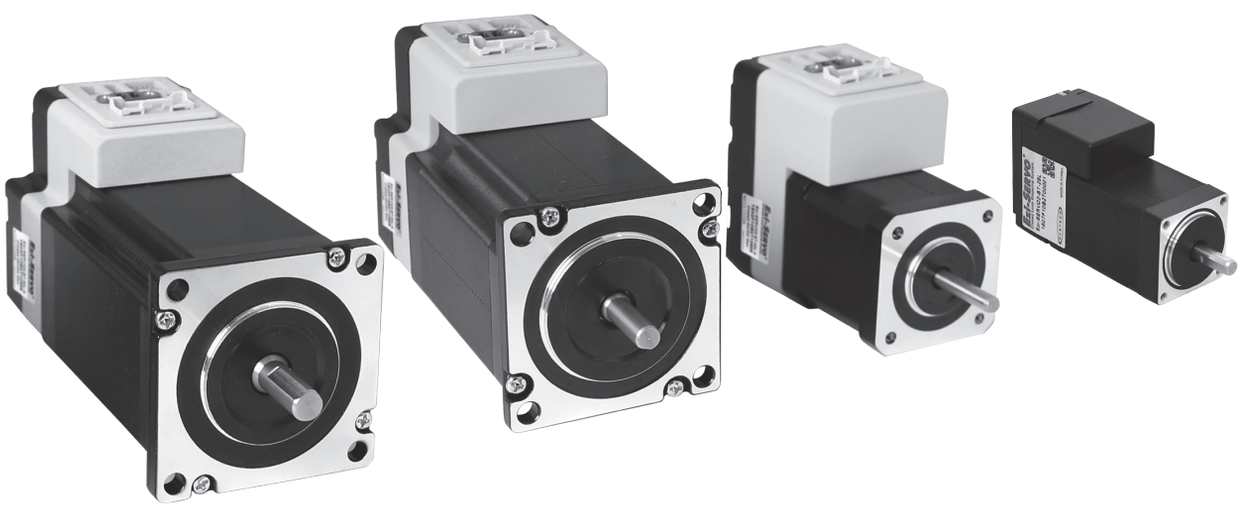
Operating Manual

Ezi-SERVO® II

Closed Loop Stepping System

BT



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CE

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※ Before operation ※

· Thank you for your purchasing Ezi-SERVO II BT.
· Ezi-SERVO II BT is an all-in-one Unit. For high-speed and high-precision drive of a stepping motor, Ezi-SERVO II BT 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 II BT.
· Before operating Ezi-SERVO II BT, thoroughly read this manual.
· After reading the manual, keep the manual near the Ezi-SERVO II BT 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 II BT.
· When the manual is damaged or lost, please go to the homepage(www.fastech-motions.com) 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 II BT, thoroughly read the manual and fully understand the contents. Before operating the Ezi-SERVO II BT please, understand the mechanical characteristics of the Ezi-SERVO II BT 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 II BT. 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 II BT is to be installed. Otherwise, a fire may occur. When installing several Ezi-SERVO II BT in a sealed place, install a cooling fan to keep the ambient temperature of the Ezi-SERVO II BT 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 II BT. 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 II BT is insulated from the ground of the internal circuit by the condenser. Ground the Ezi-SERVO II BT. 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 II BT. 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 II BT. 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 II BT. Otherwise, an electric shock may occur or the reconstructed product can not get After-Service.

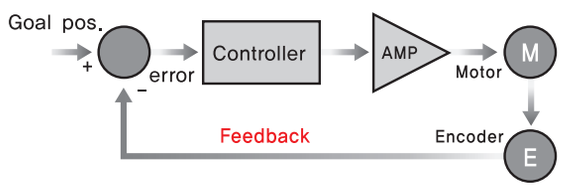
2. Main Characteristics

1 Integrated Solution

Ezi-SERVO II BT with integrated Motor and Encoder and Drive has provides the optimum solution that can take full advantage of Ezi-SERVO II by realizing compact size and simple wiring.

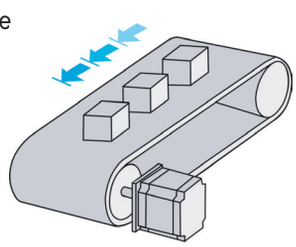
2 Closed Loop System

Ezi-SERVO II 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 II to update the current position every 50 μsec. It allows the Ezi-SERVO II 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 II automatically correct the position by encoder feedback.



3 No Gain Tuning

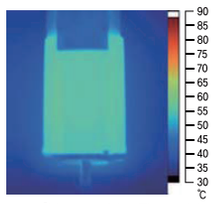
To ensure machine performance, smoothness, positional error and low servo noise, conventional servo systems require the adjustment of its servo's gains as an initial crucial step. Even systems that employ auto-tuning require manual tuning after the system is installed, especially if more that one axis are interdependent. Ezi-SERVO II 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 II is optimized for the application and ready to work right out of the box. The Ezi-SERVO II 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 II 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 II also performs exceptionally, even under heavy loads and high speeds.



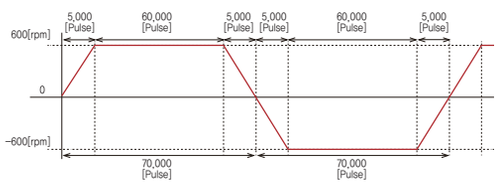
4 Heat Reduction / Energy Saving

(Motor Current Control according to load)

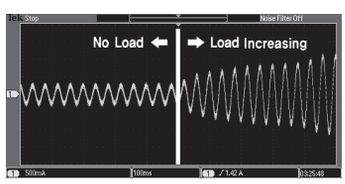
Ezi-SERVO II automatically controls motor current according to load.
Ezi-SERVO II reduces motor current when motor load is low and increases motor current when load is high. By optimizing the motor current, motor heat can be minimized and energy can be saved.



Motor temperature [Measured by Thermal Imaging Camera]



Condition to measure the motor temperature
[4hours operation, Motor surface temperature saturation]

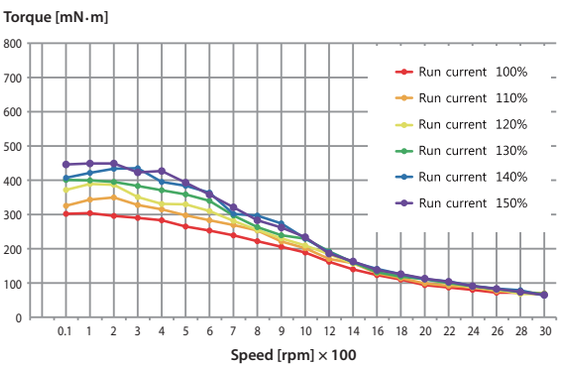


Example of the Motor Current Control according to load

5 Torque Improvement

(Motor Current Setting)

Ezi-SERVO II can increase the motor current up to 150% by setting the Run Current by parameter. Therefore acceleration and deceleration characteristics and torque characteristics at low speed can be increased.
Ezi-SERVO II can improve the torque in the low speed range by about 30%.

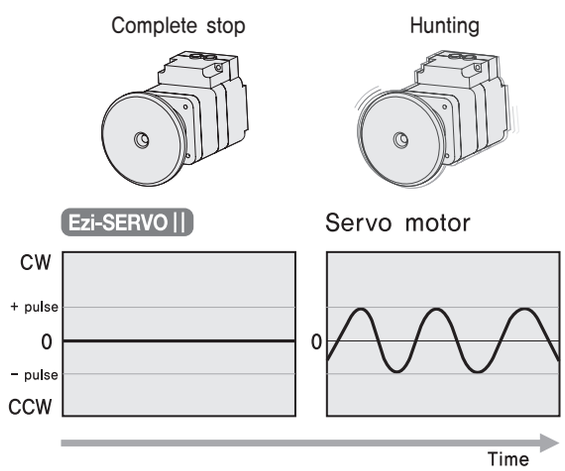


※ The torque at low speed is improved about 30%.

Measured Condition : Drive = Ezi-SERVO II-BT-42L
Motor Voltage = 24VDC
Input Voltage = 24VDC

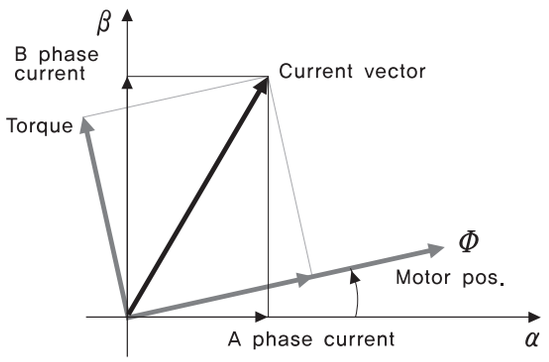
6 No Hunting

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 II Motion Control System. Ezi-SERVO II 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.



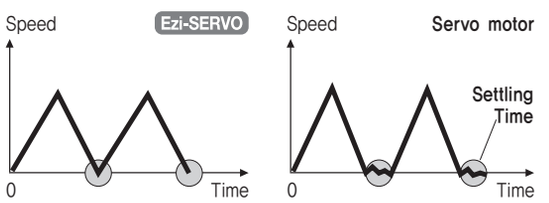
7 Smooth and Accurate

Ezi-SERVO II is a high-precision servo drive, using a high-resolution encoder with 20,000 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.



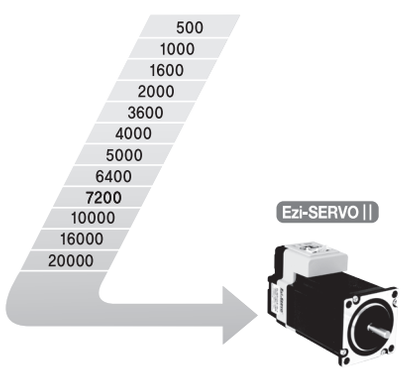
8 Fast Response

Similar to conventional stepping motors, Ezi-SERVO II instantly synchronizes with command pulses providing fast positional response. Ezi-SERVO II 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.



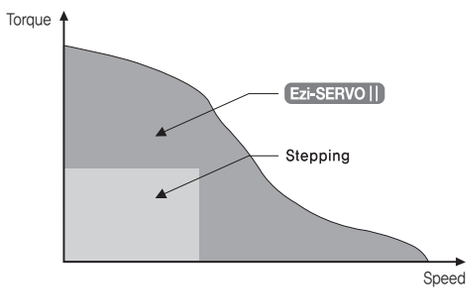
9 High Resolution

The unit of the position command can be divided precisely. (Max. 20,000 pulses/revolution)



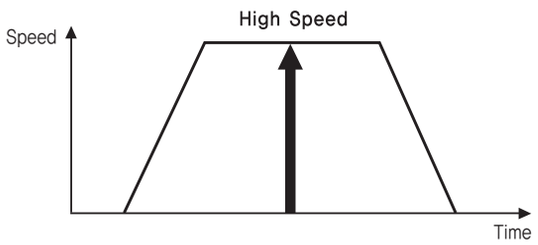
10 High Torque

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



11 High Speed

The Ezi-SERVO II operates well at high speed without the loss of synchronism or positioning error. Ezi-SERVO II'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

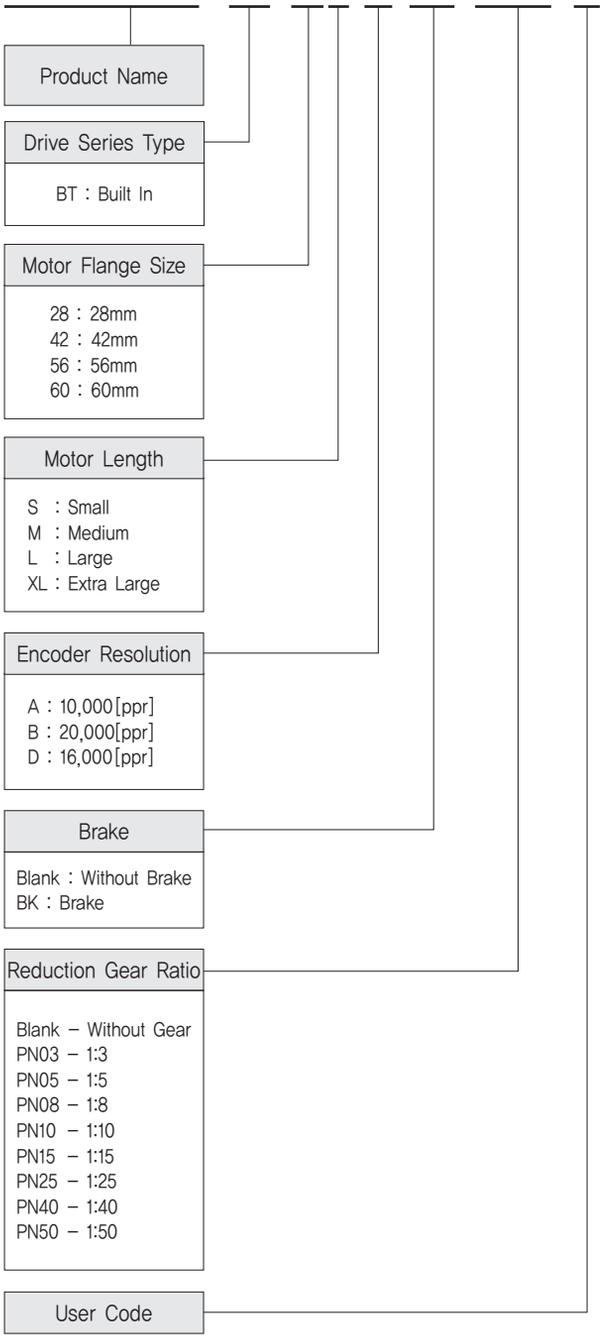
1. Reliable positioning without loss of synchronism.
2. Holding stable position and automatically recovering to the original position even after experiencing positioning error due to external forces, such as mechanical vibration or vertical positional holding.
3. Ezi-SERVO utilizes 100% of the full range 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 II BT Part Numbering

