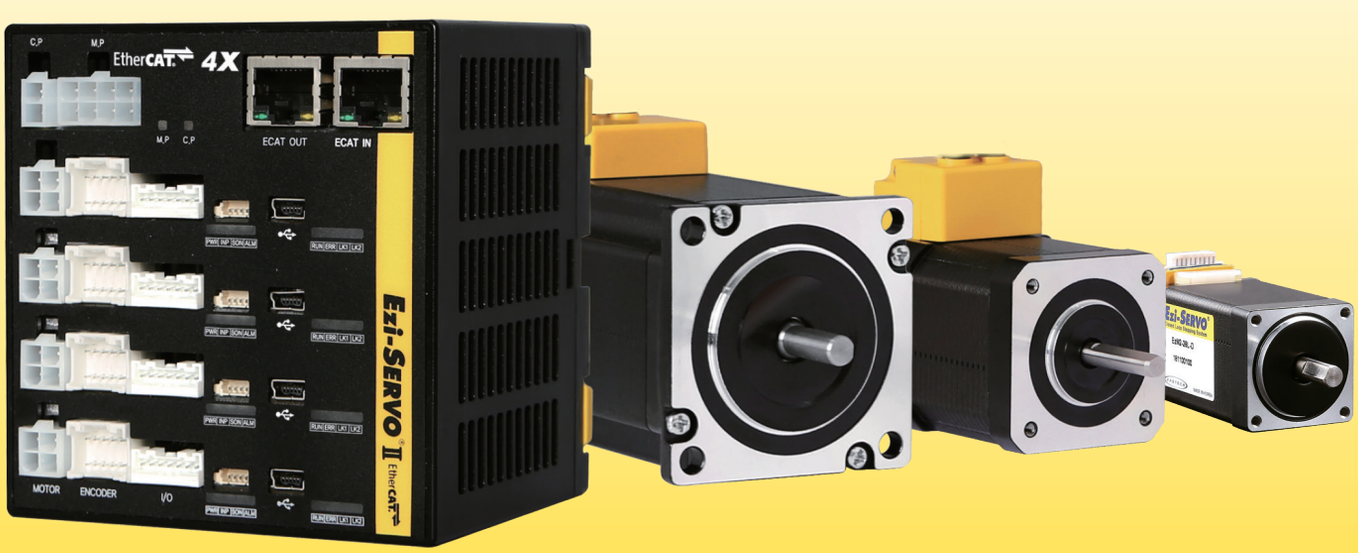
Ezi-SERVO® II

Closed Loop Stepping System

- CiA 402 Drive Profile Support
- Closed Loop System
- No Gain Tuning / No Hunting
- Compact 4 Axes Stepping Motor Drive
- Save Space / Reduce Wiring (Reduce Cost)

EtherCAT® 4X



FASTECH

Fast, Accurate, Smooth Motion

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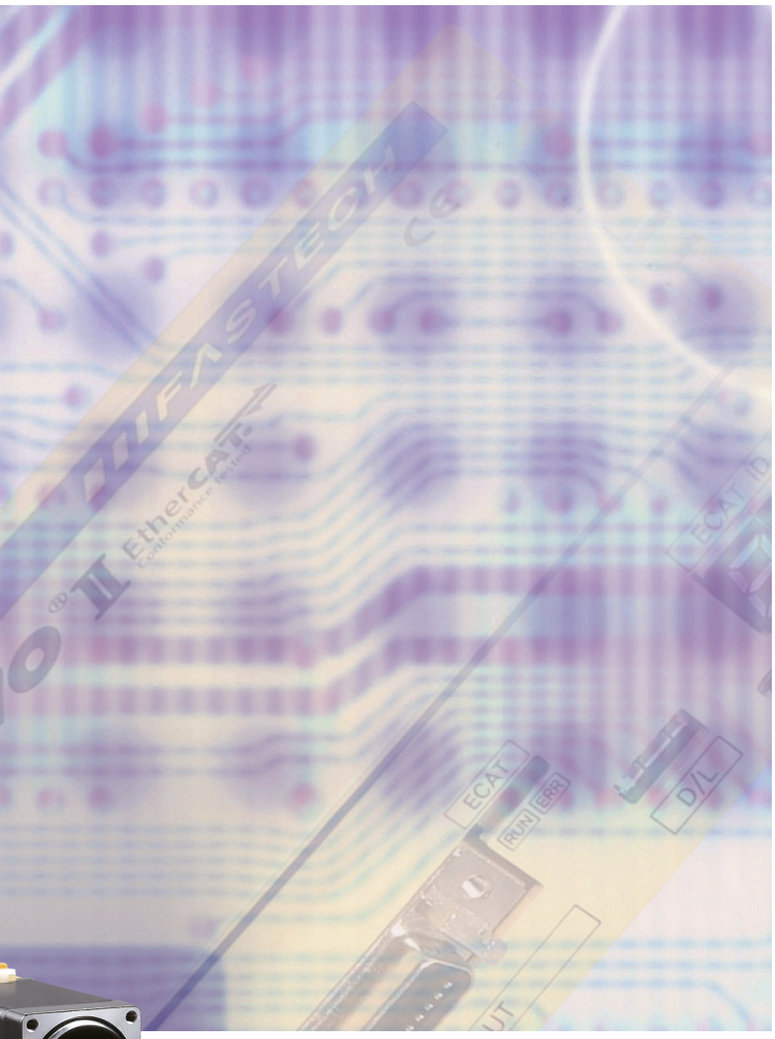
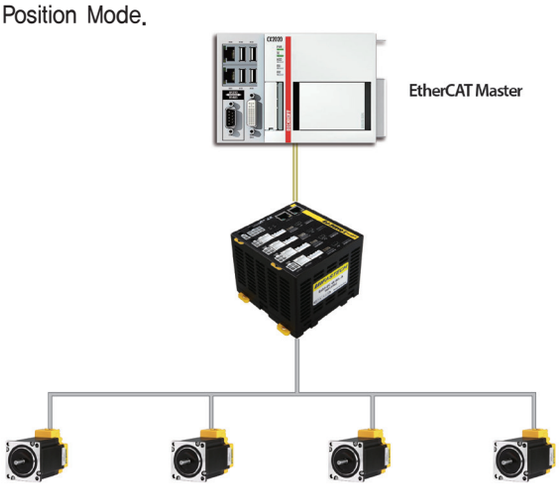
Ezi-SERVO® II EtherCAT® 4X

Closed Loop Stepping System



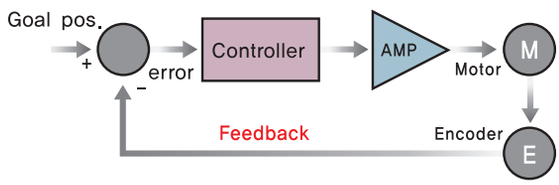
1 EtherCAT Based Motion Control

Ezi-SERVO II EtherCAT 4X is stepping motor control system using EtherCAT, high speed ethernet (100Mbps full-duplex) based fieldbus. Ezi-SERVO II EtherCAT 4X is EtherCAT slave module which support CAN application layer over EtherCAT (CoE). CiA 402 Drive Profile implemented. Supported modes are Profile Position Mode, Homing Mode, Cyclic Synchronous Position Mode.



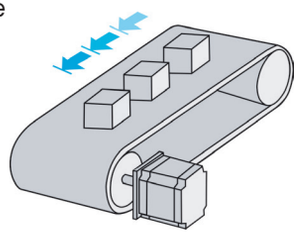
2 Closed Loop System

Ezi-SERVO II is an innovative closed loop stepping 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 micro seconds. 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

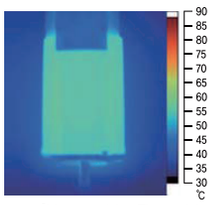
To ensure machine performance, smoothness, positional error and low servo noise, Conventional servo systems require the adjustment of its servo's gains as an initial crucial step. Even systems that employ auto-tuning require manual tuning after the system is installed, especially if more that one axis 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 additimal expensive and bulky gearbox. Ezi-SERVO II also performs exceptionally, even under heavy loads and high speeds.



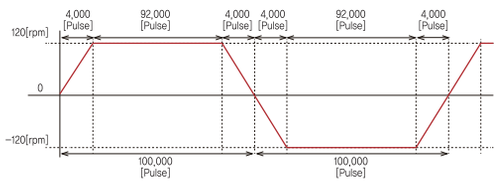
4 Heat Reduction / Energy Saving

(Motor Current Control according to load)

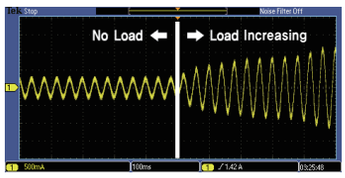
Ezi-SERVO II automatically controls motor current according to load.
Ezi-SERVO II reduces motor current when motor load is low, and increases motor current when load is high. By optimizing the motor current, motor heat can be minimized and energy can be saved.



Motor temperature [Measured by Thermal Imaging Camera]



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

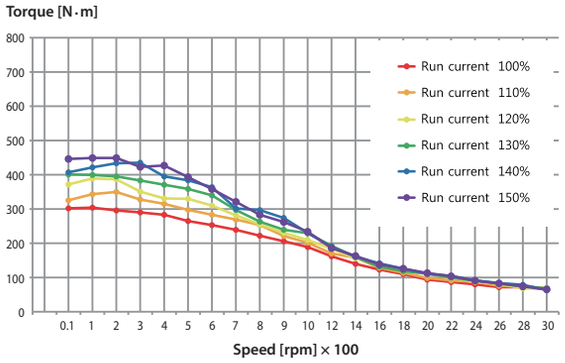


Example of the Motor Current Control according to load

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%.

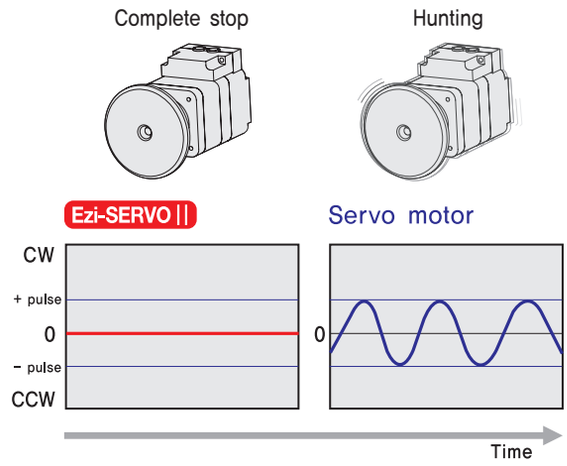


※ The torque at low speed is improved about 30%.

