Ezi-SERVO®

Closed Loop Stepping System

ST

FASTECH

Fast, Accurate, Smooth Motion

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CE RoHS COMPLIANT

Table of Contents

※ Before operation ※

· Thank you for your purchasing Ezi-SERVO ST.
· Ezi-SERVO ST is an all-in-one Unit. For high-speed and high-precision drive of a stepping motor, Ezi-SERVO ST is an unique drive that adopts a new control scheme owing to an on-board high-performance 32bit MCU.
· This manual describes handling, maintenance, repair, diagnosis and troubleshooting of Ezi-SERVO ST.
· Before operating Ezi-SERVO ST, thoroughly read this manual.
· After reading the manual, keep the manual near the Ezi-SERVO ST so that any user can read the manual whenever needed.

1. Precautions

◆ General Precautions

· Contents of this manual are subject to change without prior notice for functional improvement, change of specifications or user's better understanding. Thoroughly read the manual provided with the purchased Ezi-SERVO ST.
· When the manual is damaged or lost, please go to the homepage(www.fastech.co.kr) and downloaded the manual.
· Our company is not responsible for a product breakdown due to user's dismantling for the product, and such a breakdown is not guaranteed by the warranty.

◆ Put the Safety First

· Before installation, operation and repairing the Ezi-SERVO ST, thoroughly read the manual and fully understand the contents. Before operating the Ezi-SERVO ST please, understand the mechanical characteristics of the Ezi-SERVO ST and related safety information and precautions.
· This manual divides safety precautions into Attention and Warning.

⚠ **Attention :** If user does not properly handle the product, the user may seriously or slightly injured and damages may occur in the machine.

⚠ **Warning :** If user does not properly handle the product, a dangerous situation (such as an electric shock) may occur resulting in deaths or serious injuries.

· Although precaution is only a **Attention**, a serious result could be caused depending on the situation. Follow safety precautions.

◆ Check the Product

⚠ Attention	Check the Product is damaged or parts are missing. Otherwise, the machine may get damaged or the user may get injured.

◆ Installation

⚠ Attention	Carefully move the Ezi-SERVO ST. Otherwise the Product may get damaged or User's foot may get injured by dropping the product. Use non-flammable materials such as metal in the place where the Ezi-SERVO ST is to be installed. Otherwise, a fire may occur. When installing several Ezi-SERVO ST in a sealed place, install a cooling fan to keep the ambient temperature of the Ezi-SERVO ST as 50℃ or lower. Otherwise, a fire or other kinds of accidents may occur due to overheating.
⚠ Warning	The process of Installation, Connection, Operation, Checking and Repairing should be done with qualified person. Otherwise, a fire or other kinds of accidents may occur.

◆ Connect Cables

⚠ Attention	Keep the rated range of Input Voltage for Ezi-SERVO ST. Otherwise, a fire or other kinds of accidents may occur. Cable connection should follow the wiring diagram. Otherwise, a fire or other kinds of accidents may occur.
⚠ Warning	Before connecting cables, check if input power is off. Otherwise, an electric shock or a fire may occur. The case of the Ezi-SERVO ST is insulated from the ground of the internal circuit by the condenser. Ground the Ezi-SERVO ST. Otherwise, an electric shock or a fire may occur.

◆ Operation

⚠ **Attention**	If a protection function(alarm) occurs, firstly remove its cause and then release(alarm reset) the protection function. If you operate continuously without removing its cause, the machine may get damaged or the user may get injured. Do not make Motor Free and make input signal to ON during operation. Motor will stop and stop current will become zero. The machine may get damaged or the user may get injured. Make all input signals to OFF before supply input voltage to Ezi-SERVO ST. The machine may get damaged or the user may get injured by motor operation. All parameter values are set by default factory setting value. Change this value after reading this manual throughly. Otherwise, the machine may get damaged or other kinds of accidents may occur.

◆ Check and Repair

|	
⚠ **Attention**	Stop to supply power to the main circuit and wait for a while before checking or repairing the Ezi-SERVO ST. Electricity remaining in the capacitor may cause danger. Do not change cabling while power is being supplied. Otherwise, the user may get injured or the product may get damaged. Do not reconstruct the Ezi-SERVO ST. Otherwise, an electric shock may occur or the reconstructed product can not get After-Service.

2. Main Characteristics

1 Closed Loop System

Ezi-SERVO is an innovative Closed Loop System that utilizes a high-resolution motor mounted encoder constantly to monitor the current position. The encoder feedback allows the Ezi-SERVO to update the current position every 25 μsec. It 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 but Ezi-SERVO automatically correct the position by encoder feedback.
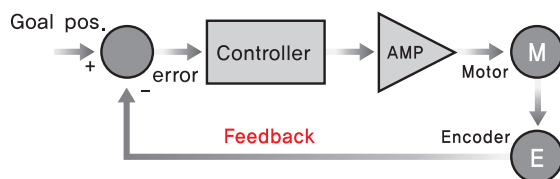
2 No Gain Tuning

To ensure machine performance, smoothness, positional error and low servo noise, conventional servo systems require the adjustment of its servo's gains as an initial crucial step. Even systems that employ auto-tuning require manual tuning after the system is installed, especially if more that one axis are interdependent. Ezi-SERVO employs the best characteristics of stepper, 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 sometime require conventional servo systems to inertia match with the additional expensive and bulky gearbox. Ezi-SERVO also performs exceptionally, even under heavy loads and high speeds.
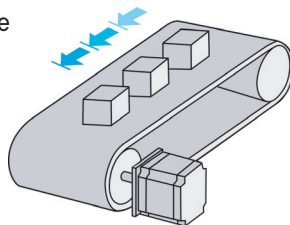
3 Heat Reduction / Energy Saving

(Motor Current Control according to load)

Ezi-SERVO automatically controls motor current according to load. Ezi-SERVO reduces motor current when motor load is low and increases motor current when load is high. By optimizing the motor current, motor heat can be minimized and energy can be saved.

Motor temperature [Measured by Thermal Imaging Camera]

Condition to measure the motor temperature
[4hours operation, Motor surface temperature saturation]
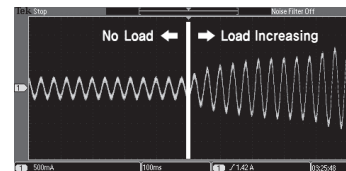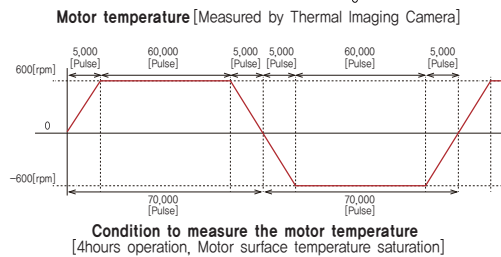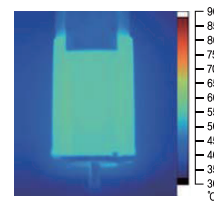
Example of the Motor Current Control according to load

4 Torque Improvement
(Motor Voltage Increasing)

Ezi-SERVO boosts the voltage supplied to the motor to increase the torque at high speed. In the case that motor speed is increased, Back-EMF will be increased accordingly and it cause the reduction of motor torque at high speed. Since Ezi-SERVO has the function to increase the voltage supplied to the motor to compensate the torque reduction, the torque of motor at high speed can be imrpoved about 30%.
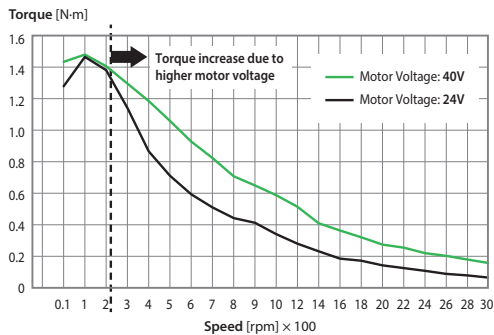
※ The torque at high speed is improved about 30%

Measured Condition : Drive = Ezi-SERVO-ST-56L
Motor Voltage = 40VDC
Input Voltage = 24VDC

5 No Hunting

Traditional servo motor drives overshoot their position and try to correct overshooting by moving 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 ink jet printing in which system oscillation and vibration could be a problem.
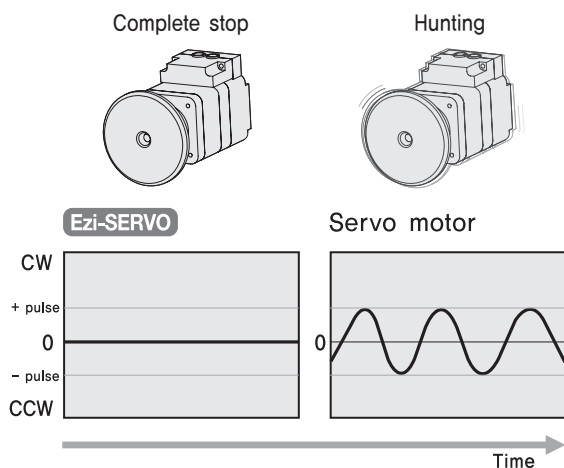
6 Smooth and Accurate

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 MCU (Micro Controller Unit) performs vector control and filtering, producing a smooth rotational control with minimum ripples.
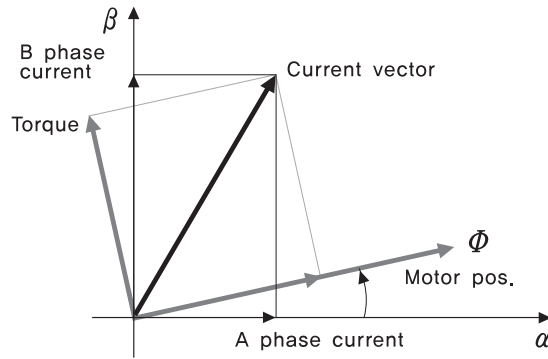
7 Fast Response

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 called settling time between the command input signals and the resultant motion because of the constant monitoring of the current position.
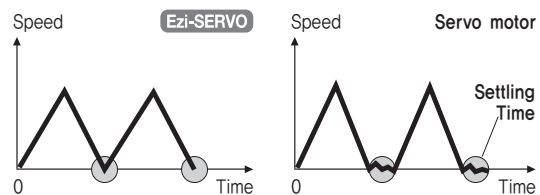
8 High Resolution

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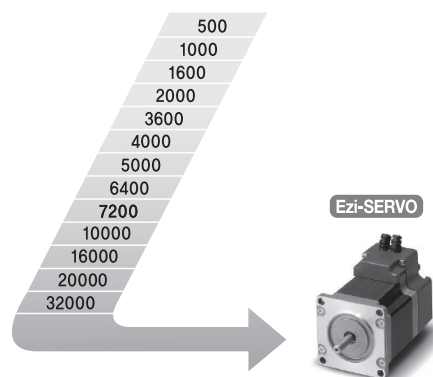
9 High Torque

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.
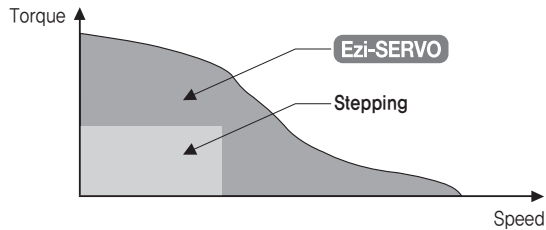
10 High Speed

The Ezi-SERVO operates well at high speed without the loss of synchronism or positioning error. Ezi-SERVO's ability of continuous current position monitoring of enables the stepping motor to generate high torque, even under a 100% load condition.
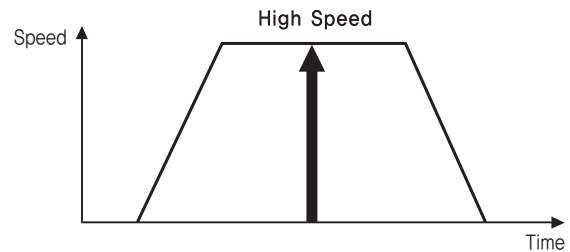
● Advantages over Open-Loop Control Stepping Drive

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-dependent current control, open-loop stepping drivers use a constant current control at all speed ranges without considering load variations.

● Advantages over Servo Motor Controller

1. No gain tuning. (Automatic gain adjustment in response to a load change)

2. Maintains the stable holding position without oscillation after completion of positioning.

3. Fast positioning due to the independent control by on-board MCU.

4. Continuous operation during rapid short-stroke movement due to instantaneous positioning.

3. Ezi-SERVO ST Part Numbering

Ezi-SERVO-ST-56L-A-BK-PN05-□

Product Name

Drive Series Type
ST : Stand Alone

Motor Flange Size
20 : 20mm 28 : 28mm 35 : 35mm 42 : 42mm 56 : 56mm 60 : 60mm 86 : 86mm

Motor Length
S : Small M : Medium L : Large XL : Extra Large

Encoder Resolution
A : 10,000[ppr] B : 20,000[ppr] C : 32,000[ppr] D : 16,000[ppr] F : 4,000[ppr]

Brake
Blank : Without Brake BK : Brake

Reduction Gear Ratio
Blank − Without Gear PN03 − 1:3 PN05 − 1:5 PN08 − 1:8 PN10 − 1:10 PN15 − 1:15 PN25 − 1:25 PN40 − 1:40 PN50 − 1:50

User Code

4. Standard Combination

Unit Part Number	Motor Model Number	Drive Model Number
Ezi-SERVO-ST-20M-F	EzM-20M-F	EzS-PD-20M-F
Ezi-SERVO-ST-20L-F	EzM-20L-F	EzS-PD-20L-F
Ezi-SERVO-ST-28S-D	EzM-28S-D	EzS-PD-28S-D
Ezi-SERVO-ST-28SM-D	EzM-28SM-D	EzS-PD-28S-D
Ezi-SERVO-ST-28M-D	EzM-28M-D	EzS-PD-28M-D
Ezi-SERVO-ST-28MM-D	EzM-28MM-D	EzS-PD-28M-D
Ezi-SERVO-ST-28L-D	EzM-28L-D	EzS-PD-28L-D
Ezi-SERVO-ST-28LM-D	EzM-28LM-D	EzS-PD-28L-D
Ezi-SERVO-ST-35M-D	EzM-35M-D	EzS-PD-35M-D
Ezi-SERVO-ST-35MM-D	EzM-35MM-D	EzS-PD-35M-D
Ezi-SERVO-ST-35L-D	EzM-35L-D	EzS-PD-35L-D
Ezi-SERVO-ST-35LM-D	EzM-35LM-D	EzS-PD-35L-D
Ezi-SERVO-ST-42S-A	EzM-42S-A	EzS-PD-42S-A
Ezi-SERVO-ST-42S-B	EzM-42S-B	EzS-PD-42S-B
Ezi-SERVO-ST-42S-C	EzM-42S-C	EzS-PD-42S-C
Ezi-SERVO-ST-42M-A	EzM-42M-A	EzS-PD-42M-A
Ezi-SERVO-ST-42M-B	EzM-42M-B	EzS-PD-42M-B
Ezi-SERVO-ST-42M-C	EzM-42M-C	EzS-PD-42M-C
Ezi-SERVO-ST-42L-A	EzM-42L-A	EzS-PD-42L-A
Ezi-SERVO-ST-42L-B	EzM-42L-B	EzS-PD-42L-B
Ezi-SERVO-ST-42L-C	EzM-42L-C	EzS-PD-42L-C
Ezi-SERVO-ST-42XL-A	EzM-42XL-A	EzS-PD-42XL-A
Ezi-SERVO-ST-42XL-B	EzM-42XL-B	EzS-PD-42XL-B
Ezi-SERVO-ST-42XL-C	EzM-42XL-C	EzS-PD-42XL-C
Ezi-SERVO-ST-56S-A	EzM-56S-A	EzS-PD-56S-A
Ezi-SERVO-ST-56S-B	EzM-56S-B	EzS-PD-56S-B
Ezi-SERVO-ST-56S-C	EzM-56S-C	EzS-PD-56S-C
Ezi-SERVO-ST-56M-A	EzM-56M-A	EzS-PD-56M-A
Ezi-SERVO-ST-56M-B	EzM-56M-B	EzS-PD-56M-B
Ezi-SERVO-ST-56M-C	EzM-56M-C	EzS-PD-56M-C
Ezi-SERVO-ST-56L-A	EzM-56L-A	EzS-PD-56L-A
Ezi-SERVO-ST-56L-B	EzM-56L-B	EzS-PD-56L-B
Ezi-SERVO-ST-56L-C	EzM-56L-C	EzS-PD-56L-C
Ezi-SERVO-ST-60S-A	EzM-60S-A	EzS-PD-60S-A
Ezi-SERVO-ST-60S-B	EzM-60S-B	EzS-PD-60S-B
Ezi-SERVO-ST-60S-C	EzM-60S-C	EzS-PD-60S-C
Ezi-SERVO-ST-60M-A	EzM-60M-A	EzS-PD-60M-A
Ezi-SERVO-ST-60M-B	EzM-60M-B	EzS-PD-60M-B
Ezi-SERVO-ST-60M-C	EzM-60M-C	EzS-PD-60M-C
Ezi-SERVO-ST-60L-A	EzM-60L-A	EzS-PD-60L-A
Ezi-SERVO-ST-60L-B	EzM-60L-B	EzS-PD-60L-B
Ezi-SERVO-ST-60L-C	EzM-60L-C	EzS-PD-60L-C
Ezi-SERVO-ST-86M-A	EzM-86M-A	EzS-PD-86M-A
Ezi-SERVO-ST-86M-B	EzM-86M-B	EzS-PD-86M-B
Ezi-SERVO-ST-86M-C	EzM-86M-C	EzS-PD-86M-C
Ezi-SERVO-ST-86L-A	EzM-86L-A	EzS-PD-86L-A
Ezi-SERVO-ST-86L-B	EzM-86L-B	EzS-PD-86L-B
Ezi-SERVO-ST-86L-C	EzM-86L-C	EzS-PD-86L-C
Ezi-SERVO-ST-86XL-A	EzM-86XL-A	EzS-PD-86XL-A
Ezi-SERVO-ST-86XL-B	EzM-86XL-B	EzS-PD-86XL-B
Ezi-SERVO-ST-86XL-C	EzM-86XL-C	EzS-PD-86XL-C

* When places an order for Stopper type 28mm, 35mm motor, please write "M" additionally after motor length of Unit Part Number.
(Ex : Ezi-SERVO-ST-28LM-D, Ezi-SERVO-ST-35LM-D)