Ezi-SERVO II -BT-42S-A-BK-PN10-□



4. Standard Combination

Unit Part Number	Motor Model Number	Drive Model Number
Ezi-SERVO II-BT-28S-D	Motor & Drive Integrated	
Ezi-SERVO II-BT-28M-D		
Ezi-SERVO II-BT-28L-D		
Ezi-SERVO II-BT-42S-A		
Ezi-SERVO II-BT-42S-B		
Ezi-SERVO II-BT-42M-A		
Ezi-SERVO II-BT-42M-B		
Ezi-SERVO II-BT-42L-A		
Ezi-SERVO II-BT-42L-B		
Ezi-SERVO II-BT-42XL-A		
Ezi-SERVO II-BT-42XL-B		
Ezi-SERVO II-BT-56S-A		
Ezi-SERVO II-BT-56S-B		
Ezi-SERVO II-BT-56M-A		
Ezi-SERVO II-BT-56M-B		
Ezi-SERVO II-BT-56L-A		
Ezi-SERVO II-BT-56L-B		
Ezi-SERVO II-BT-60S-A		
Ezi-SERVO II-BT-60S-B		
Ezi-SERVO II-BT-60M-A		
Ezi-SERVO II-BT-60M-B		
Ezi-SERVO II-BT-60L-A		
Ezi-SERVO II-BT-60L-B		

5. Combination with Brake

Unit Part Number	Motor Model Number	Drive Model Number
Ezi-SERVO II-BT-42S-A-BK	Motor & Drive Integrated	
Ezi-SERVO II-BT-42S-B-BK		
Ezi-SERVO II-BT-42M-A-BK		
Ezi-SERVO II-BT-42M-B-BK		
Ezi-SERVO II-BT-42L-A-BK		
Ezi-SERVO II-BT-42L-B-BK		
Ezi-SERVO II-BT-42XL-A-BK		
Ezi-SERVO II-BT-42XL-B-BK		
Ezi-SERVO II-BT-56S-A-BK		
Ezi-SERVO II-BT-56S-B-BK		
Ezi-SERVO II-BT-56M-A-BK		
Ezi-SERVO II-BT-56M-B-BK		
Ezi-SERVO II-BT-56L-A-BK		
Ezi-SERVO II-BT-56L-B-BK		
Ezi-SERVO II-BT-60S-A-BK		
Ezi-SERVO II-BT-60S-B-BK		
Ezi-SERVO II-BT-60M-A-BK		
Ezi-SERVO II-BT-60M-B-BK		
Ezi-SERVO II-BT-60L-A-BK		
Ezi-SERVO II-BT-60L-B-BK		

6. Combination with Gearbox

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

Unit Part Number	Motor Model Number	Drive Model Number	Reduction gear ratio
Ezi-SERVO II-BT-56S-A-PN3	Motor & Drive Integrated		1:3
Ezi-SERVO II-BT-56S-B-PN3			
Ezi-SERVO II-BT-56S-A-PN5			1:5
Ezi-SERVO II-BT-56S-B-PN5			
Ezi-SERVO II-BT-56S-A-PN8			1:8
Ezi-SERVO II-BT-56S-B-PN8			
Ezi-SERVO II-BT-56S-A-PN10			1:10
Ezi-SERVO II-BT-56S-B-PN10			
Ezi-SERVO II-BT-56S-A-PN15			1:15
Ezi-SERVO II-BT-56S-B-PN15			
Ezi-SERVO II-BT-56S-A-PN25			1:25
Ezi-SERVO II-BT-56S-B-PN25			
Ezi-SERVO II-BT-56S-A-PN40			1:40
Ezi-SERVO II-BT-56S-B-PN40			
Ezi-SERVO II-BT-56S-A-PN50			1:50
Ezi-SERVO II-BT-56S-B-PN50			
Ezi-SERVO II-BT-56M-A-PN3			1:3
Ezi-SERVO II-BT-56M-B-PN3			
Ezi-SERVO II-BT-56M-A-PN5			1:5
Ezi-SERVO II-BT-56M-B-PN5			
Ezi-SERVO II-BT-56M-A-PN8			1:8
Ezi-SERVO II-BT-56M-B-PN8			
Ezi-SERVO II-BT-56M-A-PN10			1:10
Ezi-SERVO II-BT-56M-B-PN10			
Ezi-SERVO II-BT-56M-A-PN15			1:15
Ezi-SERVO II-BT-56M-B-PN15			
Ezi-SERVO II-BT-56M-A-PN25			1:25
Ezi-SERVO II-BT-56M-B-PN25			
Ezi-SERVO II-BT-56M-A-PN40			1:40
Ezi-SERVO II-BT-56M-B-PN40			
Ezi-SERVO II-BT-56M-A-PN50			1:50
Ezi-SERVO II-BT-56M-B-PN50			
Ezi-SERVO II-BT-56L-A-PN3			1:3
Ezi-SERVO II-BT-56L-B-PN3			
Ezi-SERVO II-BT-56L-A-PN5			1:5
Ezi-SERVO II-BT-56L-B-PN5			
Ezi-SERVO II-BT-56L-A-PN8			1:8
Ezi-SERVO II-BT-56L-B-PN8			
Ezi-SERVO II-BT-56L-A-PN10			1:10
Ezi-SERVO II-BT-56L-B-PN10			
Ezi-SERVO II-BT-56L-A-PN15			1:15
Ezi-SERVO II-BT-56L-B-PN15			
Ezi-SERVO II-BT-56L-A-PN25			1:25
Ezi-SERVO II-BT-56L-B-PN25			
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Ezi-SERVO II-BT-56L-B-PN40			
Ezi-SERVO II-BT-56L-A-PN50			1:50
Ezi-SERVO II-BT-56L-B-PN50			
Ezi-SERVO II-BT-60S-A-PN3			1:3
Ezi-SERVO II-BT-60S-B-PN3			
Ezi-SERVO II-BT-60S-A-PN5			1:5
Ezi-SERVO II-BT-60S-B-PN5			
Ezi-SERVO II-BT-60S-A-PN8			1:8
Ezi-SERVO II-BT-60S-B-PN8			
Ezi-SERVO II-BT-60S-A-PN10			1:10
Ezi-SERVO II-BT-60S-B-PN10			
Ezi-SERVO II-BT-60S-A-PN15			1:15
Ezi-SERVO II-BT-60S-B-PN15			
Ezi-SERVO II-BT-60S-A-PN25			1:25
Ezi-SERVO II-BT-60S-B-PN25			
Ezi-SERVO II-BT-60S-A-PN40			1:40
Ezi-SERVO II-BT-60S-B-PN40			
Ezi-SERVO II-BT-60S-A-PN50			1:50
Ezi-SERVO II-BT-60S-B-PN50			

6. Combination with Gearbox

Unit Part Number	Motor Model Number	Drive Model Number	Reduction gear ratio
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Ezi-SERVO II-BT-60M-A-PN8			1:8
Ezi-SERVO II-BT-60M-B-PN8			
Ezi-SERVO II-BT-60M-A-PN10			1:10
Ezi-SERVO II-BT-60M-B-PN10			
Ezi-SERVO II-BT-60M-A-PN15			1:15
Ezi-SERVO II-BT-60M-B-PN15			
Ezi-SERVO II-BT-60M-A-PN25			1:25
Ezi-SERVO II-BT-60M-B-PN25			
Ezi-SERVO II-BT-60M-A-PN40			1:40
Ezi-SERVO II-BT-60M-B-PN40			
Ezi-SERVO II-BT-60M-A-PN50			1:50
Ezi-SERVO II-BT-60M-B-PN50			
Ezi-SERVO II-BT-60L-A-PN3			1:3
Ezi-SERVO II-BT-60L-B-PN3			
Ezi-SERVO II-BT-60L-A-PN5			1:5
Ezi-SERVO II-BT-60L-B-PN5			
Ezi-SERVO II-BT-60L-A-PN8			1:8
Ezi-SERVO II-BT-60L-B-PN8			
Ezi-SERVO II-BT-60L-A-PN10			1:10
Ezi-SERVO II-BT-60L-B-PN10			
Ezi-SERVO II-BT-60L-A-PN15			1:15
Ezi-SERVO II-BT-60L-B-PN15			
Ezi-SERVO II-BT-60L-A-PN25			1:25
Ezi-SERVO II-BT-60L-B-PN25			
Ezi-SERVO II-BT-60L-A-PN40			1:40
Ezi-SERVO II-BT-60L-B-PN40			
Ezi-SERVO II-BT-60L-A-PN50			1:50
Ezi-SERVO II-BT-60L-B-PN50			

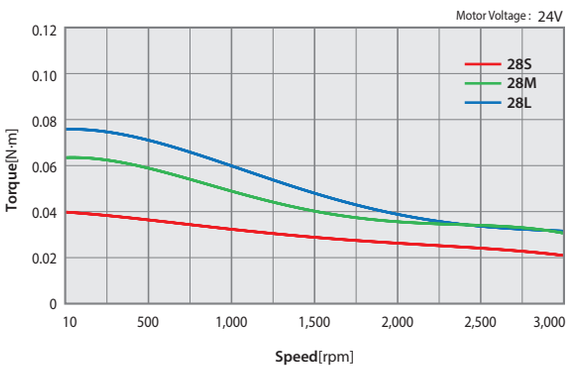
7. Specifications of Motor

MODEL			Ezi-SERVO II-BT-28 series			Ezi-SERVO II-BT-42 series			
		UNIT	28S	28M	28L	42S	42M	42L	42XL
DRIVE METHOD		-	BI-POLAR						
NUMBER OF PHASES		-	2	2	2	2	2	2	2
CURRENT per PHASE		A	0.95	0.95	0.95	1.2	1.2	1.2	1.2
HOLDING TORQUE		N·m	0.069	0.098	0.118	0.32	0.44	0.5	0.65
ROTOR INERTIA		$g \cdot cm^2$	9	13	18	35	54	77	114
WEIGHTS		g	110	140	200	250	280	350	500
LENGTH(L)		mm	32	45	50	34	40	48	60
PERMISSIBLE OVERHUNG LOAD (DISTANCE FROM END OF SHAFT)	3mm	N	30	30	30	22	22	22	22
	8mm		38	38	38	26	26	26	26
	13mm		53	53	53	33	33	33	33
	18mm		-	-	-	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						

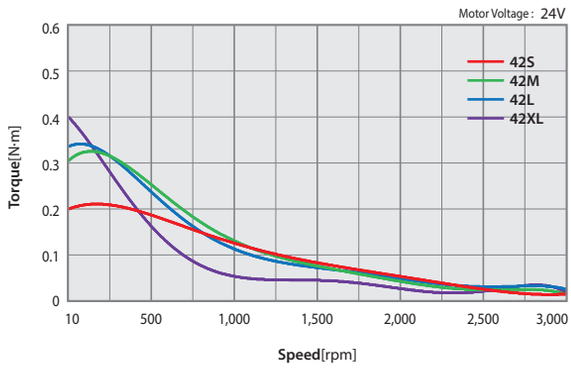
MODEL			Ezi-SERVO II-BT-56 series			Ezi-SERVO II-BT-60 series		
		UNIT	56S	56M	56L	60S	60M	60L
DRIVE METHOD		-	BI-POLAR					
NUMBER OF PHASES		-	2	2	2	2	2	2
CURRENT per PHASE		A	3.0	3.0	3.0	4.0	4.0	4.0
HOLDING TORQUE		N·m	0.64	1.0	1.5	0.88	1.28	2.4
ROTOR INERTIA		$g \cdot cm^2$	180	280	520	240	490	690
WEIGHTS		g	500	720	1150	600	1000	1300
LENGTH(L)		mm	46	55	80	47	56	85
PERMISSIBLE OVERHUNG LOAD (DISTANCE FROM END OF SHAFT)	3mm	N	52	52	52	70	70	70
	8mm		65	65	65	87	87	87
	13mm		85	85	85	114	114	114
	18mm		123	123	123	165	165	165
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					

