

Ezi-SERVO[®]

Closed Loop Stepping System

- Miniaturized Compact Size
- Closed Loop System
- No Gain Tuning / No Hunting
- Heat Reduction
- High Resolution
- Fast Response

MINI



Fast, Accurate, Smooth Motion



Fast, Accurate, Smooth Motion

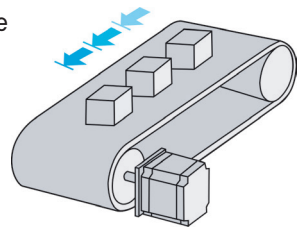
Ezi-SERVO[®] **MINI**

Closed Loop Stepping System



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 than 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.



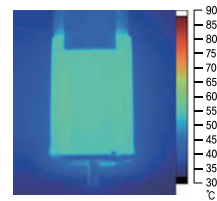
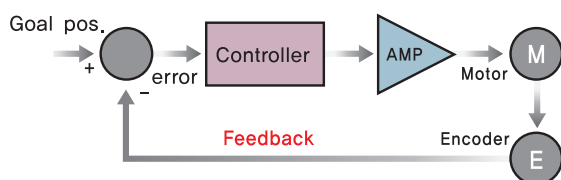
3 Heat Reduction / Energy Saving

(Motor Current Control according to load)

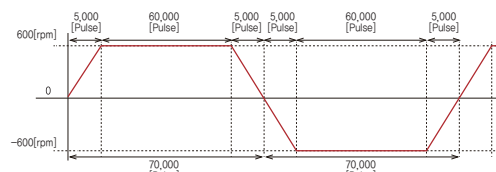
Ezi-SERVO automatically controls motor current according to load. Ezi-SERVO reduces motor current when motor load is low and increases motor current when load is high. By optimizing the motor current, motor heat can be minimized and energy saved.

1 Closed Loop System

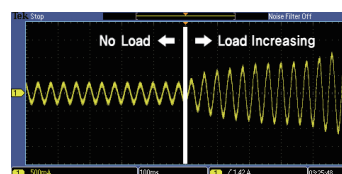
Ezi-SERVO is an innovative Closed Loop System that utilizes a high-resolution motor mounted encoder constantly to monitor the current position. The encoder feedback allows the Ezi-SERVO to update the current position every 25 μ sec. It allows the Ezi-SERVO drive to compensate for the loss of position, 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.



Motor temperature [Measured by Thermal Imaging Camera]



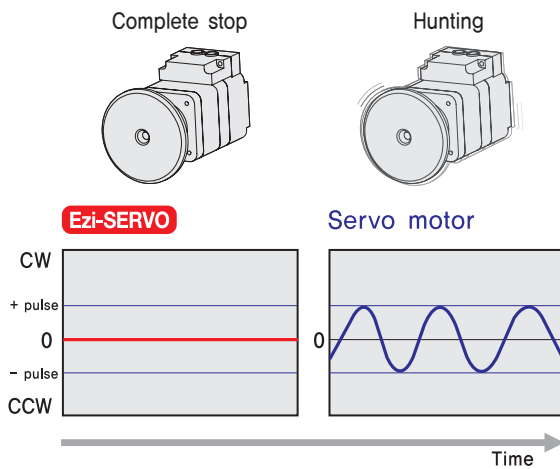
Condition to measure the motor temperature
[4hours operation, Motor surface temperature saturation]



Example of the Motor Current Control according to load

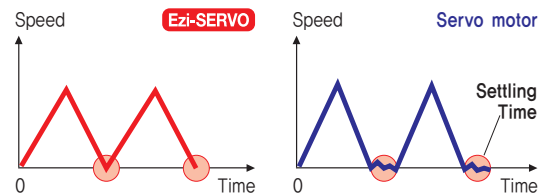
4 No Hunting

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.



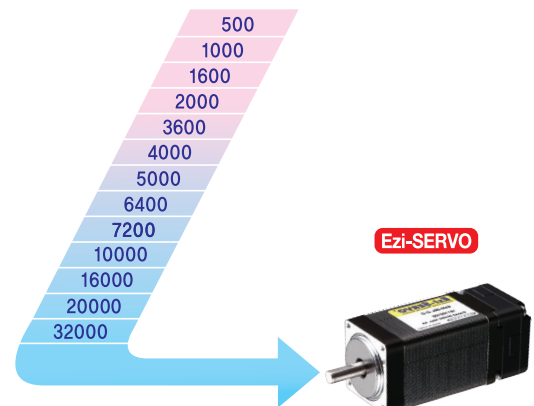
6 Fast Response

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.



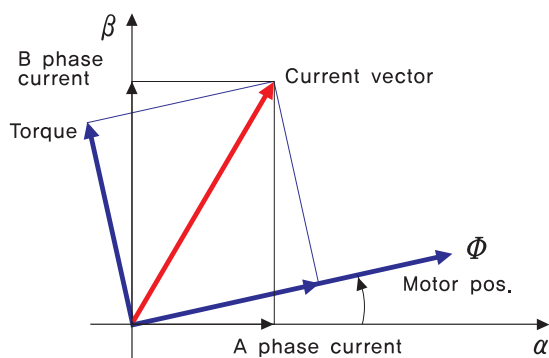
7 High Resolution

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



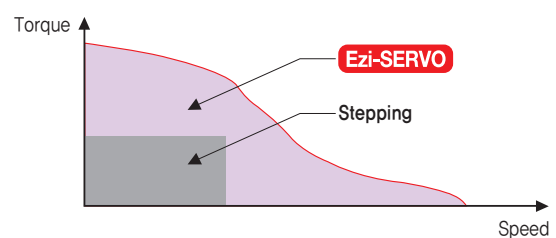
5 Smooth and Accurate

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.



8 High Torque

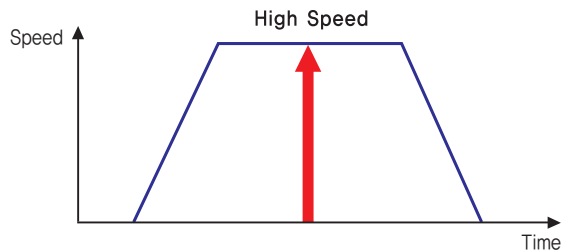
Compared with common step motors and drives, Ezi-SERVO motion control systems can maintain a high torque state over relatively long period of time. This means that Ezi-SERVO continuously operates without loss of position under 100% of the load. Unlike conventional Microstep drives, Ezi-SERVO exploits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



9

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 enables the stepping motor to generate high torque, even under a 100% load condition.