Measured Condition : Drive = Ezi-SERVO II-EC-4X-42L
Motor Voltage = 24VDC
Input Voltage = 24VDC

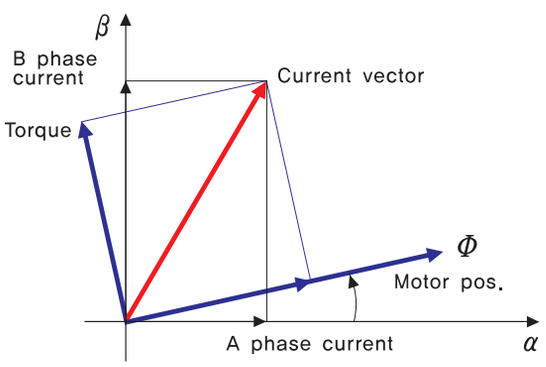
6 No Hunting

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.



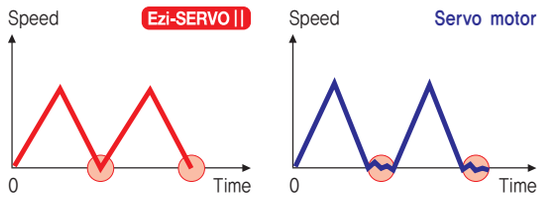
7 Smooth and Accurate

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 ARM (Advanced RISC Machine) performs vector control and filtering, producing a smooth rotational control with minimum ripples.



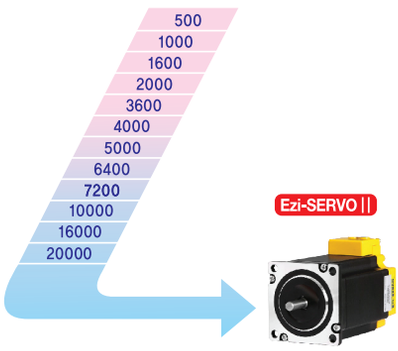
8 Fast Response

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.



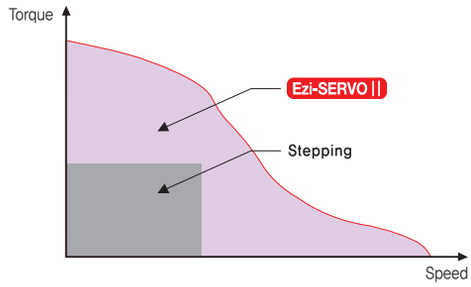
9 High Resolution

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



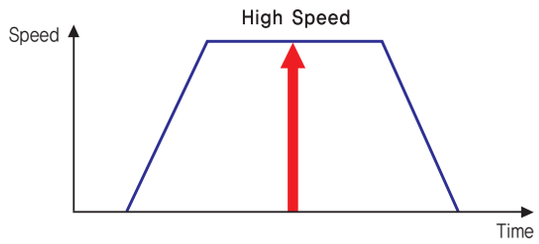
10 High Torque

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 II utilizes 100% of the full range of rated motor torque, contrary to a conventional open-loop stepping driver that can use up to 50% of the rated motor torque due to the loss of synchronism.
4. Capability to operate at high speed due to load-dependant current control, open-loop stepping drivers use a constant current control at all speed ranges without considering load varitions.

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

● Ezi-SERVO II EtherCAT 4X Part Numbering

Ezi-SERVO II - EC - 4X - □ - □

- Product Name
- Drive Series Type
  - EC : EtherCAT
- Number of motor axis
  - 4X : 4 axes
  - 3X : 3 axes
  - 2X : 2 axes
- User Code
- Please mention the specification of motors and options in purchase order

● Combination with Standard Motor / Brake

Ezi-SERVO II EtherCAT 4X can use up to 4 motors in one drive. Available motors include Standard Motor, Motor with Brake and Motor with Gearbox. Different Motor Number can be used for each axis. Refer to the Motor Model Number below.

Motor Model Number
EzM2-20M-F
EzM2-20L-F
EzM2-28S-D
EzM2-28SM-D
EzM2-28M-D
EzM2-28MM-D
EzM2-28L-D
EzM2-28LM-D
EzM2-35M-D
EzM2-35L-D
EzM2-42S-A
EzM2-42S-B
EzM2-42M-A
EzM2-42M-B
EzM2-42L-A
EzM2-42L-B
EzM2-42XL-A
EzM2-42XL-B
EzM2-56S-A
EzM2-56S-B
EzM2-56M-A
EzM2-56M-B
EzM2-56L-A
EzM2-56L-B

Motor Model Number
EzM2-60S-A
EzM2-60S-B
EzM2-60M-A
EzM2-60M-B
EzM2-60L-A
EzM2-60L-B

Motor Model Number with Brake
EzM2-42S-A-BK
EzM2-42S-B-BK
EzM2-42M-A-BK
EzM2-42M-B-BK
EzM2-42L-A-BK
EzM2-42L-B-BK
EzM2-42XL-A-BK
EzM2-42XL-B-BK
EzM2-56S-A-BK
EzM2-56S-B-BK
EzM2-56M-A-BK
EzM2-56M-B-BK
EzM2-56L-A-BK
EzM2-56L-B-BK
EzM2-60S-A-BK
EzM2-60S-B-BK
EzM2-60M-A-BK
EzM2-60M-B-BK
EzM2-60L-A-BK
EzM2-60L-B-BK

* When places an order for Stopper type 28mm motor, please write "M" additionally after motor length of unit part number.(Ex: EzM2-28LM-D, EzM2-35LM-D)

● Motor Model Number with Gearbox

Ezi-SERVO II EtherCAT 4X can use up to 4 motors in one drive. Available motors include Standard Motor, Motor with Brake and Motor with Gearbox. Different Motor Number can be used for each axis. Refer to the Motor Model Number below.

Motor Model Number	Reduction gear ratio
EzM2-42S-A-PN3	1:3
EzM2-42S-B-PN3	
EzM2-42S-A-PN5	1:5
EzM2-42S-B-PN5	
EzM2-42S-A-PN8	1:8
EzM2-42S-B-PN8	
EzM2-42S-A-PN10	1:10
EzM2-42S-B-PN10	
EzM2-42S-A-PN15	1:15
EzM2-42S-B-PN15	
EzM2-42S-A-PN25	1:25
EzM2-42S-B-PN25	
EzM2-42S-A-PN40	1:40
EzM2-42S-B-PN40	
EzM2-42S-A-PN50	1:50
EzM2-42S-B-PN50	
EzM2-42M-A-PN3	1:3
EzM2-42M-B-PN3	
EzM2-42M-A-PN5	1:5
EzM2-42M-B-PN5	
EzM2-42M-A-PN8	1:8
EzM2-42M-B-PN8	
EzM2-42M-A-PN10	1:10
EzM2-42M-B-PN10	
EzM2-42M-A-PN15	1:15
EzM2-42M-B-PN15	
EzM2-42M-A-PN25	1:25
EzM2-42M-B-PN25	
EzM2-42M-A-PN40	1:40
EzM2-42M-B-PN40	
EzM2-42M-A-PN50	1:50
EzM2-42M-B-PN50	
EzM2-42L-A-PN3	1:3
EzM2-42L-B-PN3	
EzM2-42L-A-PN5	1:5
EzM2-42L-B-PN5	
EzM2-42L-A-PN8	1:8
EzM2-42L-B-PN8	
EzM2-42L-A-PN10	1:10
EzM2-42L-B-PN10	
EzM2-42L-A-PN15	1:15
EzM2-42L-B-PN15	
EzM2-42L-A-PN25	1:25
EzM2-42L-B-PN25	
EzM2-42L-A-PN40	1:40
EzM2-42L-B-PN40	
EzM2-42L-A-PN50	1:50
EzM2-42L-B-PN50	
EzM2-42XL-A-PN3	1:3
EzM2-42XL-B-PN3	
EzM2-42XL-A-PN5	1:5
EzM2-42XL-B-PN5	
EzM2-42XL-A-PN8	1:8
EzM2-42XL-B-PN8	
EzM2-42XL-A-PN10	1:10
EzM2-42XL-B-PN10	
EzM2-42XL-A-PN15	1:15
EzM2-42XL-B-PN15	
EzM2-42XL-A-PN25	1:25
EzM2-42XL-B-PN25	
EzM2-42XL-A-PN40	1:40
EzM2-42XL-B-PN40	
EzM2-42XL-A-PN50	1:50
EzM2-42XL-B-PN50	

Motor Model Number	Reduction gear ratio
EzM2-56S-A-PN3	1:3
EzM2-56S-B-PN3	
EzM2-56S-A-PN5	1:5
EzM2-56S-B-PN5	
EzM2-56S-A-PN8	1:8
EzM2-56S-B-PN8	
EzM2-56S-A-PN10	1:10
EzM2-56S-B-PN10	
EzM2-56S-A-PN15	1:15
EzM2-56S-B-PN15	
EzM2-56S-A-PN25	1:25
EzM2-56S-B-PN25	
EzM2-56S-A-PN40	1:40
EzM2-56S-B-PN40	
EzM2-56S-A-PN50	1:50
EzM2-56S-B-PN50	
EzM2-56M-A-PN3	1:3
EzM2-56M-B-PN3	
EzM2-56M-A-PN5	1:5
EzM2-56M-B-PN5	
EzM2-56M-A-PN8	1:8
EzM2-56M-B-PN8	
EzM2-56M-A-PN10	1:10
EzM2-56M-B-PN10	
EzM2-56M-A-PN15	1:15
EzM2-56M-B-PN15	
EzM2-56M-A-PN25	1:25
EzM2-56M-B-PN25	
EzM2-56M-A-PN40	1:40
EzM2-56M-B-PN40	
EzM2-56M-A-PN50	1:50
EzM2-56M-B-PN50	
EzM2-56L-A-PN3	1:3
EzM2-56L-B-PN3	
EzM2-56L-A-PN5	1:5
EzM2-56L-B-PN5	
EzM2-56L-A-PN8	1:8
EzM2-56L-B-PN8	
EzM2-56L-A-PN10	1:10
EzM2-56L-B-PN10	
EzM2-56L-A-PN15	1:15
EzM2-56L-B-PN15	
EzM2-56L-A-PN25	1:25
EzM2-56L-B-PN25	
EzM2-56L-A-PN40	1:40
EzM2-56L-B-PN40	
EzM2-56L-A-PN50	1:50
EzM2-56L-B-PN50	