8. Torque Characteristics of Motor

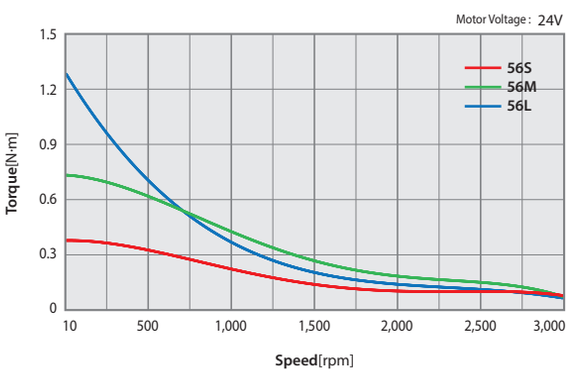
Ezi-SERVO II-BT-28 series



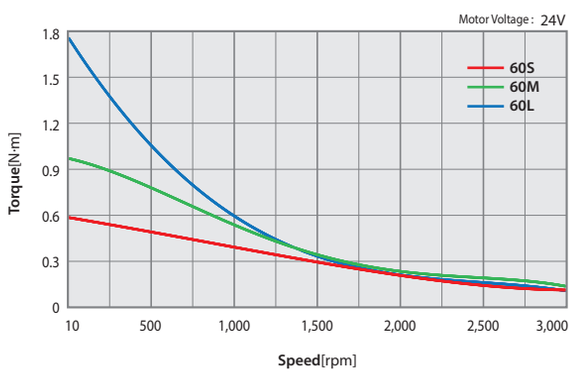
Ezi-SERVO II-BT-42 series



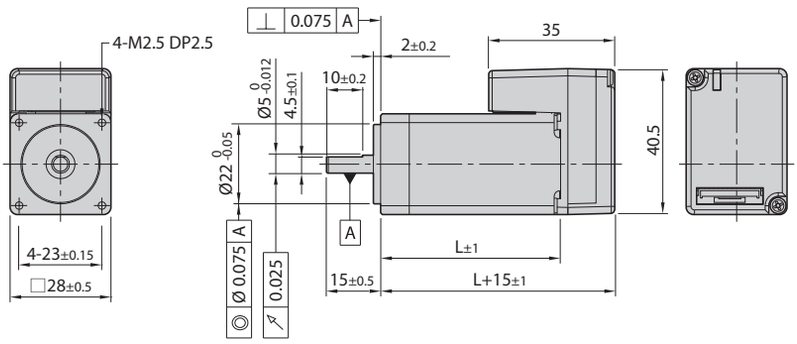
Ezi-SERVO II-BT-56 series



Ezi-SERVO II-BT-60 series

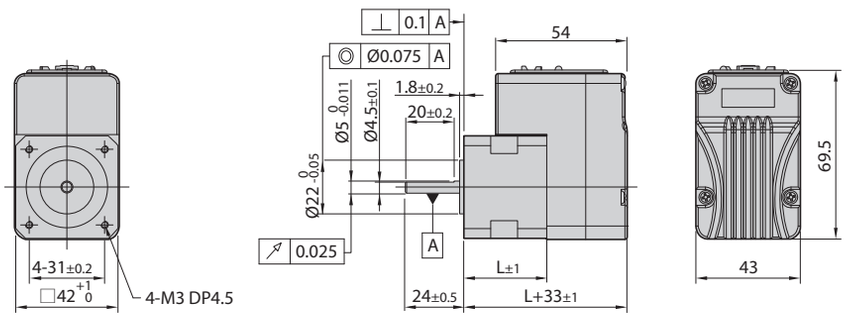


9. Dimensions of Motor [mm]



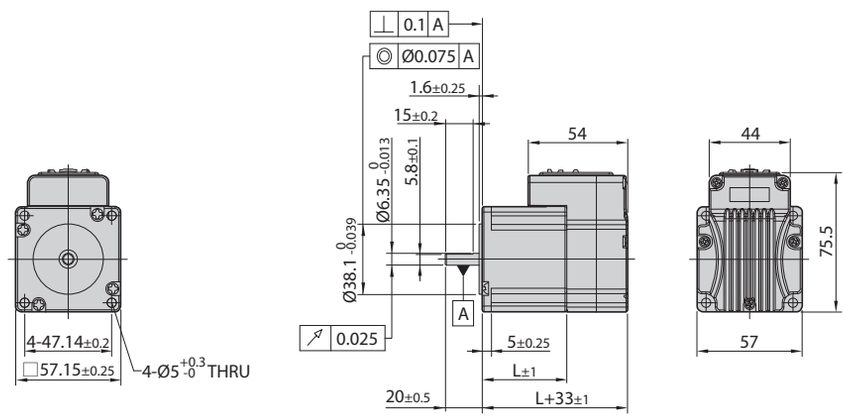
28mm

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



42mm

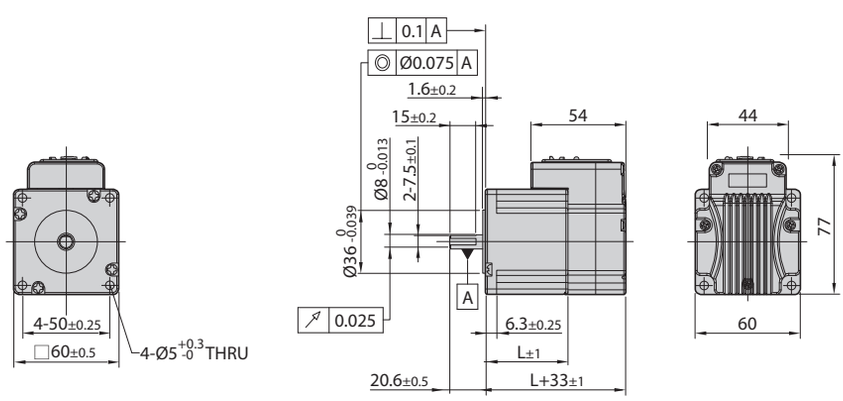
Model name	Length(L)
42S	34
42M	40
42L	48
42XL	60



※ There are 2 kinds size of front shaft diameter for Ezi-SERVO II-BT-56 series as Ø6.35 and Ø8.0.

56mm

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



60mm

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

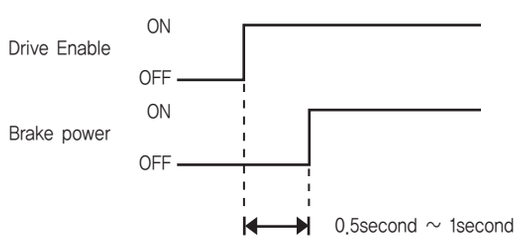
10. Specifications of Motor with Brake

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 II-BT-42S-■-BK	Motor & Drive Integrated	Non-excitation run Type	24VDC ±10%	0.2	5	0.2	580	22	26	33	46	Must be Lower than Unit's Weight
Ezi-SERVO II-BT-42M-■-BK							650					
Ezi-SERVO II-BT-42L-■-BK							720					
Ezi-SERVO II-BT-42XL-■-BK							850					
Ezi-SERVO II-BT-56S-■-BK				0.27	6.6	0.7	1120	52	65	85	123	
Ezi-SERVO II-BT-56M-■-BK							1280					
Ezi-SERVO II-BT-56L-■-BK							1720					
Ezi-SERVO II-BT-60S-■-BK							1230	70	87	114	165	
Ezi-SERVO II-BT-60M-■-BK							1420					
Ezi-SERVO II-BT-60L-■-BK							2040					

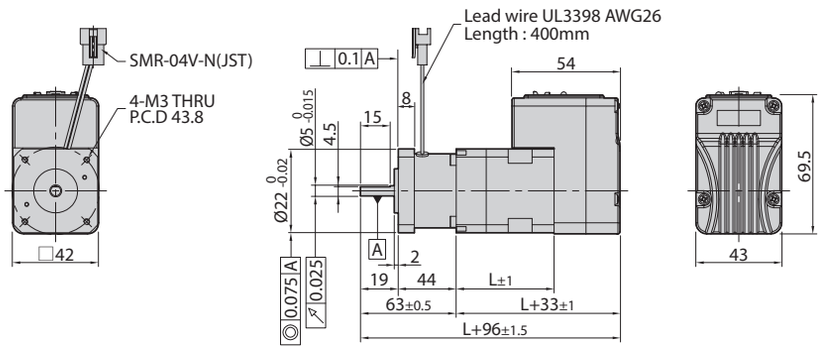
* The code of encoder resolution will be marked in "■"
* Electronic Brake cannot be used for braking. Position hold purpose only when power OFF.
* The weight means Motor Unit Weight including Motor and Electronic Brake.
* Motor specification and torque characteristic are same as Standard Motor.

* Brake Operation Timing Chart

Ezi-SERVO II-BT-56/60/60 series control Brake by Drive automatically.
Please refer to below Timing Chart when control Brake from upper controller other than using Ezi-SERVO II-BT-56/60/60 series Brake control.
Otherwise, Drive malfunctioning and loads can be fall down.
Also, please do not operate Brake while motor operation to prevent damage.
Ezi-SERVO II-BT-28 series has no brake control function.

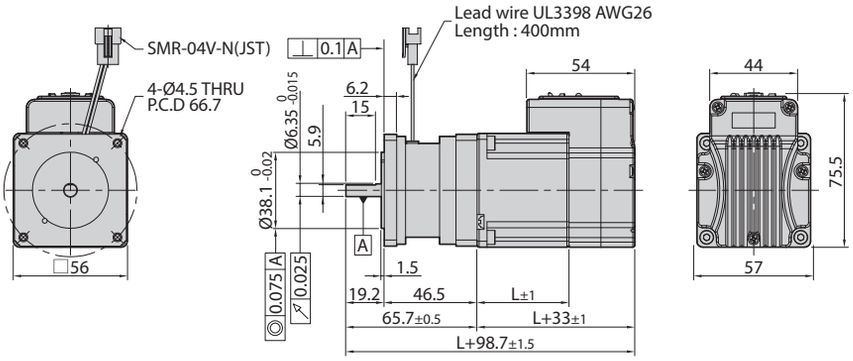


11. Dimensions of Motor with Brake [mm]



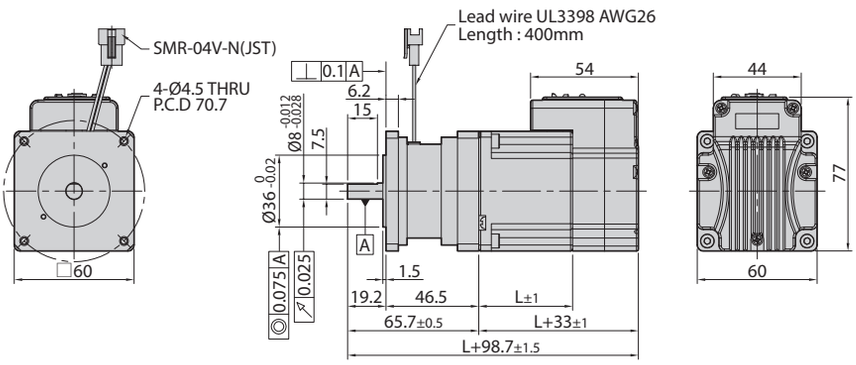
42mm

Model Name	Length(L)	Weight(kg)
42S	34	0.58
42M	40	0.65
42L	48	0.72
42XL	60	0.85



56mm

Model Name	Length(L)	Weight(kg)
56S	46	1.12
56M	55	1.28
56L	80	1.72



60mm

Model Name	Length(L)	Weight(kg)
60S	47	1.23
60M	56	1.42
60L	85	2.04

12. Specifications of Motor with Gearbox

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 II-BT-42S-■-PN3	0.55	$35x10^{-7}$	3	5	3	0.012°	6	12	0~1000	0.89	240	270
Ezi-SERVO II-BT-42S-■-PN5	0.92				5	0.0072°	9	18	0~600		290	330
Ezi-SERVO II-BT-42S-■-PN8	1.47				8	0.0045°	9	18	0~375		340	410
Ezi-SERVO II-BT-42S-■-PN10	1.84				10	0.0036°	6	12	0~300		360	450
Ezi-SERVO II-BT-42S-■-PN15	2.67		5	7	15	0.0024°	6	12	0~200	0.99	410	540
Ezi-SERVO II-BT-42S-■-PN25	4.46				25	0.00144°	9	18	0~120		490	640
Ezi-SERVO II-BT-42S-■-PN40	7.13				40	0.0009°	9	18	0~75		570	640
Ezi-SERVO II-BT-42S-■-PN50	9.00				50	0.00072°	9	18	0~60		620	640
Ezi-SERVO II-BT-42M-■-PN3	0.85	$54x10^{-7}$	3	5	3	0.012°	6	12	0~1000	0.96	240	270
Ezi-SERVO II-BT-42M-■-PN5	1.42				5	0.0072°	9	18	0~600		290	330
Ezi-SERVO II-BT-42M-■-PN8	2.28				8	0.0045°	9	18	0~375		340	410
Ezi-SERVO II-BT-42M-■-PN10	2.85				10	0.0036°	6	12	0~300		360	450
Ezi-SERVO II-BT-42M-■-PN15	4.14		5	7	15	0.0024°	6	12	0~200	1.06	410	540
Ezi-SERVO II-BT-42M-■-PN25	6.90				25	0.00144°	9	18	0~120		490	640
Ezi-SERVO II-BT-42M-■-PN40	9.00				40	0.0009°	9	18	0~75		570	640
Ezi-SERVO II-BT-42M-■-PN50	9.00				50	0.00072°	9	18	0~60		620	640
Ezi-SERVO II-BT-42L-■-PN3	0.93	$77x10^{-7}$	3	5	3	0.012°	6	12	0~1000	1.02	240	270
Ezi-SERVO II-BT-42L-■-PN5	1.55				5	0.0072°	9	18	0~600		290	330
Ezi-SERVO II-BT-42L-■-PN8	2.48				8	0.0045°	9	18	0~375		340	410
Ezi-SERVO II-BT-42L-■-PN10	3.10				10	0.0036°	6	12	0~300		360	450
Ezi-SERVO II-BT-42L-■-PN15	4.51		5	7	15	0.0024°	6	12	0~200	1.12	410	540
Ezi-SERVO II-BT-42L-■-PN25	7.52				25	0.00144°	9	18	0~120		490	640
Ezi-SERVO II-BT-42L-■-PN40	9.00				40	0.0009°	9	18	0~75		570	640
Ezi-SERVO II-BT-42L-■-PN50	9.00				50	0.00072°	9	18	0~60		620	640
Ezi-SERVO II-BT-42XL-■-PN3	1.42	$114x10^{-7}$	3	5	3	0.012°	6	12	0~1000	1.15	240	270
Ezi-SERVO II-BT-42XL-■-PN5	2.38				5	0.0072°	9	18	0~600		290	330
Ezi-SERVO II-BT-42XL-■-PN8	3.80				8	0.0045°	9	18	0~375		340	410
Ezi-SERVO II-BT-42XL-■-PN10	4.76				10	0.0036°	6	12	0~300		360	450
Ezi-SERVO II-BT-42XL-■-PN15	6.00		5	7	15	0.0024°	6	12	0~200	1.25	410	540
Ezi-SERVO II-BT-42XL-■-PN25	9.00				25	0.00144°	9	18	0~120		490	640
Ezi-SERVO II-BT-42XL-■-PN40	9.00				40	0.0009°	9	18	0~75		570	640
Ezi-SERVO II-BT-42XL-■-PN50	9.00				50	0.00072°	9	18	0~60		620	640

