

Ezi-SERVO[®]

Closed Loop Stepping System

- Miniaturized Compact Size
- Embedded Controller
- Position Table
- Closed Loop System
- No Gain Tuning / No Hunting
- High Resolution / Fast Response

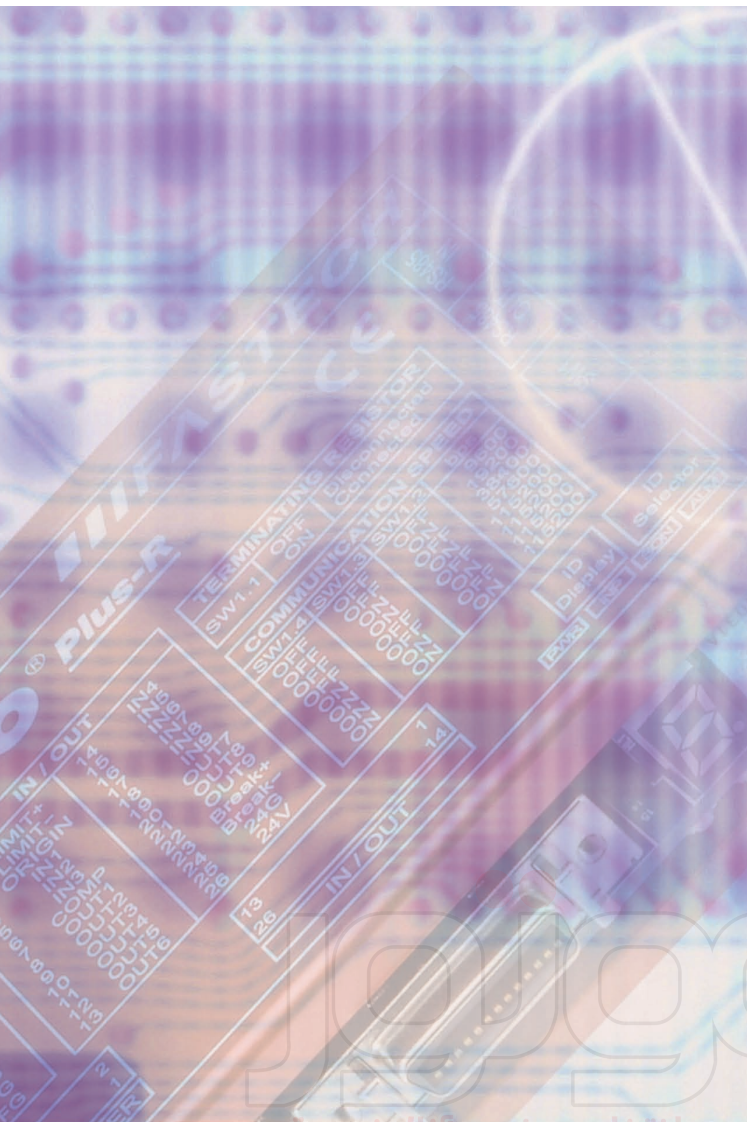
**Plus-R
MINI**





Ezi-SERVO[®] **Plus-R MINI**

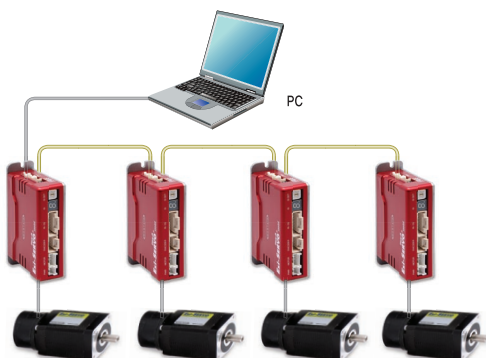
Closed Loop Stepping System



بررسی، انتخاب و خرید آنلاین موتور

1 Network Based Motion Control

A maximum of 16 axis can be operated from a PC through RS-485 communications. All of the Motion conditions are set through the network and saved in Flash ROM as a parameter. Motion Library(DLL) is provided for programming under Windows 2000/XP.