● Advantages over Open-Loop Control Stepping Drive

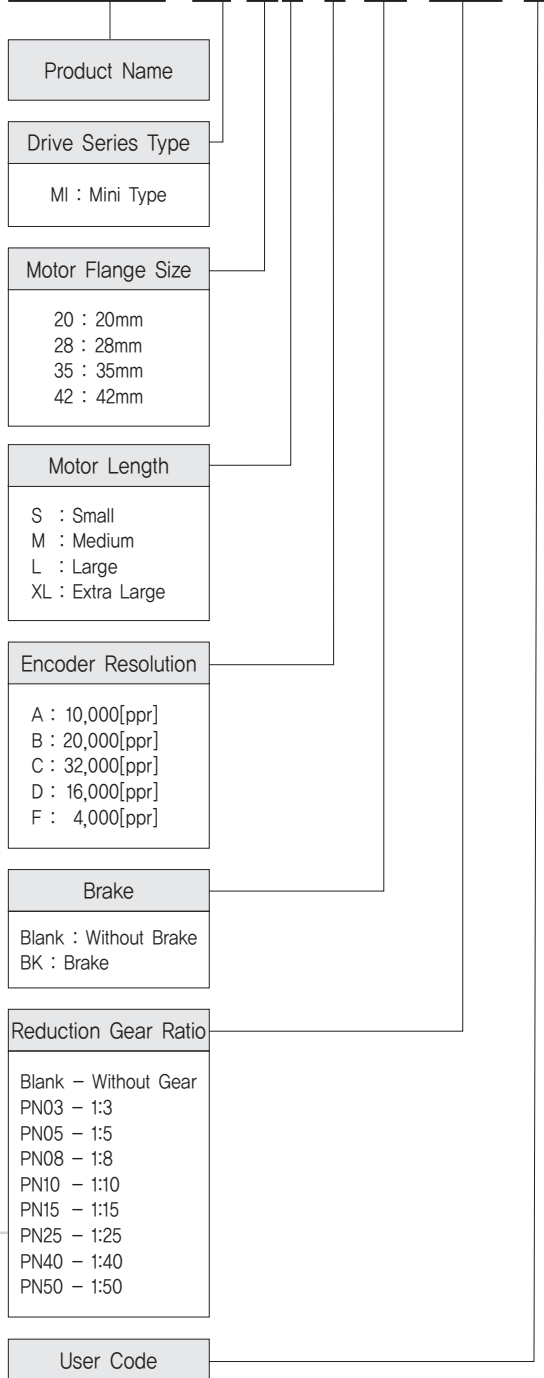
1. Reliable positioning without loss of synchronism.
2. Holding stable position and automatically recovering to the original position even after experiencing positioning error due to external forces, such as mechanical vibration or vertical positional holding.
3. Ezi-SERVO utilizes 100% of the full range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

● Ezi-SERVO MINI Part Numbering

Ezi-SERVO-MI-42M-A-BK-PN05-□



FASTECH Ezi-SERVO MINI

● Standard Combination

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

● Combination with Brake

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

● Combination with Gearbox

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

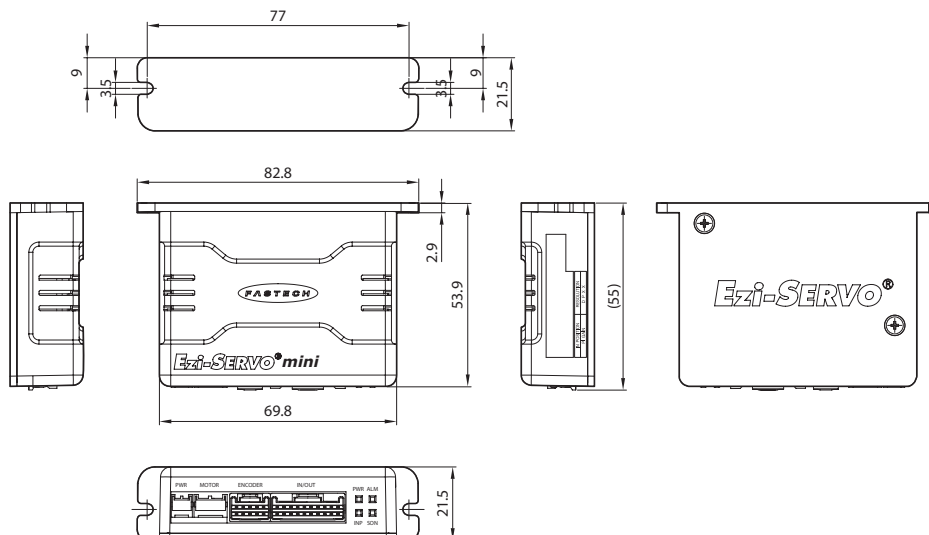
● Specifications of Drive

Motor Model	EzM-20 series	EzM-28 series	EzM-35 series	EzM-42 series
Driver Model	EzS-PD-MI-20 series	EzS-PD-MI-28 series	EzS-PD-MI-35 series	EzS-PD-MI-42 series
Input Voltage	24VDC \pm 10%			
Control Method	Closed loop control with 32bit MCU			
Current Consumption	Max 500mA (Except motor current)			
Operating Condition	Ambient Temperature	<ul style="list-style-type: none"> · In Use: 0~50°C · In Storage: -20~70°C 		
	Humidity	<ul style="list-style-type: none"> · 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 DIP 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 DIP switch)		
	Position Gain Selection	0~F (Selectable with DIP 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.

● Dimensions of Drive [mm]

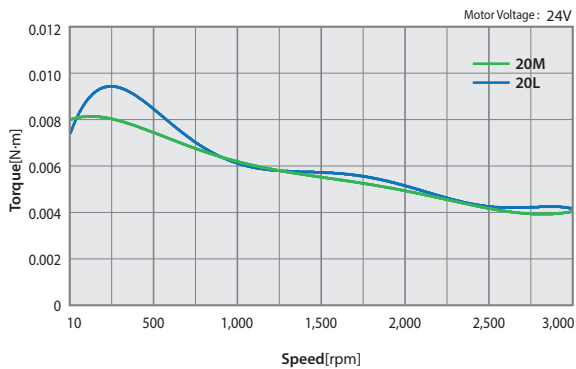


● Specifications of Motor

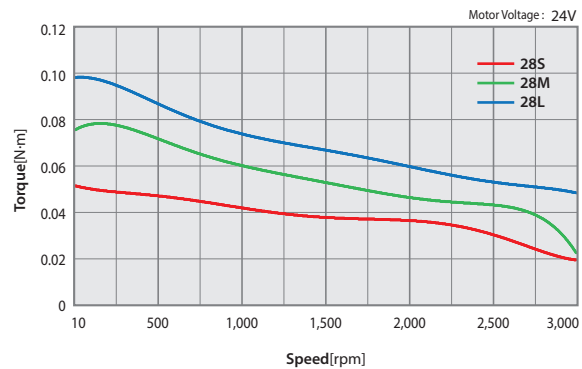
MODEL	UNIT	EzM-20 series		EzM-28 series			EzM-35 series		EzM-42 series			
		20M	20L	28S	28M	28L	35M	35L	42S	42M	42L	42XL
DRIVE METHOD	-	BI-POLAR										
NUMBER OF PHASES	-	2	2	2	2	2	2	2	2	2	2	2
CURRENT per PHASE	A	0,5	0,5	0,95	0,95	0,95	1,5	1,5	1,2	1,2	1,2	1,2
HOLDING TORQUE	N·m	0,016	0,025	0,069	0,098	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
	8mm		30	30	38	38	38	26	26	26	26	26
	13mm		-	-	53	53	53	33	33	33	33	33
	18mm		-	-	-	-	-	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°C)										
OPERATING TEMPERATURE	°C	0 to 55										