5. Combination with Brake

Unit Part Number	Motor Model Number	Drive Model Number
Ezi-SERVO-ST-42S-A-BK	EzM-42S-A-BK	EzS-PD-42S-A
Ezi-SERVO-ST-42S-B-BK	EzM-42S-B-BK	EzS-PD-42S-B
Ezi-SERVO-ST-42M-A-BK	EzM-42M-A-BK	EzS-PD-42M-A
Ezi-SERVO-ST-42M-B-BK	EzM-42M-B-BK	EzS-PD-42M-B
Ezi-SERVO-ST-42L-A-BK	EzM-42L-A-BK	EzS-PD-42L-A
Ezi-SERVO-ST-42L-B-BK	EzM-42L-B-BK	EzS-PD-42L-B
Ezi-SERVO-ST-42XL-A-BK	EzM-42XL-A-BK	EzS-PD-42XL-A
Ezi-SERVO-ST-42XL-B-BK	EzM-42XL-B-BK	EzS-PD-42XL-B
Ezi-SERVO-ST-56S-A-BK	EzM-56S-A-BK	EzS-PD-56S-A
Ezi-SERVO-ST-56S-B-BK	EzM-56S-B-BK	EzS-PD-56S-B
Ezi-SERVO-ST-56M-A-BK	EzM-56M-A-BK	EzS-PD-56M-A
Ezi-SERVO-ST-56M-B-BK	EzM-56M-B-BK	EzS-PD-56M-B
Ezi-SERVO-ST-56L-A-BK	EzM-56L-A-BK	EzS-PD-56L-A
Ezi-SERVO-ST-56L-B-BK	EzM-56L-B-BK	EzS-PD-56L-B
Ezi-SERVO-ST-60S-A-BK	EzM-60S-A-BK	EzS-PD-60S-A
Ezi-SERVO-ST-60S-B-BK	EzM-60S-B-BK	EzS-PD-60S-B
Ezi-SERVO-ST-60M-A-BK	EzM-60M-A-BK	EzS-PD-60M-A
Ezi-SERVO-ST-60M-B-BK	EzM-60M-B-BK	EzS-PD-60M-B
Ezi-SERVO-ST-60L-A-BK	EzM-60L-A-BK	EzS-PD-60L-A
Ezi-SERVO-ST-60L-B-BK	EzM-60L-B-BK	EzS-PD-60L-B
Ezi-SERVO-ST-86M-A-BK	EzM-86M-A-BK	EzS-PD-86M-A
Ezi-SERVO-ST-86M-B-BK	EzM-86M-B-BK	EzS-PD-86M-B
Ezi-SERVO-ST-86L-A-BK	EzM-86L-A-BK	EzS-PD-86L-A
Ezi-SERVO-ST-86L-B-BK	EzM-86L-B-BK	EzS-PD-86L-B
Ezi-SERVO-ST-86XL-A-BK	EzM-86XL-A-BK	EzS-PD-86XL-A
Ezi-SERVO-ST-86XL-B-BK	EzM-86XL-B-BK	EzS-PD-86XL-B

6. Combination with Gearbox

Unit Part Number	Motor Model Number	Drive Model Number	Reduction gear ratio
Ezi-SERVO-ST-42S-A-PN3	EzM-42S-A-PN3	EzS-PD-42S-A	1:3
Ezi-SERVO-ST-42S-B-PN3	EzM-42S-B-PN3	EzS-PD-42S-B	
Ezi-SERVO-ST-42S-A-PN5	EzM-42S-A-PN5	EzS-PD-42S-A	1:5
Ezi-SERVO-ST-42S-B-PN5	EzM-42S-B-PN5	EzS-PD-42S-B	
Ezi-SERVO-ST-42S-A-PN8	EzM-42S-A-PN8	EzS-PD-42S-A	1:8
Ezi-SERVO-ST-42S-B-PN8	EzM-42S-B-PN8	EzS-PD-42S-B	
Ezi-SERVO-ST-42S-A-PN10	EzM-42S-A-PN10	EzS-PD-42S-A	1:10
Ezi-SERVO-ST-42S-B-PN10	EzM-42S-B-PN10	EzS-PD-42S-B	
Ezi-SERVO-ST-42S-A-PN15	EzM-42S-A-PN15	EzS-PD-42S-A	1:15
Ezi-SERVO-ST-42S-B-PN15	EzM-42S-B-PN15	EzS-PD-42S-B	
Ezi-SERVO-ST-42S-A-PN25	EzM-42S-A-PN25	EzS-PD-42S-A	1:25
Ezi-SERVO-ST-42S-B-PN25	EzM-42S-B-PN25	EzS-PD-42S-B	
Ezi-SERVO-ST-42S-A-PN40	EzM-42S-A-PN40	EzS-PD-42S-A	1:40
Ezi-SERVO-ST-42S-B-PN40	EzM-42S-B-PN40	EzS-PD-42S-B	
Ezi-SERVO-ST-42S-A-PN50	EzM-42S-A-PN50	EzS-PD-42S-A	1:50
Ezi-SERVO-ST-42S-B-PN50	EzM-42S-B-PN50	EzS-PD-42S-B	
Ezi-SERVO-ST-42M-A-PN3	EzM-42M-A-PN3	EzS-PD-42M-A	1:3
Ezi-SERVO-ST-42M-B-PN3	EzM-42M-B-PN3	EzS-PD-42M-B	
Ezi-SERVO-ST-42M-A-PN5	EzM-42M-A-PN5	EzS-PD-42M-A	1:5
Ezi-SERVO-ST-42M-B-PN5	EzM-42M-B-PN5	EzS-PD-42M-B	
Ezi-SERVO-ST-42M-A-PN8	EzM-42M-A-PN8	EzS-PD-42M-A	1:8
Ezi-SERVO-ST-42M-B-PN8	EzM-42M-B-PN8	EzS-PD-42M-B	
Ezi-SERVO-ST-42M-A-PN10	EzM-42M-A-PN10	EzS-PD-42M-A	1:10
Ezi-SERVO-ST-42M-B-PN10	EzM-42M-B-PN10	EzS-PD-42M-B	
Ezi-SERVO-ST-42M-A-PN15	EzM-42M-A-PN15	EzS-PD-42M-A	1:15
Ezi-SERVO-ST-42M-B-PN15	EzM-42M-B-PN15	EzS-PD-42M-B	
Ezi-SERVO-ST-42M-A-PN25	EzM-42M-A-PN25	EzS-PD-42M-A	1:25
Ezi-SERVO-ST-42M-B-PN25	EzM-42M-B-PN25	EzS-PD-42M-B	
Ezi-SERVO-ST-42M-A-PN40	EzM-42M-A-PN40	EzS-PD-42M-A	1:40
Ezi-SERVO-ST-42M-B-PN40	EzM-42M-B-PN40	EzS-PD-42M-B	
Ezi-SERVO-ST-42M-A-PN50	EzM-42M-A-PN50	EzS-PD-42M-A	1:50
Ezi-SERVO-ST-42M-B-PN50	EzM-42M-B-PN50	EzS-PD-42M-B	

6. Combination with Gearbox

Unit Part Number	Motor Model Number	Drive Model Number	Reduction gear ratio
Ezi-SERVO-ST-42L-A-PN3	EzM-42L-A-PN3	EzS-PD-42L-A	1:3
Ezi-SERVO-ST-42L-B-PN3	EzM-42L-B-PN3	EzS-PD-42L-B	
Ezi-SERVO-ST-42L-A-PN5	EzM-42L-A-PN5	EzS-PD-42L-A	1:5
Ezi-SERVO-ST-42L-B-PN5	EzM-42L-B-PN5	EzS-PD-42L-B	
Ezi-SERVO-ST-42L-A-PN8	EzM-42L-A-PN8	EzS-PD-42L-A	1:8
Ezi-SERVO-ST-42L-B-PN8	EzM-42L-B-PN8	EzS-PD-42L-B	
Ezi-SERVO-ST-42L-A-PN10	EzM-42L-A-PN10	EzS-PD-42L-A	1:10
Ezi-SERVO-ST-42L-B-PN10	EzM-42L-B-PN10	EzS-PD-42L-B	
Ezi-SERVO-ST-42L-A-PN15	EzM-42L-A-PN15	EzS-PD-42L-A	1:15
Ezi-SERVO-ST-42L-B-PN15	EzM-42L-B-PN15	EzS-PD-42L-B	
Ezi-SERVO-ST-42L-A-PN25	EzM-42L-A-PN25	EzS-PD-42L-A	1:25
Ezi-SERVO-ST-42L-B-PN25	EzM-42L-B-PN25	EzS-PD-42L-B	
Ezi-SERVO-ST-42L-A-PN40	EzM-42L-A-PN40	EzS-PD-42L-A	1:40
Ezi-SERVO-ST-42L-B-PN40	EzM-42L-B-PN40	EzS-PD-42L-B	
Ezi-SERVO-ST-42L-A-PN50	EzM-42L-A-PN50	EzS-PD-42L-A	1:50
Ezi-SERVO-ST-42L-B-PN50	EzM-42L-B-PN50	EzS-PD-42L-B	
Ezi-SERVO-ST-42XL-A-PN3	EzM-42XL-A-PN3	EzS-PD-42XL-A	1:3
Ezi-SERVO-ST-42XL-B-PN3	EzM-42XL-B-PN3	EzS-PD-42XL-B	
Ezi-SERVO-ST-42XL-A-PN5	EzM-42XL-A-PN5	EzS-PD-42XL-A	1:5
Ezi-SERVO-ST-42XL-B-PN5	EzM-42XL-B-PN5	EzS-PD-42XL-B	
Ezi-SERVO-ST-42XL-A-PN8	EzM-42XL-A-PN8	EzS-PD-42XL-A	1:8
Ezi-SERVO-ST-42XL-B-PN8	EzM-42XL-B-PN8	EzS-PD-42XL-B	
Ezi-SERVO-ST-42XL-A-PN10	EzM-42XL-A-PN10	EzS-PD-42XL-A	1:10
Ezi-SERVO-ST-42XL-B-PN10	EzM-42XL-B-PN10	EzS-PD-42XL-B	
Ezi-SERVO-ST-42XL-A-PN15	EzM-42XL-A-PN15	EzS-PD-42XL-A	1:15
Ezi-SERVO-ST-42XL-B-PN15	EzM-42XL-B-PN15	EzS-PD-42XL-B	
Ezi-SERVO-ST-42XL-A-PN25	EzM-42XL-A-PN25	EzS-PD-42XL-A	1:25
Ezi-SERVO-ST-42XL-B-PN25	EzM-42XL-B-PN25	EzS-PD-42XL-B	
Ezi-SERVO-ST-42XL-A-PN40	EzM-42XL-A-PN40	EzS-PD-42XL-A	1:40
Ezi-SERVO-ST-42XL-B-PN40	EzM-42XL-B-PN40	EzS-PD-42XL-B	
Ezi-SERVO-ST-42XL-A-PN50	EzM-42XL-A-PN50	EzS-PD-42XL-A	1:50
Ezi-SERVO-ST-42XL-B-PN50	EzM-42XL-B-PN50	EzS-PD-42XL-B	
Ezi-SERVO-ST-56S-A-PN3	EzM-56S-A-PN3	EzS-PD-56S-A	1:3
Ezi-SERVO-ST-56S-B-PN3	EzM-56S-B-PN3	EzS-PD-56S-B	
Ezi-SERVO-ST-56S-A-PN5	EzM-56S-A-PN5	EzS-PD-56S-A	1:5
Ezi-SERVO-ST-56S-B-PN5	EzM-56S-B-PN5	EzS-PD-56S-B	
Ezi-SERVO-ST-56S-A-PN8	EzM-56S-A-PN8	EzS-PD-56S-A	1:8
Ezi-SERVO-ST-56S-B-PN8	EzM-56S-B-PN8	EzS-PD-56S-B	
Ezi-SERVO-ST-56S-A-PN10	EzM-56S-A-PN10	EzS-PD-56S-A	1:10
Ezi-SERVO-ST-56S-B-PN10	EzM-56S-B-PN10	EzS-PD-56S-B	
Ezi-SERVO-ST-56S-A-PN15	EzM-56S-A-PN15	EzS-PD-56S-A	1:15
Ezi-SERVO-ST-56S-B-PN15	EzM-56S-B-PN15	EzS-PD-56S-B	
Ezi-SERVO-ST-56S-A-PN25	EzM-56S-A-PN25	EzS-PD-56S-A	1:25
Ezi-SERVO-ST-56S-B-PN25	EzM-56S-B-PN25	EzS-PD-56S-B	
Ezi-SERVO-ST-56S-A-PN40	EzM-56S-A-PN40	EzS-PD-56S-A	1:40
Ezi-SERVO-ST-56S-B-PN40	EzM-56S-B-PN40	EzS-PD-56S-B	
Ezi-SERVO-ST-56S-A-PN50	EzM-56S-A-PN50	EzS-PD-56S-A	1:50
Ezi-SERVO-ST-56S-B-PN50	EzM-56S-B-PN50	EzS-PD-56S-B	
Ezi-SERVO-ST-56M-A-PN3	EzM-56M-A-PN3	EzS-PD-56M-A	1:3
Ezi-SERVO-ST-56M-B-PN3	EzM-56M-B-PN3	EzS-PD-56M-B	
Ezi-SERVO-ST-56M-A-PN5	EzM-56M-A-PN5	EzS-PD-56M-A	1:5
Ezi-SERVO-ST-56M-B-PN5	EzM-56M-B-PN5	EzS-PD-56M-B	
Ezi-SERVO-ST-56M-A-PN8	EzM-56M-A-PN8	EzS-PD-56M-A	1:8
Ezi-SERVO-ST-56M-B-PN8	EzM-56M-B-PN8	EzS-PD-56M-B	
Ezi-SERVO-ST-56M-A-PN10	EzM-56M-A-PN10	EzS-PD-56M-A	1:10
Ezi-SERVO-ST-56M-B-PN10	EzM-56M-B-PN10	EzS-PD-56M-B	
Ezi-SERVO-ST-56M-A-PN15	EzM-56M-A-PN15	EzS-PD-56M-A	1:15
Ezi-SERVO-ST-56M-B-PN15	EzM-56M-B-PN15	EzS-PD-56M-B	
Ezi-SERVO-ST-56M-A-PN25	EzM-56M-A-PN25	EzS-PD-56M-A	1:25
Ezi-SERVO-ST-56M-B-PN25	EzM-56M-B-PN25	EzS-PD-56M-B	
Ezi-SERVO-ST-56M-A-PN40	EzM-56M-A-PN40	EzS-PD-56M-A	1:40
Ezi-SERVO-ST-56M-B-PN40	EzM-56M-B-PN40	EzS-PD-56M-B	
Ezi-SERVO-ST-56M-A-PN50	EzM-56M-A-PN50	EzS-PD-56M-A	1:50
Ezi-SERVO-ST-56M-B-PN50	EzM-56M-B-PN50	EzS-PD-56M-B	