2 Position Table Function

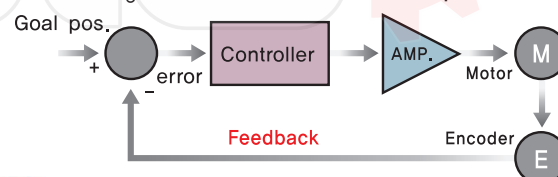
Position Table can be used for motion control by digital input and output signals of host controller. You can operate the motor directly by sending the position table number, start/stop, origin search and other digital input values from a PLC.

The PLC can monitor the In-position, origin search, moving/stop, servo ready and other digital output signals from a drive. A maximum of 256 positioning points can be set from PLC.



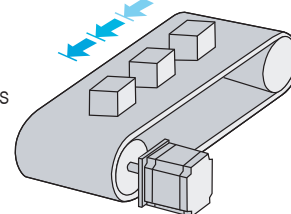
3 Closed Loop System

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



4 No Gain Tuning

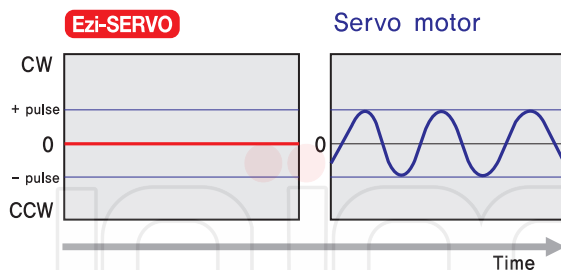
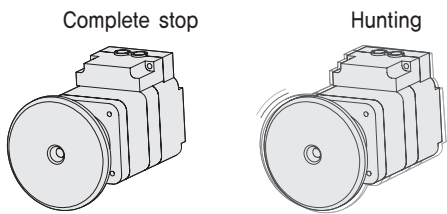
Conventional servo systems, to ensure machine performance, smoothness, positional error and low servo noise, require the adjustment of its servo's gains as an initial crucial step. Even systems that employ auto-tuning require manual tweaking after the system is installed, especially if more than one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



5

No Hunting

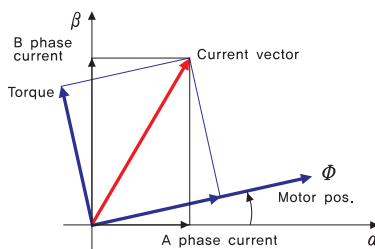
Traditional servo motor drives overshoot their position and try to correct by overshooting the opposite direction, especially in high gain applications. This is called null hunt and is especially prevalent in systems that the break away or static friction is significantly higher than the running friction.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



6

Smooth and Accurate

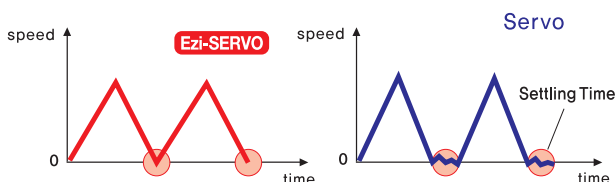
Ezi-SERVO® is a high-precision servo drive, using a high-resolution encoder with 32,000 pulses/revolution. Unlike a conventional Microstep drive, the on-board high performance DSP (Digital Signal Processor) performs vector control and filtering, producing a smooth rotational control with minimum ripples.