● Torque Characteristics of Motor

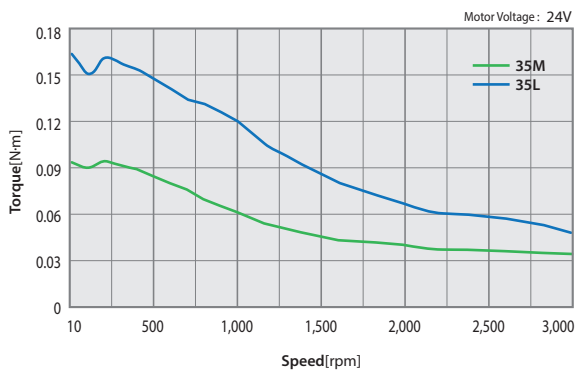
Ezi-SERVO-MI-20 series



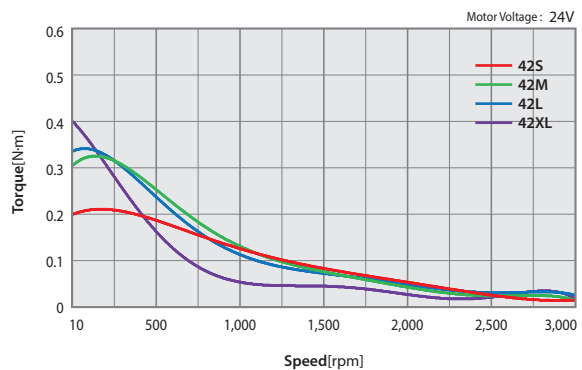
Ezzi-SERVO-MI-28 series



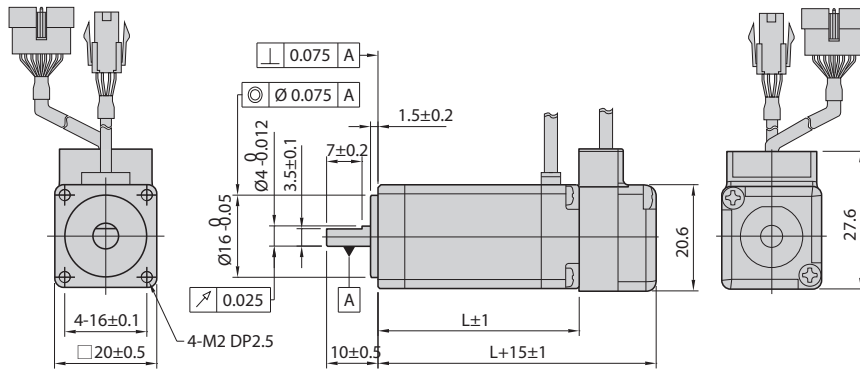
Ezzi-SERVO-MI-35 series



Ezzi-SERVO-MI-42 series

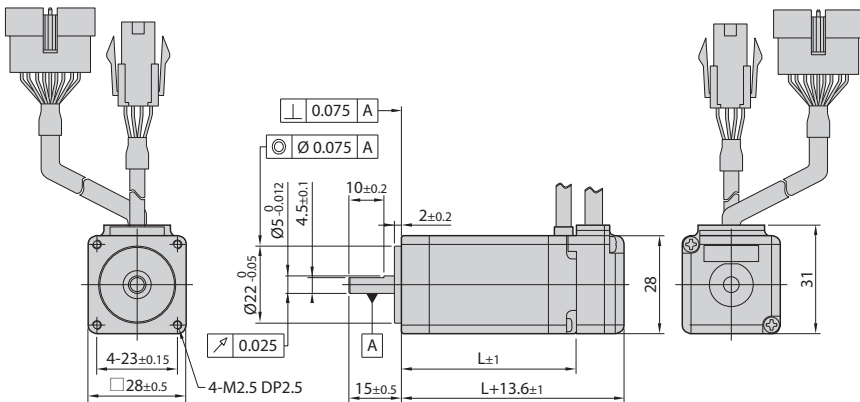


● Dimensions of Motor [mm]



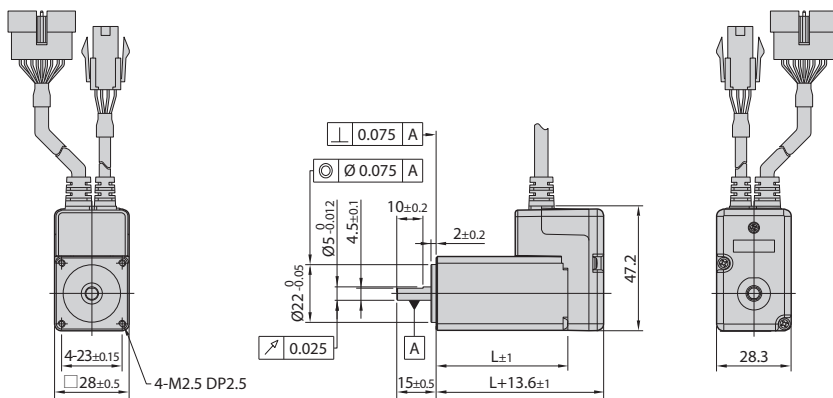
20mm

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



28mm

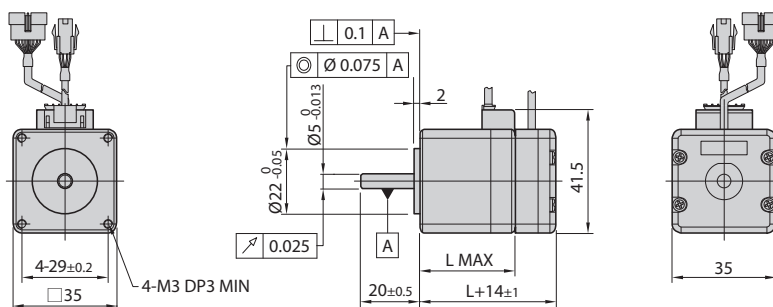
Model name	Length(L)
EzM-28S	32
EzM-28M	45
EzM-28L	50



28mm (Stopper type)