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

12. 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 II-BT-56S-■-PN3	1	$180x10^{-7}$	3	5	3	0.012°	18	35	0~1000	1.94	430	310
Ezi-SERVO II-BT-56S-■-PN5	1.7				5	0.0072°	27	50	0~600		510	390
Ezi-SERVO II-BT-56S-■-PN8	2.8				8	0.0045°	27	50	0~375		600	480
Ezi-SERVO II-BT-56S-■-PN10	3.5				10	0.0036°	18	35	0~300		640	530
Ezi-SERVO II-BT-56S-■-PN15	5.1				15	0.0024°	18	35	0~200	2.14	740	630
Ezi-SERVO II-BT-56S-■-PN25	8.6				25	0.00144°	27	50	0~120		870	790
Ezi-SERVO II-BT-56S-■-PN40	13.8				40	0.0009°	27	50	0~75		1000	970
Ezi-SERVO II-BT-56S-■-PN50	17.2				50	0.00072°	27	50	0~60		1100	1100
Ezi-SERVO II-BT-56M-■-PN3	2.0	$280x10^{-7}$	3	5	3	0.012°	18	35	0~1000	2.15	430	310
Ezi-SERVO II-BT-56M-■-PN5	3.4				5	0.0072°	27	50	0~600		510	390
Ezi-SERVO II-BT-56M-■-PN8	5.5				8	0.0045°	27	50	0~375		600	480
Ezi-SERVO II-BT-56M-■-PN10	6.9				10	0.0036°	18	35	0~300		640	530
Ezi-SERVO II-BT-56M-■-PN15	10				15	0.0024°	18	35	0~200	2.35	740	630
Ezi-SERVO II-BT-56M-■-PN25	16.7				25	0.00144°	27	50	0~120		870	790
Ezi-SERVO II-BT-56M-■-PN40	27.0				40	0.0009°	27	50	0~75		1000	970
Ezi-SERVO II-BT-56M-■-PN50	27.0				50	0.00072°	27	50	0~60		1100	1100
Ezi-SERVO II-BT-56L-■-PN3	3.6	$520x10^{-7}$	3	5	3	0.012°	18	35	0~1000	2.55	430	310
Ezi-SERVO II-BT-56L-■-PN5	6				5	0.0072°	27	50	0~600		510	390
Ezi-SERVO II-BT-56L-■-PN8	9.7				8	0.0045°	27	50	0~375		600	480
Ezi-SERVO II-BT-56L-■-PN10	12.1				10	0.0036°	18	35	0~300		640	530
Ezi-SERVO II-BT-56L-■-PN15	18.0				15	0.0024°	18	35	0~200	2.75	740	630
Ezi-SERVO II-BT-56L-■-PN25	27.0				25	0.00144°	27	50	0~120		870	790
Ezi-SERVO II-BT-56L-■-PN40	27.0				40	0.0009°	27	50	0~75		1000	970
Ezi-SERVO II-BT-56L-■-PN50	27.0				50	0.00072°	27	50	0~60		1100	1100

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

12. Specifications of Motor with Gearbox

60mm

Motor Model 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 II-BT-60S-■-PN3	1.5	240x10⁻⁷	3	5	3	0.012°	18	35	0~1000	2.0	430	310
Ezi-SERVO II-BT-60S-■-PN5	2.5				5	0.0072°	27	50	0~600		510	390
Ezi-SERVO II-BT-60S-■-PN8	4.0				8	0.0045°	27	50	0~375		600	480
Ezi-SERVO II-BT-60S-■-PN10	5.1				10	0.0036°	18	35	0~300		640	530
Ezi-SERVO II-BT-60S-■-PN15	7.4				15	0.0024°	18	35	0~200	2.2	740	630
Ezi-SERVO II-BT-60S-■-PN25	12.3				25	0.00144°	27	50	0~120		870	790
Ezi-SERVO II-BT-60S-■-PN40	19.8				40	0.0009°	27	50	0~75		1000	970
Ezi-SERVO II-BT-60S-■-PN50	24.7				50	0.00072°	27	50	0~60		1100	1100
Ezi-SERVO II-BT-60M-■-PN3	2.6	490x10⁻⁷	3	5	3	0.012°	18	35	0~1000	2.0	430	310
Ezi-SERVO II-BT-60M-■-PN5	4.4				5	0.0072°	27	50	0~600		510	390
Ezi-SERVO II-BT-60M-■-PN8	7.0				8	0.0045°	27	50	0~375		600	480
Ezi-SERVO II-BT-60M-■-PN10	8.8				10	0.0036°	18	35	0~300		640	530
Ezi-SERVO II-BT-60M-■-PN15	12.8				15	0.0024°	18	35	0~200	2.2	740	630
Ezi-SERVO II-BT-60M-■-PN25	21.4				25	0.00144°	27	50	0~120		870	790
Ezi-SERVO II-BT-60M-■-PN40	27.0				40	0.0009°	27	50	0~75		1000	970
Ezi-SERVO II-BT-60M-■-PN50	27.0				50	0.00072°	27	50	0~60		1100	1100
Ezi-SERVO II-BT-60L-■-PN3	5.2	690x10⁻⁷	3	5	3	0.012°	18	35	0~1000	3.0	430	310
Ezi-SERVO II-BT-60L-■-PN5	8.7				5	0.0072°	27	50	0~600		510	390
Ezi-SERVO II-BT-60L-■-PN8	13.9				8	0.0045°	27	50	0~375		600	480
Ezi-SERVO II-BT-60L-■-PN10	18.0				10	0.0036°	18	35	0~300		640	530
Ezi-SERVO II-BT-60L-■-PN15	18.0				15	0.0024°	18	35	0~200	3.2	740	630
Ezi-SERVO II-BT-60L-■-PN25	27.0				25	0.00144°	27	50	0~120		870	790
Ezi-SERVO II-BT-60L-■-PN40	27.0				40	0.0009°	27	50	0~75		1000	970
Ezi-SERVO II-BT-60L-■-PN50	27.0				50	0.00072°	27	50	0~60		1100	1100

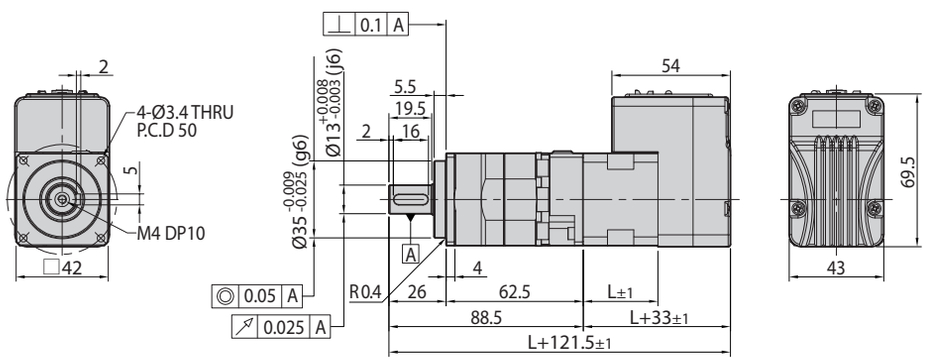
* The code of encoder resolution will be marked in "■"

13. Dimensions of Motor with Gearbox [mm]

42mm

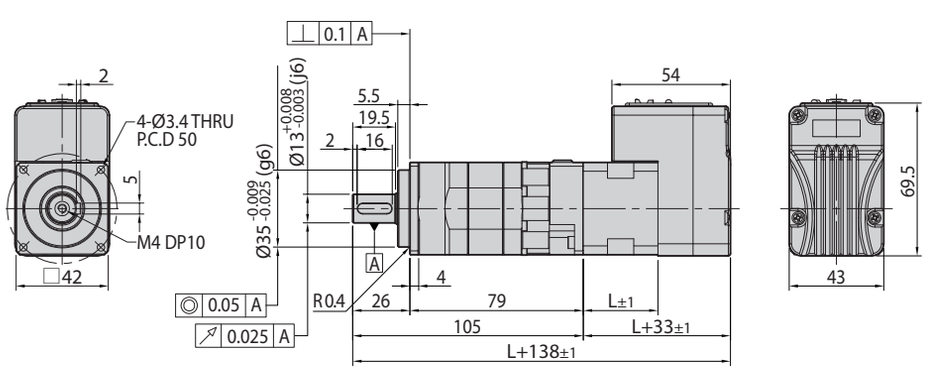
Unit Part Number	Motor	Stage	□Reduction Gear Ratio	L Length [mm]
Ezi-SERVO II-BT-42S-■-PN□	Motor & Drive Integrated	Single Stage	3, 5, 8, 10	34
Ezi-SERVO II-BT-42M-■-PN□			3, 5, 8, 10	40
Ezi-SERVO II-BT-42L-■-PN□			3, 5, 8, 10	48
Ezi-SERVO II-BT-42XL-■-PN□			3, 5, 8, 10	60

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



Unit Part Number	Motor	Stage	□Reduction Gear Ratio	L Length [mm]
Ezi-SERVO II-BT-42S-■-PN□	Motor & Drive Integrated	Double Stage	15, 25, 40, 50	34
Ezi-SERVO II-BT-42M-■-PN□			15, 25, 40, 50	40
Ezi-SERVO II-BT-42L-■-PN□			15, 25, 40, 50	48
Ezi-SERVO II-BT-42XL-■-PN□			15, 25, 40, 50	60

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

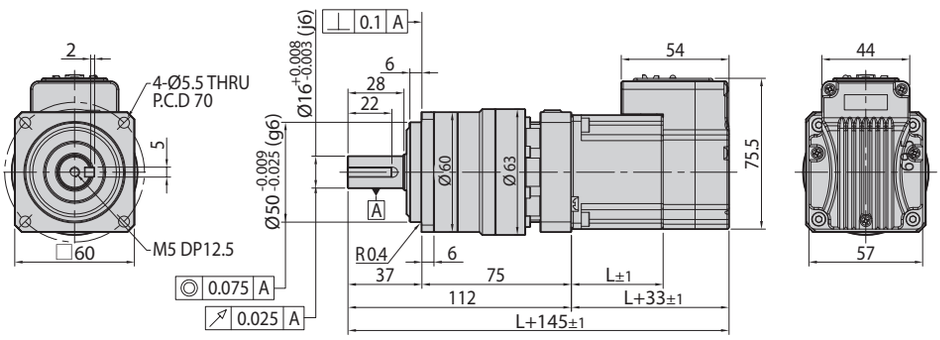


13. Dimensions of Motor with Gearbox [mm]

56mm

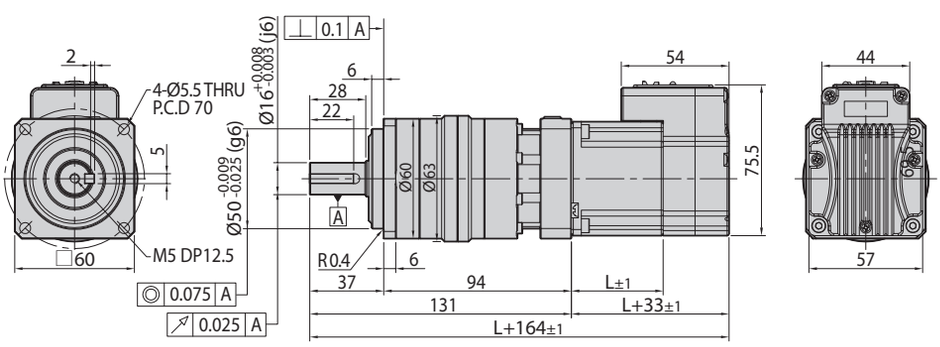
Unit Part Number	Motor	Stage	□Reduction Gear Ratio	L Length [mm]
Ezi-SERVO II-BT-56S-■-PN□	Motor & Drive Integrated	Single Stage	3, 5, 8, 10	46
Ezi-SERVO II-BT-56M-■-PN□			3, 5, 8, 10	55
Ezi-SERVO II-BT-56L-■-PN□			3, 5, 8, 10	80

