torque from Servo Motor is proportional to position Error.
- Torque from Step Motor has no relation to position accuracy.
- Torque from Step Motor has only relation to Speed.



WHY STEP MOTOR SYSTEM IS BETTER FOR BELT & PULLEY SYSTEM

- Motor revolution generate 62.8mm of linear movement so most of motion must be short pitch of movement.
- Due to less rigidity of load, shaking of load should be directly delivered to motor shaft when motion stops. In case of servo motor, when motor stops, servo motor has very tiny power to keep target position so shaking of load can be easily effected to motor shaft it's own vibration

* In a step motor's aspect, belt & pulley is short pitch of movement



$$L = 2\pi R$$

Ex : R=10mm, L=62.8mm

Ezi-SERVO[®]

Closed Loop Stepping System

Ezi-SERVO[®] ST



Innovative closed loop stepping motor control system which utilizes a high resolution encoder to update the motor position every 25 micro-seconds. Using high performance DSP technology(Digital Signal Processor) and software, the drive ensures exact position, no overshooting and smooth motion. It is very innovative closed loop stepping control system which is best selection for Vision Inspection Application.

- Closed Loop System
- No Gain Tuning
- No Hunting
- High Resolution (10000, 20000 and 32000PPR)
- Fast Response

Ezi-SERVO[®] BT



Innovative integrated stepping motor and drive system in one robust package! A high resolution encoder updates the motor position every 25 micro-seconds to the integrated drive. Optimizing high performance DSP technology(Digital Signal Processor) and proprietary software, the drive ensures exact position, no overshooting and smooth motion at 100% of load.

- Motor + Encoder + Drive
- Closed Loop System
- No Gain Tuning / No Hunting
- High Resolution (10000, 20000 PPR)
- Fast Response

Ezi-SERVO[®] MINI



Compact and miniaturized closed loop stepping motor and drive system which utilizes a high resolution encoder to update the motor position every 25 micro-seconds. Optimizing high performance DSP technology(Digital Signal Processor) and proprietary software, the drive ensures exact position, no overshooting and smooth motion at 100% of load.

- Miniaturized Compact Size
- Closed Loop System
- No Gain Tuning
- No Hunting
- High Resolution (4000, 10000, 16000, 20000 and 32000PPR)
- Fast Response

FASTECH Overview

FASTECH products can be found driving applications such as: LCD/LED Manufacturing, semi-conductor fabrication, assembly machines, packaging machines, medical diagnostic equipment, laboratory apparatus, vision inspection systems and many other applications that require precise smooth movement. Fastech drives have industry standard NEMA mounting flanges and easily adapt to most linear actuators and precision stages.

Ezi-SERVO® Plus-R



Innovative closed loop stepping motor control system with an integrated Motion Control. The integrated Motion Controller can be linked up to 16 axes and can be operated from a PC through RS-485 communication. All of the motion conditions are set through the integrated network and saved in flash ROM as a parameter. FASTECH Motion Library (DLL) is provided for programming under Windows 2000/XP. A maximum of 256 positions can be saved in flash ROM memory.

- Intergrated Controller
- Closed Loop System
- High Resolution (10000, 20000 and 32000PPR)
- Fast Response
- Position Table
- No Gain Tuning / No Hunting

Ezi-SERVO® ALL



Innovative integrated stepping motor, drive and controller system in one robust package! A high resolution encoder updates the motor position every 25 micro-seconds to the integrated drive. The integrated Motion Controller can be linked up to 16axes and can be operated from a PC through RS-485 communication. All of the motion conditions are set through the integrated network and saved in flash ROM as a parameter. FASTECH Motion Library (DLL) is provided for programming under Windows 2000/XP. A maximum of 64 positions can be saved in flash ROM memory.

- Motor + Encoder + Drive + Controller + Network
- Embedded Controller
- Closed Loop System
- High Resolution (10000, 20000 PPR) / Fast Response
- Position Table
- No Gain Tuning / No Hunting

Ezi-SERVO® Plus-R MINI



Compact and miniaturized closed loop stepping motor, drive and controller system which utilizes a high resolution encoder to update the motor position every 25 micro-seconds. The integrated Motion Controller can be linked up to 16 axes and can be operated from a PC through RS-485 communication. All of the motion conditions are set through the integrated network and saved in flash ROM as a parameter. FASTECH Motion Library(DLL) is provided for programming under Windows 2000/XP. A maximum of 64 positions can be saved in flash ROM memory

- Miniaturized Compact Size
- Position Table
- No Gain Tuning / No Hunting
- High Resolution (4000, 10000, 16000, 20000 and 32000PPR)
- Embedded Controller
- Closed Loop System
- Fast Response

Ezi-STEP[®]

Micro Stepping System

Ezi-STEP[®] BT



High speed, high precision drive and stepping motor integrated into one package, Ezi-STEP[®] is unique as it adopts a new control scheme based on a built in high performance DSP(Digital Signal Processor) and software. Ezi-STEP[®] utilizes a unique position estimation algorithm which instantaneously detects out of synchronization of the stepping motor rotor, which is not available with conventional stepping motor & drives.