Motor Model Number	Reduction gear ratio
EzM2-60S-A-PN3	1:3
EzM2-60S-B-PN3	
EzM2-60S-A-PN5	1:5
EzM2-60S-B-PN5	
EzM2-60S-A-PN8	1:8
EzM2-60S-B-PN8	
EzM2-60S-A-PN10	1:10
EzM2-60S-B-PN10	
EzM2-60S-A-PN15	1:15
EzM2-60S-B-PN15	
EzM2-60S-A-PN25	1:25
EzM2-60S-B-PN25	
EzM2-60S-A-PN40	1:40
EzM2-60S-B-PN40	
EzM2-60S-A-PN50	1:50
EzM2-60S-B-PN50	
EzM2-60M-A-PN3	1:3
EzM2-60M-B-PN3	
EzM2-60M-A-PN5	1:5
EzM2-60M-B-PN5	
EzM2-60M-A-PN8	1:8
EzM2-60M-B-PN8	
EzM2-60M-A-PN10	1:10
EzM2-60M-B-PN10	
EzM2-60M-A-PN15	1:15
EzM2-60M-B-PN15	
EzM2-60M-A-PN25	1:25
EzM2-60M-B-PN25	
EzM2-60M-A-PN40	1:40
EzM2-60M-B-PN40	
EzM2-60M-A-PN50	1:50
EzM2-60M-B-PN50	
EzM2-60L-A-PN3	1:3
EzM2-60L-B-PN3	
EzM2-60L-A-PN5	1:5
EzM2-60L-B-PN5	
EzM2-60L-A-PN8	1:8
EzM2-60L-B-PN8	
EzM2-60L-A-PN10	1:10
EzM2-60L-B-PN10	
EzM2-60L-A-PN15	1:15
EzM2-60L-B-PN15	
EzM2-60L-A-PN25	1:25
EzM2-60L-B-PN25	
EzM2-60L-A-PN40	1:40
EzM2-60L-B-PN40	
EzM2-60L-A-PN50	1:50
EzM2-60L-B-PN50	

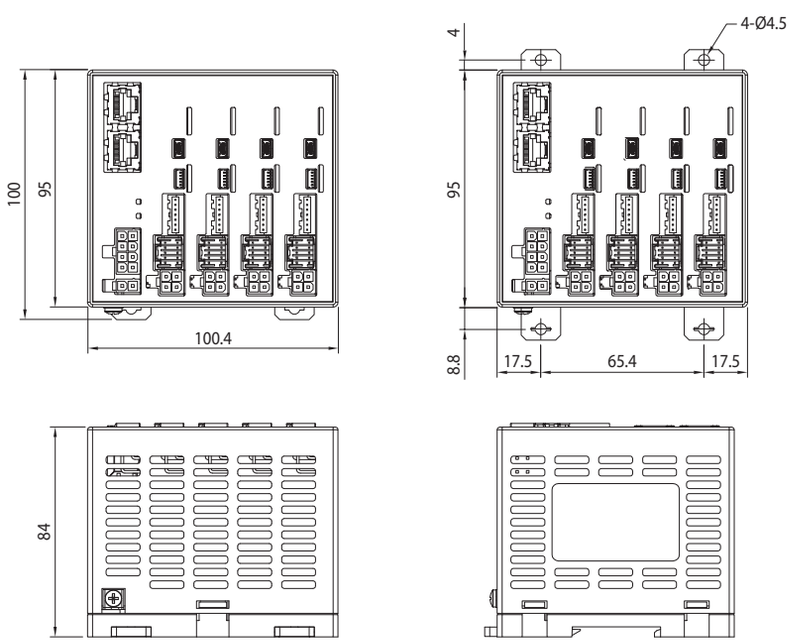
Specifications of Drive

Motor Model		EzM2-20 series	EzM2-28 series	EzM2-35 series	EzM2-42 series	EzM2-56 series	EzM2-60 series
Driver Model		EzS2-EC-4X, 3X, 2X series					
Input Voltage		24VDC ±10%					
Control Method		Closed loop control with 32bit MCU					
Current Consumption		Max 500mA/axis (Except motor current)					
Operating Condition	Ambient Temperature	· In Use: 0~50℃ · In Storage: -20~70℃					
	Humidity	· In Use: 35~85% RH (Non-Condensing) · In Storage: 10~90% RH (Non-Condensing)					
	Vib. Resist.	0.5g					
Function	Rotation Speed	0~3,000 [rpm] *1					
	Resolution [ppr]	4,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 4,000 10,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 16,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 16,000 20,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 20,000 (Selectable by parameter) *2					
	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					
	LED Display	Power status, In-Position status, Servo On status, Alarm status					
EtherCAT	Supported Protocol	CoE (CiA 402 Drive Profile), FoE (Firmware Download)					
	Supported Mode	Profile Position Mode, Homing Mode, Cyclic Synchronous Position Mode					
	Synchronization	Free Run, SM Event, DC SYNC Event					
I/O Signal	Input Signals	3 dedicated inputs (LIMIT+, LIMIT-, ORIGIN)					
	Output Signals	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]



※ Can be installed on DIN Rail. (35mm)

※ Outer dimension of 2X and 3X drive is the same as 4X.

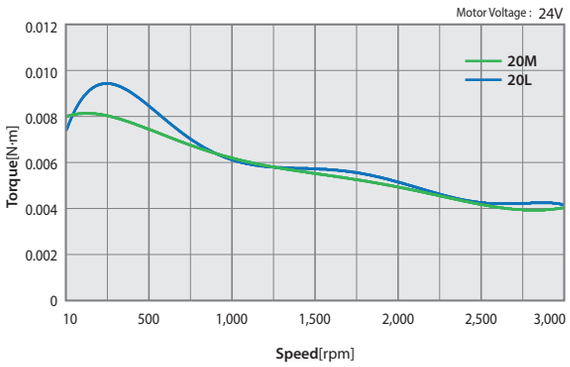
● Specifications of Motor

MODEL			EzM2-20 series		EzM2-28 series			EzM2-35 series		EzM2-42 series			
		UNIT	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
VOLTAGE		VDC	2.75	3.0	3.0	3.0	3.0	1.8	2.7	3.36	4.32	4.56	7.2
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
RESISTANCE per PHASE		Ohm	5.5	6.0	3.2	3.2	3.2	1.2	1.8	2.8	3.6	3.8	6.0
INDUCTANCE per PHASE		mH	2.0	2.6	2.0	2.7	3.2	1.2	2.6	5.4	7.2	8.0	15.6
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		$g \cdot cm^2$	2.5	3.3	9.0	13	18	15	20	35	54	77	114
WEIGHTS		g	50	80	110	140	200	150	180	250	280	350	500
LENGTH(L)		mm	28	38	32	45	50	32	36	34	40	48	60
PERMISSIBLE OVERHUNG LOAD (DISTANCE FROM END OF SHAFT)	3mm	N	18	18	30	30	30	22	22	22	22	22	22
	8mm		30	30	38	38	38	26	26	26	26	26	26
	13mm		–	–	53	53	53	33	33	33	33	33	33
	18mm		–	–	–	–	–	46	46	46	46	46	46
PERMISSIBLE THRUST LOAD		N	Lower than motor weight										
INSULATION RESISTANCE		Mohm	100 MIN.(at 500VDC)										
INSULATION CLASS		–	CLASS B(130℃)										
OPERATING TEMPERATURE		℃	0 to 55										

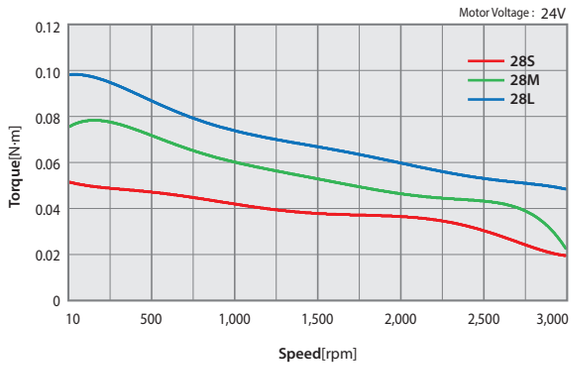
MODEL			EzM2-56 series			EzM2-60 series		
		UNIT	56S	56M	56L	60S	60M	60L
DRIVE METHOD		–	BI-POLAR					
NUMBER OF PHASES		–	2	2	2	2	2	2
VOLTAGE		VDC	1.56	1.62	2.64	1.32	1.48	2.2
CURRENT per PHASE		A	3.0	3.0	3.0	4.0	4.0	4.0
RESISTANCE per PHASE		Ohm	0.52	0.54	0.88	0.33	0.37	0.55
INDUCTANCE per PHASE		mH	1.2	2.0	4.0	0.75	1.1	2.7
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					