6. Combination with Gearbox

| Unit Part Number	Motor Model Number	Drive Model Number	Reduction gear ratio	Unit Part Number	Motor Model Number	Drive Model Number	Reduction gear ratio
Ezi-SERVO-ST-56L-A-PN3	EzM-56L-A-PN3	EzS-PD-56L-A	1:3	Ezi-SERVO-ST-86M-A-PN3	EzM-86M-A-PN3	EzS-PD-86M-A	1:3
Ezi-SERVO-ST-56L-B-PN3	EzM-56L-B-PN3	EzS-PD-56L-B		Ezi-SERVO-ST-86M-B-PN3	EzM-86M-B-PN3	EzS-PD-86M-B	
Ezi-SERVO-ST-56L-A-PN5	EzM-56L-A-PN5	EzS-PD-56L-A	1:5	Ezi-SERVO-ST-86M-A-PN5	EzM-86M-A-PN5	EzS-PD-86M-A	1:5
Ezi-SERVO-ST-56L-B-PN5	EzM-56L-B-PN5	EzS-PD-56L-B		Ezi-SERVO-ST-86M-B-PN5	EzM-86M-B-PN5	EzS-PD-86M-B	
Ezi-SERVO-ST-56L-A-PN8	EzM-56L-A-PN8	EzS-PD-56L-A	1:8	Ezi-SERVO-ST-86M-A-PN8	EzM-86M-A-PN8	EzS-PD-86M-A	1:8
Ezi-SERVO-ST-56L-B-PN8	EzM-56L-B-PN8	EzS-PD-56L-B		Ezi-SERVO-ST-86M-B-PN8	EzM-86M-B-PN8	EzS-PD-86M-B	
Ezi-SERVO-ST-56L-A-PN10	EzM-56L-A-PN10	EzS-PD-56L-A	1:10	Ezi-SERVO-ST-86M-A-PN10	EzM-86M-A-PN10	EzS-PD-86M-A	1:10
Ezi-SERVO-ST-56L-B-PN10	EzM-56L-B-PN10	EzS-PD-56L-B		Ezi-SERVO-ST-86M-B-PN10	EzM-86M-B-PN10	EzS-PD-86M-B	
Ezi-SERVO-ST-56L-A-PN15	EzM-56L-A-PN15	EzS-PD-56L-A	1:15	Ezi-SERVO-ST-86M-A-PN15	EzM-86M-A-PN15	EzS-PD-86M-A	1:15
Ezi-SERVO-ST-56L-B-PN15	EzM-56L-B-PN15	EzS-PD-56L-B		Ezi-SERVO-ST-86M-B-PN15	EzM-86M-B-PN15	EzS-PD-86M-B	
Ezi-SERVO-ST-56L-A-PN25	EzM-56L-A-PN25	EzS-PD-56L-A	1:25	Ezi-SERVO-ST-86M-A-PN25	EzM-86M-A-PN25	EzS-PD-86M-A	1:25
Ezi-SERVO-ST-56L-B-PN25	EzM-56L-B-PN25	EzS-PD-56L-B		Ezi-SERVO-ST-86M-B-PN25	EzM-86M-B-PN25	EzS-PD-86M-B	
Ezi-SERVO-ST-56L-A-PN40	EzM-56L-A-PN40	EzS-PD-56L-A	1:40	Ezi-SERVO-ST-86M-A-PN40	EzM-86M-A-PN40	EzS-PD-86M-A	1:40
Ezi-SERVO-ST-56L-B-PN40	EzM-56L-B-PN40	EzS-PD-56L-B		Ezi-SERVO-ST-86M-B-PN40	EzM-86M-B-PN40	EzS-PD-86M-B	
Ezi-SERVO-ST-56L-A-PN50	EzM-56L-A-PN50	EzS-PD-56L-A	1:50	Ezi-SERVO-ST-86M-A-PN50	EzM-86M-A-PN50	EzS-PD-86M-A	1:50
Ezi-SERVO-ST-56L-B-PN50	EzM-56L-B-PN50	EzS-PD-56L-B		Ezi-SERVO-ST-86M-B-PN50	EzM-86M-B-PN50	EzS-PD-86M-B	
Ezi-SERVO-ST-60S-A-PN3	EzM-60S-A-PN3	EzS-PD-60S-A	1:3	Ezi-SERVO-ST-86L-A-PN3	EzM-86L-A-PN3	EzS-PD-86L-A	1:3
Ezi-SERVO-ST-60S-B-PN3	EzM-60S-B-PN3	EzS-PD-60S-B		Ezi-SERVO-ST-86L-B-PN3	EzM-86L-B-PN3	EzS-PD-86L-B	
Ezi-SERVO-ST-60S-A-PN5	EzM-60S-A-PN5	EzS-PD-60S-A	1:5	Ezi-SERVO-ST-86L-A-PN5	EzM-86L-A-PN5	EzS-PD-86L-A	1:5
Ezi-SERVO-ST-60S-B-PN5	EzM-60S-B-PN5	EzS-PD-60S-B		Ezi-SERVO-ST-86L-B-PN5	EzM-86L-B-PN5	EzS-PD-86L-B	
Ezi-SERVO-ST-60S-A-PN8	EzM-60S-A-PN8	EzS-PD-60S-A	1:8	Ezi-SERVO-ST-86L-A-PN8	EzM-86L-A-PN8	EzS-PD-86L-A	1:8
Ezi-SERVO-ST-60S-B-PN8	EzM-60S-B-PN8	EzS-PD-60S-B		Ezi-SERVO-ST-86L-B-PN8	EzM-86L-B-PN8	EzS-PD-86L-B	
Ezi-SERVO-ST-60S-A-PN10	EzM-60S-A-PN10	EzS-PD-60S-A	1:10	Ezi-SERVO-ST-86L-A-PN10	EzM-86L-A-PN10	EzS-PD-86L-A	1:10
Ezi-SERVO-ST-60S-B-PN10	EzM-60S-B-PN10	EzS-PD-60S-B		Ezi-SERVO-ST-86L-B-PN10	EzM-86L-B-PN10	EzS-PD-86L-B	
Ezi-SERVO-ST-60S-A-PN15	EzM-60S-A-PN15	EzS-PD-60S-A	1:15	Ezi-SERVO-ST-86L-A-PN15	EzM-86L-A-PN15	EzS-PD-86L-A	1:15
Ezi-SERVO-ST-60S-B-PN15	EzM-60S-B-PN15	EzS-PD-60S-B		Ezi-SERVO-ST-86L-B-PN15	EzM-86L-B-PN15	EzS-PD-86L-B	
Ezi-SERVO-ST-60S-A-PN25	EzM-60S-A-PN25	EzS-PD-60S-A	1:25	Ezi-SERVO-ST-86L-A-PN25	EzM-86L-A-PN25	EzS-PD-86L-A	1:25
Ezi-SERVO-ST-60S-B-PN25	EzM-60S-B-PN25	EzS-PD-60S-B		Ezi-SERVO-ST-86L-B-PN25	EzM-86L-B-PN25	EzS-PD-86L-B	
Ezi-SERVO-ST-60S-A-PN40	EzM-60S-A-PN40	EzS-PD-60S-A	1:40	Ezi-SERVO-ST-86L-A-PN40	EzM-86L-A-PN40	EzS-PD-86L-A	1:40
Ezi-SERVO-ST-60S-B-PN40	EzM-60S-B-PN40	EzS-PD-60S-B		Ezi-SERVO-ST-86L-B-PN40	EzM-86L-B-PN40	EzS-PD-86L-B	
Ezi-SERVO-ST-60S-A-PN50	EzM-60S-A-PN50	EzS-PD-60S-A	1:50	Ezi-SERVO-ST-86L-A-PN50	EzM-86L-A-PN50	EzS-PD-86L-A	1:50
Ezi-SERVO-ST-60S-B-PN50	EzM-60S-B-PN50	EzS-PD-60S-B		Ezi-SERVO-ST-86L-B-PN50	EzM-86L-B-PN50	EzS-PD-86L-B	
Ezi-SERVO-ST-60M-A-PN3	EzM-60M-A-PN3	EzS-PD-60M-A	1:3	Ezi-SERVO-ST-86XL-A-PN3	EzM-86XL-A-PN3	EzS-PD-86XL-A	1:3
Ezi-SERVO-ST-60M-B-PN3	EzM-60M-B-PN3	EzS-PD-60M-B		Ezi-SERVO-ST-86XL-B-PN3	EzM-86XL-B-PN3	EzS-PD-86XL-B	
Ezi-SERVO-ST-60M-A-PN5	EzM-60M-A-PN5	EzS-PD-60M-A	1:5	Ezi-SERVO-ST-86XL-A-PN5	EzM-86XL-A-PN5	EzS-PD-86XL-A	1:5
Ezi-SERVO-ST-60M-B-PN5	EzM-60M-B-PN5	EzS-PD-60M-B		Ezi-SERVO-ST-86XL-B-PN5	EzM-86XL-B-PN5	EzS-PD-86XL-B	
Ezi-SERVO-ST-60M-A-PN8	EzM-60M-A-PN8	EzS-PD-60M-A	1:8	Ezi-SERVO-ST-86XL-A-PN8	EzM-86XL-A-PN8	EzS-PD-86XL-A	1:8
Ezi-SERVO-ST-60M-B-PN8	EzM-60M-B-PN8	EzS-PD-60M-B		Ezi-SERVO-ST-86XL-B-PN8	EzM-86XL-B-PN8	EzS-PD-86XL-B	
Ezi-SERVO-ST-60M-A-PN10	EzM-60M-A-PN10	EzS-PD-60M-A	1:10	Ezi-SERVO-ST-86XL-A-PN10	EzM-86XL-A-PN10	EzS-PD-86XL-A	1:10
Ezi-SERVO-ST-60M-B-PN10	EzM-60M-B-PN10	EzS-PD-60M-B		Ezi-SERVO-ST-86XL-B-PN10	EzM-86XL-B-PN10	EzS-PD-86XL-B	
Ezi-SERVO-ST-60M-A-PN15	EzM-60M-A-PN15	EzS-PD-60M-A	1:15	Ezi-SERVO-ST-86XL-A-PN15	EzM-86XL-A-PN15	EzS-PD-86XL-A	1:15
Ezi-SERVO-ST-60M-B-PN15	EzM-60M-B-PN15	EzS-PD-60M-B		Ezi-SERVO-ST-86XL-B-PN15	EzM-86XL-B-PN15	EzS-PD-86XL-B	
Ezi-SERVO-ST-60M-A-PN25	EzM-60M-A-PN25	EzS-PD-60M-A	1:25	Ezi-SERVO-ST-86XL-A-PN25	EzM-86XL-A-PN25	EzS-PD-86XL-A	1:25
Ezi-SERVO-ST-60M-B-PN25	EzM-60M-B-PN25	EzS-PD-60M-B		Ezi-SERVO-ST-86XL-B-PN25	EzM-86XL-B-PN25	EzS-PD-86XL-B	
Ezi-SERVO-ST-60M-A-PN40	EzM-60M-A-PN40	EzS-PD-60M-A	1:40	Ezi-SERVO-ST-86XL-A-PN40	EzM-86XL-A-PN40	EzS-PD-86XL-A	1:40
Ezi-SERVO-ST-60M-B-PN40	EzM-60M-B-PN40	EzS-PD-60M-B		Ezi-SERVO-ST-86XL-B-PN40	EzM-86XL-B-PN40	EzS-PD-86XL-B	
Ezi-SERVO-ST-60M-A-PN50	EzM-60M-A-PN50	EzS-PD-60M-A	1:50	Ezi-SERVO-ST-86XL-A-PN50	EzM-86XL-A-PN50	EzS-PD-86XL-A	1:50
Ezi-SERVO-ST-60M-B-PN50	EzM-60M-B-PN50	EzS-PD-60M-B		Ezi-SERVO-ST-86XL-B-PN50	EzM-86XL-B-PN50	EzS-PD-86XL-B	
Ezi-SERVO-ST-60L-A-PN3	EzM-60L-A-PN3	EzS-PD-60L-A	1:3				
Ezi-SERVO-ST-60L-B-PN3	EzM-60L-B-PN3	EzS-PD-60L-B					
Ezi-SERVO-ST-60L-A-PN5	EzM-60L-A-PN5	EzS-PD-60L-A	1:5				
Ezi-SERVO-ST-60L-B-PN5	EzM-60L-B-PN5	EzS-PD-60L-B					
Ezi-SERVO-ST-60L-A-PN8	EzM-60L-A-PN8	EzS-PD-60L-A	1:8				
Ezi-SERVO-ST-60L-B-PN8	EzM-60L-B-PN8	EzS-PD-60L-B					
Ezi-SERVO-ST-60L-A-PN10	EzM-60L-A-PN10	EzS-PD-60L-A	1:10				
Ezi-SERVO-ST-60L-B-PN10	EzM-60L-B-PN10	EzS-PD-60L-B					
Ezi-SERVO-ST-60L-A-PN15	EzM-60L-A-PN15	EzS-PD-60L-A	1:15				
Ezi-SERVO-ST-60L-B-PN15	EzM-60L-B-PN15	EzS-PD-60L-B					
Ezi-SERVO-ST-60L-A-PN25	EzM-60L-A-PN25	EzS-PD-60L-A	1:25				
Ezi-SERVO-ST-60L-B-PN25	EzM-60L-B-PN25	EzS-PD-60L-B					
Ezi-SERVO-ST-60L-A-PN40	EzM-60L-A-PN40	EzS-PD-60L-A	1:40				
Ezi-SERVO-ST-60L-B-PN40	EzM-60L-B-PN40	EzS-PD-60L-B					
Ezi-SERVO-ST-60L-A-PN50	EzM-60L-A-PN50	EzS-PD-60L-A	1:50				
Ezi-SERVO-ST-60L-B-PN50	EzM-60L-B-PN50	EzS-PD-60L-B					

7. Drive Specification and Dimension

7.1 Specifications of Drive

Motor Model	EzM-20 series	EzM-28 series	EzM-35 series	EzM-42 series	EzM-56 series	EzM-60 series	EzM-86 series
Driver Model	EzS-PD-20 series	EzS-PD-28 series	EzS-PD-35 series	EzS-PD-42 series	EzS-PD-56 series	EzS-PD-60 series	EzS-PD-86 series
Input Voltage	24VDC ±10%						40~70VDC
Control Method	Closed loop control with 32bit MCU						
Current Consumption	Max 500mA (Except motor current)						

Operating Condition	Ambient Temperature	· In Use: 0~50℃ · In Storage: -20~70℃
	Humidity	· In Use: 35~85% RH (Non-Condensing) · In Storage: 10~90% RH (Non-Condensing)
	Vib. Resist.	0.5g
Function	Rotation Speed	0~3,000 [rpm] *1
	Resolution [ppr]	4,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000　4,000 10,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 16,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 16,000 20,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 20,000 32,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 32,000 (Selectable with Rotary switch) *2
	Max. Input Pulse Frequency	500kHz (Duty 50%)
	Protection Functions	Over Current Error, Over Speed Error, Position Tracking Error, Over Load Error, Over Temperature Error, Over Regenerated Voltage Error, Motor Connect Error, Encoder Connect Error, In-Position Error, System Error, ROM Error, Position Overflow Error
	LED Display	Power status, In-Position status, Servo On status, Alarm status
	In-Position Selection	0~F (Selectable with Rotary switch)
	Position Gain Selection	0~F (Selectable with Rotary switch)
	Pulse Input Method	1-Pulse / 2-Pulse (Selectable with DIP switch)
	Rotational Direction	CW/CCW (Selectable with DIP switch)
	Speed/Position Control Command	Pulse Train Input
I/O Signal	Input Signals	Position Command Pulse, Servo On/Off, Alarm Reset (Photocoupler Input)
	Output Signals	In-Position, Alarm (Photocoupler Output) Encoder Signal (A+, A-, B+, B-, Z+, Z-, 26C31 of Equivalent) (Line Driver Output), Brake

*1 : Up to the resolution of 10,000[ppr], maximum speed can be reached by 3,000[rpm] and with the resolution more than 10,000[ppr], maximum speed shall be reduced accordingly.

*2 : When selected resolution is more than encoder resolution, motor shall be operated by microstep between pulses.

7.2 Dimensions of Drive [mm]
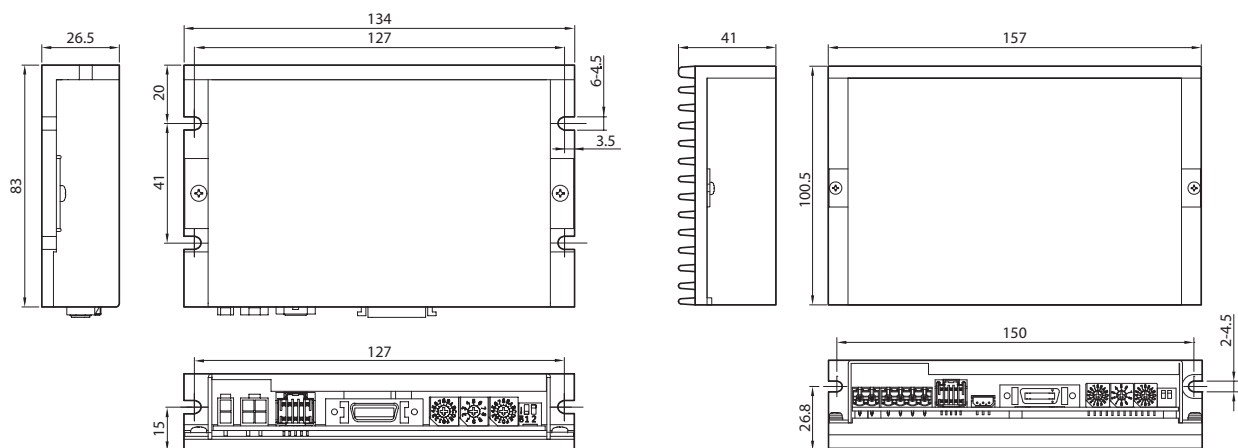
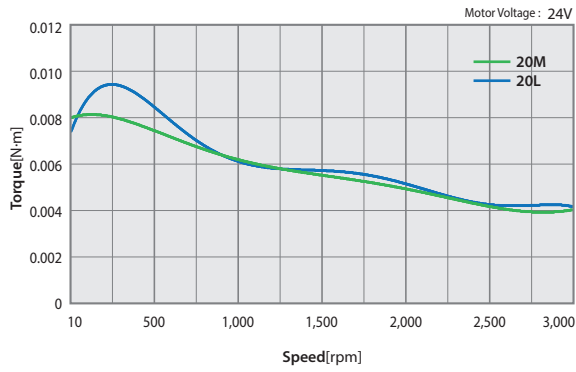※ 86mm motor drive (EzS-PD-86 series)

8. Specifications of Motor

MODEL		UNIT	EzM-20 series		EzM-28 series			EzM-35 series		EzM-42 series			
			20M	20L	28S	28M	28L	35M	35L	42S	42M	42L	42XL
DRIVE METHOD		−	BI-POLAR										
NUMBER OF PHASES		−	2	2	2	2	2	2	2	2	2	2	2
CURRENT per PHASE		A	0.5	0.5	0.95	0.95	0.95	1.5	1.5	1.2	1.2	1.2	1.2
HOLDING TORQUE		N·m	0.016	0.025	0.069	0.098	0.118	0.13	0.23	0.32	0.44	0.5	0.65
ROTOR INERTIA		g·cm^2	2.5	3.3	9.0	13	18	15	20	35	54	77	114
WEIGHTS		g	79	104	147	204	232	194	226	299	364	433	567
LENGTH(L)		mm	28	38	32	45	50	32	36	34	40	48	60
PERMISSIBLE OVERHUNG LOAD (DISTANCE FROM END OF SHAFT)	3mm	N	18	18	30	30	30	22	22	22	22	22	22
	8mm		30	30	38	38	38	26	26	26	26	26	26
	13mm		−	−	53	53	53	33	33	33	33	33	33
	18mm		−	−	−	−	−	46	46	46	46	46	46
PERMISSIBLE THRUST LOAD		N	Lower than motor weight										
INSULATION RESISTANCE		Mohm	100 MIN.(at 500VDC)										
INSULATION CLASS		−	CLASS B(130℃)										
OPERATING TEMPERATURE		℃	0 to 55										

MODEL		UNIT	EzM-56 series			EzM-60 series			EzM-86 series		
			56S	56M	56L	60S	60M	60L	86M	86L	86XL
DRIVE METHOD		−	BI-POLAR								
NUMBER OF PHASES		−	2	2	2	2	2	2	2	2	2
CURRENT per PHASE		A	3.0	3.0	3.0	4.0	4.0	4.0	6.0	6.0	6.0
HOLDING TORQUE		N·m	0.64	1.0	1.5	0.88	1.28	2.4	4.5	8.5	12
ROTOR INERTIA		g·cm^2	180	280	520	240	490	690	1800	3600	5400
WEIGHTS		g	613	784	1231	697	862	1422	2412	3956	5486
LENGTH(L)		mm	46	55	80	47	56	85	78	117	155
PERMISSIBLE OVERHUNG LOAD (DISTANCE FROM END OF SHAFT)	3mm	N	52	52	52	70	70	70	270	270	270
	8mm		65	65	65	87	87	87	300	300	300
	13mm		85	85	85	114	114	114	350	350	350
	18mm		123	123	123	165	165	165	400	400	400
PERMISSIBLE THRUST LOAD		N	Lower than motor weight								
INSULATION RESISTANCE		Mohm	100 MIN.(at 500VDC)								
INSULATION CLASS		−	CLASS B(130℃)								
OPERATING TEMPERATURE		℃	0 to 55								

9. Torque Characteristics of Motor

Ezi-SERVO-ST-20 series

Motor Voltage : 24V

Ezi-SERVO-ST-28 series

Motor Voltage : 24V
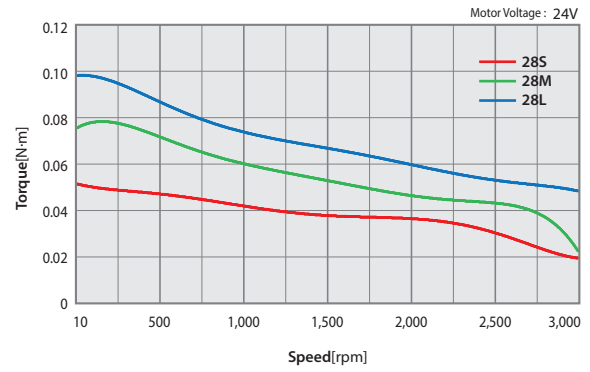
Ezi-SERVO-ST-35 series

Motor Voltage : 24V
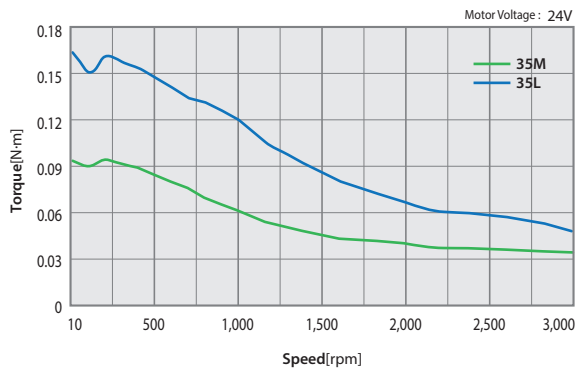
Ezi-SERVO-ST-42 series