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



Unit Part Number	Motor	Stage	□Reduction Gear Ratio	L Length [mm]
Ezi-SERVO II-BT-56S-■-PN□	Motor & Drive Integrated	Double Stage	15, 25, 40, 50	46
Ezi-SERVO II-BT-56M-■-PN□			15, 25, 40, 50	55
Ezi-SERVO II-BT-56L-■-PN□			15, 25, 40, 50	80

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

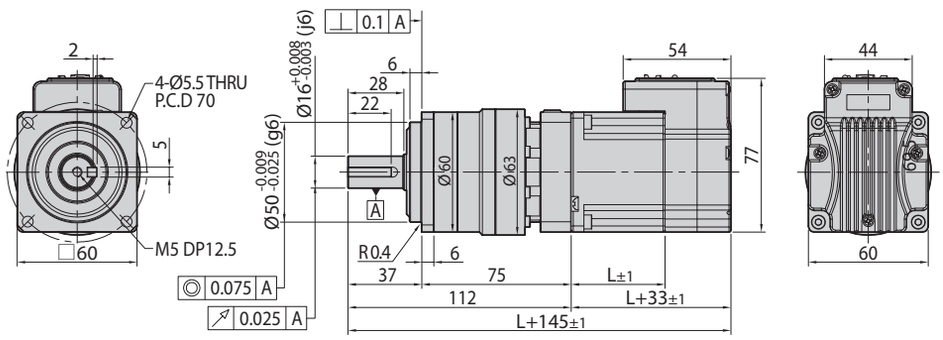


13. Dimensions of Motor with Gearbox [mm]

60mm

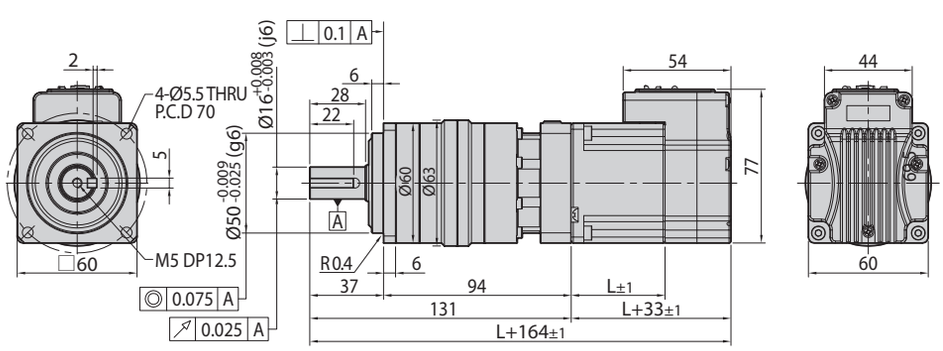
Unit Part Number	Motor	Stage	□Reduction Gear Ratio	L Length [mm]
Ezi-SERVO II-BT-60S-■-PN□	Motor & Drive Integrated	Single Stage	3, 5, 8, 10	47
Ezi-SERVO II-BT-60M-■-PN□			3, 5, 8, 10	56
Ezi-SERVO II-BT-60L-■-PN□			3, 5, 8, 10	85

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



Unit Part Number	Motor	Stage	□Reduction Gear Ratio	L Length [mm]
Ezi-SERVO II-BT-60S-■-PN□	Motor & Drive Integrated	Double Stage	15, 25, 40, 50	47
Ezi-SERVO II-BT-60M-■-PN□			15, 25, 40, 50	56
Ezi-SERVO II-BT-60L-■-PN□			15, 25, 40, 50	85

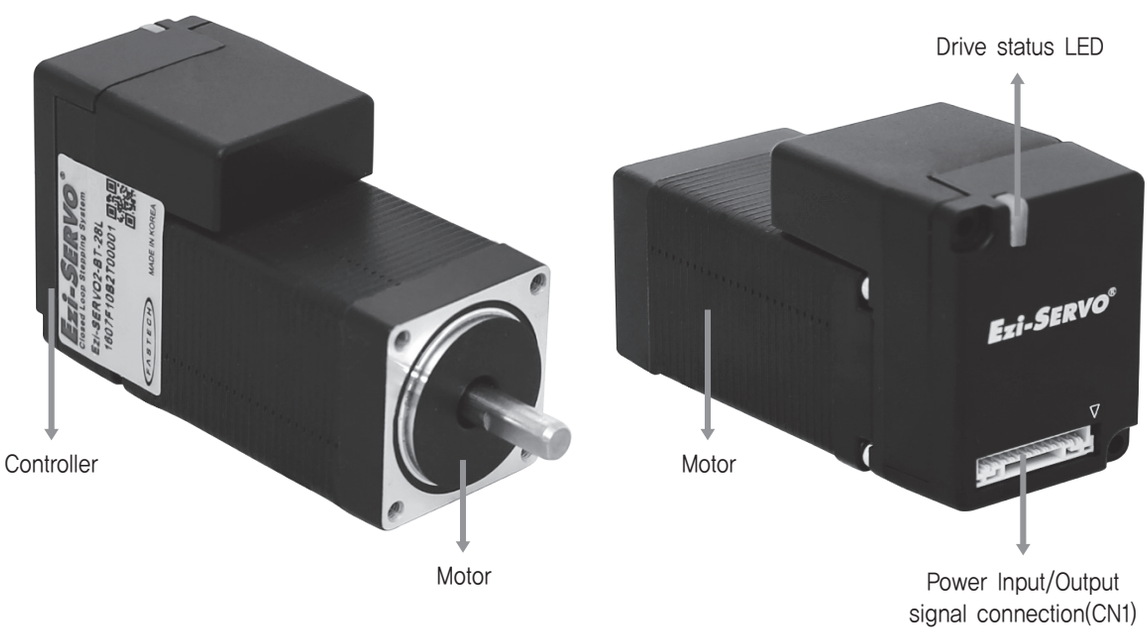
* The code of encoder resolution will be marked in "■"



14. Specifications of Drive [Ezi-SERVO II-BT-28 series]

Model		Ezi-SERVO II-BT-28 series
Input Voltage		24VDC ±10%
Control Method		Closed loop control with 32bit MCU
Current Consumption		Max 500mA (Except motor current)
Operating Condition	Ambient Temperature	· In Use: 0~40℃ · 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]
	Resolution [ppr]	500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 16,000 (Selectable by parameter) * Default: 16,000
	Max. Input Pulse Frequency	500kHz (Duty 50%)
	Protection Functions	Over Current Error, Over Speed Error, Position Tracking Error, Over Load Error, Over Temperature Error, Motor Connect Error, Encoder Connect Error, In-Position Error, ROM Error, Position Overflow Error
	In-Position Selection	0~63 (Selectable by parameter) * Default: 0
	Position Gain Selection	0~63 (Selectable by parameter) * Default: 3
	Pulse Input Method	1-Pulse / 2-Pulse (Selectable by parameter) * Default: 2-Pulse Mode
	Rotational Direction	CW/CCW (Selectable by parameter)
	Speed/Position Control Command	Pulse Train Input
I/O Signal	Input Signals	Position Command Pulse, Servo On/Off, Alarm Reset
	Output Signals	In-Position, Alarm

15. Settings and Operation [Ezi-SERVO II-BT-28 series]



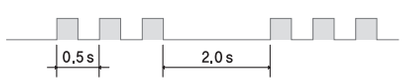
15.1 Drive Status LED

In the case of Ezi-SERVO II-BT-28 series products, LED can be checked by LED color, lighting, On/Off and blinking.

Status	LED	Description
Disable	Green : Red :	Green light flashing, Red light off
Enable	Green : Red :	Green light on, Red light off
In motion	Green : Red :	Green light on, Red light on
In-position deviation	Green : Red :	Green and Red light alternately flashing
Alarm	Green : Red :	Red light flashing repeatedly as many as alarm number

◆ Protection functions and LED flash times

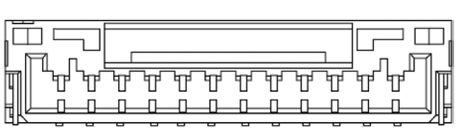
Times	Protection	Conditions
1	Over Current Error	The current through power devices in inverter exceeds 4.8A
2	Over Speed Error	Motor speed exceeds 3,000 [rpm]
3	Position Tracking Error	Position error value is higher than 180° in motor run state
4	Over Load Error	The motor is continuously operated more than 5 seconds under a load exceeding the max. torque
5	Over Temperature Error	Inside temperature of drive exceeds 85℃
6	Over Regeneratived Voltage Error	Back-EMF is higher than 48V
7	Motor Connect Error	The power is ON without connection of the motor cable to drive
8	Encoder Connect Error	Cable connection error with Encoder connection in drive
10	In-Position Error	After operation is finished, position error more than 1 pulse is continued for more than 3 seconds
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



Alarm LED flash
(Ex, Position tracking error)

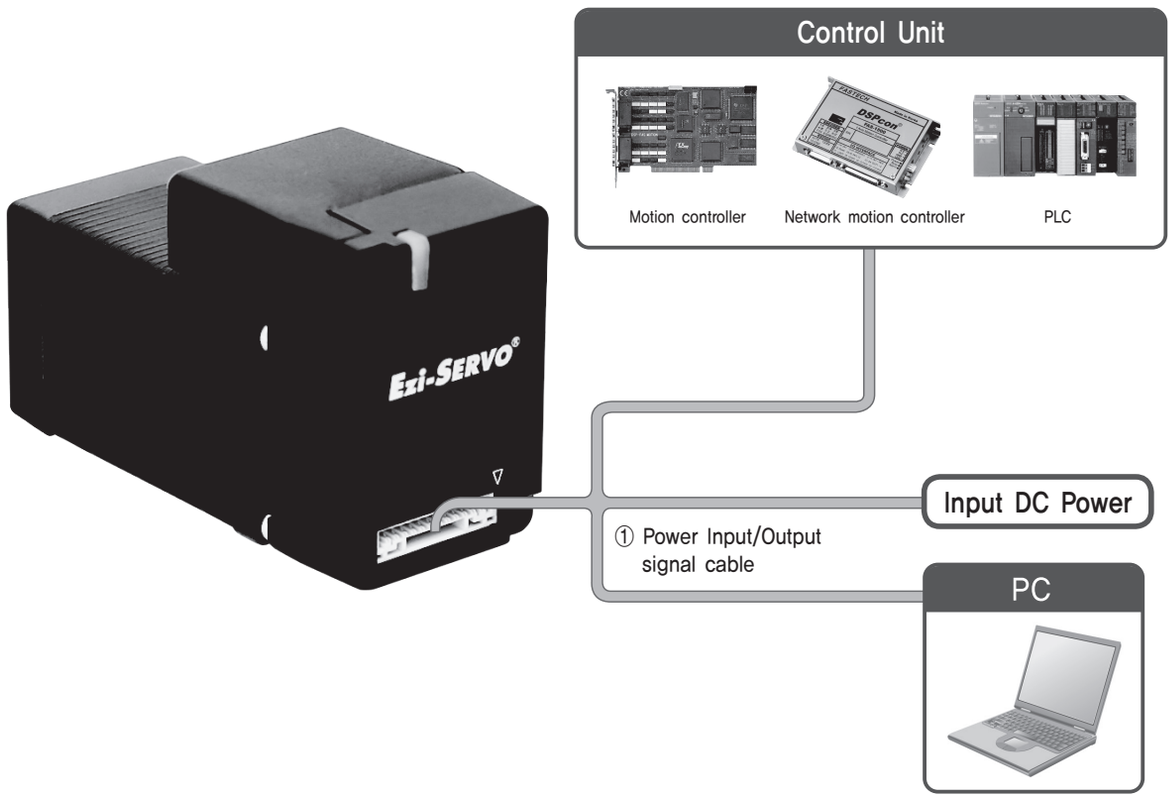
15.2 Power Input/Output Signal Connector(CN1)

NO.	Function	I/O
1	GND	Input
2	24VDC	Input
3	Tx	Output
4	Rx	Input
5	Alarm	Output
6	In-Position	Output
7	Servo On/Off	Input
8	Alarm Reset	Input
9	CCW+(Dir+)	Input
10	CCW-(Dir-)	Input
11	CW+(Pulse+)	Input
12	CW-(Pulse-)	Input



1 12

16. System Configuration [Ezi-SERVO II-BT-28 series]



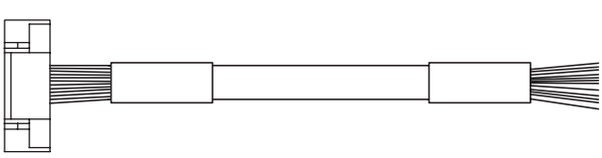
Type	Signal Cable	Power Cable	Parameter Setting Cable
Length supplied	–	–	–
Max. Length	20m	2m	3m

16.1 Options

① Power Input/Output Signal Cable

Item	Length [m]	Remark
CSVB-A-OR4F	0.4m	Normal Cable

※ This cable is provide item as standard option.