Torque Characteristics of Motor

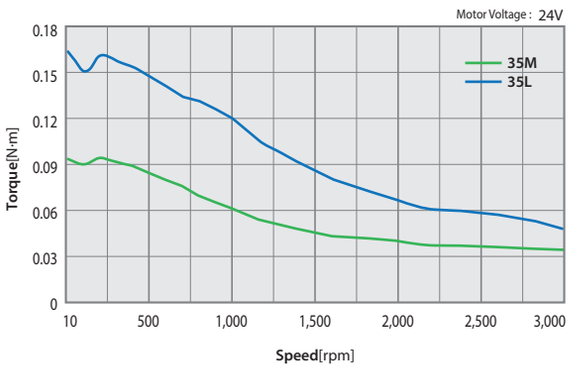
Ezi-SERVOII-EC-4X-20 series



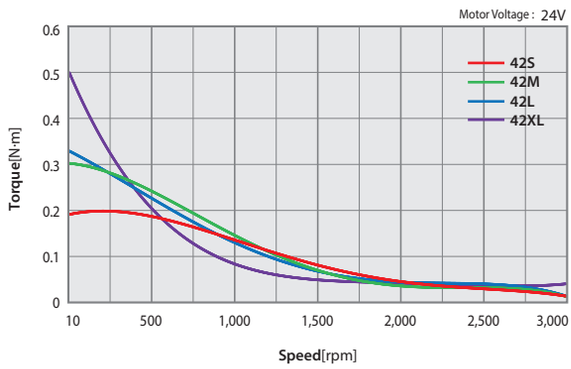
Ezi-SERVOII-EC-4X-28 series



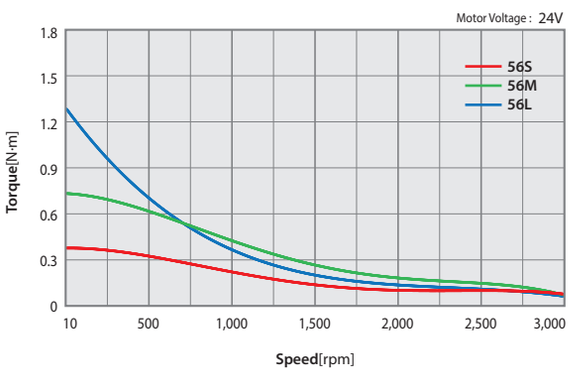
Ezi-SERVOII-EC-4X-35 series



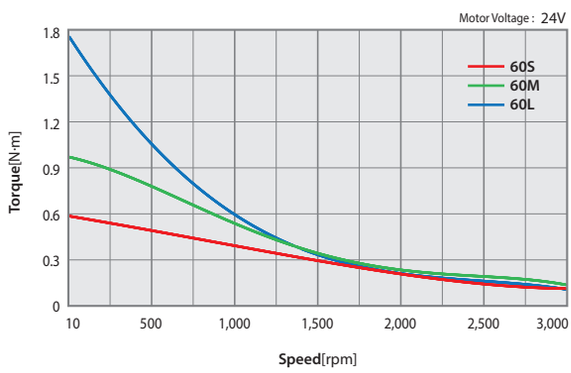
Ezi-SERVOII-EC-4X-42 series



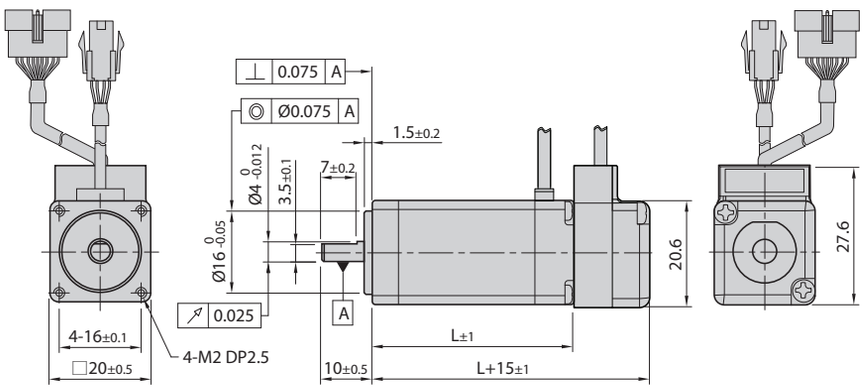
Ezi-SERVOII-EC-4X-56 series



Ezi-SERVOII-EC-4X-60 series

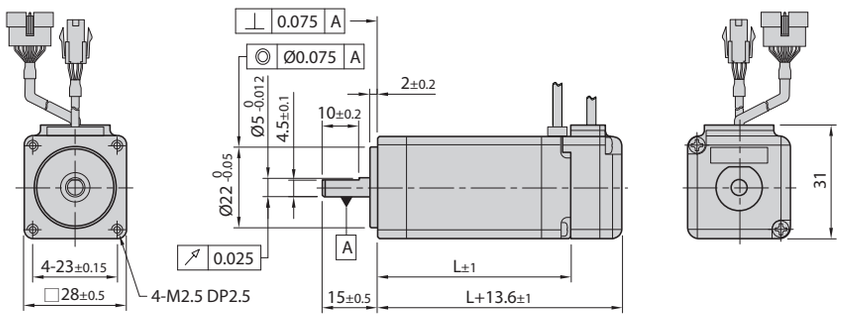


● Dimensions of Motor [mm]



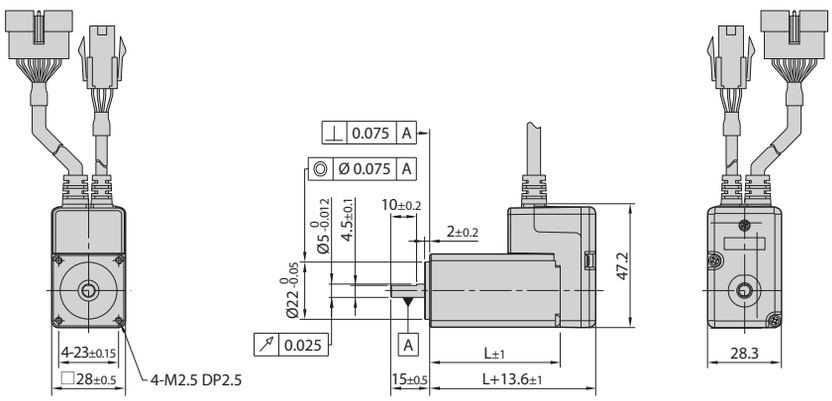
20mm

Model name	Length(L)
EzM2-20M	28
EzM2-20L	38



28mm

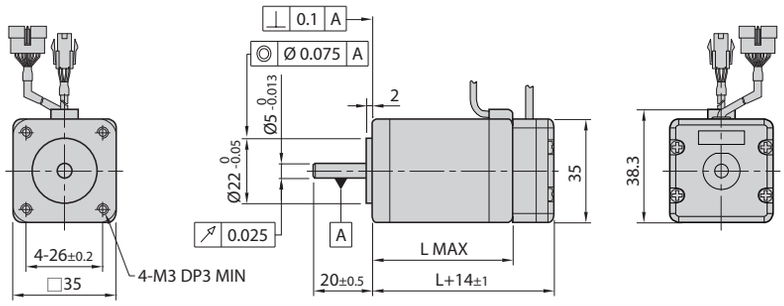
Model name	Length(L)
EzM2-28S	32
EzM2-28M	45
EzM2-28L	50



28mm (Stopper type)

Model name	Length(L)
EzM2-28SM	32
EzM2-28MM	45
EzM2-28LM	50

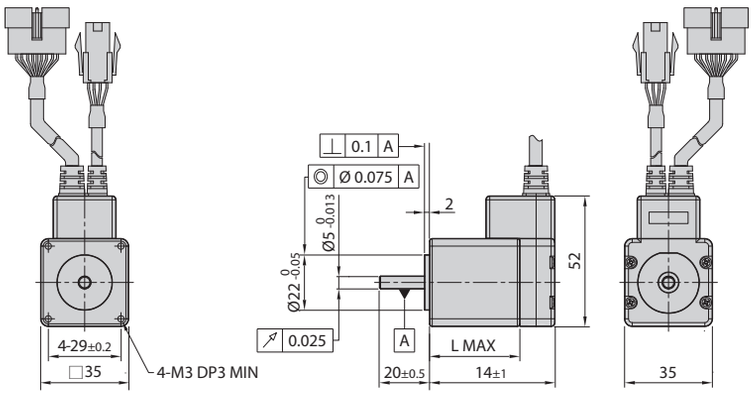
※ When ordering 28mm Stopper type of motor, please add "M" after standard motor model number.



35mm

Model name	Length(L)
EzM2-35M	26
EzM2-35L	38

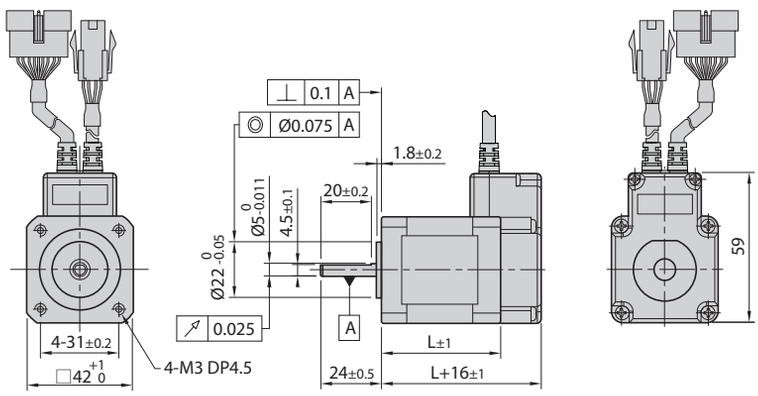
● Dimensions of Motor [mm]



35mm (Stopper type)

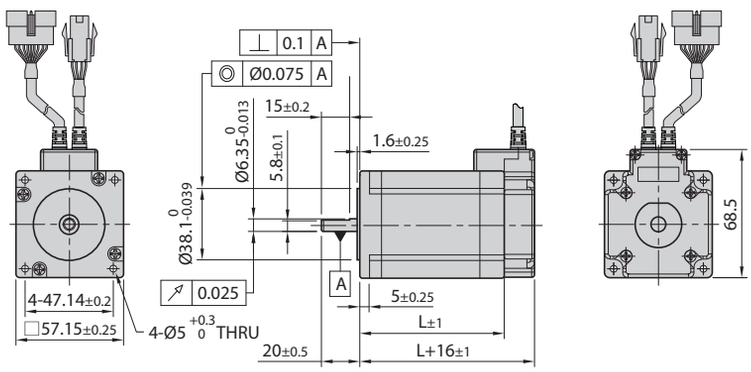
Model name	Length(L)
EzM2-35MM	32
EzM2-35LM	36

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



42mm

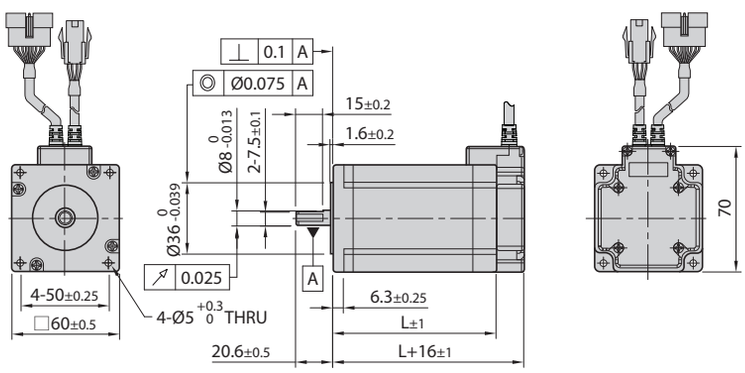
Model name	Length(L)
EzM2-42S	34
EzM2-42M	40
EzM2-42L	48
EzM2-42XL	60



56mm

Model name	Length(L)
EzM2-56S	46
EzM2-56M	55
EzM2-56L	80

※ There are 2 kinds size of front shaft diameter for EzM2-56 series as Ø6.35 and Ø8.0.