- Micro Stepping with Integrated Drive
- Sensorless Stall Detection
- Software Damping
- Run/Stop Signal Output

Ezi-STEP[®] ST



For high speed and high precision drive of stepping motors, Ezi-STEP[®]-ST is a unique drive that adopts a new control scheme due to an on-board high performance digital signal processor and software(DSP). With a unique position estimation algorithm, it instantaneously detects an out of synchronization of the stepping motor rotor, which is not available with a conventional stepping motor and drives.

- Micro Stepping
- Sensorless Stall Detection
- Software Damping
- Run / Stop Signal Output

Ezi-STEP[®] ALL



High speed precision microstep drive, controller and stepping motor integrated into one robust package, Ezi-STEP[®] ALL is unique due to its new control scheme based on a built in high performance DSP(Digital Signal Processor) and software. The onboard controller eliminates costly support systems and can easily digitally network up to 16 axis together to a host controller or operate stand alone.

- Motor + Drive + Controller + Network
- Embedded Controller
- Micro Stepping
- Sensorless Stall Detection
- Software Damping
- Run / Stop Signal Output

Product Overview

The Motion Controller of FAS Technology is to realize the high speed arithmetic & motion control algorithm by using the 32bit DSP. Simultaneously this makes come true the FAS(Fast, Accurate and Smooth) Motion which are the most significant factors in Motion Control Business.

Ezi-STEP® Plus-R



Innovative, open loop stepping motor and motion control system which is suitable for low cost applications. A maximum of 16 axes can be operated from a PC through RS-485 communication and it can be connected to Ezi-SERVO® Plus-R, as well. All of the motion conditions are set through the network and are saved in flash ROM as a parameter. The Motion Library(DLL) is provided for programming under Windows 2000/XP. A maximum of 256 positions can be saved in flash ROM memory.

- Intergrated Controller
- Position Table
- Micro Stepping
- Sensorless Stall Detection
- Software Damping
- Run / Stop Signal Output

Ezi-LINEARSTEP® Linear Step System with Closed Loop Control

Ezi-LINEARSTEP®



Ezi-LinearStep, Hybrid Stepper Linear Actuators can offer High precision and strong durability for various applications. Motor Characteristics can be customized.

- Durable Compact Linear Actuator
- Precision Hybrid Stepper Motor
- High Precision Positioning
- High Speed Linear Motion
- Easy To Use

Ezi-LINEARSTEP® ST



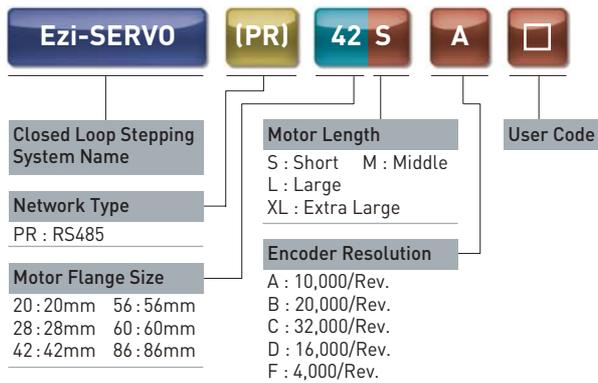
Ezi-LinearStep ST, Combination between High Precision of Stepper Linear Actuator and Innovative Closed Loop Stepping System. It can offer High Precision plus High Resolution of Encoder so Fastech's LinearStep Solution will guarantee to cover all of applications.

- Precision Hybrid Stepper Linear Actuators
- High Durability
- High Precision of Positioning
- High Speed Linear Motion
- Easy To Use