7

Fast Response

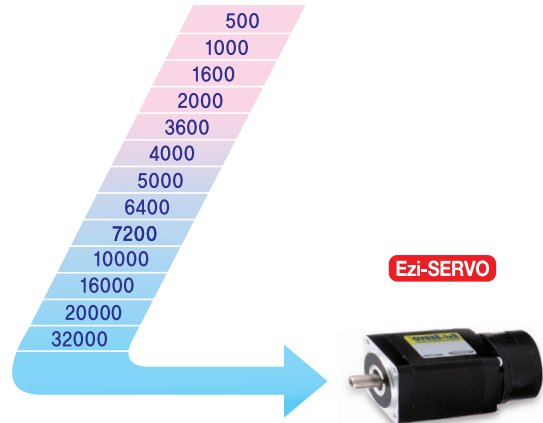
Similar to conventional stepping motors, Ezi-SERVO® instantly synchronizes with command pulses providing fast positional response. Ezi-SERVO® is the optimum choice when zero-speed stability and rapid motions within a short distance are required. Traditional servo motor systems have a natural delay between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



8

High Resolution

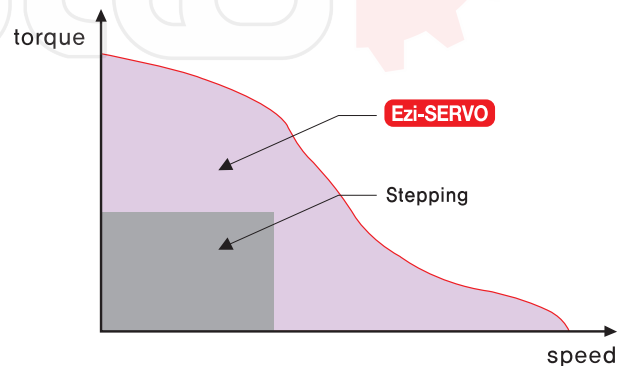
The unit of the position command can be divided precisely. (Max. 32,000 pulses/revolution)



9

High Torque

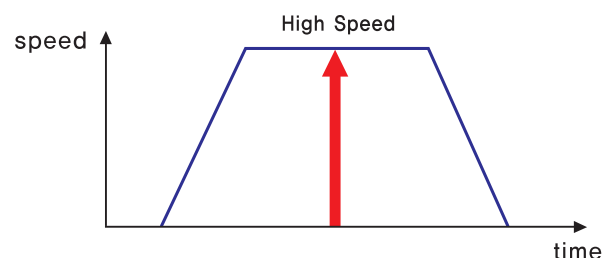
Compared with common step motors and drives, Ezi-SERVO® motion control systems can maintain a high torque state over relatively long period of time. This means that Ezi-SERVO continuously operates without loss of position under 100% of the load. Unlike conventional Microstep drives, Ezi-SERVO® exploits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



10

High Speed

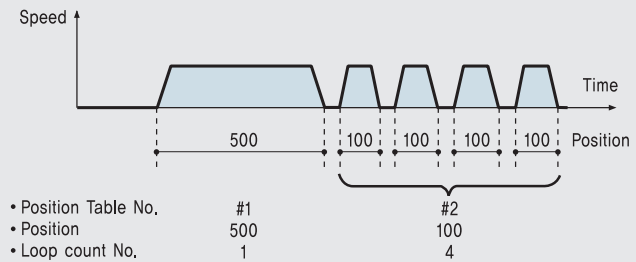
The Ezi-SERVO® functions well at high speed without the loss of Synchronism or positioning error. Ezi-SERVO®'s ability of continuous monitoring of current position enables the stepping motor to generate high-torque, even under a 100% load condition.



● Features of Motion Controller

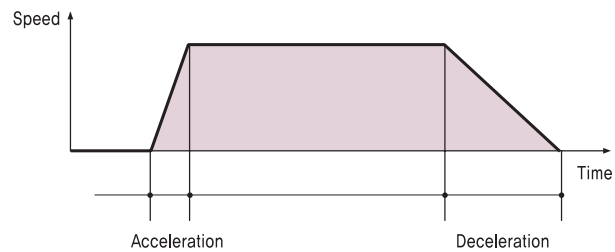
1. Loop Count

This function allows positioning repeatedly according to the Loop Count Number.