Manufacturer : JST
Housing : GHR-12V-S
Terminal : SSHL-002T-P0.2

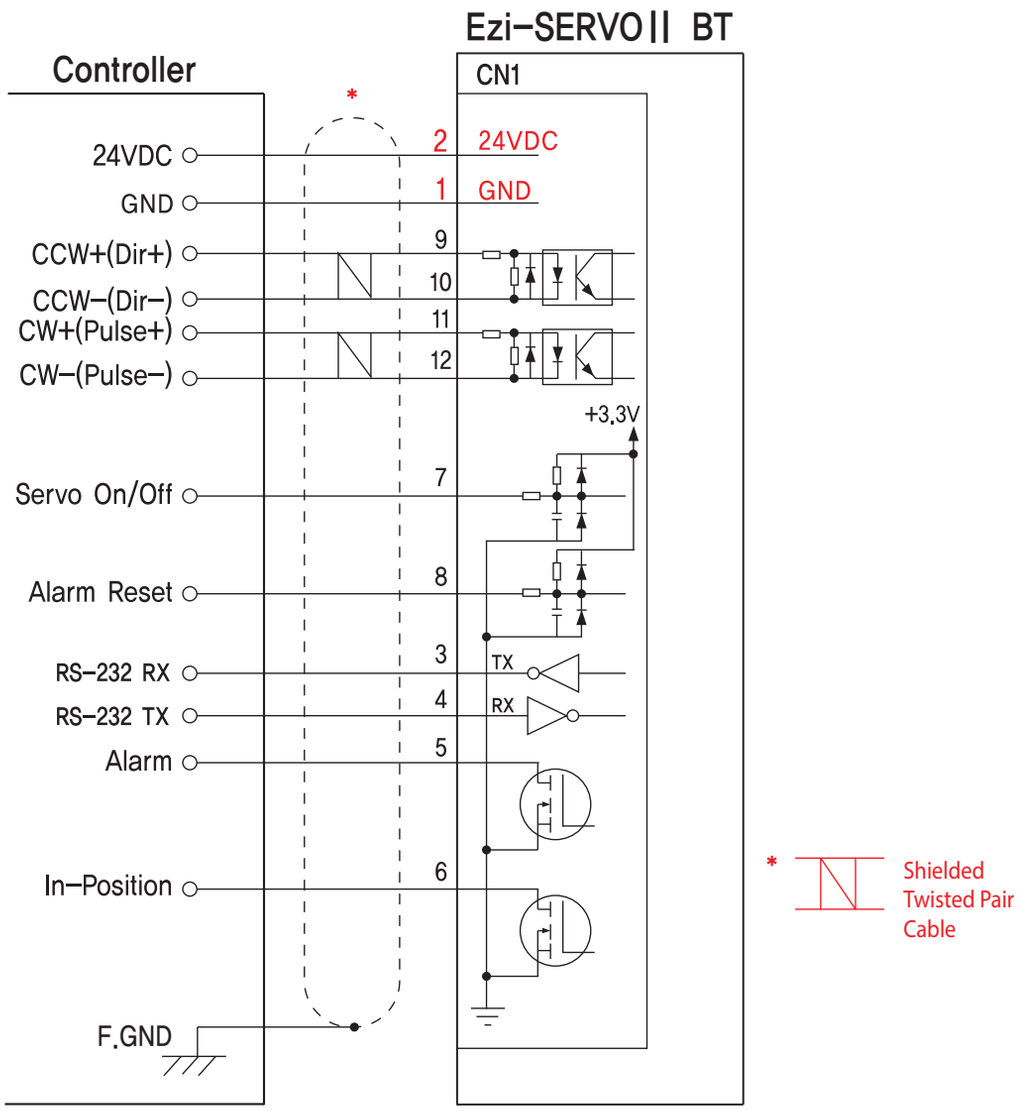
16.2 Connector Specifications

Connector specifications for cabling to drive.

Purpose	Item	Part Number	Manufacturer
Signal	Housing Terminal	GHR-12V-S SSHL-002T-P0.2	JST

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

17. External Wiring Diagram [Ezi-SERVO II-BT-28 series]

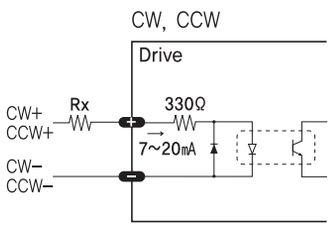


※ When connects I/O cable between controller and drive, please turn off the power of both controller and drive, in order to protect the drive from any damage.

18. Control Signal Input/Output Description [Ezi-SERVO II-BT-28 series]

1 Input Signal

Pulse 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.

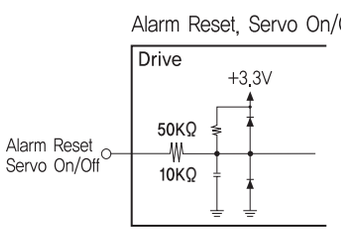


Pin No.	Function
11	CW+
12	CW-
9	CCW+
10	CCW-

◆ CW, CCW Input

This signal can be used to receive a positioning pulse command from a customer host motion controller.
The customer can select 1-Pulse Input mode or 2-Pulse Input mode(refer to switch No.1, SW 1). 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 connect to the drive directly. When the level of input signal is more than 5V, Rx resistor is required. If the resistor is absent, the drive will be damaged! If the input signal level is 12V, Rx value is 680ohm and 24V, Rx value is 1.8Kohm.

Servo On / Off and Alarm Reset of the drive are operated with voltage level [ON : High] and [OFF : Low].



Pin No.	Function
7	Servo On/Off
8	Alarm Reset

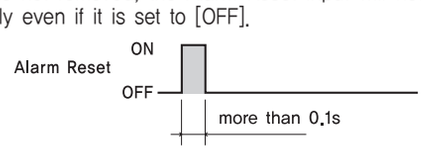
※ Please use the input voltage 5-24VDC, If the input is not connected, it is in the High state. If the input voltage is less than 0.6V, it is the Low state.

◆ Servo On/Off Input

This input can be used only to adjust the position by manually moving the motor shaft from the load-side. By setting the signal [LOW], the drive cuts off the power supply to the motor. Then, one can manually adjust output position. When setting the signal back to [High], the drive resumes the power to the motor and recovers the holding torque. When driving a motor, one needs to set the signal [High].

◆ Alarm Reset Input

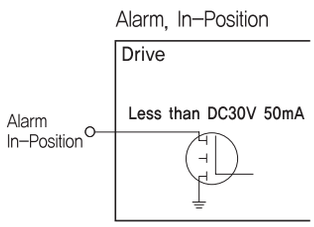
Release the alarm output of the drive where the protection function is activated. When the Alarm Reset input is set to [OFF], the alarm output is canceled. Remove the cause of the alarm before releasing the alarm output. If the cause of the alarm is not removed, the Alarm Reset input will not operate normally even if it is set to [OFF].



※ 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

Alarm and In-Position signals of the drive are operated by [ON : Conduction] and [OFF : Non-conduction] of open-drain circuit.



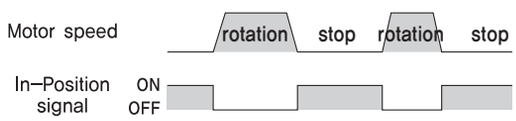
Pin No.	Function
5	Alarm
6	In-Position

◆ Alarm Output

The Alarm output indicates [ON] when the drive is in a normal operation. If a protection mode has been activated, it goes [OFF]. A host controller needs to detect this signal and stop sending a motor driving command. When the drive 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.

◆ In-Position Output

The In-Position output is used to send motor motion to the host controller. When the movement of the motor is completed, the In-Position output becomes [ON].
In-Position output is [ON] when the motor stops within the position deviation set value.

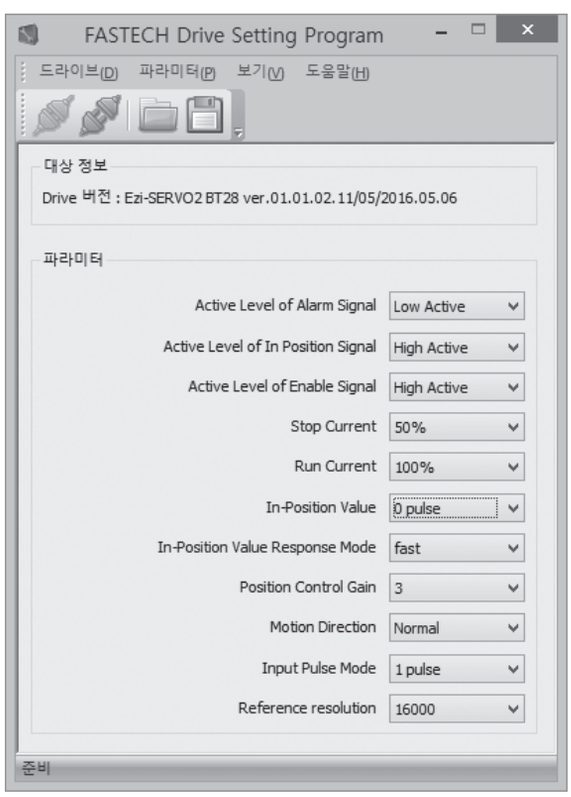


19. Parameter Settings [Ezi-SERVO II-BT-28 series]

1 Parameter Settings GUI

(User Interface)

Ezi-SERVO II BT drive utilizes various parameters for operation and some parameters can be changed upon the needs of the user. Ezi-SERVO II BT provides Drive Setting Program for more convenient use. The screen shot in right side is the sample of Drive Setting Program which is used for drive setting and parameter change. User can change and set the parameter such as level of Alarm Reset, Alarm, In-Position Signal, Enable signal and so on. By using this drive setting program, user can find the optimal condition to Ezi-SERVO II BT to fit with the user's own system. Please be noticed that connection for drive setting program shall be done when the Ezi-SERVO II BT is disable staus for safety reason.



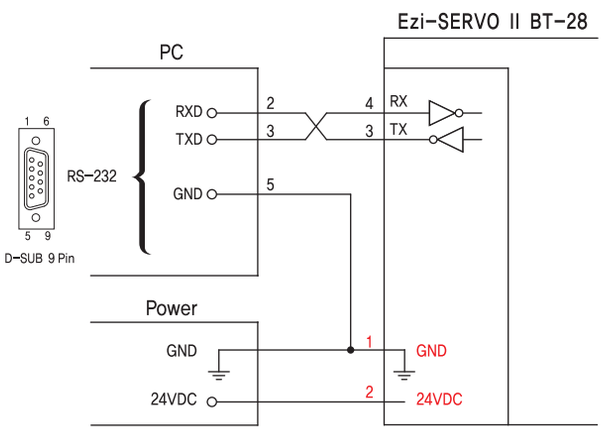
※ Graphic User Interface(GUI) Program can be downloaded from website. (www.fastech-motions.com)

※ Graphic User Interface(GUI) Program can support Window 7/8/10.

※ Graphic User Interface(GUI) Program can be update without prior notice for improving the performance or convenience of user.

2 Parameter Settings wiring Diagram

(Ezi-SERVO II-BT-28 Series)

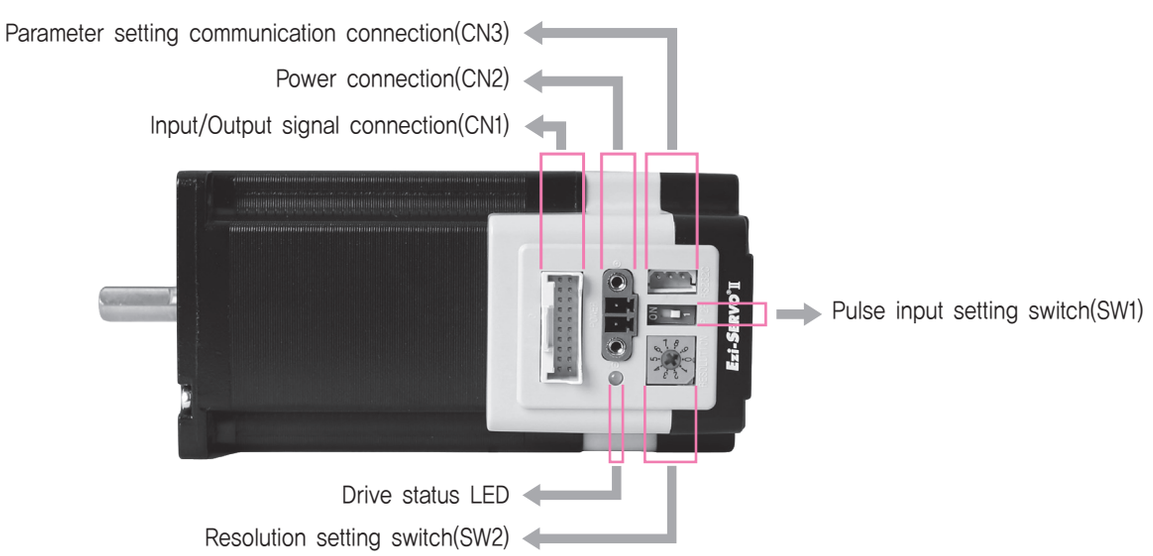


20. Specifications of Drive [Ezi-SERVO II-BT-42/56/60 series]

Model		Ezi-SERVO II-BT-42 series	Ezi-SERVO II-BT-56 series	Ezi-SERVO II-BT-60 series
Input Voltage		24VDC ±10%		
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]	10,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 20,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 20,000 (Selectable with Rotary Switch)		
	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, ROM Error, Position Overflow Error		
	In-Position Selection	0~63 (Selectable by parameter) * Default: 0		
	Position Gain Selection	0~63 (Selectable by parameter) * Default: 3		
	Pulse Input Method	1-Pulse / 2-Pulse (Selectable with DIP switch) * Default: 2-Pulse Mode		
	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.