Motor Voltage : 40V
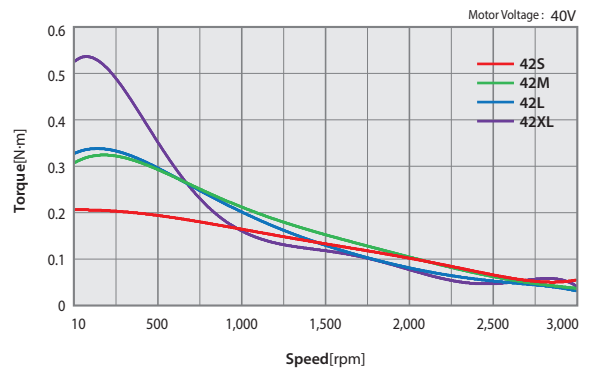
Ezi-SERVO-ST-56 series

Motor Voltage : 40V
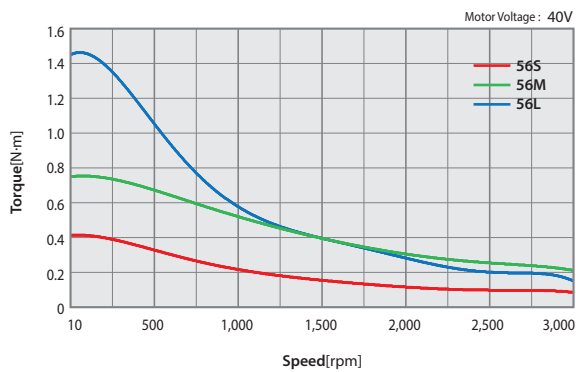
Ezi-SERVO-ST-60 series

Motor Voltage : 40V
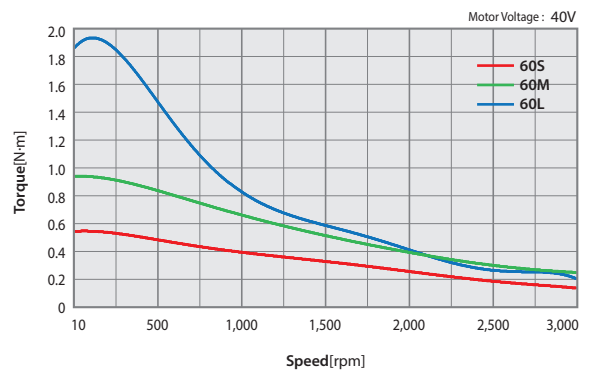
Ezi-SERVO-ST-86 series

Motor Voltage : 70V
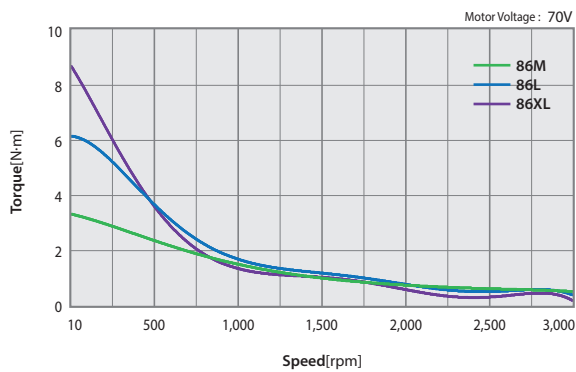
10. Dimensions of Motor [mm]
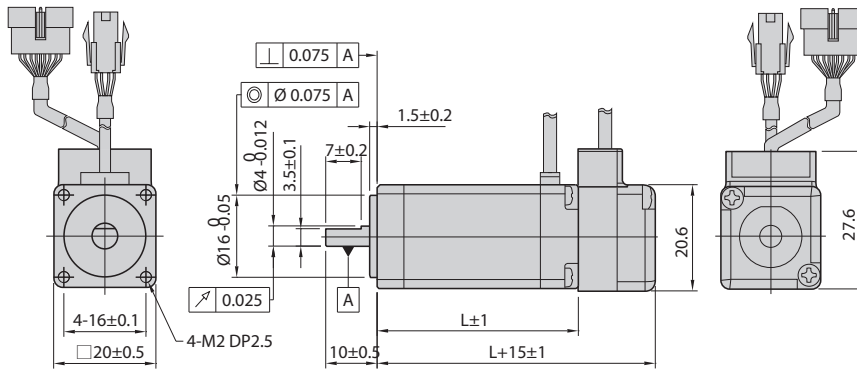
20mm

Model name	Length(L)
EzM–20M	28
EzM–20L	38

Dimensions: ⊥ 0.075 A, ◎ Ø 0.075 A, 1.5±0.2, Ø4 -0.012, 7±0.2, 3.5±0.1, Ø16 -0.05, 20.6, 27.6, 4-16±0.1, □20±0.5, 4-M2 DP2.5, ↗ 0.025, A, L±1, 10±0.5, L+15±1
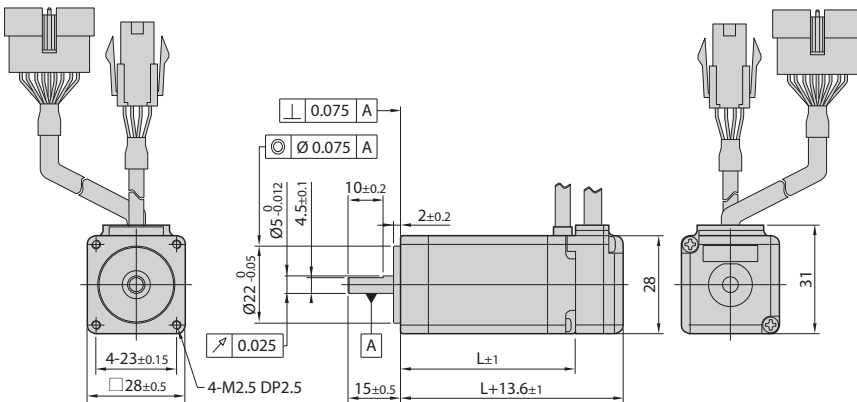
28mm

Model name	Length(L)
EzM–28S	32
EzM–28M	45
EzM–28L	50

Dimensions: ⊥ 0.075 A, ◎ Ø 0.075 A, Ø5 -0.012, 4.5±0.1, 10±0.2, 2±0.2, Ø22 -0.05, 28, 31, 4-23±0.15, □28±0.5, 4-M2.5 DP2.5, ↗ 0.025, A, L±1, 15±0.5, L+13.6±1
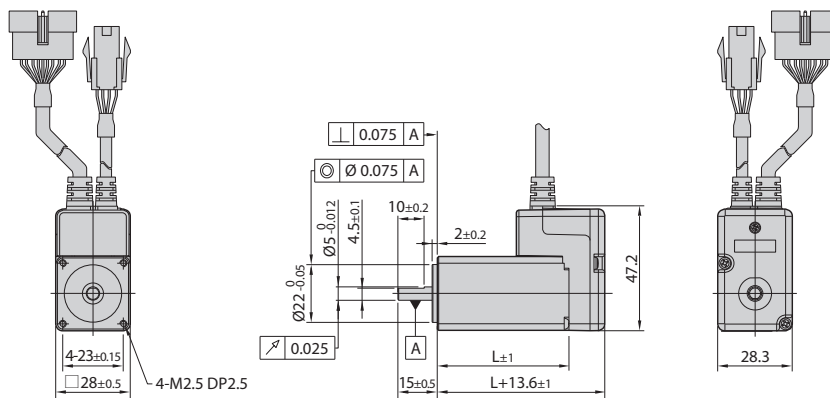
28mm
(Stopper type)

Model name	Length(L)
EzM–28SM	32
EzM–28MM	45
EzM–28LM	50

Dimensions: ⊥ 0.075 A, ◎ Ø 0.075 A, Ø5 -0.012, 4.5±0.1, 10±0.2, 2±0.2, Ø22 -0.05, 47.2, 4-23±0.15, □28±0.5, 4-M2.5 DP2.5, ↗ 0.025, A, L±1, 15±0.5, L+13.6±1, 28.3

※ When ordering 28mm Stopper type of motor, please add "M" after standard motor model number.
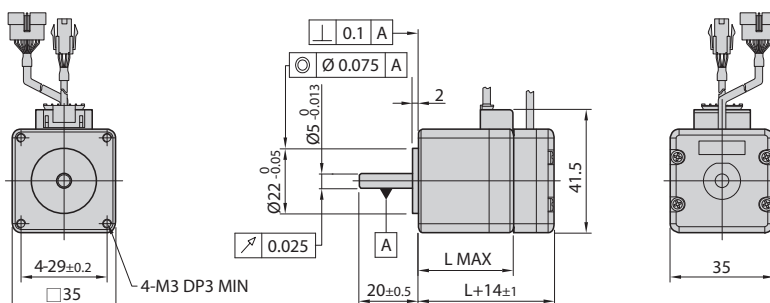
35mm

Model name	Length(L)
EzM–35M	32
EzM–35L	36

Dimensions: ⊥ 0.1 A, ◎ Ø 0.075 A, Ø5 -0.013, 2, Ø22 -0.05, 41.5, 4-29±0.2, □35, 4-M3 DP3 MIN, ↗ 0.025, A, L MAX, 20±0.5, L+14±1, 35

10. Dimensions of Motor [mm]
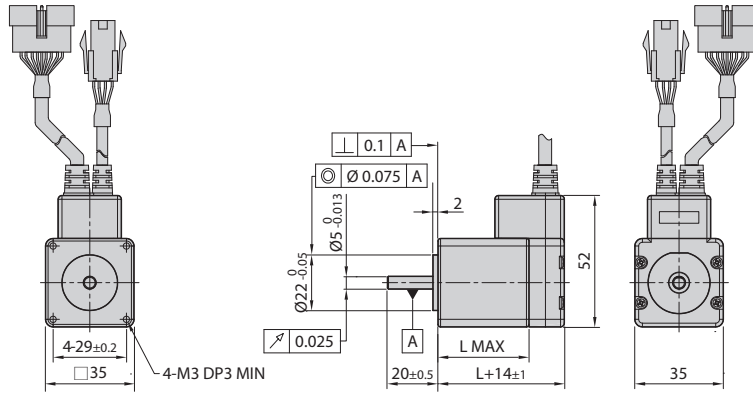
35mm
(Stopper type)

Model name	Length(L)
EzM-35MM	32
EzM-35LM	36

※ When ordering 35mm Stopper type of motor, please add "M" after standard motor model number.
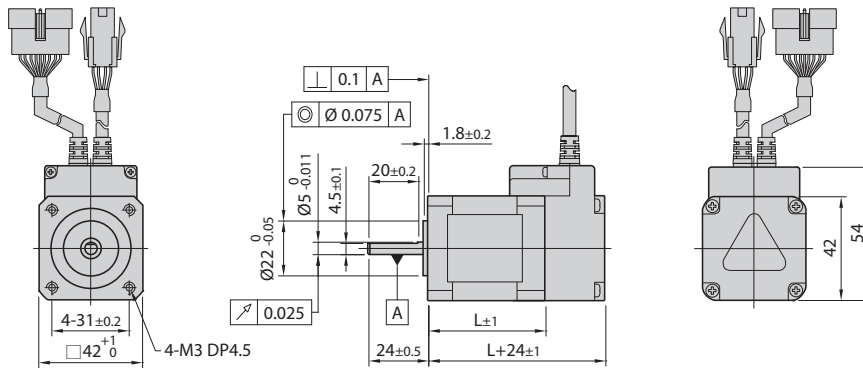
42mm

Model name	Length(L)
EzM-42S	34
EzM-42M	40
EzM-42L	48
EzM-42XL	60
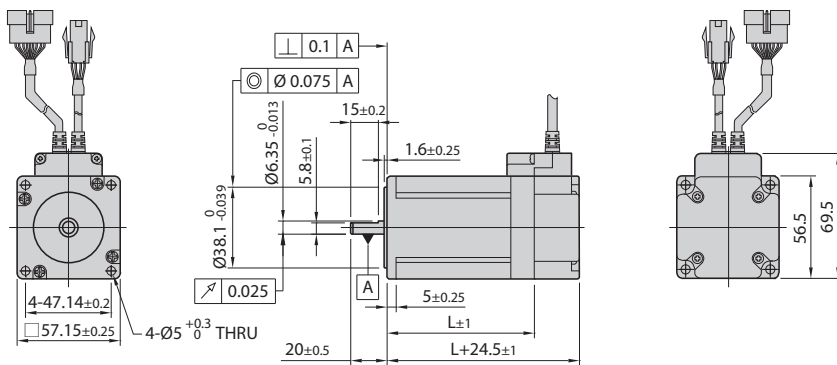
56mm

Model name	Length(L)
EzM-56S	46
EzM-56M	55
EzM-56L	80

※ There are 2 kinds size of front shaft diameter for EzM-56 series as Ø6.35 and Ø8.0.
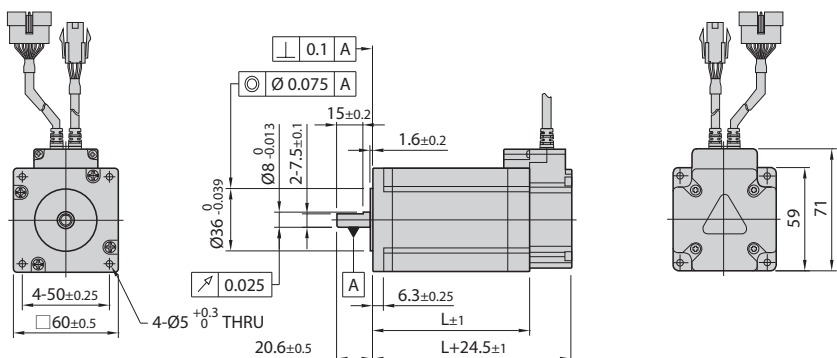
60mm

Model name	Length(L)
EzM-60S	47
EzM-60M	56
EzM-60L	85

10. Dimensions of Motor [mm]

Model name	Length(L)
EzM–86M	78
EzM–86L	117
EzM–86XL	155
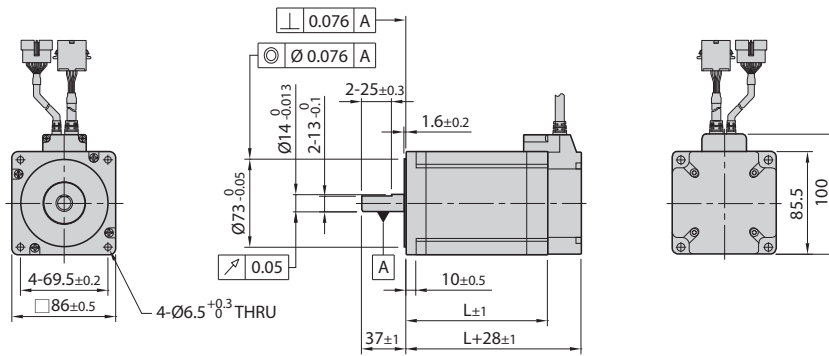
86mm

11. Notes on Installation

1) Ezi–SERVO ST is designed for indoor use only.

2) The ambient temperature of the room should be 0℃~50℃.

3) If the temperature of the product case is higher than 50℃, radiate heat of the outside to cool down.

4) Do not install Ezi–SERVO ST under direct rays, near magnetic or radioactive objects.

5) If you set more than 2 drives, you must set over 20mm vertically and over 50mm horizontally as shown below.
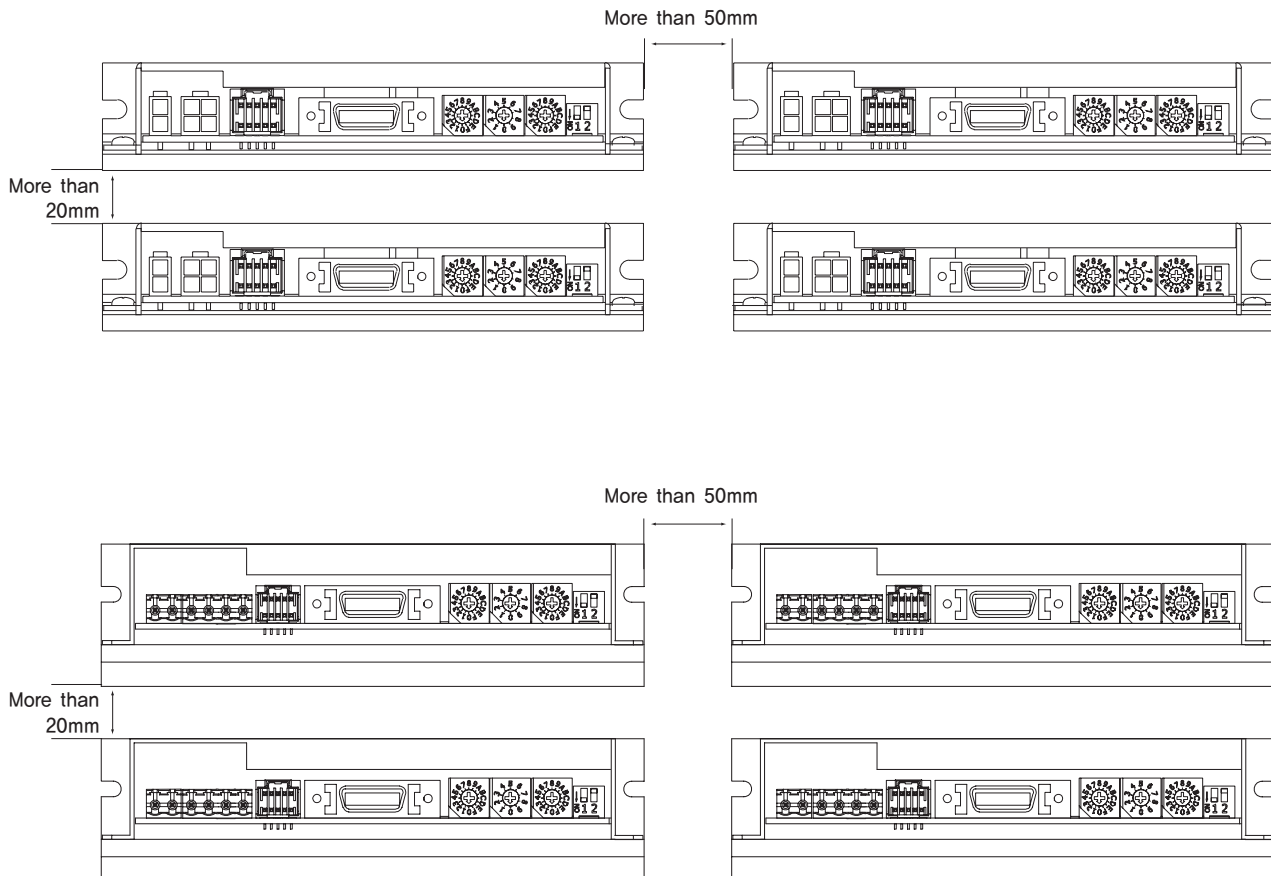
12. Specifications of Motor with Brake

| Unit Part Number	Motor Model Number	Electronic Brake					Motor Unit Weight [g]	Permitted Overhung Load [N]				Permitted Thrust Load [N]
		Type	Voltage Input [V]	Rated Current [A]	Power Consumption [W]	Statical Friction Torque [N·m]		Length from Motor Point [mm]				
								3	8	13	18	
Ezi-SERVO-ST-42S-■-BK	EzM-42S-■-BK	Non-excitation run Type	24VDC ±10%	0.2	5	0.2	510	22	26	33	46	Must be Lower than Unit's Weight
Ezi-SERVO-ST-42M-■-BK	EzM-42M-■-BK						570					
Ezi-SERVO-ST-42L-■-BK	EzM-42L-■-BK						640					
Ezi-SERVO-ST-42XL-■-BK	EzM-42XL-■-BK						770					
Ezi-SERVO-ST-56S-■-BK	EzM-56S-■-BK			0.27	6.6	0.7	1030	52	65	85	123	
Ezi-SERVO-ST-56M-■-BK	EzM-56M-■-BK						1190					
Ezi-SERVO-ST-56L-■-BK	EzM-56L-■-BK						1630					
Ezi-SERVO-ST-60S-■-BK	EzM-60S-■-BK						1150	70	87	114	165	
Ezi-SERVO-ST-60M-■-BK	EzM-60M-■-BK						1350					
Ezi-SERVO-ST-60L-■-BK	EzM-60L-■-BK						1960					
Ezi-SERVO-ST-86M-■-BK	EzM-86M-■-BK			0.54	13	4	3600	270	300	350	400	
Ezi-SERVO-ST-86L-■-BK	EzM-86L-■-BK						5100					
Ezi-SERVO-ST-86XL-■-BK	EzM-86XL-■-BK						6600					

* The code of encoder resolution will be marked in "■"
* Electronic Brake cannot be used for braking. Position hold purpose only when power OFF.
* The weight means Motor Unit Weight including Motor and Electronic Brake.
* Motor Model Number is combined model name of Motor and Brake.
* Motor specification and torque characteristic are same as Standard Motor.