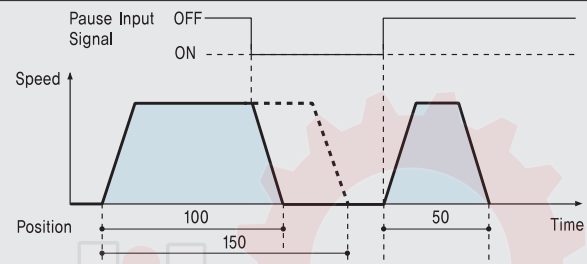
2. Acceleration/Deceleration

For quick acceleration and gradual deceleration, you can set each acceleration and deceleration time separately.



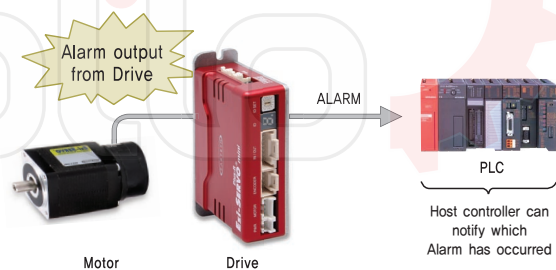
3. Pause

You can pause the motion upon the input of an external signal. When Pause signal change to OFF, the motor will restart to original target position.



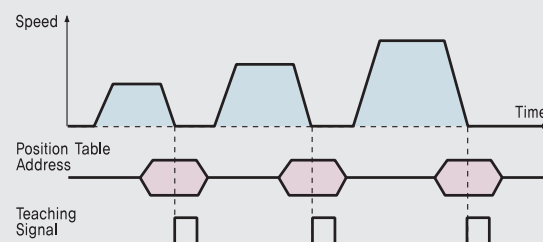
4. Alarm

The number of 7-Segment flashing time indicates which Alarm has occurred.



5. Teaching

Teaching signal is used to memorize current Position data into the selected Position Table item.

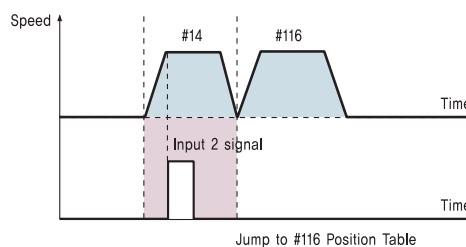
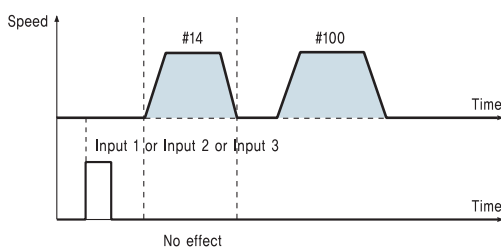


6. Jump

Within one Position Table, you can select various Position Table numbers that you want to jump. With three external input signal during movement, the next jump Position Table number can be select.