21. Settings and Operation [Ezi-SERVO II-BT-42/56/60 series]

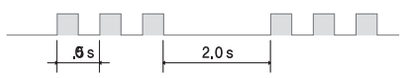


21.1 Drive status LED

Indication	Color	Function	ON/OFF Condition
PWR	Green	Power input indication	LED is turned ON when power is applied
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

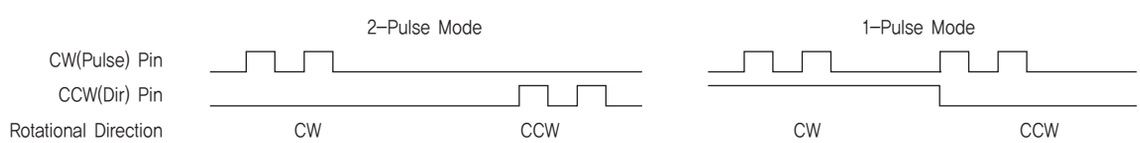
Times	Protection	Conditions
1	Over Current Error	The current through power devices in inverter exceeds the 4.8A
2	Over Speed Error	Motor speed exceeds 3,000 [rpm]
3	Position Tracking Error	Position error value is higher than 180° in motor run state
4	Over Load Error	The motor is continuously operated more than 5 seconds under a load exceeding the max. torque
5	Over Temperature Error	Inside temperature of drive exceeds 85℃
6	Over Regeneratived Voltage Error	Back-EMF is higher than 48V
7	Motor Connect Error	The power is ON without connection of the motor cable to drive
8	Encoder Connect Error	Cable connection error with Encoder connection in drive
10	In-Position Error	After operation is finished, position error more than 1 pulse is continued for more than 3 seconds
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



Alarm LED flash
(Ex, Position tracking error)

21.2 Pulse Input Setting Switch(SW1)

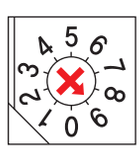
Indication	Switch Name	Functions
2P/1P	Selecting pulse input mode	Selectable 1-Pulse input mode or 2-Pulse input mode as Pulse input signal. ON: 1-Pulse mode OFF: 2-Pulse mode ※ Default: 2-Pulse mode



21.3 Resolution Setting Switch(SW2)

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

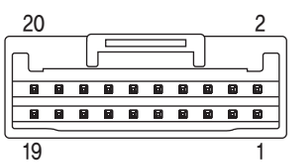


*1 : Resolution of position "0" will be different according to the resolution of encoder adopted to the product.
But in case of the encoder with 10,000[ppr] resolution, it will be set as 500.

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

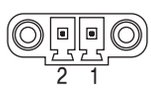
21.4 Input/Output Signal Connector(CN1)

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



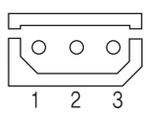
21.5 Power Connector(CN2)

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

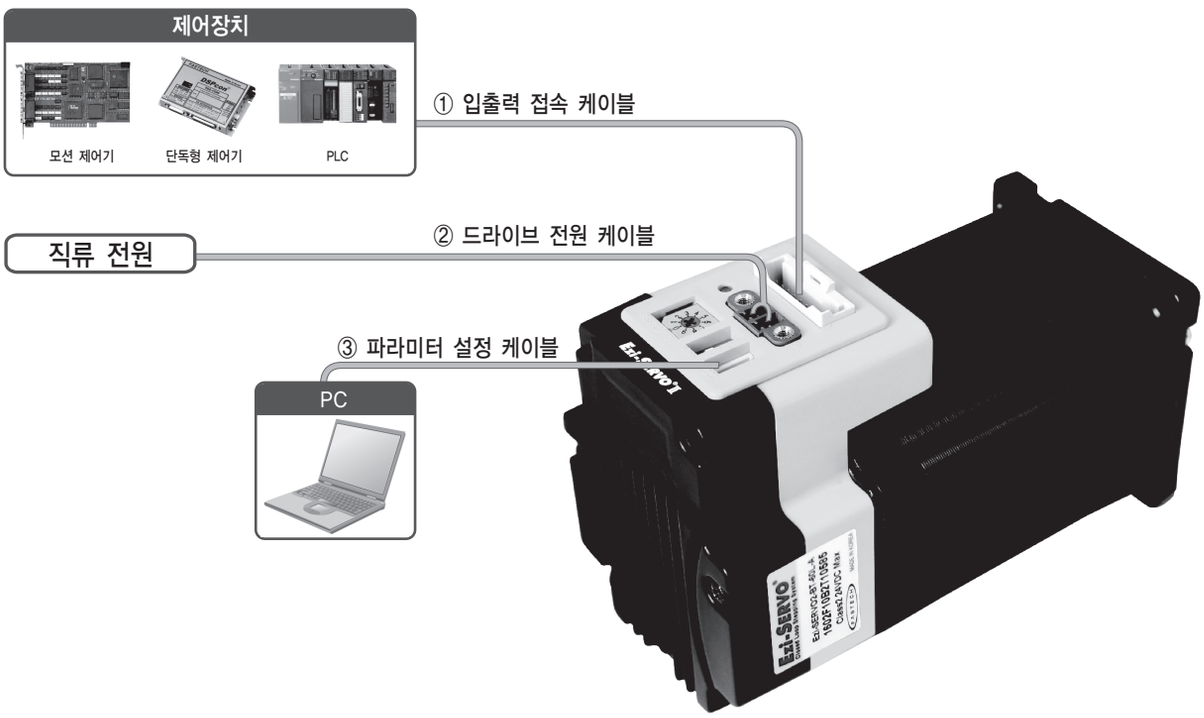


21.6 Parameter Setting Communication Connector(CN3)

NO.	Function	I/O
1	Tx	Output
2	Rx	Input
3	GND	----



22. System Configuration [Ezi-SERVO II-BT-42/56/60 series]



Type	Signal Cable	Power Cable	Parameter Setting Cable
Length supplied	–	–	–
Max. Length	20m	2m	3m

22.1 Options

① Signal Cable

Available to connect between Control System and Ezi-SERVO II BT.

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

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

② Power Cable

Available to connect between Power and Ezi-SERVO II BT.

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

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

③ Parameter Setting Cable

Cable to connect Ezi-SERVO II BT series and computer. Please use this cable to change parameter of Drive.

Item	Length [m]	Remark
CBTS-C-□□□F	□□□	Normal Cable

□ is for Cable Length. The unit is 1m and Max. 3m length.

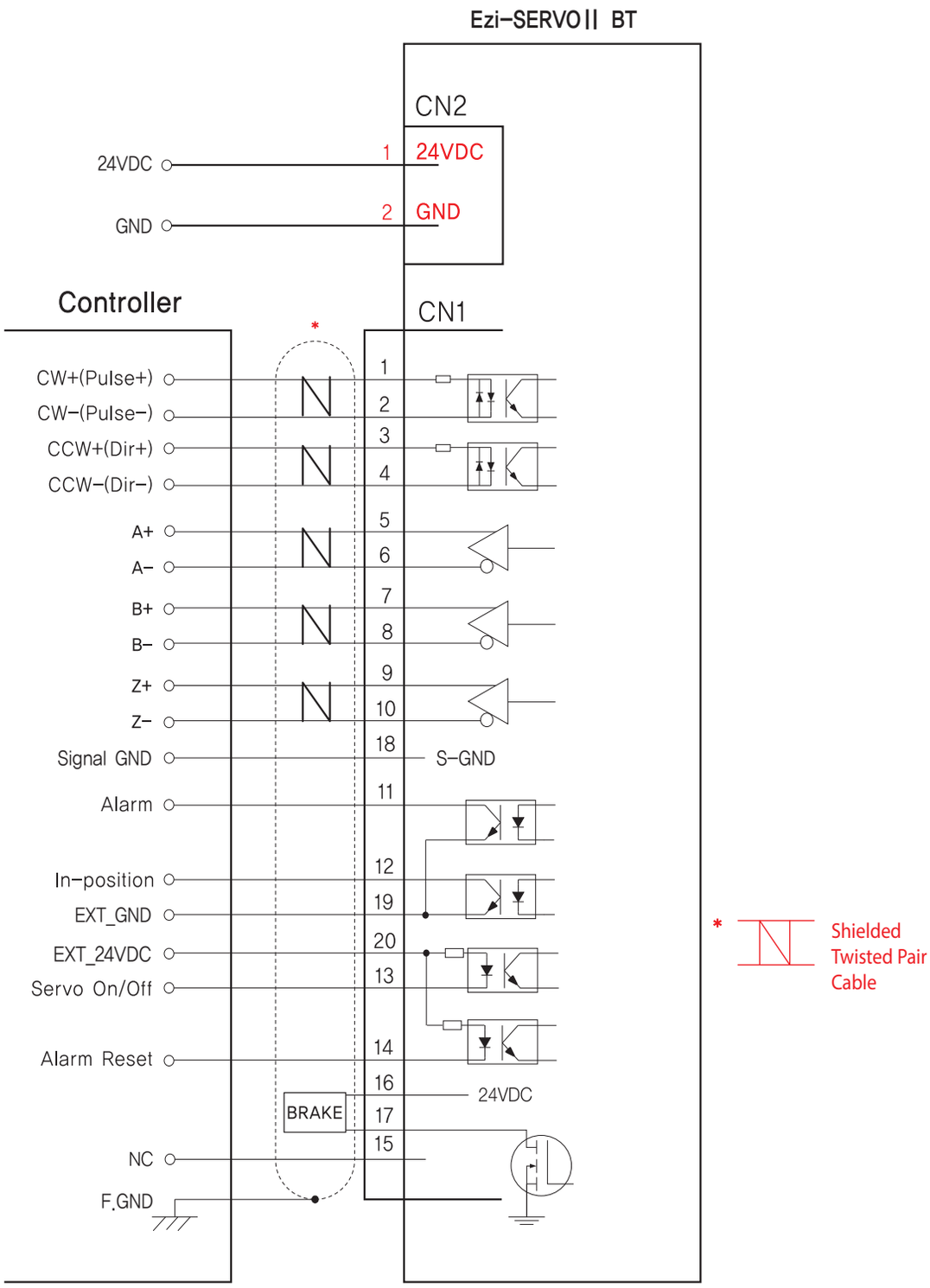
22.2 Connector Specifications

Connector specifications for cabling to drive.

Purpose	Item	Part Number	Manufacturer
Power (CN2)	Terminal Block	MC421-38102	DECA
Signal (CN1)	Housing Terminal	501646-2000 501648-1000(AWG 26~28)	MOLEX
Parameter setting (CN3)	Housing Terminal	5264-03 5263PBTL	MOLEX

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

23. External Wiring Diagram [Ezi-SERVO II-BT-42/56/60 series]

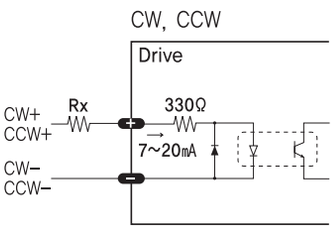


※ When connects I/O cable between controller and drive, please turn off the power of both controller and drive, in order to protect the drive from any damage.

24. Control Signal Input/Output Description [Ezi-SERVO II-BT-42/56/60 series]

1 Input Signal

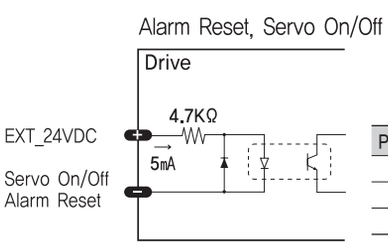
Input signals of the drive are all photocoupler protected. The signal shows the status of internal photocouplers [ON: conduction], [OFF: Non-conduction], not displaying the voltage levels of the signal.



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 host motion controller. The user can select 1-pulse input mode or 2-pulse input mode (refer to switch No.1, SW1).
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 connect 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 will be damaged. If the input signal level is 12V, Rx value is 680ohm and 24V, Rx value is 1.8Kohm.



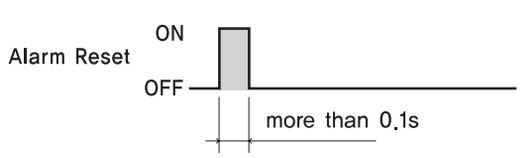
Pin No.	Function
13	Servo On/Off
14	Alarm Reset
20	EXT_24VDC

◆ Servo On/Off Input

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

◆ Alarm Reset Input

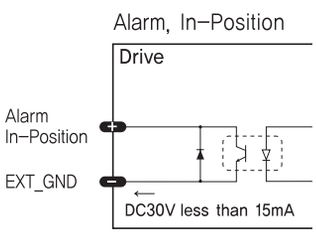
When a protection mode has been activated, a signal to this alarm reset input cancels the Alarm output.