60mm

Model name	Length(L)
EzM2-60S	47
EzM2-60M	56
EzM2-60L	85

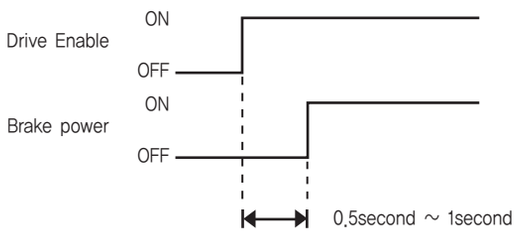
● Specifications of Motor with Brake

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	
EzM2-42S-■-BK	Non-excitation run Type	24VDC ±10%	0.2	5	0.2	510	22	26	33	46	Must be Lower than Unit's Weight
EzM2-42M-■-BK						570					
EzM2-42L-■-BK						640					
EzM2-42XL-■-BK						770					
EzM2-56S-■-BK			0.27	6.6	0.7	1030	52	65	85	123	
EzM2-56M-■-BK						1190					
EzM2-56L-■-BK						1630					
EzM2-60S-■-BK						1150	70	87	114	165	
EzM2-60M-■-BK						1350					
EzM2-60L-■-BK						1960					

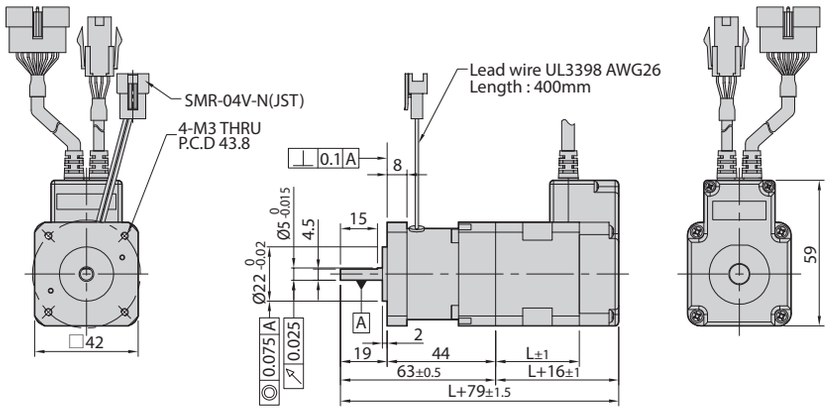
* The code of encoder resolution will be marked in "■"
* Electronic Brake cannot be used for braking. Position hold purpose only when power OFF.
* The weight means Motor Unit Weight including Motor and Electronic Brake.
* Motor Model Number is combined model name of Motor and Brake.
* Motor specification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

* Brake Operation Timing Chart

Ezi-SERVO II EtherCAT 4X controls Brake by Drive automatically.
Please refer to below Timing Chart when Brake is controlled by the upper controller other than using Ezi-SERVO II EtherCAT 4X Brake control. Otherwise, Drive malfunctioning and loads can be fall down.
Also, please do not operate Brake while motor operation to prevent damage.

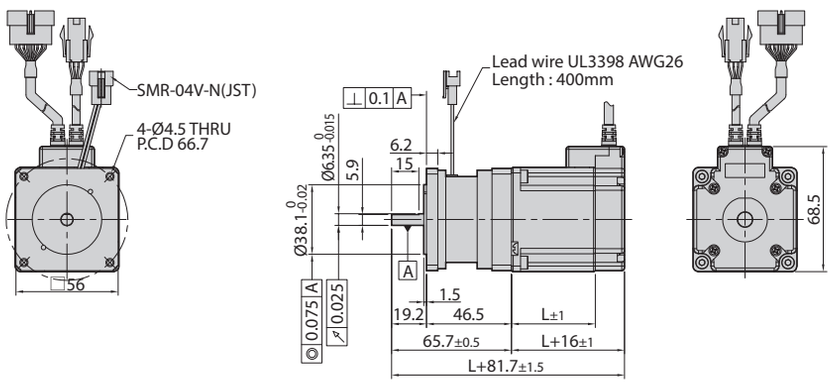


● Dimensions of Motor with Brake [mm]



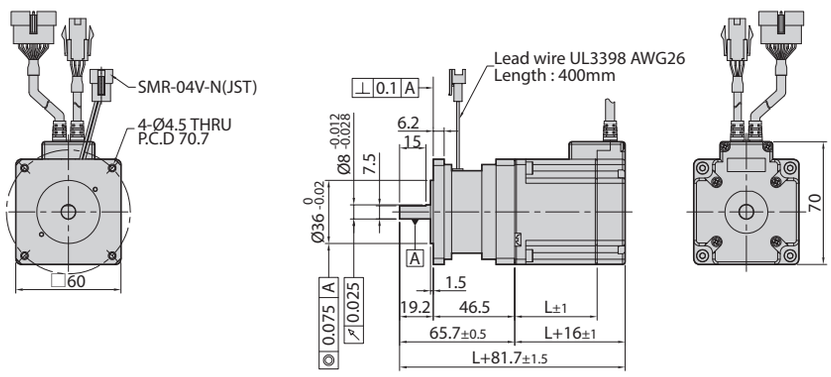
42mm

Model Name	Length(L)	Weight(kg)
EzM2-42S	34	0.51
EzM2-42M	40	0.57
EzM2-42L	48	0.64
EzM2-42XL	60	0.77



56mm

Model Name	Length(L)	Weight(kg)
EzM2-56S	46	1.03
EzM2-56M	55	1.19
EzM2-56L	80	1.63



60mm

Model Name	Length(L)	Weight(kg)
EzM2-60S	47	1.15
EzM2-60M	56	1.35
EzM2-60L	85	1.96

● Specifications of Motor with Gearbox

Ezi-SERVO II EtherCAT 4X can use up to 4 motors in one drive. Different Motor Model Number can be used for each axis.
The following table shows the Gearbox integrated Motor Models that can be used with Ezi-SERVO II EtherCAT 4X.
Refer to the Motor Model Number below.

42mm

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]
EzM2-42S-■-PN3	0.57	$35x10^{-7}$	3	5	3	0.012°	6	12	0~1000	0.89	240	270
EzM2-42S-■-PN5	0.95				5	0.0072°	9	18	0~600		290	330
EzM2-42S-■-PN8	1.52				8	0.0045°	9	18	0~375		340	410
EzM2-42S-■-PN10	1.90				10	0.0036°	6	12	0~300		360	450
EzM2-42S-■-PN15	2.76		5	7	15	0.0024°	6	12	0~200	0.99	410	540
EzM2-42S-■-PN25	4.60				25	0.00144°	9	18	0~120		490	640
EzM2-42S-■-PN40	7.36				40	0.0009°	9	18	0~75		570	640
EzM2-42S-■-PN50	9.00				50	0.00072°	9	18	0~60		620	640
EzM2-42M-■-PN3	0.85	$54x10^{-7}$	3	5	3	0.012°	6	12	0~1000	0.96	240	270
EzM2-42M-■-PN5	1.42				5	0.0072°	9	18	0~600		290	330
EzM2-42M-■-PN8	2.28				8	0.0045°	9	18	0~375		340	410
EzM2-42M-■-PN10	2.85				10	0.0036°	6	12	0~300		360	450
EzM2-42M-■-PN15	4.14		5	7	15	0.0024°	6	12	0~200	1.06	410	540
EzM2-42M-■-PN25	6.90				25	0.00144°	9	18	0~120		490	640
EzM2-42M-■-PN40	9.00				40	0.0009°	9	18	0~75		570	640
EzM2-42M-■-PN50	9.00				50	0.00072°	9	18	0~60		620	640
EzM2-42L-■-PN3	0.92	$77x10^{-7}$	3	5	3	0.012°	6	12	0~1000	1.02	240	270
EzM2-42L-■-PN5	1.54				5	0.0072°	9	18	0~600		290	330
EzM2-42L-■-PN8	2.47				8	0.0045°	9	18	0~375		340	410
EzM2-42L-■-PN10	3.09				10	0.0036°	6	12	0~300		360	450
EzM2-42L-■-PN15	4.49		5	7	15	0.0024°	6	12	0~200	1.12	410	540
EzM2-42L-■-PN25	7.49				25	0.00144°	9	18	0~120		490	640
EzM2-42L-■-PN40	9.00				40	0.0009°	9	18	0~75		570	640
EzM2-42L-■-PN50	9.00				50	0.00072°	9	18	0~60		620	640
EzM2-42XL-■-PN3	1.45	$114x10^{-7}$	3	5	3	0.012°	6	12	0~1000	1.15	240	270
EzM2-42XL-■-PN5	2.42				5	0.0072°	9	18	0~600		290	330
EzM2-42XL-■-PN8	3.87				8	0.0045°	9	18	0~375		340	410
EzM2-42XL-■-PN10	4.84				10	0.0036°	6	12	0~300		360	450
EzM2-42XL-■-PN15	6.00		5	7	15	0.0024°	6	12	0~200	1.25	410	540
EzM2-42XL-■-PN25	9.00				25	0.00144°	9	18	0~120		490	640
EzM2-42XL-■-PN40	9.00				40	0.0009°	9	18	0~75		570	640
EzM2-42XL-■-PN50	9.00				50	0.00072°	9	18	0~60		620	640

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

● Specifications of Motor with Gearbox

Ezi-SERVO II EtherCAT 4X can use up to 4 motors in one drive. Different Motor Model Number can be used for each axis.
The following table shows the Gearbox integrated Motor Models that can be used with Ezi-SERVO II EtherCAT 4X.
Refer to the Motor Model Number below.

56mm

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]
EzM2-56S-■-PN3	1.1	180x10⁻⁷	3	5	3	0.012°	18	35	0~1000	1.94	430	310
EzM2-56S-■-PN5	1.9				5	0.0072°	27	50	0~600		510	390
EzM2-56S-■-PN8	3.0				8	0.0045°	27	50	0~375		600	480
EzM2-56S-■-PN10	3.8				10	0.0036°	18	35	0~300		640	530
EzM2-56S-■-PN15	5.5				15	0.0024°	18	35	0~200	2.14	740	630
EzM2-56S-■-PN25	9.3				25	0.00144°	27	50	0~120		870	790
EzM2-56S-■-PN40	14.9				40	0.0009°	27	50	0~75		1000	970
EzM2-56S-■-PN50	18.6				50	0.00072°	27	50	0~60		1100	1100
EzM2-56M-■-PN3	2.0	280x10⁻⁷	3	5	3	0.012°	18	35	0~1000	2.15	430	310
EzM2-56M-■-PN5	3.4				5	0.0072°	27	50	0~600		510	390
EzM2-56M-■-PN8	5.4				8	0.0045°	27	50	0~375		600	480
EzM2-56M-■-PN10	6.8				10	0.0036°	18	35	0~300		640	530
EzM2-56M-■-PN15	9.9				15	0.0024°	18	35	0~200	2.35	740	630
EzM2-56M-■-PN25	16.6				25	0.00144°	27	50	0~120		870	790
EzM2-56M-■-PN40	27.0				40	0.0009°	27	50	0~75		1000	970
EzM2-56M-■-PN50	27.0				50	0.00072°	27	50	0~60		1100	1100
EzM2-56L-■-PN3	4.0	520x10⁻⁷	3	5	3	0.012°	18	35	0~1000	2.52	430	310
EzM2-56L-■-PN5	6.8				5	0.0072°	27	50	0~600		510	390
EzM2-56L-■-PN8	10.8				8	0.0045°	27	50	0~375		600	480
EzM2-56L-■-PN10	13.6				10	0.0036°	18	35	0~300		640	530
EzM2-56L-■-PN15	18.0				15	0.0024°	18	35	0~200	2.72	740	630
EzM2-56L-■-PN25	27.0				25	0.00144°	27	50	0~120		870	790
EzM2-56L-■-PN40	27.0				40	0.0009°	27	50	0~75		1000	970
EzM2-56L-■-PN50	27.0				50	0.00072°	27	50	0~60		1100	1100

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

● Specifications of Motor with Gearbox

Ezi-SERVO II EtherCAT 4X can use up to 4 motors in one drive. Different Motor Model Number can be used for each axis.
The following table shows the Gearbox integrated Motor Models that can be used with Ezi-SERVO II EtherCAT 4X.
Refer to the Motor Model Number below.