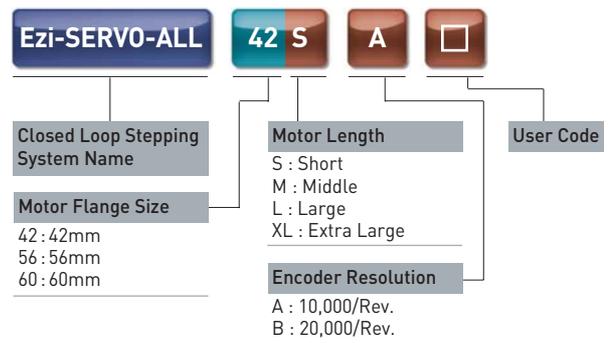
PART NUMBERING



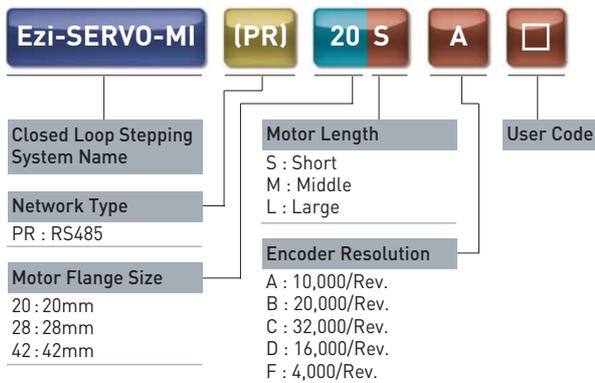
Ezi-SERVO ST/Plus-R



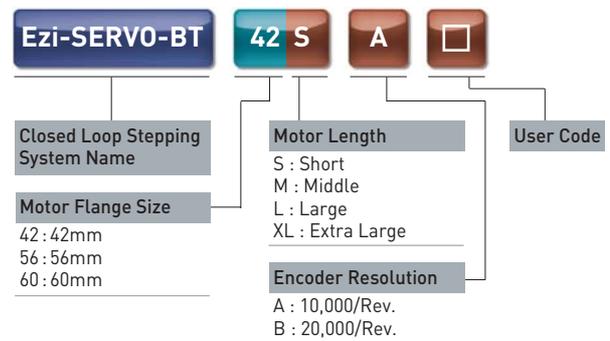
Ezi-SERVO ALL



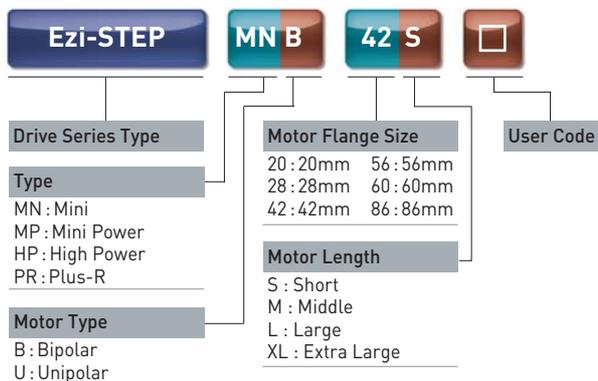
Ezi-SERVO MINI/Plus-R MINI



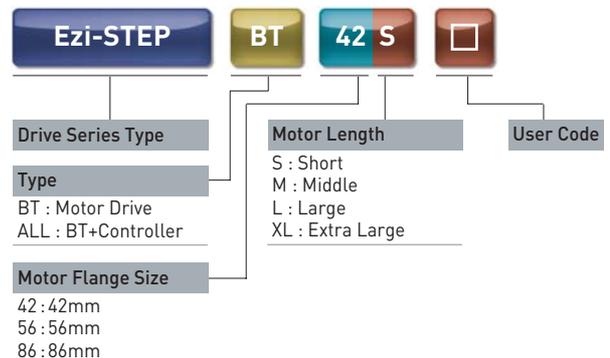
Ezi-SERVO BT



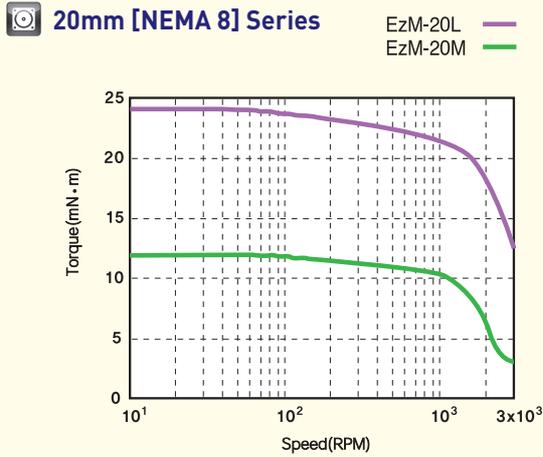
Ezi-STEP ST(MN, MP, HP)/ Plus-R



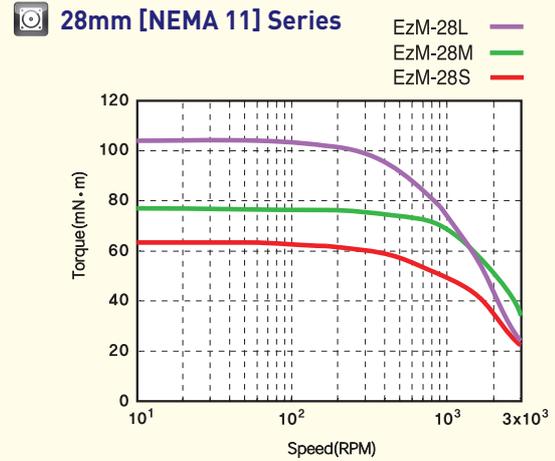
Ezi-STEP BT/ALL



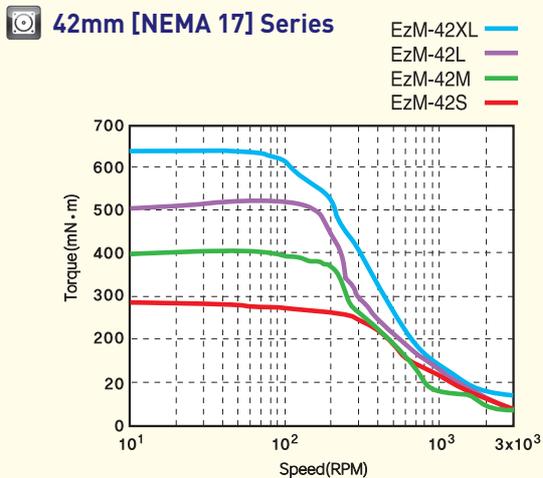
TORQUE CHARACTERISTICS



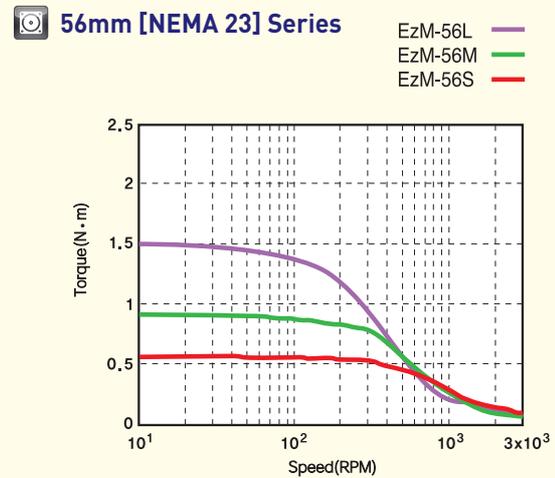
※ Measured Condition
Motor Voltage = 24VDC
Motor Current = Rated Current(Refer to Motor Specification)



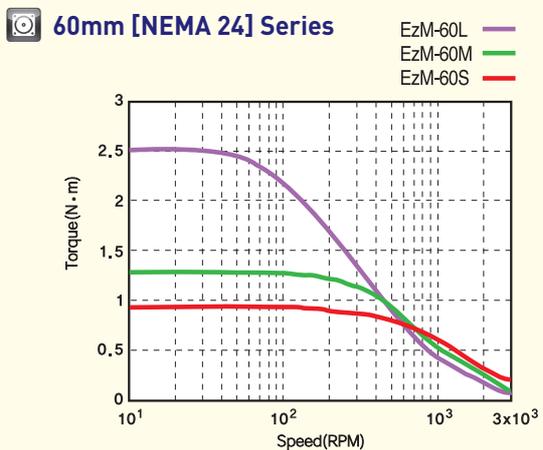
※ Measured Condition
Motor Voltage = 24VDC
Motor Current = Rated Current(Refer to Motor Specification)



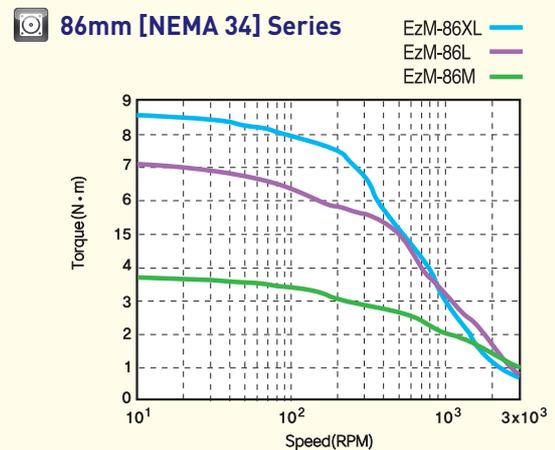
※ Measured Condition
Motor Voltage = 24VDC
Motor Current = Rated Current(Refer to Motor Specification)



※ Measured Condition
Motor Voltage = 24VDC
Motor Current = Rated Current(Refer to Motor Specification)



※ Measured Condition
Motor Voltage = 24VDC
Motor Current = Rated Current(Refer to Motor Specification)



※ Measured Condition
Motor Voltage = 70VDC
Motor Current = Rated Current(Refer to Motor Specification)

Global Network



Motion Controller and Motor Drive as FASTECH's main products have been exported to **34** countries including Japan, USA, Germany, Taiwan, Italy, China, India and so on. Currently including 13 exclusive distributors in each territory, thru by entire 40 global distributors, FASTECH is achieving global business.



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