※ 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.



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

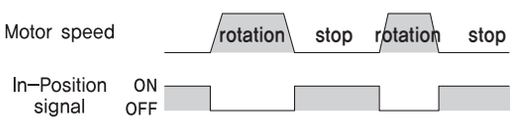
◆ Alarm Output

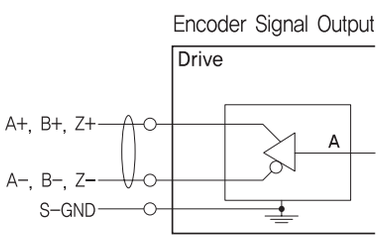
The Alarm output indicates [ON] when the driver is in a normal operation. If a protection mode has been activated, it goes [OFF]. A host controller needs to detect this signal and stop sending a motor driving command. When the driver detects an abnormal operation such as overload or over current of the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





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.

25. Parameter Settings [Ezi-SERVOII-BT-42/56/60 series]

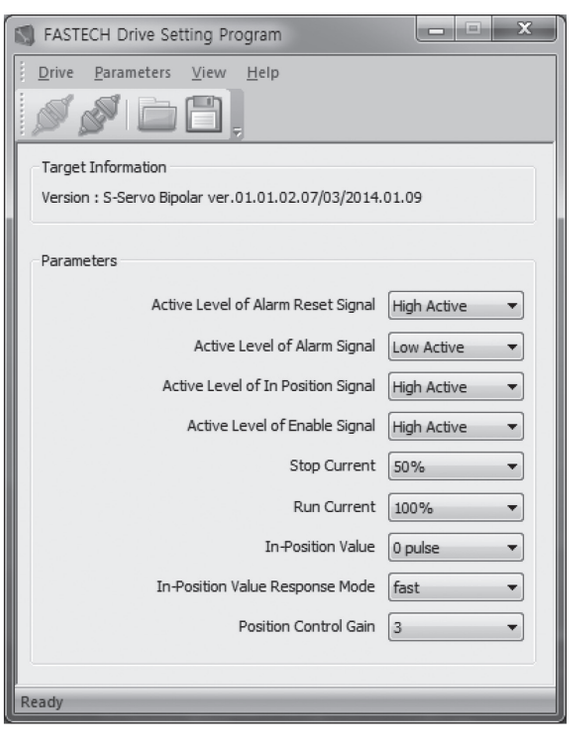
1 Parameter Settings GUI

(User Interface)

Ezi-SERVO II BT driver utilizes various parameters for operation.
Some parameters need to be adjusted once users feel inconvenience to use or in order to maximize efficiency.
Ezi-SERVO II BT provides parameter modification program for convenience of product usage for users.

The screen shot as below is computer program (GUI) which used for operation process. Users can change and set the parameters of drive for Enable Level, Alarm Reset Level, In-Position Level, Alarm Output Level. Users can use Ezi-SERVO II BT according to its own system.

Please connect parameter setting GUI when Ezi-SERVO II BT is Disable state.
For safety reason, Ezi-SERVO II BT can not be connected to setting GUI when it is Enable state.



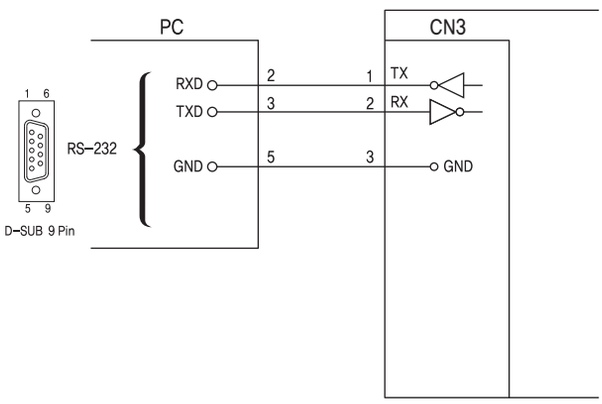
※ Graphic User Interface(GUI) Program can be downloaded from website. (www.fastech-motions.com)

※ Graphic User Interface(GUI) Program can support Window 7/8/10.

※ Graphic User Interface(GUI) Program can be update without prior notice for improving the performance or convenience of user.

2 Parameter Settings wiring Diagram

(Ezi-SERVO II-BT-42/56/60 Series)



26. Diagnosis and Rectification of Faults

26.1 When the Alarm LED is not Blinking

Even though the alarm LED is not blinking if the motor can not be operated as normal, please refer to below chart.

Phenomenon	Possible Cause	Rectification
Motor axis can be moved by hand	Servo On/Off input is [ON].	When Alarm LED(RED) does not blink this is not a state of Motor Servo On. Please check signal of Controller.
Motor axis can not be moved by hand	Bad connection of input terminal.	Please check connection between Controller and Drive.
	When Pulse Mode of Drive is CW/CCW input method (2Pulse input method), CW+ line and CW− line may have been reversed or CCW+ line and CCW− line may have been reversed.	Please check connection status of CW+, CW−, CCW+ and CCW− lines.
	The brake is locked. (Only for brake installed type)	Please loosening the brake by energized.
Motor shaft moves only one direction	Pulse Mode of Drive is set as CW/CCW input method (2Pulse input method), then Controller send Pulse by Pulse/Dir method(1Pulse method).	Please check signal method of Controller.
	Pulse Mode of Drive is set as Pulse/Dir input method(1Pulse input method), then Controller send Pulse by CW/CCW method(2Pulse method).	Please check signal method of Controller.
Motor axis moves in the opposite direction to the specified direction	When Pulse Mode of Drive is CW/CCW input method (2Pulse input method), CW input and CCW input is connected reversely.	The CW Pulse signal should be connected to CW input, CCW Pulse signal should be connected to CCW input.
Motion of motor is unstable	Bad connection of Pulse signal cable	Please check connection of Controller and Drive.
No retention of the brake	The brake is released. (Only for brake installed type)	Please stop the power supply to brake, so keep the locked state of brake.
Motor axis movement does not match to the set amount	The setting of resolution is difference.	Please check setting switch of resolution (SW2)

26.2 When the Alarm LED is Blinking

When Alarm LED of drive is blinking, the protection function is generated. Please count the number of blinking and refer to chart below. The Alarm LED is blinking 1 to 15 times (0.5 seconds on, 0.5 seconds off), the same number of blinking will be repeated after 2 seconds.

Flash Times	Alarm Contents	Conditions	The Cause of Error	Checking Point	Corrective Measure
1	Over Current	The current through motor-driven devices exceeds the limit value	If motor has a problem	Checking the status of the short-circuit of the motor cable. (A and/A, B and B, A or /A and motor body, B or /B and Motor body)	① Replace the motor.
			If drive has a problem		① If Alarm keep blinking after replace the motor, replace drive.
2	Over Speed	Motor speed exceed 3,000rpm	The host controller like PLC send speed command of over 3,000rpm	Checking speed command of host controller (PLC)	① Lower the speed command of the host controller.
3	Position Tracking Error	Position error value is higher than 90° in motor run state	The rotation of motor is not smooth because of mechanical problem	Checking the assemble status of the unit(unscrews, debris, and deformation structures)	① Fix the defected structure of the equipment.
			Operate motor when brake is locked	Checking the brake cable by brake operation sound. Checking if 24V is supplied to No.16terminal of I/O connector. Checking the terminal signal of No.17 of I/O connector. If brake hold it self, it means 24V. if not it is 0V.	① Fix the defect of brake. ② If brake control signal is correct, replace the brake.
			Motor does not operate because motor is damaged	Checking if the motor bearing is damaged. -> Power off the motor, and listening to sound while rotate shaft of motor by hand. Checking a short circuit and disconnection of motor cable. -> Checking a short circuit and disconnection by multimeter.	① Replace the motor when bearing is damaged, disconnection of motor cable and short circuit.
			Motor does not operate because encoder is damaged	Checking the connection status of encoder cable. -> Checking short circuit, disconnection, faulty wiring of cable.	① Correct the mis-wiring. ② Replace the cable when cable is disconnected. ③ Correct the short circuit.
			Motor does not operate because of transient shock to mechanical part	Cause of Shock elimination	① Remove the cause of the shock.
			If drive has a problem		① If Alarm keep blinking after tried all of above, replace the drive.

Flash Times	Alarm Contents	Conditions	The Cause of Error	Checking Point	Corrective Measure
4	Over Load	The motor is continuously operated more than 5second under a load exceeding the max torque	If send the command to move into the distance beyond the end of the structure	Checking the command of distance from host controller(PLC).	① Fix the command of distance to reasonable value.
			It does not operate normally, because its deformable structure	Checking the assemble status of the equipment. (Unscrews, debris, and deformation structures)	① Fix the assemble status of the equipment.
			The load exceeding the Max torque of motor	Checking whether motor has enough torque by comparing to load of instrument.	① Lower the speed of operation. (Step motor generate higher torque when speed is low) ② When ① is impossible, replace the motor to higher torque than load.
			Motor does not operate because motor is damaged	Checking whether motor is damaged because motor bearing damage. –〉 Power off the motor, and listening to sound while rotate shaft of motor by hand.	① If find any damage, replace the motor.
			The drive may have problem		① If Alarm keep blinking after tried all of above, replace the drive.
5	Over Temperature	Inside temperature of drive exceeds 85℃	If the ambient temperature is too high or the heating element is near the drive	Checking the ambient temperature and make sure no heating element near the drive.	① Lower the room ambient temperature to under 25℃, and do heat dissipation by fan when the temperature of the case is over 50℃ ② Remove the heating element from the drive.
			Distance between drive is below 50mm, so heat dissipation is difficult	Make sure the distance between drive is more than 50mm.	① Keeping the distance more than 50mm between drive. ② If ① is impossible, do heat dissipation by FAN.
			The drive may have problem		③ If Alarm keep blinking after tried all of above, replace the drive.
6	Over Regenerative Voltage	Back-EMF of motor exceeds 48V	The acceleration and deceleration value is too small	Checking the Acceleration and Deceleration conditions. (Difference depending on load and speed)	① Change the condition of Acceleration and Deceleration. ② Lower the operation speed of motor relatively.
			The drive may have problem		① If Alarm keep blinking after tried all of above, replace the drive.
7	Motor Connect Error	An error with the connection between the drive and the motor	The motor may have problem	Checking the disconnection of motor phase. (A and/A, B and/B)	① Replace the motor.
			If the motor cable between motor and drive is damaged	Checking the connection of the motor cable.	① Fix the error after check connection status of motor cable. ② Replace the extension cable between motor and drive, if there is problem.
			The drive may have problem		① If Alarm keep blinking after tried all of above, replace the drive.

Flash Times	Alarm Contents	Conditions	The Cause of Error	Checking Point	Corrective Measure
8	Encoder Connect Error	An error with the connection between the drive and the encoder	If the encoder extension cable is damaged	Checking the connection status of motor and the extension cable of encoder.	① Make sure connection of cable connector.
				Checking if the extension cable of encoder is disconnected.	① Replace the extension cable of encoder.
				Checking the wiring status of the extension cable of encoder.	① Fix the extension cable of encoder. ② If same alarm is generated after correction, drive and motor may have damaged by faulty cable, so replace the motor and drive.
			The encoder may have problem	Checking if the encoder is damaged, unscrew or extension cable of encoder is disconnected. (Can not be checked when assembled)	① Replace the motor.
			The drive may have problem		① If Alarm keep blinking after tried all of above, replace the drive.
10	In-Position Error	After operation is finished, a position error(more than 1) occur for more than 3seconds	The mechanical part is in vibration status	Checking the status of vibration of mechanical part by hand.	① Remove the cause of vibration.
			The tension of pulley is not suitable if the pulley is applied	Checking the tension of the pulley.	① Adjust to suitable tension by tension gage.
			After Enable, motor does not grab the STEP degree by external force	Checking whether mechanical part not moving due to external force.	① Reassemble the mechanical part.
			The wiring of extension cable of motor and encoder is not correct	Checking the wiring status of extension cable of motor and encoder.	① Fix the wiring of the cable.
			The motor may have problem	Checking the status of the short-circuit or disconnection of the motor cable. (A and/A, B and B, A or /A and motor body, B or /B and Motor body)	① Replace the motor.
			The drive may have problem		① If Alarm keep blinking after tried all of above, replace the drive.
12	ROM Error	The ROM may have problem	The parameter Storage Devices(ROM) in the motor controller may have problem	Checking whether any problem with power. Make sure voltage of drive input terminal is over 23V.	① If power is correct, turn off and turn it back on. If alarm keep blinking after tried above, replace the drive.
15	Position Overflow Error	Position error value is higher than 90° in motor stop status.	The motor is rotated by external force	Checking whether external force generate motor rotation.	① Remove the external force. ② If ① is impossible, install the brake so motor does not rotate when it stopped. ③ ① and ② are impossible, replace the motor, so can have higher holding torque bearable to external force.
			The encoder may have problem	Checking the install status of encoder and the output signal.	① Replace the motor.
			The drive may have problem		① If alarm is keep generated, after tried all of above, replace the drive.

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