60mm

Motor Model Number	Maximum Holding Torque [N·m]	Rotor Inertia Moment [kg·m^2]	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]
EzM2-60S-■-PN3	1.5	240x10^{-7}	3	5	3	0.012°	18	35	0~1000	2.0	430	310
EzM2-60S-■-PN5	2.5				5	0.0072°	27	50	0~600		510	390
EzM2-60S-■-PN8	4.0				8	0.0045°	27	50	0~375		600	480
EzM2-60S-■-PN10	5.1				10	0.0036°	18	35	0~300		640	530
EzM2-60S-■-PN15	7.4				15	0.0024°	18	35	0~200	2.2	740	630
EzM2-60S-■-PN25	12.3				25	0.00144°	27	50	0~120		870	790
EzM2-60S-■-PN40	19.8				40	0.0009°	27	50	0~75		1000	970
EzM2-60S-■-PN50	24.7				50	0.00072°	27	50	0~60		1100	1100
EzM2-60M-■-PN3	2.6	490x10^{-7}	3	5	3	0.012°	18	35	0~1000	2.0	430	310
EzM2-60M-■-PN5	4.4				5	0.0072°	27	50	0~600		510	390
EzM2-60M-■-PN8	7.0				8	0.0045°	27	50	0~375		600	480
EzM2-60M-■-PN10	8.8				10	0.0036°	18	35	0~300		640	530
EzM2-60M-■-PN15	12.8				15	0.0024°	18	35	0~200	2.2	740	630
EzM2-60M-■-PN25	21.4				25	0.00144°	27	50	0~120		870	790
EzM2-60M-■-PN40	27.0				40	0.0009°	27	50	0~75		1000	970
EzM2-60M-■-PN50	27.0				50	0.00072°	27	50	0~60		1100	1100
EzM2-60L-■-PN3	5.2	690x10^{-7}	3	5	3	0.012°	18	35	0~1000	3.0	430	310
EzM2-60L-■-PN5	8.7				5	0.0072°	27	50	0~600		510	390
EzM2-60L-■-PN8	13.9				8	0.0045°	27	50	0~375		600	480
EzM2-60L-■-PN10	18.0				10	0.0036°	18	35	0~300		640	530
EzM2-60L-■-PN15	18.0				15	0.0024°	18	35	0~200	3.2	740	630
EzM2-60L-■-PN25	27.0				25	0.00144°	27	50	0~120		870	790
EzM2-60L-■-PN40	27.0				40	0.0009°	27	50	0~75		1000	970
EzM2-60L-■-PN50	27.0				50	0.00072°	27	50	0~60		1100	1100

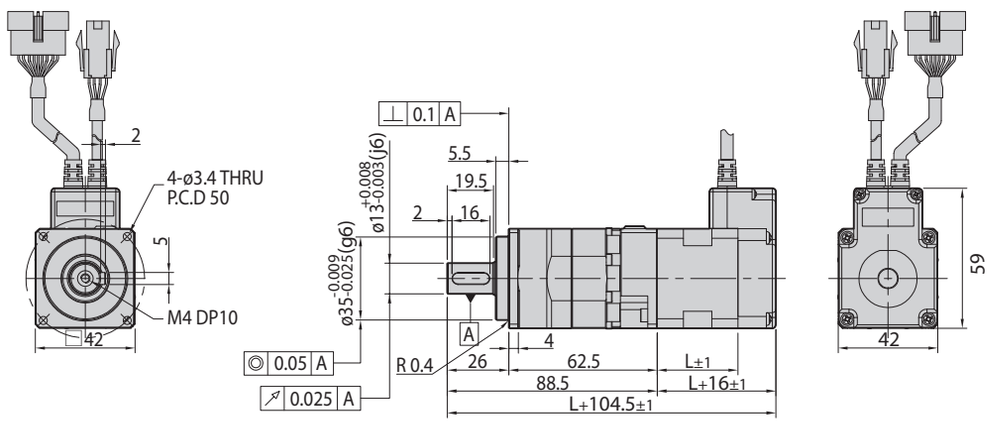
* The code of encoder resolution will be marked in "■"

● Dimensions of Motor with Gearbox [mm]

42mm

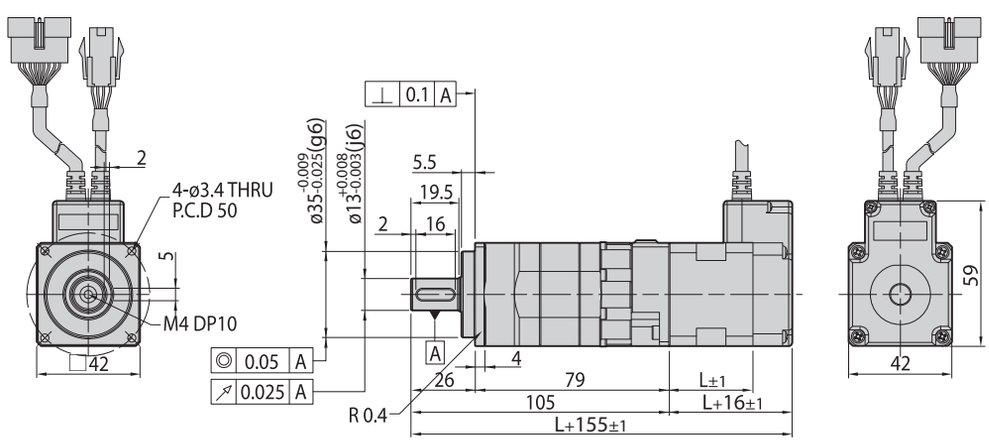
Motor	Stage	□Reduction Gear Ratio	L Length [mm]
EzM2-42S-■-PN□	Single Stage	3, 5, 8, 10	34
EzM2-42M-■-PN□		3, 5, 8, 10	40
EzM2-42L-■-PN□		3, 5, 8, 10	48
EzM2-42XL-■-PN□		3, 5, 8, 10	60

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



Motor	Stage	□Reduction Gear Ratio	L Length [mm]
EzM2-42S-■-PN□	Double Stage	15, 25, 40, 50	34
EzM2-42M-■-PN□		15, 25, 40, 50	40
EzM2-42L-■-PN□		15, 25, 40, 50	48
EzM2-42XL-■-PN□		15, 25, 40, 50	60

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

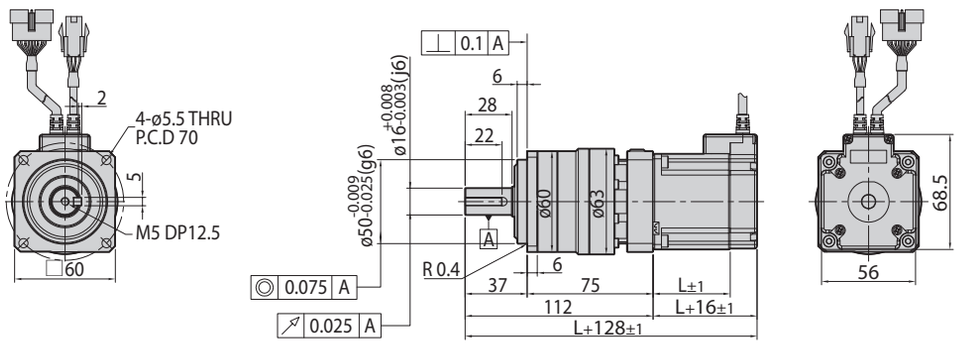


● Dimensions of Motor with Gearbox [mm]

56mm

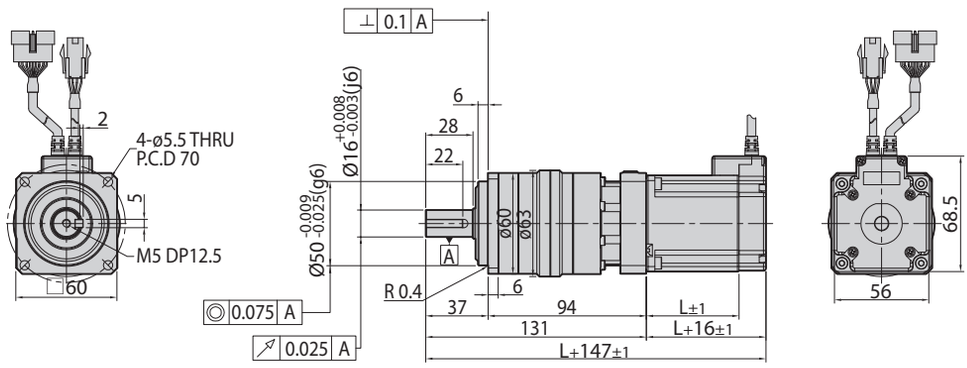
Motor	Stage	□Reduction Gear Ratio	L Length [mm]
EzM2-56S-■-PN□	Single Stage	3, 5, 8, 10	46
EzM2-56M-■-PN□		3, 5, 8, 10	55
EzM2-56L-■-PN□		3, 5, 8, 10	80

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



Motor	Stage	□Reduction Gear Ratio	L Length [mm]
EzM2-56S-■-PN□	Double Stage	15, 25, 40, 50	46
EzM2-56M-■-PN□		15, 25, 40, 50	55
EzM2-56L-■-PN□		15, 25, 40, 50	80