* Brake Operation Timing Chart

Ezi-SERVO ST controls Brake by Drive automatically.
Please refer to below Timing Chart when Brake is controlled by the upper controller other than using Ezi-SERVO ST Brake control. Otherwise,
Drive malfunctioning and loads can be fall down.
Also, please do not operate Brake while motor operation to prevent damage.
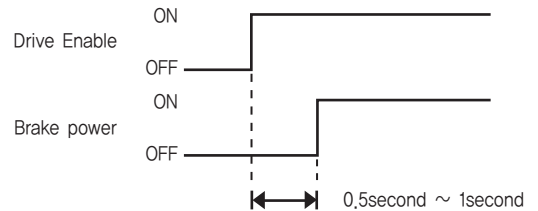
13. Dimensions of Motor with Brake [mm]

42mm

SMR-04V-N(JST)

4-M3 THRU P.C.D 43.8

Lead wire UL 3398 AWG26 Length : 400mm
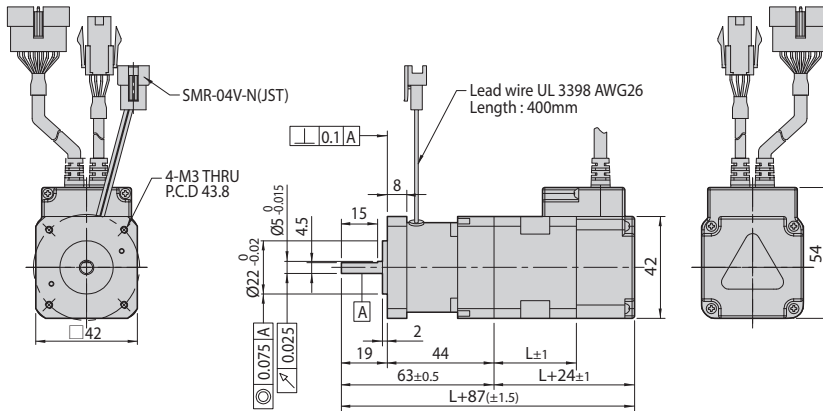
Model Name	Length(L)	Weight(kg)
EzM-42S	34	0.51
EzM-42M	40	0.57
EzM-42L	48	0.64
EzM-42XL	60	0.77

56mm

SMR-04V-N(JST)

4-Ø4.5 THRU P.C.D 66.7

Lead wire UL3398 AWG26 Length : 400mm
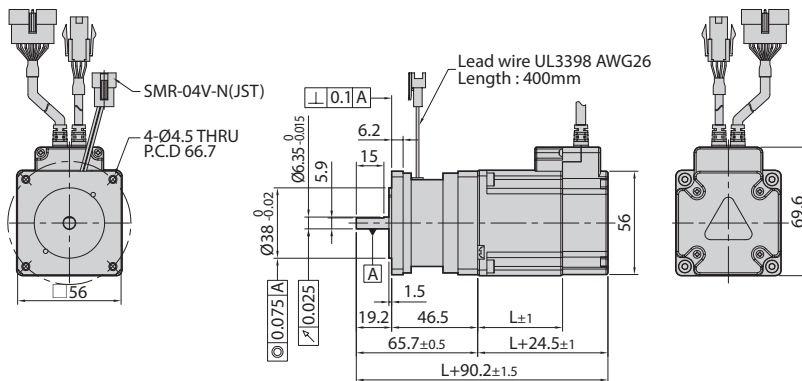
Model Name	Length(L)	Weight(kg)
EzM-56S	46	1.03
EzM-56M	55	1.19
EzM-56L	80	1.63

60mm

SMR-04V-N(JST)

4-Ø4.5 THRU P.C.D 70.7

Lead wire UL3398 AWG26 Length : 400mm
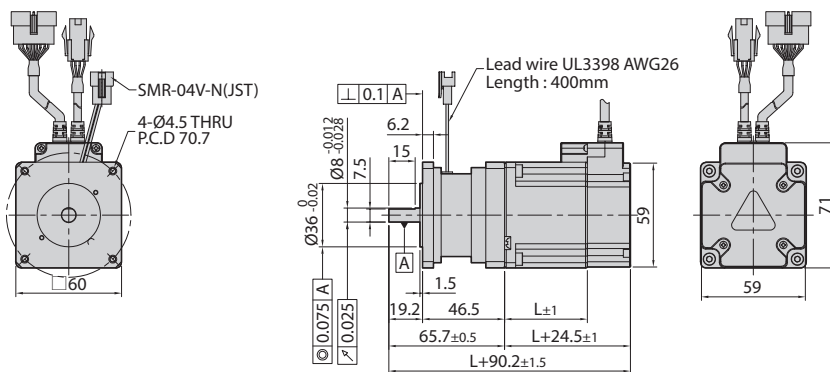
Model Name	Length(L)	Weight(kg)
EzM-60S	47	1.15
EzM-60M	56	1.35
EzM-60L	85	1.96

86mm

SMR-04V-N(JST)

4-Ø6.5 THRU P.C.D 98.45

Lead wire UL3398 AWG22 Length : 400mm
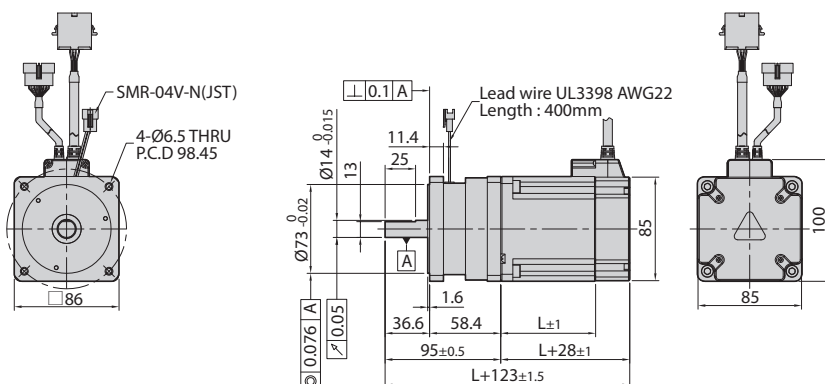
Model Name	Length(L)	Weight(kg)
EzM-86M	78	3.6
EzM-86L	117	5.1
EzM-86XL	155	6.6

42mm

Unit Part Number	Maximum Holding Torque [N·m]	Rotor Inertia Moment [kg·m²]	Back-lash [min]	Angle Trans-mission Error [min]	Re-duction Gear Ratio	Resolution (10,000 [ppr] Standard)	Permitted Torque [N·m]	Maximum Torque [N·m]	Permitted Speed Range [rpm]	Unit Weight [kg]	Permitted Overhung Load [N] Axis Center Standard	Permitted Thrust Load [N]
Ezi-SERVO-ST-42S-■-PN3	0.57	35x10⁻⁷	3	5	3	0.012°	6	12	0~1000	0.89	240	270
Ezi-SERVO-ST-42S-■-PN5	0.95				5	0.0072°	9	18	0~600		290	330
Ezi-SERVO-ST-42S-■-PN8	1.52				8	0.0045°	9	18	0~375		340	410
Ezi-SERVO-ST-42S-■-PN10	1.90				10	0.0036°	6	12	0~300		360	450
Ezi-SERVO-ST-42S-■-PN15	2.76		5	7	15	0.0024°	6	12	0~200	0.99	410	540
Ezi-SERVO-ST-42S-■-PN25	4.60				25	0.00144°	9	18	0~120		490	640
Ezi-SERVO-ST-42S-■-PN40	7.36				40	0.0009°	9	18	0~75		570	640
Ezi-SERVO-ST-42S-■-PN50	9.00				50	0.00072°	9	18	0~60		620	640
Ezi-SERVO-ST-42M-■-PN3	0.85	54x10⁻⁷	3	5	3	0.012°	6	12	0~1000	0.96	240	270
Ezi-SERVO-ST-42M-■-PN5	1.42				5	0.0072°	9	18	0~600		290	330
Ezi-SERVO-ST-42M-■-PN8	2.28				8	0.0045°	9	18	0~375		340	410
Ezi-SERVO-ST-42M-■-PN10	2.85				10	0.0036°	6	12	0~300		360	450
Ezi-SERVO-ST-42M-■-PN15	4.14		5	7	15	0.0024°	6	12	0~200	1.06	410	540
Ezi-SERVO-ST-42M-■-PN25	6.90				25	0.00144°	9	18	0~120		490	640
Ezi-SERVO-ST-42M-■-PN40	9.00				40	0.0009°	9	18	0~75		570	640
Ezi-SERVO-ST-42M-■-PN50	9.00				50	0.00072°	9	18	0~60		620	640
Ezi-SERVO-ST-42L-■-PN3	0.92	77x10⁻⁷	3	5	3	0.012°	6	12	0~1000	1.02	240	270
Ezi-SERVO-ST-42L-■-PN5	1.54				5	0.0072°	9	18	0~600		290	330
Ezi-SERVO-ST-42L-■-PN8	2.47				8	0.0045°	9	18	0~375		340	410
Ezi-SERVO-ST-42L-■-PN10	3.09				10	0.0036°	6	12	0~300		360	450
Ezi-SERVO-ST-42L-■-PN15	4.49		5	7	15	0.0024°	6	12	0~200	1.12	410	540
Ezi-SERVO-ST-42L-■-PN25	7.49				25	0.00144°	9	18	0~120		490	640
Ezi-SERVO-ST-42L-■-PN40	9.00				40	0.0009°	9	18	0~75		570	640
Ezi-SERVO-ST-42L-■-PN50	9.00				50	0.00072°	9	18	0~60		620	640
Ezi-SERVO-ST-42XL-■-PN3	1.45	114x10⁻⁷	3	5	3	0.012°	6	12	0~1000	1.15	240	270
Ezi-SERVO-ST-42XL-■-PN5	2.42				5	0.0072°	9	18	0~600		290	330
Ezi-SERVO-ST-42XL-■-PN8	3.87				8	0.0045°	9	18	0~375		340	410
Ezi-SERVO-ST-42XL-■-PN10	4.84				10	0.0036°	6	12	0~300		360	450
Ezi-SERVO-ST-42XL-■-PN15	6.00		5	7	15	0.0024°	6	12	0~200	1.25	410	540
Ezi-SERVO-ST-42XL-■-PN25	9.00				25	0.00144°	9	18	0~120		490	640
Ezi-SERVO-ST-42XL-■-PN40	9.00				40	0.0009°	9	18	0~75		570	640
Ezi-SERVO-ST-42XL-■-PN50	9.00				50	0.00072°	9	18	0~60		620	640

* The code of encoder resolution will be marked in "■"

14. Specifications of Motor with Gearbox

56mm

Unit Part Number	Maximum Holding Torque [N·m]	Rotor Inertia Moment [kg·m²]	Back-lash [min]	Angle Trans-mission Error [min]	Re-duction Gear Ratio	Resolution (10,000 [ppr] Standard)	Permitted Torque [N·m]	Maximum Torque [N·m]	Permitted Speed Range [rpm]	Unit Weight [kg]	Permitted Overhung Load [N] Axis Center Standard	Permitted Thrust Load [N]
Ezi-SERVO-ST-56S-■-PN3	1.1	180x10⁻⁷	3	5	3	0.012°	18	35	0~1000	1.94	430	310
Ezi-SERVO-ST-56S-■-PN5	1.9				5	0.0072°	27	50	0~600		510	390
Ezi-SERVO-ST-56S-■-PN8	3.0				8	0.0045°	27	50	0~375		600	480
Ezi-SERVO-ST-56S-■-PN10	3.8				10	0.0036°	18	35	0~300		640	530
Ezi-SERVO-ST-56S-■-PN15	5.5				15	0.0024°	18	35	0~200		740	630
Ezi-SERVO-ST-56S-■-PN25	9.3				25	0.00144°	27	50	0~120	2.14	870	790
Ezi-SERVO-ST-56S-■-PN40	14.9				40	0.0009°	27	50	0~75		1000	970
Ezi-SERVO-ST-56S-■-PN50	18.6				50	0.00072°	27	50	0~60		1100	1100
Ezi-SERVO-ST-56M-■-PN3	2.0	280x10⁻⁷	3	5	3	0.012°	18	35	0~1000	2.15	430	310
Ezi-SERVO-ST-56M-■-PN5	3.4				5	0.0072°	27	50	0~600		510	390
Ezi-SERVO-ST-56M-■-PN8	5.4				8	0.0045°	27	50	0~375		600	480
Ezi-SERVO-ST-56M-■-PN10	6.8				10	0.0036°	18	35	0~300		640	530
Ezi-SERVO-ST-56M-■-PN15	9.9				15	0.0024°	18	35	0~200		740	630
Ezi-SERVO-ST-56M-■-PN25	16.6				25	0.00144°	27	50	0~120	2.35	870	790
Ezi-SERVO-ST-56M-■-PN40	27.0				40	0.0009°	27	50	0~75		1000	970
Ezi-SERVO-ST-56M-■-PN50	27.0				50	0.00072°	27	50	0~60		1100	1100
Ezi-SERVO-ST-56L-■-PN3	4.0	520x10⁻⁷	3	5	3	0.012°	18	35	0~1000	2.52	430	310
Ezi-SERVO-ST-56L-■-PN5	6.8				5	0.0072°	27	50	0~600		510	390
Ezi-SERVO-ST-56L-■-PN8	10.8				8	0.0045°	27	50	0~375		600	480
Ezi-SERVO-ST-56L-■-PN10	13.6				10	0.0036°	18	35	0~300		640	530
Ezi-SERVO-ST-56L-■-PN15	18.0				15	0.0024°	18	35	0~200		740	630
Ezi-SERVO-ST-56L-■-PN25	27.0				25	0.00144°	27	50	0~120	2.72	870	790
Ezi-SERVO-ST-56L-■-PN40	27.0				40	0.0009°	27	50	0~75		1000	970
Ezi-SERVO-ST-56L-■-PN50	27.0				50	0.00072°	27	50	0~60		1100	1100

* The code of encoder resolution will be marked in "■"

60mm

Unit Part Number	Maximum Holding Torque [N·m]	Rotor Inertia Moment [kg·m²]	Back-lash [min]	Angle Trans-mission Error [min]	Re-duction Gear Ratio	Resolution (10,000 [ppr] Standard)	Permitted Torque [N·m]	Maximum Torque [N·m]	Permitted Speed Range [rpm]	Unit Weight [kg]	Permitted Overhung Load [N] Axis Center Standard	Permitted Thrust Load [N]
Ezi-SERVO-ST-60S-■-PN3	1.5	240x10⁻⁷	3	5	3	0.012°	18	35	0~1000	2.0	430	310
Ezi-SERVO-ST-60S-■-PN5	2.5				5	0.0072°	27	50	0~600		510	390
Ezi-SERVO-ST-60S-■-PN8	4.0				8	0.0045°	27	50	0~375		600	480
Ezi-SERVO-ST-60S-■-PN10	5.1				10	0.0036°	18	35	0~300		640	530
Ezi-SERVO-ST-60S-■-PN15	7.4				15	0.0024°	18	35	0~200		740	630
Ezi-SERVO-ST-60S-■-PN25	12.3				25	0.00144°	27	50	0~120	2.2	870	790
Ezi-SERVO-ST-60S-■-PN40	19.8				40	0.0009°	27	50	0~75		1000	970
Ezi-SERVO-ST-60S-■-PN50	24.7				50	0.00072°	27	50	0~60		1100	1100
Ezi-SERVO-ST-60M-■-PN3	2.6	490x10⁻⁷	3	5	3	0.012°	18	35	0~1000	2.3	430	310
Ezi-SERVO-ST-60M-■-PN5	4.4				5	0.0072°	27	50	0~600		510	390
Ezi-SERVO-ST-60M-■-PN8	7.0				8	0.0045°	27	50	0~375		600	480
Ezi-SERVO-ST-60M-■-PN10	8.8				10	0.0036°	18	35	0~300		640	530
Ezi-SERVO-ST-60M-■-PN15	12.8				15	0.0024°	18	35	0~200		740	630
Ezi-SERVO-ST-60M-■-PN25	21.4				25	0.00144°	27	50	0~120	2.5	870	790
Ezi-SERVO-ST-60M-■-PN40	27.0				40	0.0009°	27	50	0~75		1000	970
Ezi-SERVO-ST-60M-■-PN50	27.0				50	0.00072°	27	50	0~60		1100	1100
Ezi-SERVO-ST-60L-■-PN3	5.2	690x10⁻⁷	3	5	3	0.012°	18	35	0~1000	3.0	430	310
Ezi-SERVO-ST-60L-■-PN5	8.7				5	0.0072°	27	50	0~600		510	390
Ezi-SERVO-ST-60L-■-PN8	13.9				8	0.0045°	27	50	0~375		600	480
Ezi-SERVO-ST-60L-■-PN10	18.0				10	0.0036°	18	35	0~300		640	530
Ezi-SERVO-ST-60L-■-PN15	18.0				15	0.0024°	18	35	0~200		740	630
Ezi-SERVO-ST-60L-■-PN25	27.0				25	0.00144°	27	50	0~120	3.2	870	790
Ezi-SERVO-ST-60L-■-PN40	27.0				40	0.0009°	27	50	0~75		1000	970
Ezi-SERVO-ST-60L-■-PN50	27.0				50	0.00072°	27	50	0~60		1100	1100