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

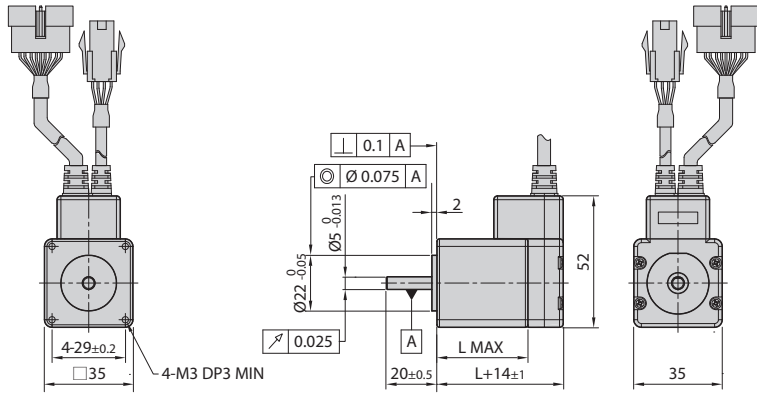
※ When ordering 28mm Stopper type of motor, please add "M" after standard motor model number.



35mm

Model name	Length(L)
EzM-35M	26
EzM-35L	38

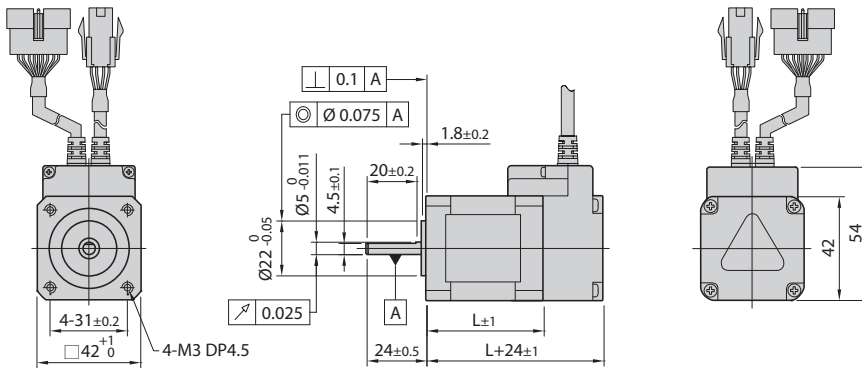
● Dimensions of Motor [mm]



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

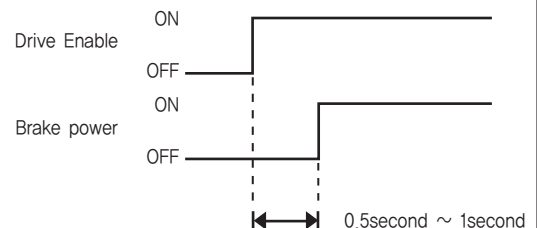
● Specifications of Motor with Brake

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-MI-42S-■-BK	EzM-42S-■-BK	Non-excitation run Type	24VDC ±10%	0.2	5	0.2	560	22	26	33	46	Must be Lower than Unit's Weight
Ezi-SERVO-MI-42M-■-BK	EzM-42M-■-BK						620					
Ezi-SERVO-MI-42L-■-BK	EzM-42L-■-BK						690					
Ezi-SERVO-MI-42XL-■-BK	EzM-42XL-■-BK						830					

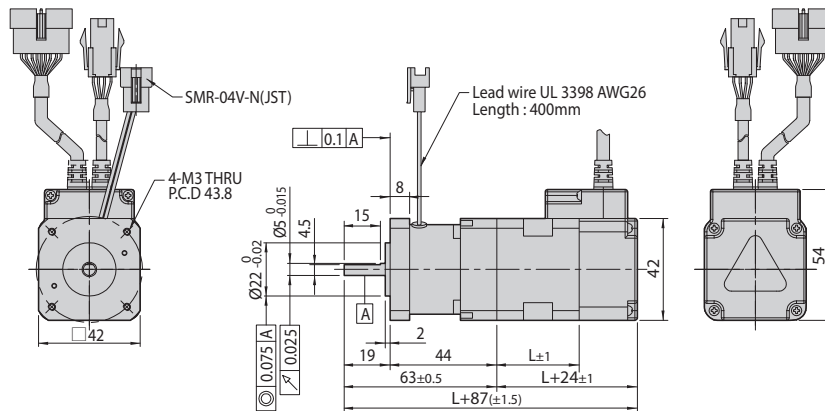
- * The code of encoder resolution will be marked in "■"
- * Electronic Brake cannot be used for braking. Position hold purpose only when power OFF.
- * The weight means Motor Unit Weight including Motor and Electronic Brake.
- * Motor Model Number is combined model name of Motor and Brake.
- * Motor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

* Brake Operation Timing Chart

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



● Dimensions of Motor with Brake [mm]



42mm

Model Name	Length(L)	Weight(kg)
EzM-42S	34	0,56
EzM-42M	40	0,62
EzM-42L	48	0,69
EzM-42XL	60	0,83

● How to Read Specifications

Unit Part Number	① Maximum Holding Torque [N·m]	② Rotor Inertia Moment [kg·m ²]	③ Backlash [min]	④ Angle Transmission Error [min]	⑤ Re-duction Gear Ratio	⑥ Resolution (10,000 [ppr] Standard)	⑦ Permitted Torque [N·m]	⑧ Maximum Torque [N·m]	⑨ Permitted Speed Range [rpm]	⑩ Unit Weight [kg]	Permitted Overhung Load [N]	Permitted Thrust Load [N]
											Axis Center Standard	
Ezi-SERVO-MI-42S-■-PN3	0,55	35x10 ⁻⁷	3	5	3	0,012°	6	12	0~1000	0,76	240	270
Ezi-SERVO-MI-42S-■-PN5	0,92										290	330
Ezi-SERVO-MI-42S-■-PN8	1,47										340	410
Ezi-SERVO-MI-42S-■-PN10	1,84										360	450
Ezi-SERVO-MI-42S-■-PN15	2,67										410	540
Ezi-SERVO-MI-42S-■-PN25	4,46	0,92	5	7	15	0,0024°	6	12	0~200	490	640	
Ezi-SERVO-MI-42S-■-PN40	7,13									570	640	
Ezi-SERVO-MI-42S-■-PN50	9,00									620	640	

FASTECH Ezi-SERVO MINI

Description of Specification Items

- ① **Maximum Holding Torque** This is the maximum torque that can be exerted through the gearbox when the motor is stopped. (Based on 100% of stop current) Use below the maximum torque of the gearbox.
- ② **Rotor Inertia Moment** It is the value of the moment of inertia of the motor.
- ③ **Backlash** It is the gap between the gear and the gear, and it is the angle at which the gearbox shaft moves without external force when stopped.
- ④ **Angle Transmission Error** This is the transmission characteristic of the gearbox, which means the difference between the theoretical rotation angle and the actual rotation angle of the output shaft.
- ⑤ **Reduction Gear Ratio** It is the value obtained by dividing the number of output rotation by the number of input rotation.
- ⑥ **Resolution(10,000[ppr] Standard)** This is the angle at which the gearbox output shaft moves when the motor is driven by 1 pulse.
- ⑦ **Permissible Torque** This value is a torque value at which the life of the motor becomes 20,000 hours when the input rotation speed is 3,000rpm. It refers to the permissible continuous torque.
- ⑧ **Maximum Torque** This is the maximum torque allowed during acceleration/deceleration.
- ⑨ **Permitted Speed Range** It is the range of rotation speed based on the output shaft of the gearbox.
- ⑩ **Unit Weight** It is the sum of the weight of the gearbox and the motor.