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

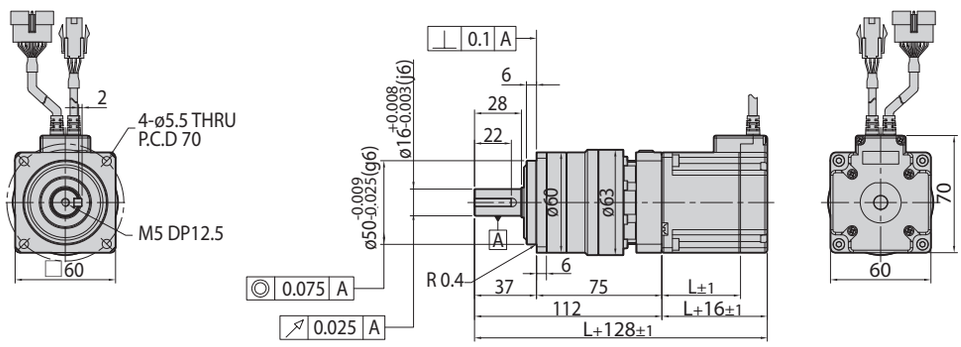


● Dimensions of Motor with Gearbox [mm]

60mm

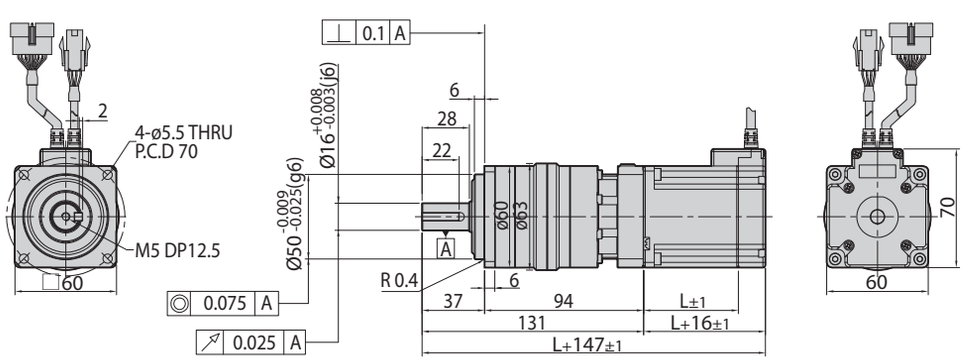
Motor	Stage	□Reduction Gear Ratio	L Length [mm]
EzM2-60S-■-PN□	Single Stage	3, 5, 8, 10	47
EzM2-60M-■-PN□		3, 5, 8, 10	56
EzM2-60L-■-PN□		3, 5, 8, 10	85

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

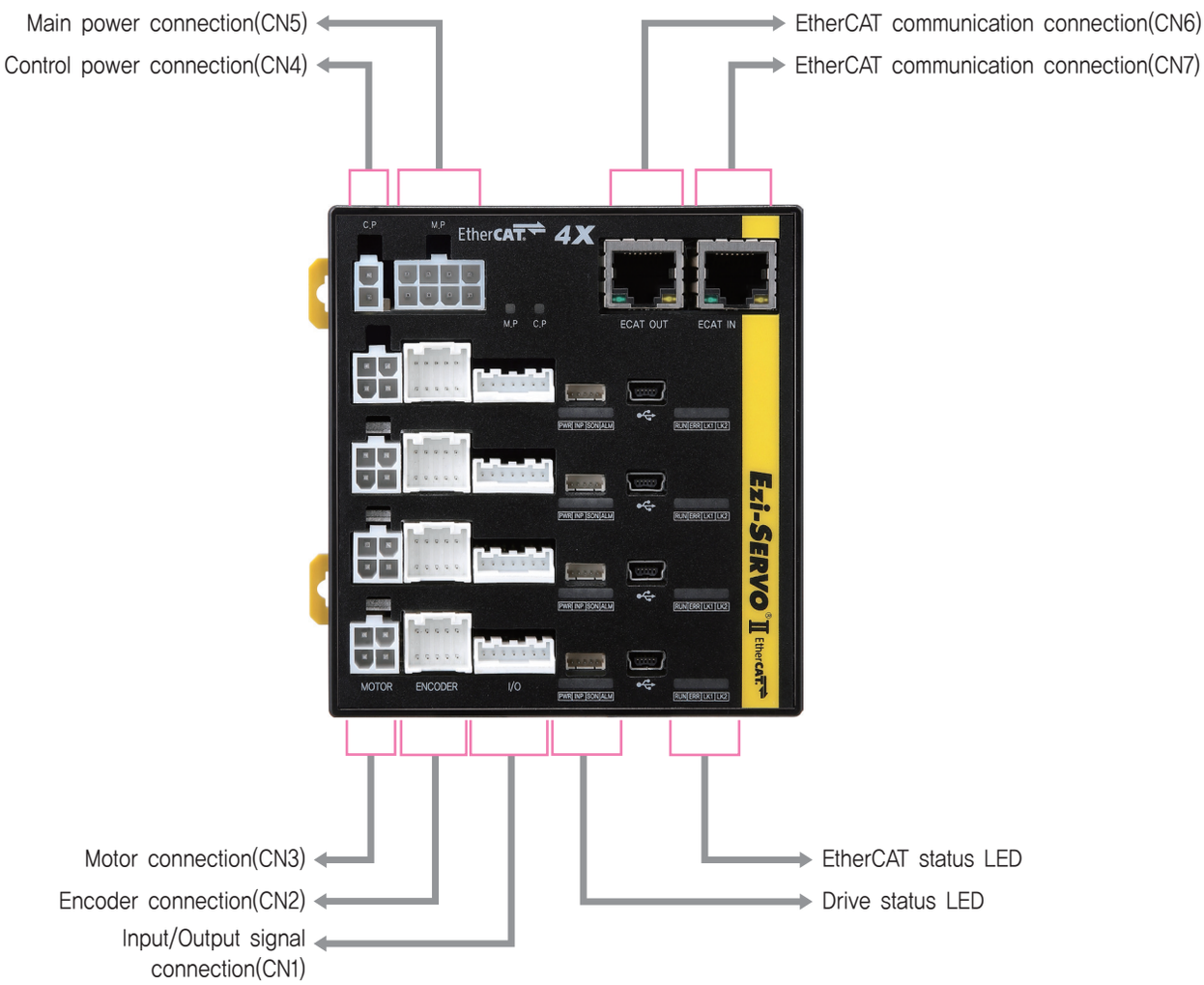


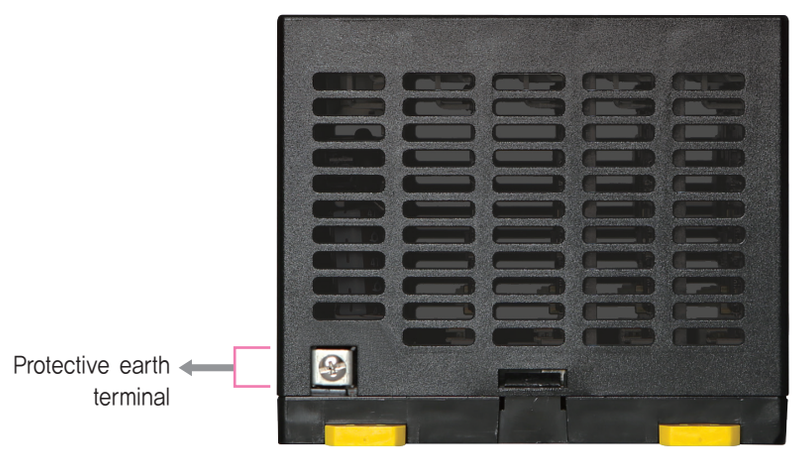
Motor	Stage	□Reduction Gear Ratio	L Length [mm]
EzM2-60S-■-PN□	Double Stage	15, 25, 40, 50	47
EzM2-60M-■-PN□		15, 25, 40, 50	56
EzM2-60L-■-PN□		15, 25, 40, 50	85

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



Settings and Operation





※ Basic configuration of 2X and 3X drive is the same as 4X and only difference is number of axis.

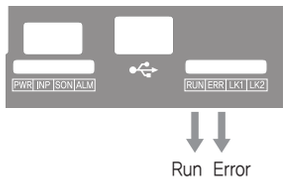
1. EtherCAT Status LED

LED indicates communication status of EtherCAT.

Name	Indication	Color	Status	Explanation
Run	RUN	Green	OFF	State INIT or Power OFF
			Blinking	State PRE-OPERATIONAL
			Single Flash	State SAFE-OPERATIONAL
			ON	State OPERATIONAL
			Flickering	State BOOTSTRAP

Name	Indication	Color	Status	Explanation
Error	ERR	Red	OFF	No Error or Power OFF
			Blinking	Invalid Configuration
			Single Flash	Local Error
			Double Flash	Watchdog Time Out

Name	Indication	Color	Status	Explanation
Link/ Activity	LK1 LK2	Green	OFF	Link not Established
			ON	Link Established
			Flickering	Link Established and in Operation

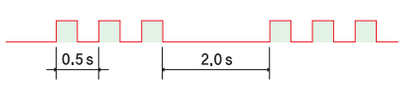


2. Drive Status LED

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 parameter
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 *1
4	Over Load Error	The motor is continuously operated more than 5 seconds under a load exceeding the max. torque
5	Over Temperature Error	Inside temperature of drive exceeds 85℃
6	Over Regenerative Voltage Error	Back-EMF is higher than 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
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 *1



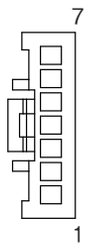
Alarm LED flash
(Ex, Position Tracking Error)

*1 : Default value can be changed by parameter. (Refer to the Manual)

※ For the details, please refer to the Manual.