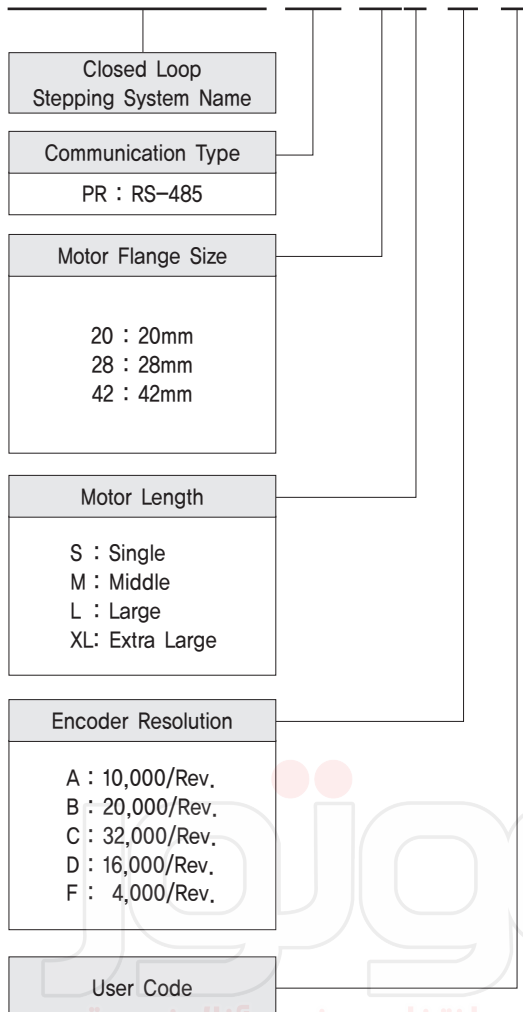
◆ Position Table #14

Position	---	Next	---	Input 1	Input 2	Input 3	---
10000		100		115	116	117	



● Part Numbering

Ezi-SERVO-MI-PR-28S-A-□



● Combination List of Ezi-SERVO MINI PR

Unit Part Number	Motor Model Number	Drive Model Number
Ezi-SERVO-MI-PR-20M-F	EzM-20M-F	EzS-NDR-MI-20M-F
Ezi-SERVO-MI-PR-20L-F	EzM-20L-F	EzS-NDR-MI-20L-F
Ezi-SERVO-MI-PR-28S-D	EzM-28S-D	EzS-NDR-MI-28S-D
Ezi-SERVO-MI-PR-28M-D	EzM-28M-D	EzS-NDR-MI-28M-D
Ezi-SERVO-MI-PR-28L-D	EzM-28L-D	EzS-NDR-MI-28L-D
Ezi-SERVO-MI-PR-42S-A	EzM-42S-A	EzS-NDR-MI-42S-A
Ezi-SERVO-MI-PR-42S-B	EzM-42S-B	EzS-NDR-MI-42S-B
Ezi-SERVO-MI-PR-42S-C	EzM-42S-C	EzS-NDR-MI-42S-C
Ezi-SERVO-MI-PR-42M-A	EzM-42M-A	EzS-NDR-MI-42M-A
Ezi-SERVO-MI-PR-42M-B	EzM-42M-B	EzS-NDR-MI-42M-B
Ezi-SERVO-MI-PR-42M-C	EzM-42M-C	EzS-NDR-MI-42M-C
Ezi-SERVO-MI-PR-42L-A	EzM-42L-A	EzS-NDR-MI-42L-A
Ezi-SERVO-MI-PR-42L-B	EzM-42L-B	EzS-NDR-MI-42L-B
Ezi-SERVO-MI-PR-42L-C	EzM-42L-C	EzS-NDR-MI-42L-C
Ezi-SERVO-MI-PR-42XL-A	EzM-42XL-A	EzS-NDR-MI-42XL-A
Ezi-SERVO-MI-PR-42XL-B	EzM-42XL-B	EzS-NDR-MI-42XL-B
Ezi-SERVO-MI-PR-42XL-C	EzM-42XL-C	EzS-NDR-MI-42XL-C

● Advantages over Open-loop Control Stepping Drive

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

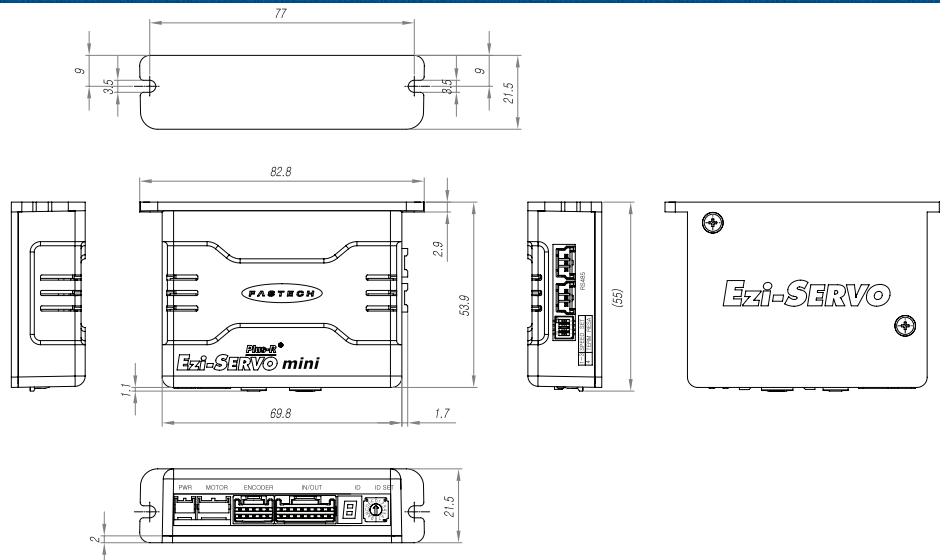
● Advantages over Servo Motor Controller