● Specifications of Motor with Gearbox

42_{mm}

Unit Part Number	Maximum Holding Torque [N·m]	Rotor Inertia Moment [kg·m ²]	Back-lash [min]	Angle Transmission 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]	Permitted Thrust Load [N]
											Axis Center Standard	
Ezi-SERVO-MI-42S-■-PN3	0,55	35x10 ⁻⁷	3	5	3	0,012°	6	12	0~1000	0,76	240	270
Ezi-SERVO-MI-42S-■-PN5	0,92				5	0,0072°	9	18	0~600		290	330
Ezi-SERVO-MI-42S-■-PN8	1,47				8	0,0045°	9	18	0~375		340	410
Ezi-SERVO-MI-42S-■-PN10	1,84				10	0,0036°	6	12	0~300		360	450
Ezi-SERVO-MI-42S-■-PN15	2,67		5	7	15	0,0024°	6	12	0~200	0,92	410	540
Ezi-SERVO-MI-42S-■-PN25	4,46				25	0,00144°	9	18	0~120		490	640
Ezi-SERVO-MI-42S-■-PN40	7,13				40	0,0009°	9	18	0~75		570	640
Ezi-SERVO-MI-42S-■-PN50	9,00				50	0,00072°	9	18	0~60		620	640
Ezi-SERVO-MI-42M-■-PN3	0,85	54x10 ⁻⁷	3	5	3	0,012°	6	12	0~1000	0,83	240	270
Ezi-SERVO-MI-42M-■-PN5	1,42				5	0,0072°	9	18	0~600		290	330
Ezi-SERVO-MI-42M-■-PN8	2,28				8	0,0045°	9	18	0~375		340	410
Ezi-SERVO-MI-42M-■-PN10	2,85				10	0,0036°	6	12	0~300		360	450
Ezi-SERVO-MI-42M-■-PN15	4,14		5	7	15	0,0024°	6	12	0~200	0,98	410	540
Ezi-SERVO-MI-42M-■-PN25	6,90				25	0,00144°	9	18	0~120		490	640
Ezi-SERVO-MI-42M-■-PN40	9,00				40	0,0009°	9	18	0~75		570	640
Ezi-SERVO-MI-42M-■-PN50	9,00				50	0,00072°	9	18	0~60		620	640
Ezi-SERVO-MI-42L-■-PN3	0,93	77x10 ⁻⁷	3	5	3	0,012°	6	12	0~1000	0,89	240	270
Ezi-SERVO-MI-42L-■-PN5	1,55				5	0,0072°	9	18	0~600		290	330
Ezi-SERVO-MI-42L-■-PN8	2,48				8	0,0045°	9	18	0~375		340	410
Ezi-SERVO-MI-42L-■-PN10	3,10				10	0,0036°	6	12	0~300		360	450
Ezi-SERVO-MI-42L-■-PN15	4,51		5	7	15	0,0024°	6	12	0~200	1,05	410	540
Ezi-SERVO-MI-42L-■-PN25	7,52				25	0,00144°	9	18	0~120		490	640
Ezi-SERVO-MI-42L-■-PN40	9,00				40	0,0009°	9	18	0~75		570	640
Ezi-SERVO-MI-42L-■-PN50	9,00				50	0,00072°	9	18	0~60		620	640
Ezi-SERVO-MI-42XL-■-PN3	1,42	114x10 ⁻⁷	3	5	3	0,012°	6	12	0~1000	1,03	240	270
Ezi-SERVO-MI-42XL-■-PN5	2,38				5	0,0072°	9	18	0~600		290	330
Ezi-SERVO-MI-42XL-■-PN8	3,80				8	0,0045°	9	18	0~375		340	410
Ezi-SERVO-MI-42XL-■-PN10	4,76				10	0,0036°	6	12	0~300		360	450
Ezi-SERVO-MI-42XL-■-PN15	6,00		5	7	15	0,0024°	6	12	0~200	1,18	410	540
Ezi-SERVO-MI-42XL-■-PN25	9,00				25	0,00144°	9	18	0~120		490	640
Ezi-SERVO-MI-42XL-■-PN40	9,00				40	0,0009°	9	18	0~75		570	640
Ezi-SERVO-MI-42XL-■-PN50	9,00				50	0,00072°	9	18	0~60		620	640

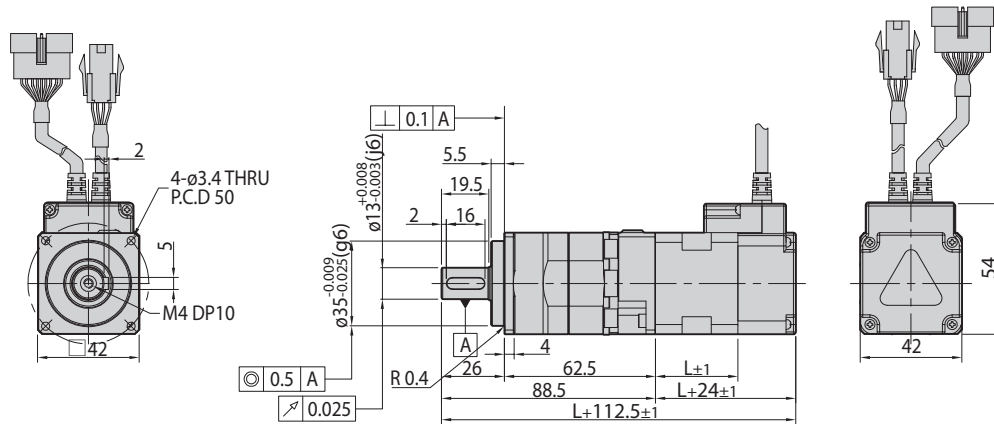
* The code of encoder resolution will be marked in "■"

● Dimensions of Motor with Gearbox [mm]