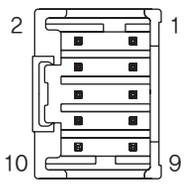
3. Input/Output Signal Connector(CN1)

NO.	Function	I/O
1	EXT_24VDC	Input
2	EXT_GND	Input
3	LIMIT+	Input
4	LIMIT−	Input
5	ORIGIN	Input
6	BRAKE+	Output
7	BRAKE−	Output



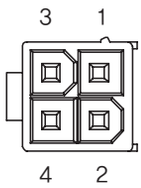
4. Encoder Connector(CN2)

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	----



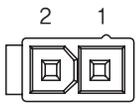
5. Motor Connector(CN3)

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



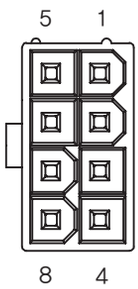
6. Control Power Connector(CN4)

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



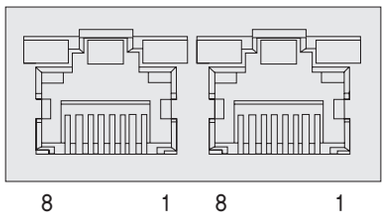
7. Main Power Connector(CN5)

NO.	Function	I/O
1	24VDC	Input
2	24VDC	Input
3	24VDC	Input
4	F.GND	----
5	GND	Input
6	GND	Input
7	GND	Input
8	F.GND	----

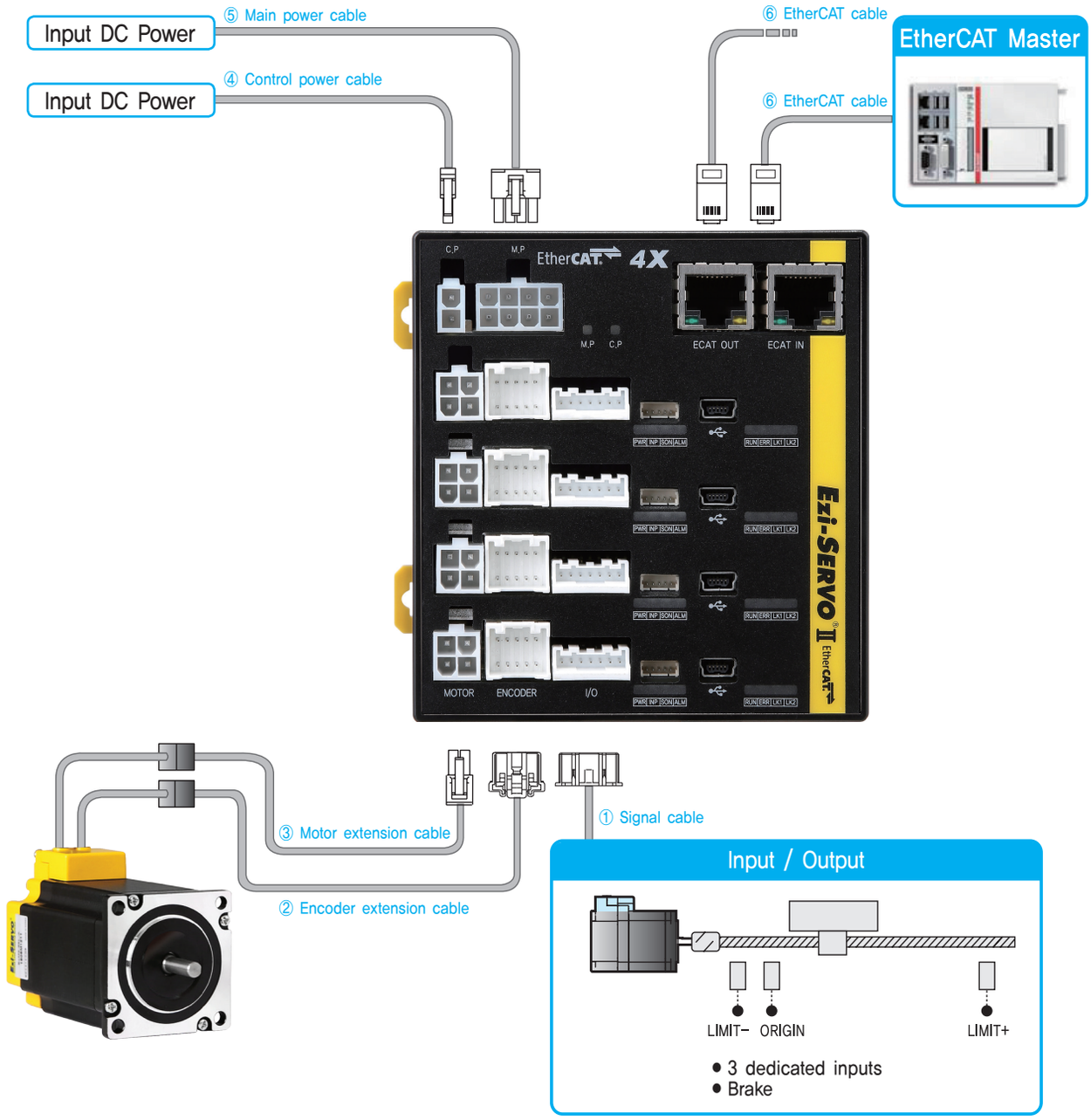


8. EtherCAT Communication Connector(CN6, CN7)

NO.	Function	NO.	Function
1	TD+	6	RD−
2	TD−	7	----
3	RD+	8	----
4	----	Connection hood	F.GND
5	----		



System Configuration



Type	Signal Cable	Encoder Cable	Motor Cable	Control Power Cable	Main Power Cable	EtherCAT Cable
Length supplied	–	30cm	30cm	–	–	–
Max. Length	20m	20m	20m	2m	2m	100m

※ Basic configuration of 2X and 3X drive is the same as 4X and only difference is number of axis.

1. Options

① Signal Cable

Available to connect between Input/Output signals and Ezi-SERVO II EtherCAT 4X.

Item	Length [m]	Remark
CECM-S-□□□F	□□□	Normal Cable
CECM-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 II EtherCAT 4X.

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

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

③ Motor Extension Cable

Available to extended connection between motor and Ezi-SERVO II EtherCAT 4X.

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

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

④ Control Power Cable

Available to connect between Power and Ezi-SERVO II EtherCAT 4X.

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

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

⑤ Main Power Cable

Available to connect between Main Power and Ezi-SERVO II EtherCAT 4X.

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

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

⑤ EtherCAT Cable

STP(Shielded twisted pair) cable of category 5e or higher.

Item	Length [m]	Remark
CGNR-EC-□□□F	□□□	Normal Cable

□ is for Cable Length. The unit is 1m and Max. 100m length.

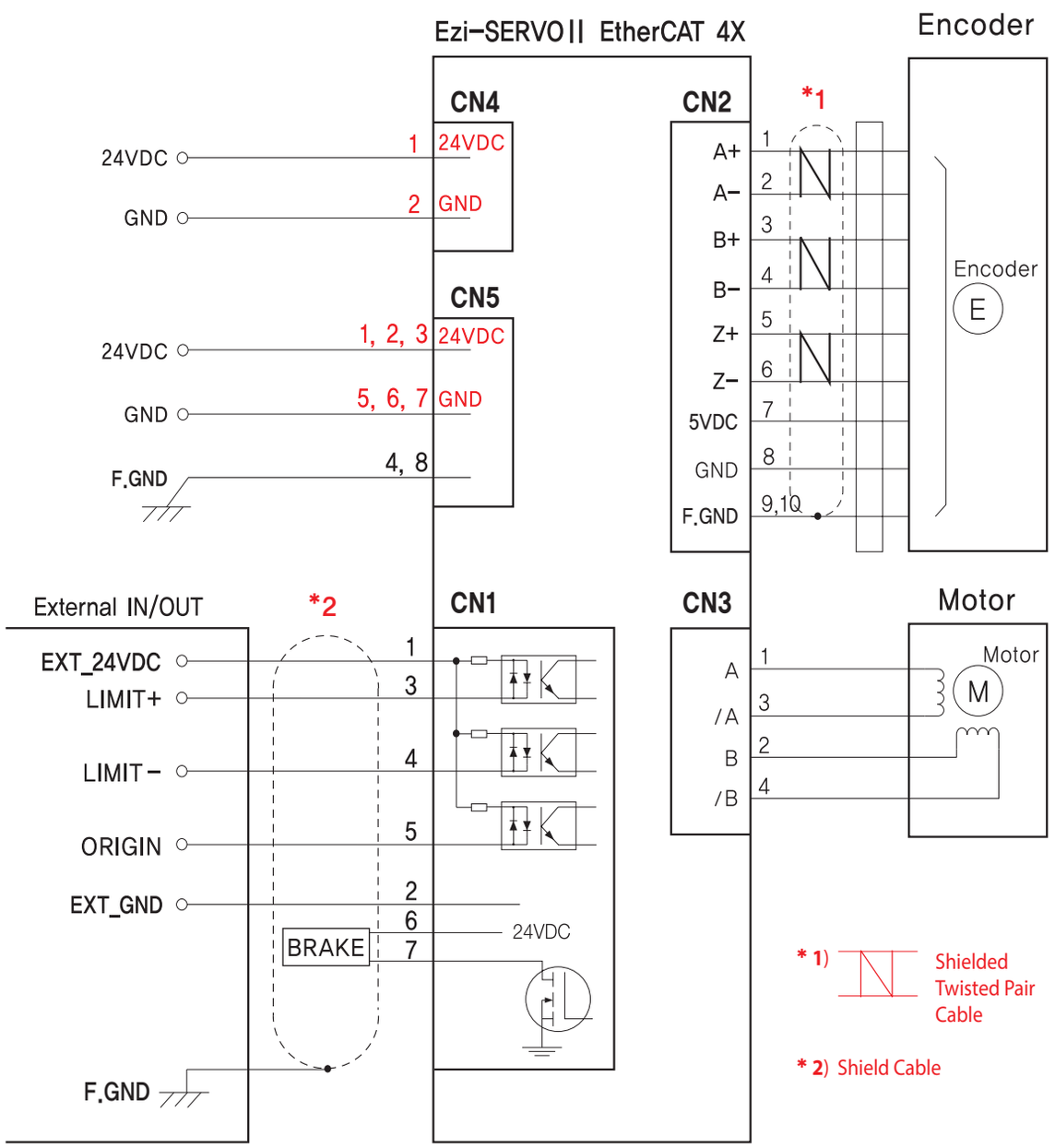
2. Connector Specifications

Connector specifications for cabling to drive.

Purpose		Item	Part Number	Manufacturer
Main Power (CN5)		Housing Terminal	5557-08R 5556T	MOLEX
Control Power (CN4)		Housing Terminal	5557-02R 5556T	MOLEX
Motor	Drive Side (CN3)	Housing Terminal	5557-04R 5556T	MOLEX
	Motor Side	Housing Terminal	5557-04R 5556T	MOLEX
Encoder	Drive Side (CN2)	Housing Terminal	51353-1000 56134-9000	MOLEX
	Encoder Side	Housing Terminal	SMP-09V-NC SHF-001T-0.8BS	JST
Signal (CN1)		Housing Terminal	PAP-07V-S SPHD-001T-P0.5	JST

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

External Wiring Diagram



※ 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.

MEMO

FASTECH

Fast, Accurate, Smooth Motion

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