* The code of encoder resolution will be marked in "■"

14. Specifications of Motor with Gearbox

$86mm$

Unit Part Number	Maximum Holding Torque [N·m]	Rotor Inertia Moment [kg·m²]	Back-lash [min]	Angle Trans-mission Error [min]	Re-duction Gear Ratio	Resolution (10,000 [ppr] Standard)	Permitted Torque [N·m]	Maximum Torque [N·m]	Permitted Speed Range [rpm]	Unit Weight [kg]	Permitted Overhung Load [N] Axis Center Standard	Permitted Thrust Load [N]
Ezi-SERVO-ST-86M-■-PN3	9.6	1800×10^{-7}	3	5	3	0.012°	50	80	0~1000	6.0	810	930
Ezi-SERVO-ST-86M-■-PN5	16.0				5	0.0072°	75	125	0~600		960	1200
Ezi-SERVO-ST-86M-■-PN8	25.7				8	0.0045°	75	125	0~375		1100	1400
Ezi-SERVO-ST-86M-■-PN10	32.1				10	0.0036°	50	80	0~300		1200	1600
Ezi-SERVO-ST-86M-■-PN15	46.6				15	0.0024°	50	80	0~200	6.5	1200	1900
Ezi-SERVO-ST-86M-■-PN25	75.0				25	0.00144°	75	125	0~120		1600	2200
Ezi-SERVO-ST-86M-■-PN40	75.0				40	0.0009°	75	125	0~75		1900	2200
Ezi-SERVO-ST-86M-■-PN50	75.0				50	0.00072°	75	125	0~60		2100	2200
Ezi-SERVO-ST-86L-■-PN3	17.1	3600×10^{-7}	3	5	3	0.012°	50	80	0~1000	7.5	810	930
Ezi-SERVO-ST-86L-■-PN5	28.5				5	0.0072°	75	125	0~600		960	1200
Ezi-SERVO-ST-86L-■-PN8	45.6				8	0.0045°	75	125	0~375		1100	1400
Ezi-SERVO-ST-86L-■-PN10	50.0				10	0.0036°	50	80	0~300		1200	1600
Ezi-SERVO-ST-86L-■-PN15	50.0				15	0.0024°	50	80	0~200	8.0	1200	1900
Ezi-SERVO-ST-86L-■-PN25	75.0				25	0.00144°	75	125	0~120		1600	2200
Ezi-SERVO-ST-86L-■-PN40	75.0				40	0.0009°	75	125	0~75		1900	2200
Ezi-SERVO-ST-86L-■-PN50	75.0				50	0.00072°	75	125	0~60		2100	2200
Ezi-SERVO-ST-86XL-■-PN3	23.6	5400×10^{-7}	3	5	3	0.012°	50	80	0~1000	9.0	810	930
Ezi-SERVO-ST-86XL-■-PN5	39.4				5	0.0072°	75	125	0~600		960	1200
Ezi-SERVO-ST-86XL-■-PN8	63.0				8	0.0045°	75	125	0~375		1100	1400
Ezi-SERVO-ST-86XL-■-PN10	50.0				10	0.0036°	50	80	0~300		1200	1600
Ezi-SERVO-ST-86XL-■-PN15	50.0				15	0.0024°	50	80	0~200	9.5	1200	1900
Ezi-SERVO-ST-86XL-■-PN25	75.0				25	0.00144°	75	125	0~120		1600	2200
Ezi-SERVO-ST-86XL-■-PN40	75.0				40	0.0009°	75	125	0~75		1900	2200
Ezi-SERVO-ST-86XL-■-PN50	75.0				50	0.00072°	75	125	0~60		2100	2200

* The code of encoder resolution will be marked in "■"

42mm

Unit Part Number	Motor	Stage	□ Reduction Gear Ratio	L Length [mm]
Ezi−SERVO−ST−42S−■−PN□	EzM−42S−■−PN□	Single Stage	3, 5, 8, 10	34
Ezi−SERVO−ST−42M−■−PN□	EzM−42M−■−PN□		3, 5, 8, 10	40
Ezi−SERVO−ST−42L−■−PN□	EzM−42L−■−PN□		3, 5, 8, 10	48
Ezi−SERVO−ST−42XL−■−PN□	EzM−42XL−■−PN□		3, 5, 8, 10	60

* The code of encoder resolution will be marked in "■"
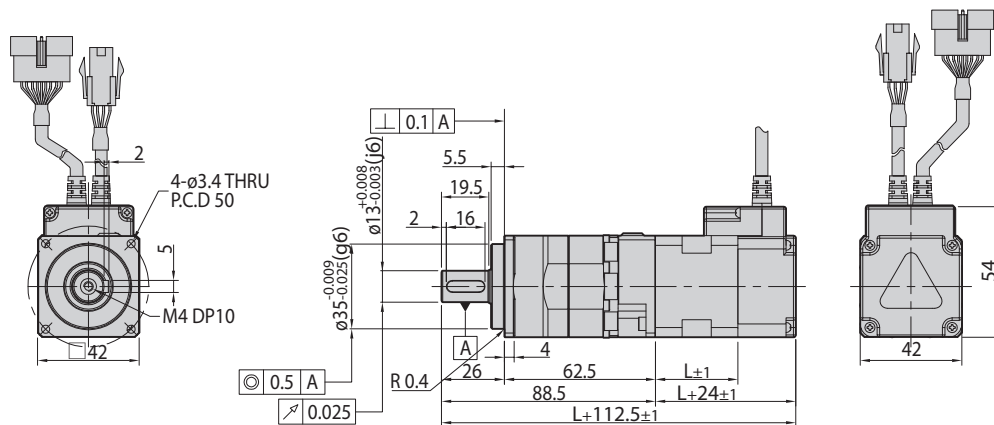
Unit Part Number	Motor	Stage	□ Reduction Gear Ratio	L Length [mm]
Ezi−SERVO−ST−42S−■−PN□	EzM−42S−■−PN□	Double Stage	15, 25, 40, 50	34
Ezi−SERVO−ST−42M−■−PN□	EzM−42M−■−PN□		15, 25, 40, 50	40
Ezi−SERVO−ST−42L−■−PN□	EzM−42L−■−PN□		15, 25, 40, 50	48
Ezi−SERVO−ST−42XL−■−PN□	EzM−42XL−■−PN□		15, 25, 40, 50	60

* The code of encoder resolution will be marked in "■"
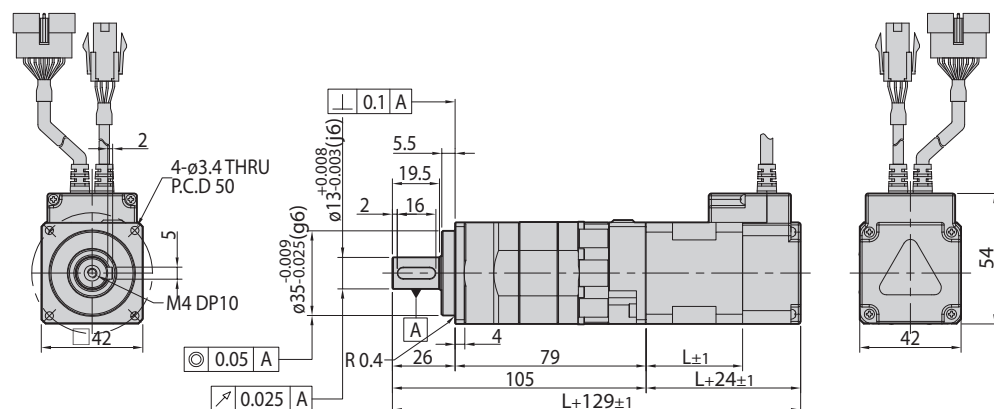
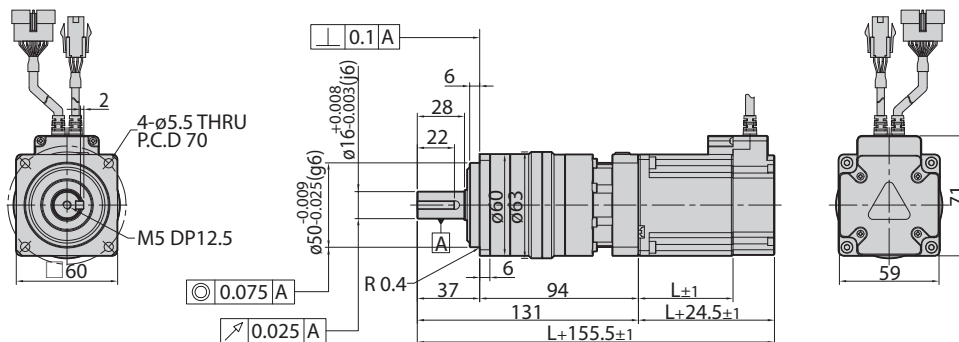# 15. Dimensions of Motor with Gearbox [mm]

56mm

Unit Part Number	Motor	Stage	□Reduction Gear Ratio	L Length [mm]
Ezi−SERVO−ST−56S−■−PN□	EzM−56S−■−PN□	Single Stage	3, 5, 8, 10	46
Ezi−SERVO−ST−56M−■−PN□	EzM−56M−■−PN□		3, 5, 8, 10	55
Ezi−SERVO−ST−56L−■−PN□	EzM−56L−■−PN□		3, 5, 8, 10	80

* The code of encoder resolution will be marked in "■"
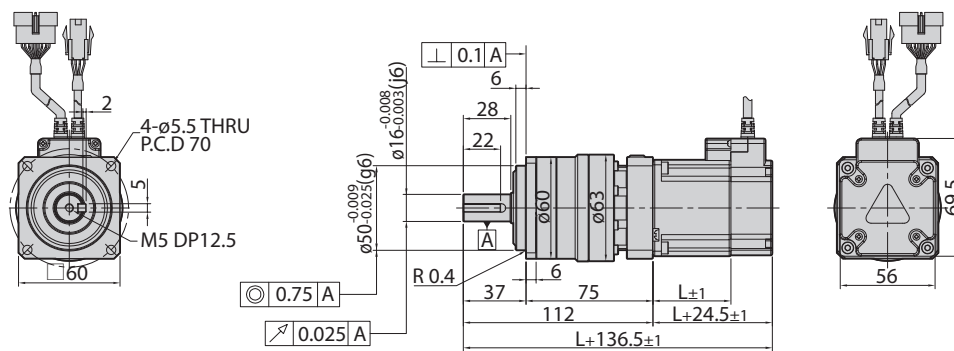
Unit Part Number	Motor	Stage	□Reduction Gear Ratio	L Length [mm]
Ezi−SERVO−ST−56S−■−PN□	EzM−56S−■−PN□	Double Stage	15, 25, 40, 50	46
Ezi−SERVO−ST−56M−■−PN□	EzM−56M−■−PN□		15, 25, 40, 50	55
Ezi−SERVO−ST−56L−■−PN□	EzM−56L−■−PN□		15, 25, 40, 50	80

* The code of encoder resolution will be marked in "■"
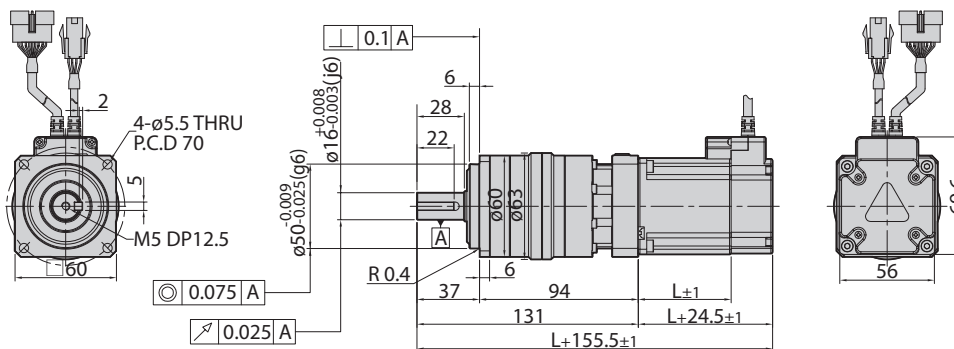
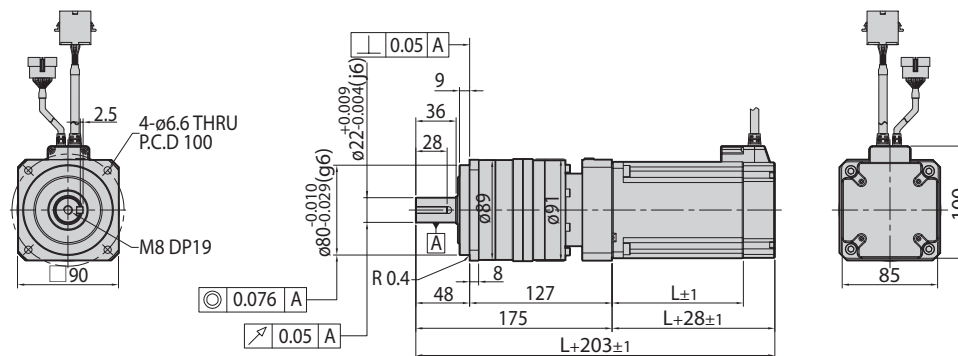## 15. Dimensions of Motor with Gearbox [mm]

60mm

Unit Part Number	Motor	Stage	□Reduction Gear Ratio	L Length [mm]
Ezi−SERVO−ST−60S−■−PN□	EzM−60S−■−PN□	Single Stage	3, 5, 8, 10	47
Ezi−SERVO−ST−60M−■−PN□	EzM−60M−■−PN□		3, 5, 8, 10	56
Ezi−SERVO−ST−60L−■−PN□	EzM−60L−■−PN□		3, 5, 8, 10	85

* The code of encoder resolution will be marked in "■"
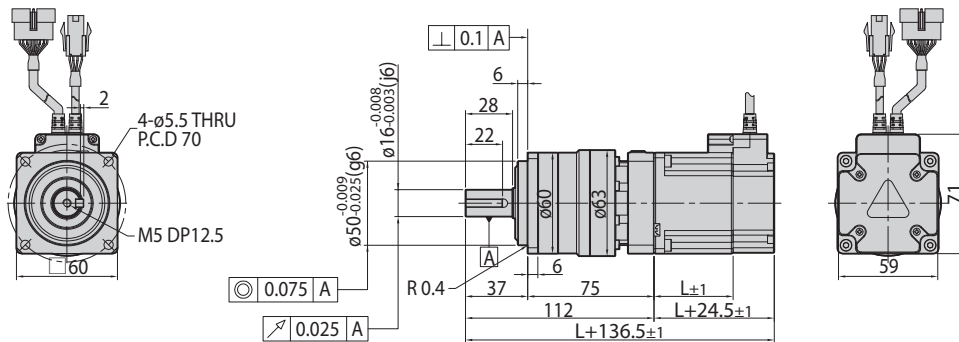
Unit Part Number	Motor	Stage	□Reduction Gear Ratio	L Length [mm]
Ezi−SERVO−ST−60S−■−PN□	EzM−60S−■−PN□	Double Stage	15, 25, 40, 50	47
Ezi−SERVO−ST−60M−■−PN□	EzM−60M−■−PN□		15, 25, 40, 50	56
Ezi−SERVO−ST−60L−■−PN□	EzM−60L−■−PN□		15, 25, 40, 50	85

* The code of encoder resolution will be marked in "■"

15. Dimensions of Motor with Gearbox [mm]

86mm

Unit Part Number	Motor	Stage	□Reduction Gear Ratio	L Length [mm]
Ezi−SERVO−ST−86M−■−PN□	EzM−86M−■−PN□	Single Stage	3, 5, 8, 10	78
Ezi−SERVO−ST−86L−■−PN□	EzM−86L−■−PN□		3, 5, 8, 10	117
Ezi−SERVO−ST−86XL−■−PN□	EzM−86XL−■−PN□		3, 5, 8, 10	155

* The code of encoder resolution will be marked in "■"
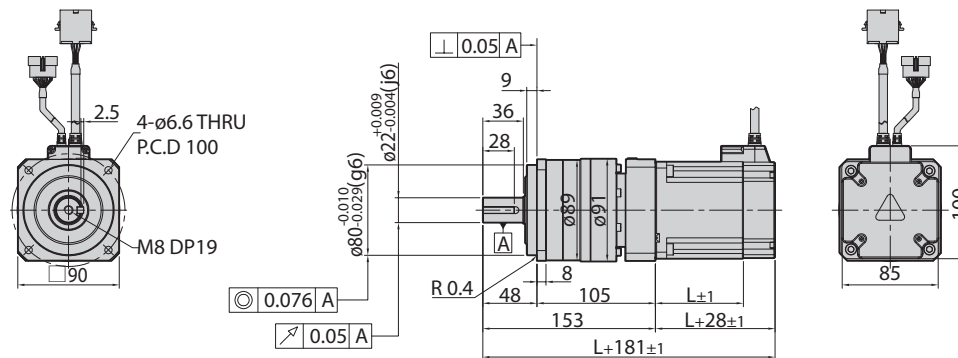
Unit Part Number	Motor	Stage	□Reduction Gear Ratio	L Length [mm]
Ezi−SERVO−ST−86M−■−PN□	EzM−86M−■−PN□	Double Stage	15, 25, 40, 50	78
Ezi−SERVO−ST−86L−■−PN□	EzM−86L−■−PN□		15, 25, 40, 50	117
Ezi−SERVO−ST−86XL−■−PN□	EzM−86XL−■−PN□		15, 25, 40, 50	155

* The code of encoder resolution will be marked in "■"

Pulse input and direction setting switch(SW1)

Position controller gain setting switch(SW2)

Resolution setting switch(SW3)

In-Position value setting switch(SW4)

Drive status LED

Input/Output signal connection(CN1)

Encoder connection(CN2)

Motor connection(CN3)

Power connection(CN4)

◆ 86mm Motor Drive (EzS-PD-86 series)

Pulse input and direction setting switch(SW1)

Position controller gain setting switch(SW2)

Resolution setting switch(SW3)

In-Position value setting switch(SW4)

Drive status LED

Input/Output signal connection(CN1)

Encoder connection(CN2)

Motor connection(CN3)