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

● Specifications

Motor Model		EzM-20 series	EzM-28 series	EzM-42 series
Driver Model		EzS-NDR-MI-20 series	EzS-NDR-MI-28 series	EzS-PD-42 series
Input Voltage		24VDC \pm 10%	24VDC \pm 10%	24VDC \pm 10%
Control Method		Closed loop control with 32bit DSP		
Multi Axes Drive		Maximum 16 axes through Daisy-Chain		
Position Table		64 motion command steps(Continuous, Wait, Loop, Jump and External start etc.)		
Current Consumption		Max 500mA (Except motor current)		
Operating Condition	Ambient Temperature	In Use : 0~55℃ In Storage : -20~70℃		
	Humidity	In Use : 35~85% (Non-condensing) In Storage : 10~90% (Non-condensing)		
	Vib. Resist.	0.5G		
Function	Rotation Speed	0~3000rpm		
	Resolution(P/R)	4000/Rev. Encoder model : 500, 1000, 1600, 2000, 3600, 5000, 6400, 7200, 10000, 4000 10000/Rev. Encoder model : 500, 1000, 1600, 2000, 3600, 5000, 6400, 7200, 10000 16000/Rev. Encoder model : 500, 1000, 1600, 2000, 3600, 5000, 6400, 7200, 10000, 16000 20000/Rev. Encoder model : 500, 1000, 1600, 2000, 3600, 5000, 6400, 7200, 10000, 20000 32000/Rev. Encoder model : 500, 1000, 1600, 2000, 3600, 5000, 6400, 7200, 10000, 32000 (Selectable with Rotary switch)		
	Protection Functions	Over current, Over speed, Position tracking error, Over load, Over temperature, Over regenerated voltage, Motor connect error, Encoder connect error, Motor voltage error, Inposition error, System error, ROM error, Position overflow error		
	LED Display	Power status, Alarm status, In-Position status, Servo On status		
	In-Position Selection	0~15(Selectable by parameter)		
	Position Gain Selection	0~15(Selectable by parameter)		
	Rotational Direction	CW / CCW (Selectable by parameter)		
I/O Signal	Input Signal	3 dedicated input (LIMIT+, LIMIT-, ORIGIN), 7 programmable input (photocoupler)		
	Output Signal	1 dedicated output (Compare Out), 1 programmable output (photocoupler), BRAKE signal		
Communication Interface		The RS-485 serial communication with PC Transmission speed : 9,600~921,600[bps]		
Position Control		Incremental mode/Absolute mode Data Range : -134,217,727 to +134,217,727[pulse], Operating speed : Max. 3000[rpm]		
Return to Origin		Origin Sensor, Z phase, \pm Limit sensor, Torque		
GUI		User Interface Program within Windows		
Software		Motion Library (DLL) for windows 2000/XP		