42mm

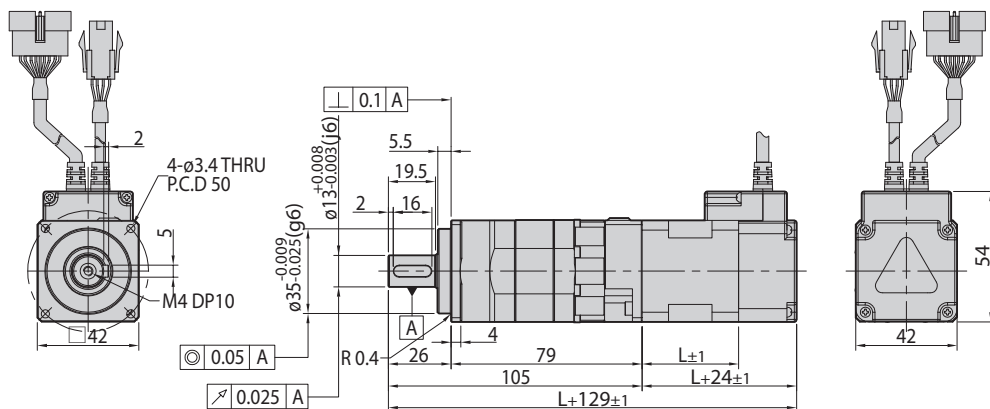
Unit Part Number	Motor	Stage	□ Reduction Gear Ratio	L Length [mm]
Ezi-SERVO-MI-42S-■-PN□	EzM-42S-■-PN□	Single Stage	3, 5, 8, 10	34
Ezi-SERVO-MI-42M-■-PN□	EzM-42M-■-PN□		3, 5, 8, 10	40
Ezi-SERVO-MI-42L-■-PN□	EzM-42L-■-PN□		3, 5, 8, 10	48
Ezi-SERVO-MI-42XL-■-PN□	EzM-42XL-■-PN□		3, 5, 8, 10	60

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

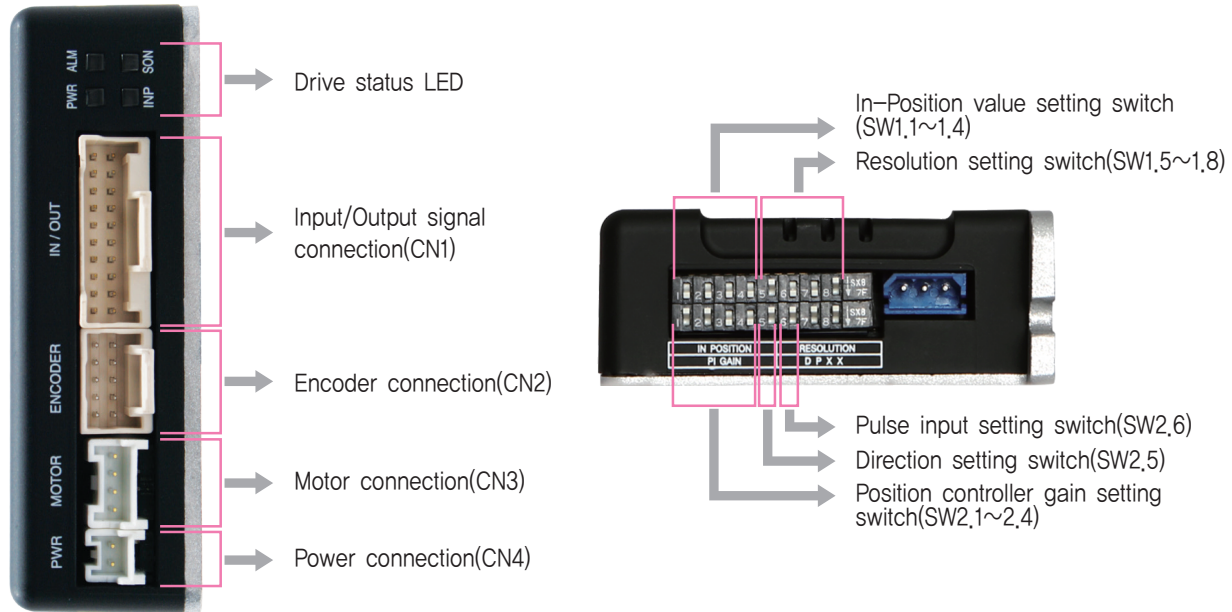


Unit Part Number	Motor	Stage	□ Reduction Gear Ratio	L Length [mm]
Ezi-SERVO-MI-42S-■-PN□	EzM-42S-■-PN□	Double Stage	15, 25, 40, 50	34
Ezi-SERVO-MI-42M-■-PN□	EzM-42M-■-PN□		15, 25, 40, 50	40
Ezi-SERVO-MI-42L-■-PN□	EzM-42L-■-PN□		15, 25, 40, 50	48
Ezi-SERVO-MI-42XL-■-PN□	EzM-42XL-■-PN□		15, 25, 40, 50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

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



Settings and Operation

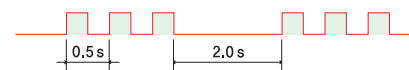


1. Drive Status LED

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 dip 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

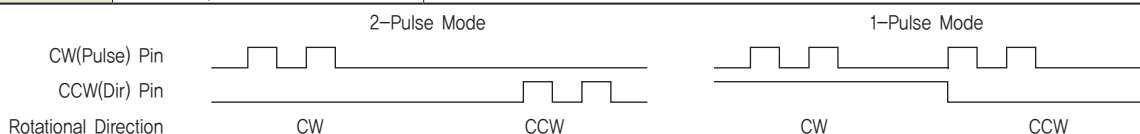
Times	Protection	Conditions
1	Over Current Error	The current through power devices in inverter exceeds 4,8A
2	Over Speed Error	Motor speed exceeds 3,000 [rpm]
3	Position Tracking Error	Position error value is higher than 180° in motor run state
4	Over Load Error	The motor is continuously operated more than 5 seconds under a load exceeding the max. torque
5	Over Temperature Error	Inside temperature of drive exceeds 85°C
6	Over Regenerated 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 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



Alarm LED flash
(Ex, Position tracking error)

2. Pulse Input Setting Switch(SW2,6)

Indication	Switch Name	Functions
P	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



3. Rotational Direction Setting Switch(SW2,5)

Indication	Switch Name	Functions
D	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.

4. Resolution Setting Switch(SW1.5~1,8)

The Number of pulse per revolution.

Position				Pulse/ Revolution	Position				Pulse/ Revolution
8	7	6	5		8	7	6	5	
ON	ON	ON	ON	500 ^{*1}	OFF	ON	ON	ON	7,200
ON	ON	ON	OFF	500	OFF	ON	ON	OFF	10,000
ON	ON	OFF	ON	1,000	OFF	ON	OFF	ON	NC
ON	ON	OFF	OFF	1,600	OFF	ON	OFF	OFF	NC
ON	OFF	ON	ON	2,000	OFF	OFF	ON	ON	NC
ON	OFF	ON	OFF	3,600	OFF	OFF	ON	OFF	NC
ON	OFF	OFF	ON	5,000	OFF	OFF	OFF	ON	NC
ON	OFF	OFF	OFF	6,400	OFF	OFF	OFF	OFF	NC

*1 : 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 than encoder resolution, motor shall be operated by microstep between pulse.