Power connection(CN4)

16.1 Drive Status LED

Indication	Color	Function	ON/OFF Condition
PWR	Green	Power input indication	LED is turned ON when power is applied
INP	Yellow	Complete Positioning Motion	Lights On when Positioning error reaches within the preset pulse selected by rotary switch
SON	Orange	Servo On/Off Indication	Servo On: Lights On, Servo Off: Lights Off
ALM	Red	Alarm indication	Flash when protection function is activated (Identifiable which protection mode is activated by counting the blinking times)

◆ Protection functions and LED flash times

| Times	Protection	Conditions
1	Over Current Error	The current through power devices in inverter exceeds the limit value [1]
2	Over Speed Error	Motor speed exceeds 3,000 [rpm]
3	Position Tracking Error	Position error value is higher than 180° in motor run state
4	Over Load Error	The motor is continuously operated more than 5 seconds under a load exceeding the max. torque
5	Over Temperature Error	Inside temperature of drive exceeds 85℃
6	Over Regenerative Voltage Error	Back-EMF is higher than limit value [2]
7	Motor Connect Error	The power is ON without connection of the motor cable to drive
8	Encoder Connect Error	Cable connection error in Encoder connection of drive
10	In-Position Error	After operation is finished, position error more than 1 pulse is continued for more than 3 seconds
11	System Error	Error occurs in drive system
12	ROM Error	Error occurs in parameter storage device(ROM)
15	Position Overflow Error	Position error value is higher than 180° in motor stop state

0.5 s   2.0 s
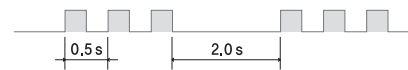
Alarm LED flash
(Ex, Position tracking error)

Motor	EzM-20~60	EzM-86
[1] Over Current limit	4.8A	9.6A
[2] Over Regeneratived Voltage limit	70V	90V

16.2 Pulse Input Setting Switch(SW1.1)

Indication	Switch Name	Functions
2P/1P	Selecting Pulse Input Mode	Selectable 1-Pulse input mode or 2-Pulse input mode as Pulse input signal. ON: 1-Pulse mode OFF: 2-Pulse mode ※ Default: 2-Pulse mode

2-Pulse Mode   1-Pulse Mode

CW(Pulse) Pin
CCW(Dir) Pin
Rotational Direction   CW   CCW   CW   CCW
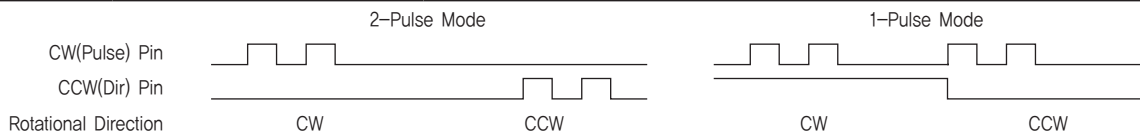
## 16.3 Rotational Direction Setting Switch(SW1.2)

Indication	Switch Name	Functions
DIR	Switching Rotational Direction	Based on CW(+Dir signal) input to driver. ON: CCW(-Direction) OFF: CW(+Direction) ※ Default: CW mode

Direction setting switch: ON

CCW Dir.

Direction setting switch: OFF

CW Dir.
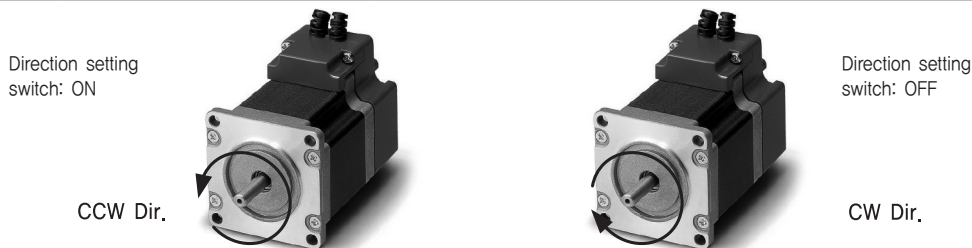
16.4 Resolution Setting Switch(SW3)

The Number of pulse per revolution.

Position	Pulse/Revolution	Position	Pulse/Revolution
0	500 [1]	5	3,600
1	500	6	5,000
2	1,000	7	6,400
3	1,600	8	7,200
4	2,000	9	10,000
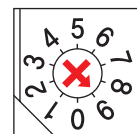
[1] : Resolution of position "0" will be different according to the resolution of encoder adopted to the product. But in case of the encoder with 10,000[ppr] resolution, it will be set as 500.

※ When selected resolution is more then encoder resolution, motor shall be operated by microstep between pulses.

16.5 Position Controller Gain Setting Switch(SW2)

The Position Controller Gain Switch allows for the correction of the motor position deviation after stopping caused by load and friction. Depending on the motor load, the user may have to select a different gain position to stabilize and to correct positional error quickly.

To tune the controller
1. Set the switch to "0" position.
2. Start to rotate the switch until system becomes stable.
3. Rotate the switch 1~2 position to reach better performance.

Position	Time Constant of the Integral part	Proportional Gain[*1]
0	1	1
1	1	2
2	1	3
3[*2]	1	4
4	1	5
5	2	1
6	2	2
7	2	3
8	2	4
9	2	5
A	3	1
B	3	2
C	3	3
D	3	4
E	3	5
F	3	6

*1 : Value in the columns are in relative units. They only show the parameter changes depending on the switch's position.
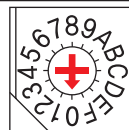*2 : Default = 3
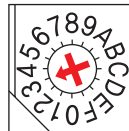
## 16.6 In-Position Value Setting Switch(SW4)

To select the output condition of In-Position signal, In-Position output signal is generated when the pulse number of positional error is lower than selected In-Position value set by this switch after positioning command is executed.

Position	In-Position Value[Pulse] Fast Response	Position	In-Position Value[Pulse] Accurate Response
0[*1]	0	8	0
1	1	9	1
2	2	A	2
3	3	B	3
4	4	C	4
5	5	D	5
6	6	E	6
7	7	F	7

*1 : Default = 0

Setting method of Fast Response and Accurate Response
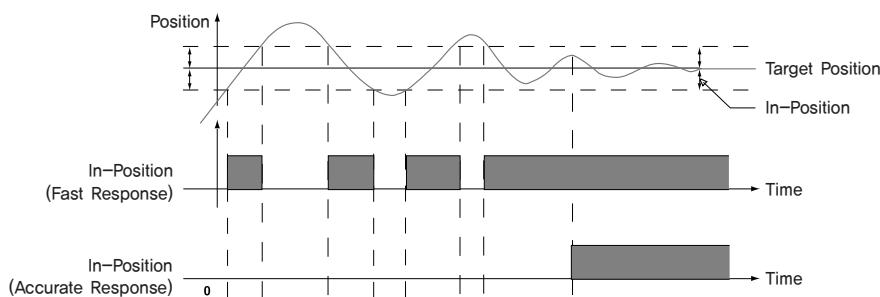
16.7 Encoder Connector(CN2)

NO.	Function	I/O
1	A+	Input
2	A−	Input
3	B+	Input
4	B−	Input
5	Z+	Input
6	Z−	Input
7	5VDC	Output
8	GND	Output
9	F.GND	————
10	F.GND	————
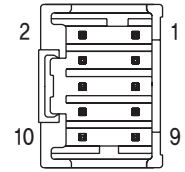
16.8 Input/Output Signal Connector(CN1)

NO.	Function	I/O
1	CW+(Pulse+)	Input
2	CW−(Pulse−)	Input
3	CCW+(Dir+)	Input
4	CCW−(Dir−)	Input
5	A+	Output
6	A−	Output
7	B+	Output
8	B−	Output
9	Z+	Output
10	Z−	Output
11	Alarm	Output
12	In−Position	Output
13	Servo On/Off	Input
14	Alarm Reset	Input
15	NC	————
16	BRAKE+	Output
17	BRAKE−	Output
18	S−GND	Output
19	EXT_GND	Input
20	EXT_24VDC	Input
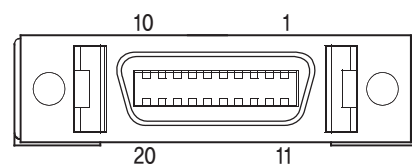
16.9 Motor Connector(CN3)

NO.	Function	I/O
1	A Phase	Output
2	B Phase	Output
3	/A Phase	Output
4	/B Phase	Output

NO.	Function	I/O
1	/B Phase	Output
2	B Phase	Output
3	/A Phase	Output
4	A Phase	Output
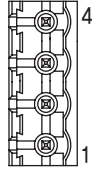
※ 86mm motor drive.

16.10 Power Connector(CN4)

NO.	Function	I/O
1	24VDC	Input
2	GND	Input

NO.	Function	I/O
1	GND	Input
2	40~70VDC	Input

※ 86mm motor drive.

17. System Configuration
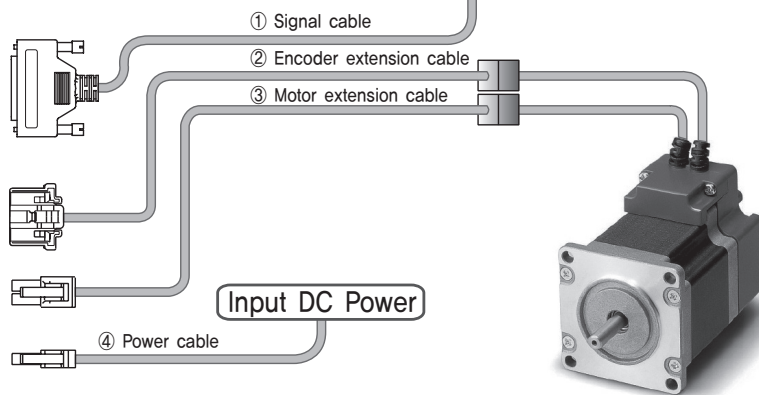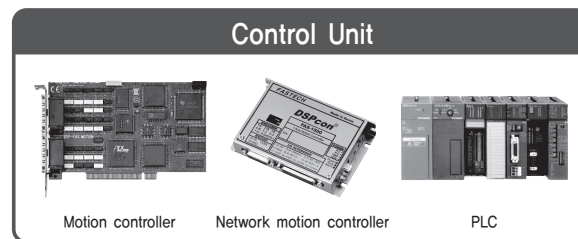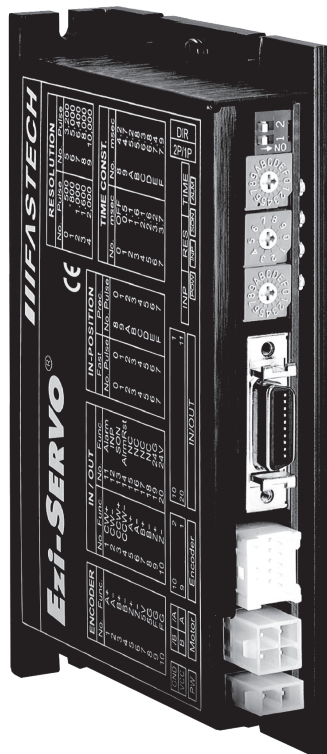
Control Unit

Motion controller   Network motion controller   PLC

① Signal cable
② Encoder extension cable
③ Motor extension cable

Input DC Power

④ Power cable

Type	Signal Cable	Encoder Cable	Motor Cable	Power Cable
Length supplied	–	30cm	30cm	–
Max. Length	20m	20m	20m	2m

17.1 Options

① Signal Cable

Available to connect between Input/Output Control System and Ezi-SERVO ST.

Item	Length [m]	Remark
CSVO-S-□□□F	□□□	Normal Cable
CSVO-S-□□□M	□□□	Robot Cable

□ is for Cable Length. The unit is 1m and Max. 20m length.

② Encoder Extension Cable

Available to extended connection between Encoder and Ezi-SERVO ST.

Item	Length [m]	Remark
CSVO-E-□□□F	□□□	Normal Cable
CSVO-E-□□□M	□□□	Robot Cable

□ is for Cable Length. The unit is 1m and Max. 20m length.

③ Motor Extension Cable

Available to extended connection between motor and Ezi-SERVO ST.

Item	Length [m]	Remark
CSVO-M-□□□F	□□□	Normal Cable
CSVO-M-□□□M	□□□	Robot Cable

□ is for Cable Length. The unit is 1m and Max. 20m length.

④ Power Cable

Available to connect between Power and Ezi-SERVO ST.

Item	Length [m]	Remark
CSVO-P-□□□F	□□□	Normal Cable
CSVO-P-□□□M	□□□	Robot Cable

□ is for Cable Length. The unit is 1m and Max. 2m length.

17.2 Connector Specifications

Connector specifications for cabling to drive.

Purpose		Item	Part Number	Manufacturer
Power (CN4)		Housing Terminal	5557-02R 5556T	MOLEX
Motor	Drive Side (CN3)	Housing Terminal	5557-04R 5556T	MOLEX
	Motor Side	Housing Terminal	5557-04R 5556T	MOLEX
Encoder	Drive Side (CN2)	Housing Terminal	51353-1000 56134-9000	MOLEX
	Encoder Side	Housing Terminal	SMP-09V-NC SHF-001T-0.8BS	JST
Signal (CN1)		Connector Backshell	10120-3000PE 10320-52A0-008	3M

※ Above connector is the most suitable product for the drive applied. Another equivalent connector can be used.
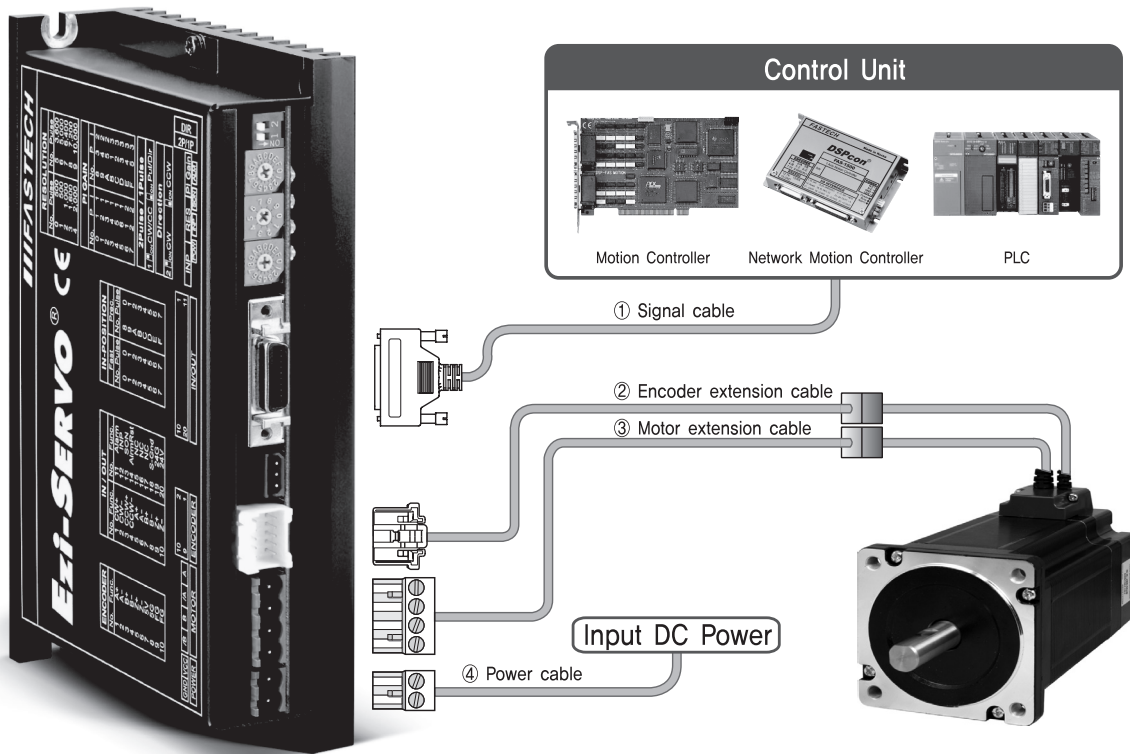
Type	Signal Cable	Encoder Cable	Motor Cable	Power Cable
Length supplied	–	30cm	30cm	–
Max. Length	20m	20m	20m	2m

18.1 Options

① Signal Cable

Available to connect between Input/Output Control System and Ezi-SERVO ST.

Item	Length [m]	Remark
CSVO-S-□□□F	□□□	Normal Cable
CSVO-S-□□□M	□□□	Robot Cable

□ is for Cable Length. The unit is 1m and Max. 20m length.

② Encoder Extension Cable

Available to extended connection between Encoder and Ezi-SERVO ST.

Item	Length [m]	Remark
CSVO-E-□□□F	□□□	Normal Cable
CSVO-E-□□□M	□□□	Robot Cable

□ is for Cable Length. The unit is 1m and Max. 20m length.

③ Motor Extension Cable

Available to extended connection between motor and Ezi-SERVO ST.

Item	Length [m]	Remark
CSVP-M-□□□F	□□□	Normal Cable
CSVP-M-□□□M	□□□	Robot Cable

□ is for Cable Length. The unit is 1m and Max. 20m length.

④ Power Cable

Available to connect between Power and Ezi-SERVO ST.

Item	Length [m]	Remark
CSVP-P-□□□F	□□□	Normal Cable
CSVP-P-□□□M	□□□	Robot Cable

□ is for Cable Length. The unit is 1m and Max. 2m length.

18.2 Connector Specifications

Connector specifications for cabling to drive.

Purpose		Item	Part Number	Manufacturer
Power (CN4)		Terminal Block	AK950-2	PTR
Motor	Drive Side (CN3)	Terminal Block	AK950-4	PTR
	Motor Side	Housing Terminal	3191-4R1 1381T	MOLEX
Encoder	Drive Side (CN2)	Housing Terminal	51353-1000 56134-9000	MOLEX
	Encoder Side	Housing Terminal	SMP-09V-NC SHF-001T-0.8BS	JST
Signal (CN1)		Connector Backshell	10120-3000PE 10320-52A0-008	3M

※ Above connector is the most suitable product for the drive applied. Another equivalent connector can be used.

Ezi-SERVO ST

Motor and Encoder

CN4

24VDC	1 24VDC
GND	2 GND

Controller

*

CN1

Controller	CN1
CW+(Pulse+)	1
CW-(Pulse-)	2
CCW+(Dir+)	3
CCW-(Dir-)	4
A+	5
A-	6
B+	7
B-	8
Z+	9
Z-	10
Signal GND	18 S-GND
Alarm	11
In-Position	12
EXT_GND	19
EXT_24VDC	20
Servo On/Off	13
Alarm Reset	14
	16 24VDC
BRAKE	17
NC	15
F.GND	F.GND

CN2

*

CN2	
A+	1
A-	2
B+	3
B-	4
Z+	5
Z-	6
5VDC	7
GND	8
F.GND	9,10

Encoder
E

CN3

CN3	
A	1
/A	3
B	2
/B	4

Motor
M

* Shielded Twisted Pair Cable

※ When connects I/O cable between controller and drive, please turn off the power of both controller and drive, in order to protect the drive from any damage.