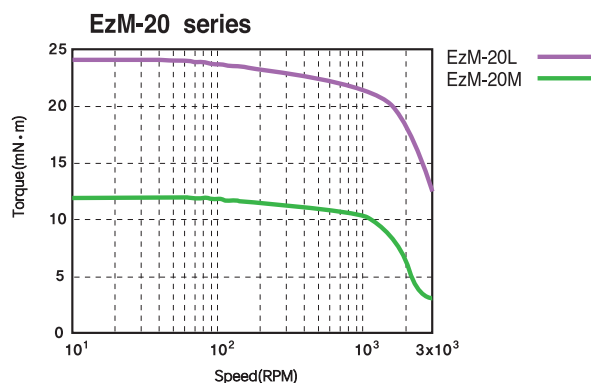
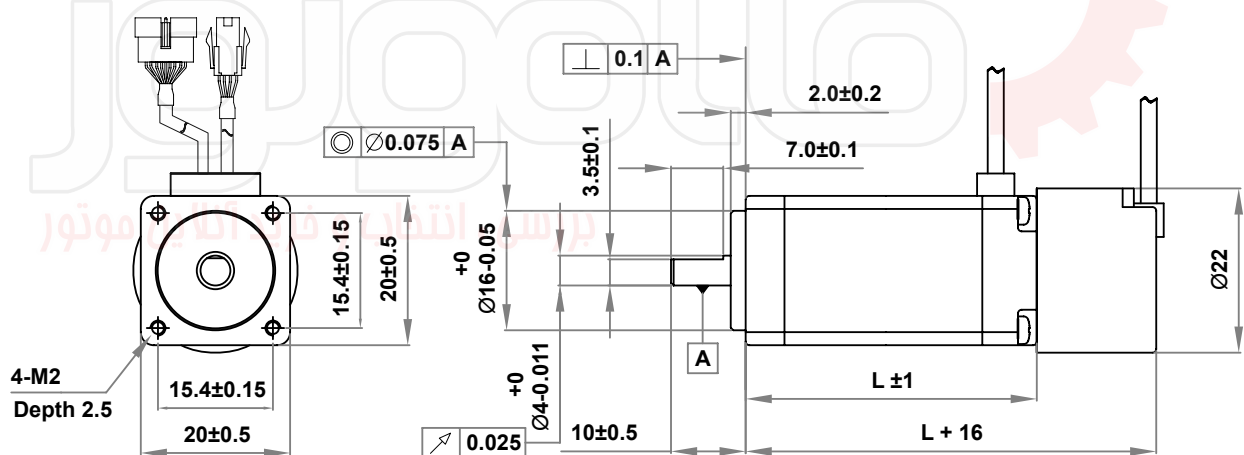
● Drive Dimension [mm]



● Motor Specifications

M O D E L		UNIT	EzM-20M-F	EzM-20L-F
DRIVE METHOD		----	BI-POLAR	BI-POLAR
NUMBER OF PHASES		----	2	2
VOLTAGE		VDC	2,9	2,25
CURRENT per PHASE		A	0,5	0,5
RESISTANCE per PHASE		Ohm	5,8	5,5
INDUCTANCE per PHASE		mH	2,5	5
HOLDING TORQUE		N · m	0,018	0,03
ROTOR INERTIA		$g \cdot cm^2$	2,5	3,3
WEIGHTS		g	50	80
LENGTH (L)		mm	28	38
ALLOWABLE OVERHUNG LOAD (DISTANCE FROM END OF SHAFT)	3mm	N	18	18
	8mm		30	30
ALLOWABLE THRUST LOAD		N	Lower than motor weight	
INSULATION RESISTANCE		MOhm	100min. (at 500VDC)	
INSULATION CLASS		----	CLASS B (130°C)	
OPERATING TEMPERATURE		°C	0 to 55	