5. Position Controller Gain Setting Switch(SW2.1~2.4)

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 "ON" 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}
4	3	2	1		
ON	ON	ON	ON	1	1
ON	ON	ON	OFF	1	2
ON	ON	OFF	ON	1	3
ON	ON	OFF	OFF	1	4 ^{*2}
ON	OFF	ON	ON	1	5
ON	OFF	ON	OFF	2	1
ON	OFF	OFF	ON	2	2
ON	OFF	OFF	OFF	2	3
OFF	ON	ON	ON	2	4
OFF	ON	ON	OFF	2	5
OFF	ON	OFF	ON	3	1
OFF	ON	OFF	OFF	3	2
OFF	OFF	ON	ON	3	3
OFF	OFF	ON	OFF	3	4
OFF	OFF	OFF	ON	3	5
OFF	OFF	OFF	OFF	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 = ON ON OFF OFF

6. In-Position Value Setting Switch(SW1.1~1.4)

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.

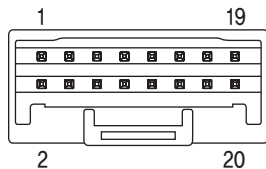
Position				In-Position Value[Pulse] Fast Response	Position				In-Position Value[Pulse] Accurate Response
4	3	2	1		4	3	2	1	
ON	ON	ON	ON	0 ^{*1}	OFF	ON	ON	ON	0
ON	ON	ON	OFF	1	OFF	ON	ON	OFF	1
ON	ON	OFF	ON	2	OFF	ON	OFF	ON	2
ON	ON	OFF	OFF	3	OFF	ON	OFF	OFF	3
ON	OFF	ON	ON	4	OFF	OFF	ON	ON	4
ON	OFF	ON	OFF	5	OFF	OFF	ON	OFF	5
ON	OFF	OFF	ON	6	OFF	OFF	OFF	ON	6
ON	OFF	OFF	OFF	7	OFF	OFF	OFF	OFF	7

*1 : Default = 0

※ Please refer to the Manual for setting.

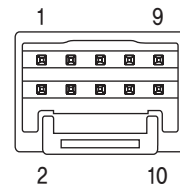
7. Input/Output Signal Connector(CN1)

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



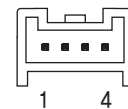
8. Encoder Connector(CN2)

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	----



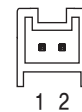
9. Motor Connector(CN3)

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

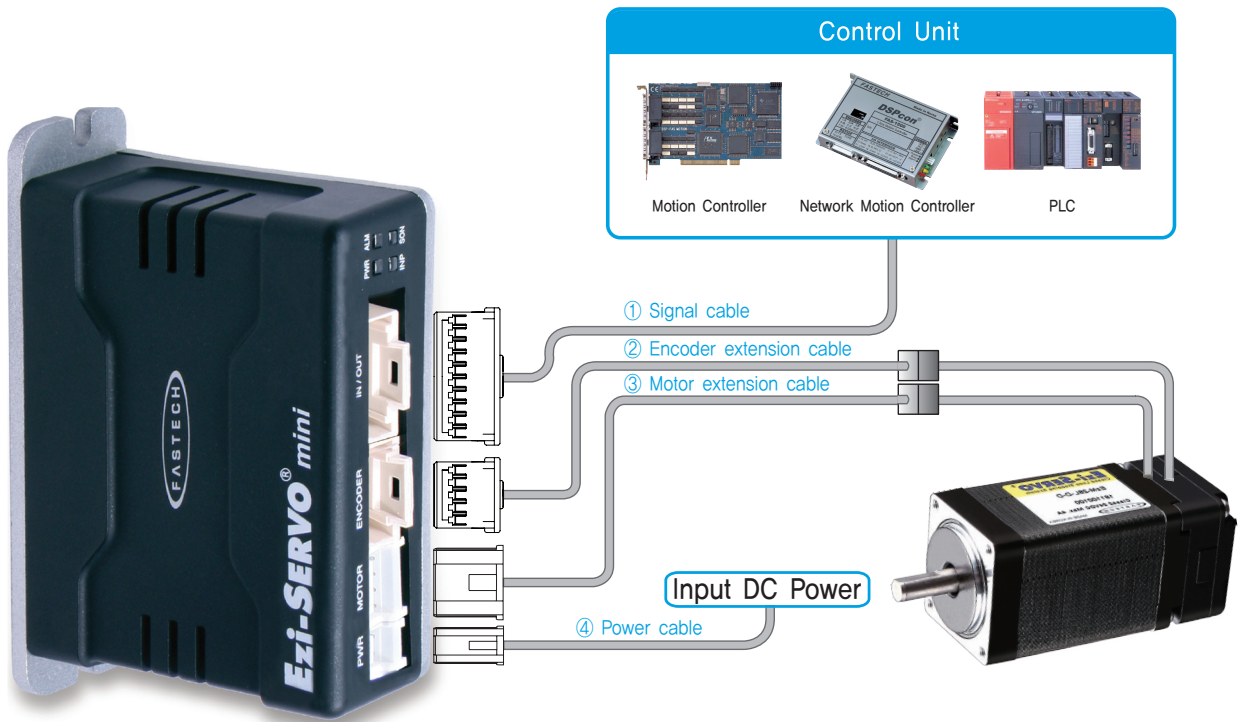


10. Power Connector(CN4)

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



System Configuration



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

FASTECH Ezi-SERVO MINI

1. Options

① Signal Cable

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

Item	Length [m]	Remark
CSVI-S-□□□F	□□□	Normal Cable
CSVI-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 MINI.

Item	Length [m]	Remark
CSVI-E-□□□F	□□□	Normal Cable
CSVI-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 MINI.

Item	Length [m]	Remark
CMNB-M-□□□F	□□□	Normal Cable
CMNB-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 MINI.