20. External Wiring Diagram [86mm Motor Drive]
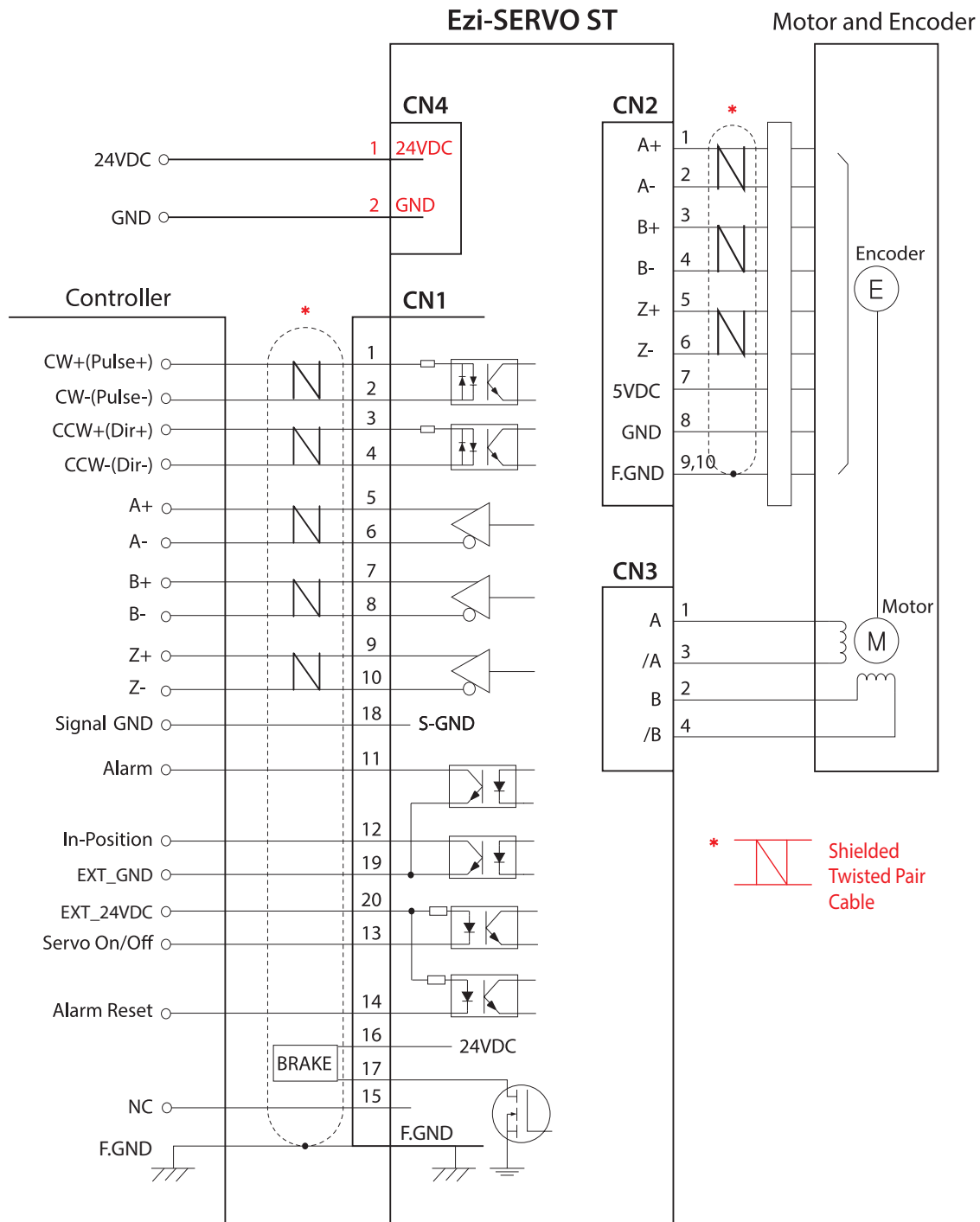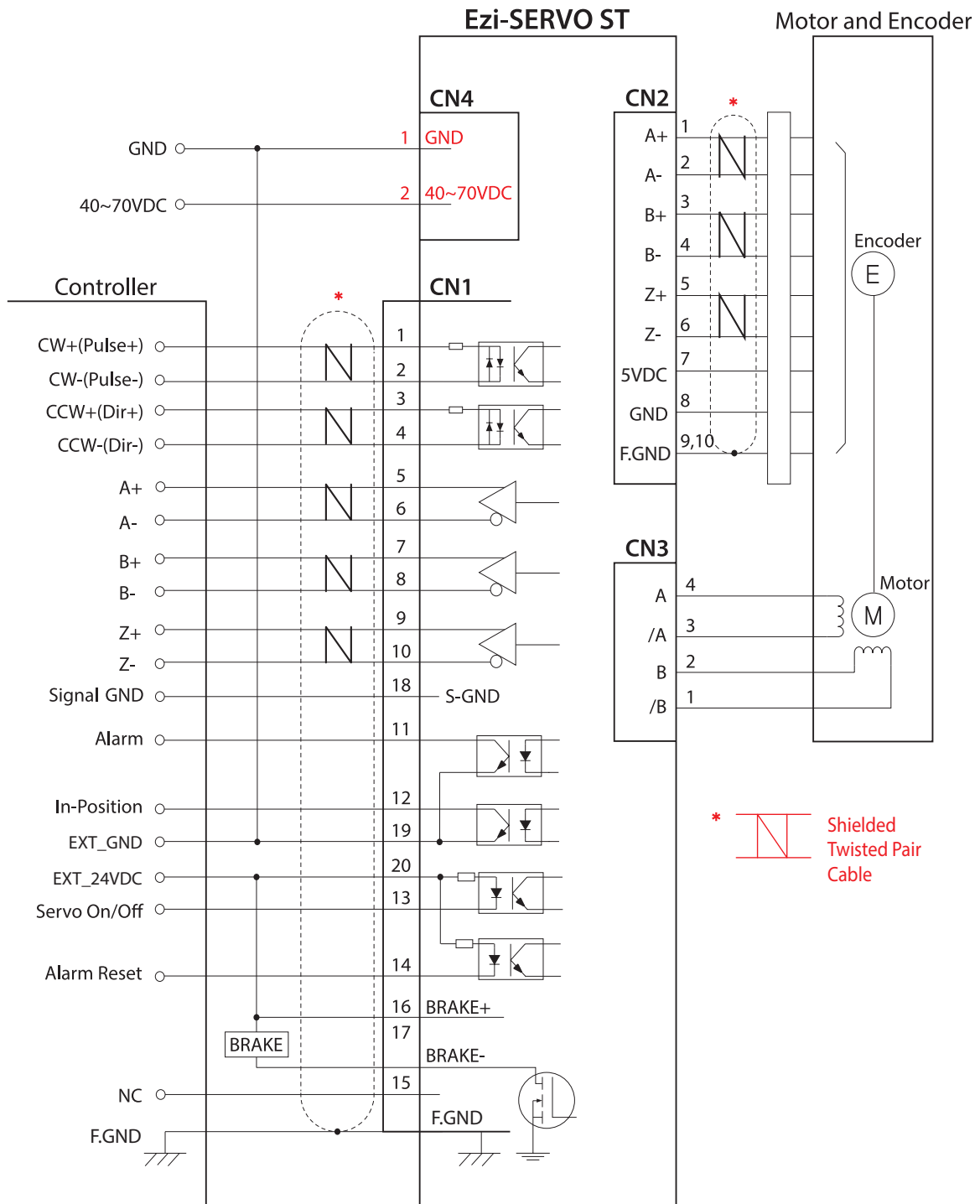
※ When connects I/O cable between controller and drive, please turn off the power of both controller and drive, in order to protect the drive from any damage.

CAUTION

Please refer to the Appendix when connects motor extension cable.

Careful connection will be required to protect the drive from any damages.

1 Input Signal

Input signals of the drive are all photocoupler protected. The signal shows the status of internal photocouplers [ON : conduction], [OFF : Non-conduction], not displaying the voltage levels of the signal.

CW, CCW

Pin No.	Function
1	CW+
2	CW-
3	CCW+
4	CCW-
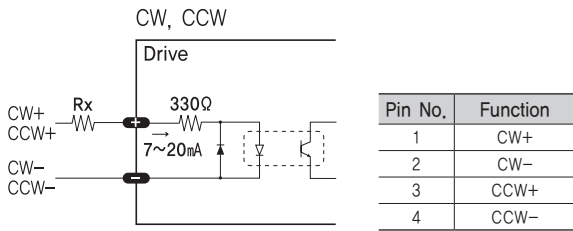
◆ CW, CCW Input

This signal can be used to receive a positioning pulse command from a user's host motion controller. The user can select 1-pulse input mode or 2-pulse input mode.
The input schematic of CW, CCW is designed for 5V TTL level. When using 5V level as an input signal, the resistor Rx is not used and connected to the driver directly.
When the level of input signal is more than 5V, Rx resistor is required. If the resistor is absent, the drive can be damaged In the case input signal level is 12V, Rx value is 680ohm and 24V, Rx value is 1.8Kohm.

Alarm Reset, Servo On/Off

| Pin No.	Function
13	Servo On/Off
14	Alarm Reset
20	EXT_24VDC
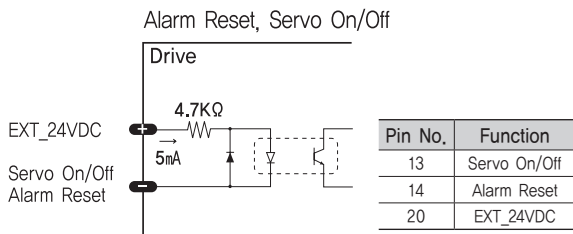
◆ Servo On/Off Input

This input can be used only to adjust the position by moving the motor shaft manually from the load-side.
By setting the signal [ON], the driver cuts off the power supplied to the motor. Then, output position can be adjusted manually. When setting the signal back to [OFF], the driver resumes to supply the power to the motor and recovers the holding torque. When driving a motor, the signal shall be set [OFF].

◆ Alarm Reset Input

When a protection mode has been activated, a signal to this alarm reset input cancels the Alarm output.

Alarm Reset ON / OFF more than 0.1s
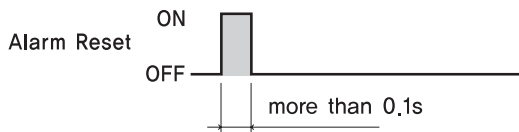
※ By setting the alarm reset input signal [ON], cancel the Alarm output. Before cancel the Alarm output, have to remove the source of alarm.

2 Output Signal

Output signals from the driver are photocoupler protected: Alarm, In-Position and the Line Driver Outputs (encoder signal). In the case of photocoupler outputs, the signal indicates the status of internal photocouplers [ON : conduction], [OFF : Non-conduction], not displaying the voltage levels of the signal.

Alarm, In-Position

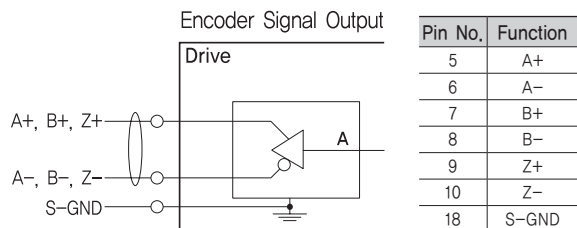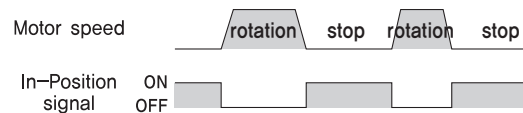| Pin No.	Function
11	Alarm
12	In-Position
19	EXT_GND

DC30V less than 15mA
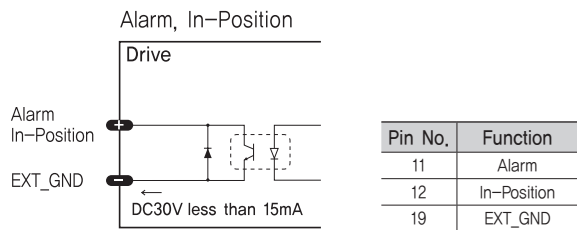
◆ Alarm Output

The Alarm output indicates [ON] when the driver is in a normal operation. If a protection mode has been activated, it goes [OFF]. User's host controller needs to detect this signal and stop sending a motor driving command. When the driver detects an abnormal operation such as overload or over current of the motor, it sets the Alarm output to [OFF], flashes the Alarm LED, disconnect the power to a motor and stops the motor simultaneously.

[Caution] Only at the Alarm output port, the photocoupler isolation is in reverse. When the driver is in normal operation the Alarm output is [ON]. On the contrary when the driver is in abnormal operation that start protection mode, the Alarm output is [OFF].

◆ In-Position Output

In-Position signal is [ON] when positioning is completed. This signal is [ON] when the motor position error is within the value set by the switch SW4.

Motor speed — rotation, stop, rotation, stop
In-Position signal — ON / OFF

Encoder Signal Output

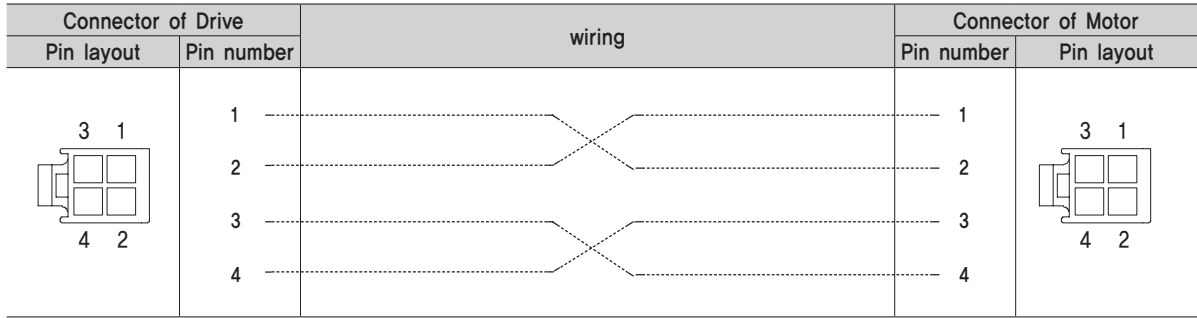| Pin No.	Function
5	A+
6	A-
7	B+
8	B-
9	Z+
10	Z-
18	S-GND

◆ Encoder Signal Output

The encoder signal is a line driver output. This can be used to confirm the stop position.

Appendix

▪ Extension Cable for Motor
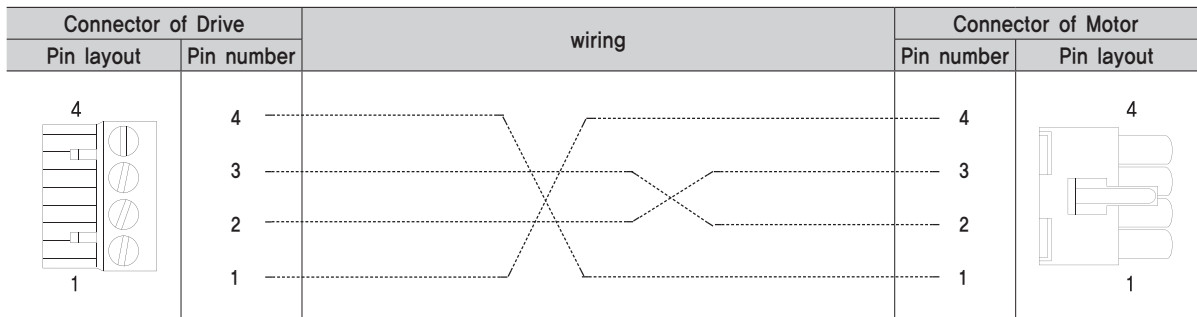
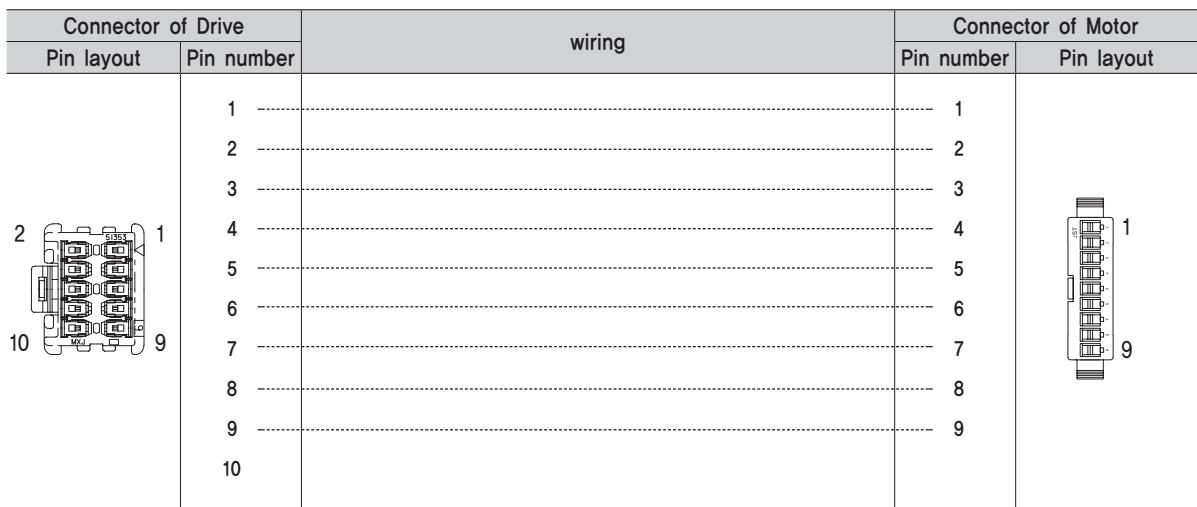For cable extension between Motor and Drive.

WIRING DIAGRAM

Connector of Drive		wiring	Connector of Motor	
Pin layout	Pin number		Pin number	Pin layout
3 1 4 2	1 2 3 4	(crossed wiring 1↔2, 3↔4)	1 2 3 4	3 1 4 2

WIRING DIAGRAM(86mm drive only)

Connector of Drive		wiring	Connector of Motor	
Pin layout	Pin number		Pin number	Pin layout
4 1	4 3 2 1	(crossed wiring)	4 3 2 1	4 1

▪ Extension Cable for Encoder

For cable extension between Encoder and Drive.

WIRING DIAGRAM

Connector of Drive		wiring	Connector of Motor	
Pin layout	Pin number		Pin number	Pin layout
2 [51353] 1 10 [MXJ] 9	1 2 3 4 5 6 7 8 9 10	(straight wiring)	1 2 3 4 5 6 7 8 9	1 9

MEMO

Fast, Accurate, Smooth Motion

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