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

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

2. Connector Specifications

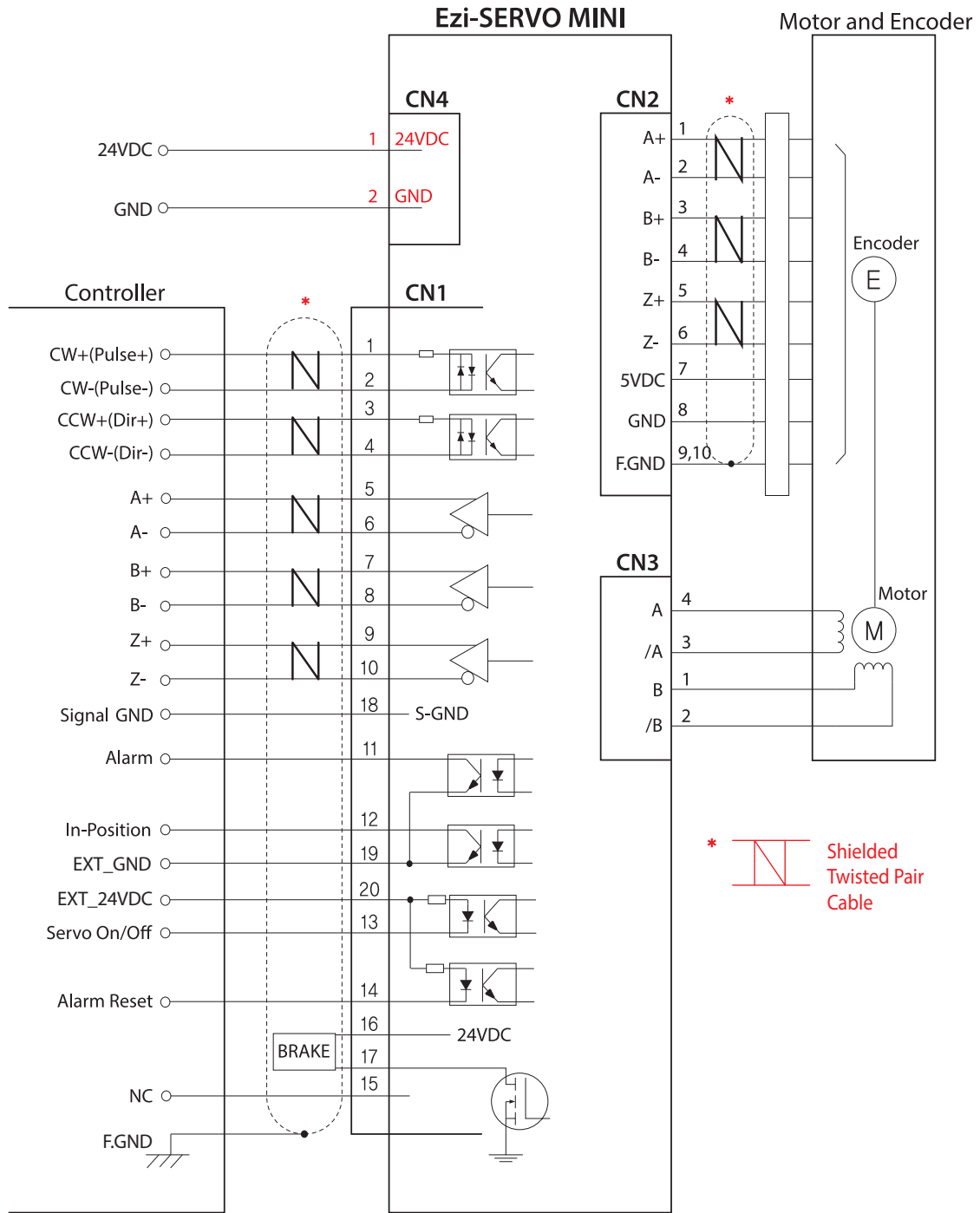
Connector specifications for cabling to drive.

Purpose		Item	Part Number	Manufacturer
Power (CN4)		Housing Terminal	PAP-02V-S SPHD-001T-P0,5	JST
Motor	Drive Side (CN3)	Housing Terminal	PAP-04V-S SPHD-001T-P0,5	JST
	Motor Side	Housing Terminal	5557-04R 5556T	MOLEX
Encoder	Drive Side (CN2)	Housing Terminal	501646-1000 501648-1000(AWG 26~28)	MOLEX
	Encoder Side	Housing Terminal	SMP-09V-NC SHF-001T-0,8BS	JST
Signal (CN1)		Housing Terminal	501646-2000 501648-1000(AWG 26~28)	MOLEX

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

External Wiring Diagram

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※ 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.

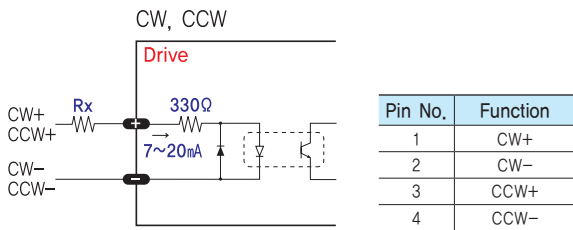
CAUTION

Please refer to the Manual when connects motor extension cable. Careful connection will be required to protect the drive from any damages.

Control Signal Input/Output Description

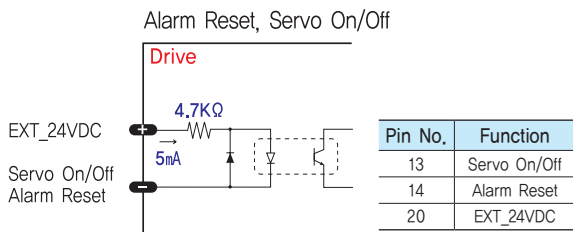
1 Input Signal

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 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.

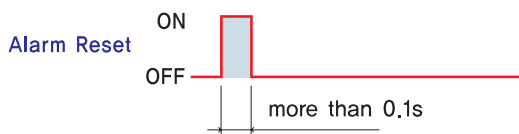


◆ Servo On/Off Input

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

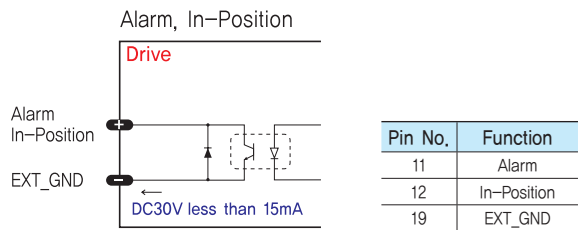
When a protection mode has been activated, a signal to this alarm reset input cancels the Alarm output.



※ 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.



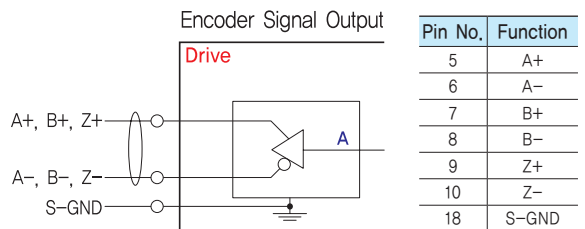
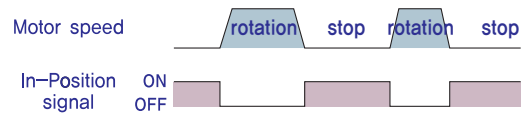
◆ Alarm Output

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.



◆ Encoder Signal Output

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

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