● Motor Dimension [mm] and Torque Characteristics



※Measured Condition

Motor Voltage = 24VDC

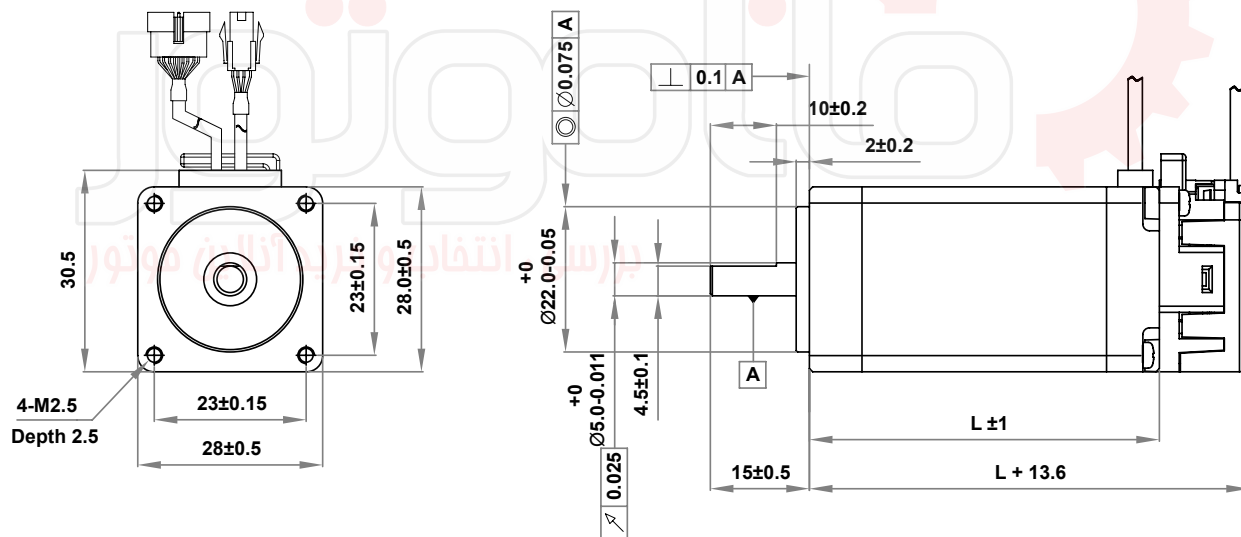
Motor Current = Rated Current (Refer to Motor Specification)

Drive = Ezi-SERVO-MI-PR

● Motor Specifications

M O D E L		UNIT	EzM-28S-D	EzM-28M-D	EzM-28L-D
DRIVE METHOD		----	BI-POLAR	BI-POLAR	BI-POLAR
NUMBER OF PHASES		----	2	2	2
VOLTAGE		VDC	3.04	3.04	3.42
CURRENT per PHASE		A	0.95	0.95	0.95
RESISTANCE per PHASE		Ohm	3.2	3.2	3.6
INDUCTANCE per PHASE		mH	2	5	5.8
HOLDING TORQUE		N · m	0.07	0.12	0.14
ROTOR INERTIA		g · cm ²	9	13	18
WEIGHTS		g	110	140	200
LENGTH (L)		mm	32	45	52
ALLOWABLE OVERHUNG LOAD (DISTANCE FROM END OF SHAFT)	3mm	N	30	30	30
	8mm		38	38	38
	13mm		53	53	53
	18mm		84	84	84
ALLOWABLE THRUST LOAD		N	Lower than motor weight		
INSULATION RESISTANCE		MOhm	100min. (at 500VDC)		
INSULATION CLASS		----	CLASS B (130°C)		
OPERATING TEMPERATURE		°C	0 to 55		

● Motor Dimension [mm] and Torque Characteristics

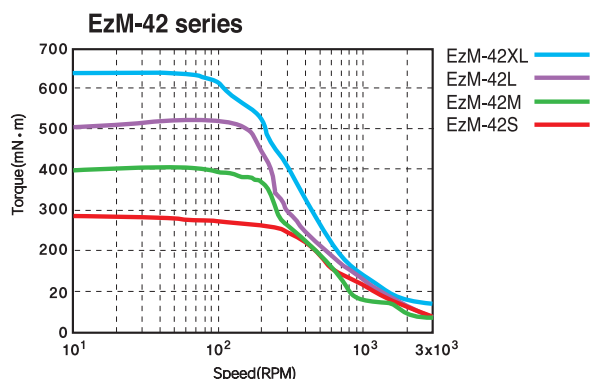
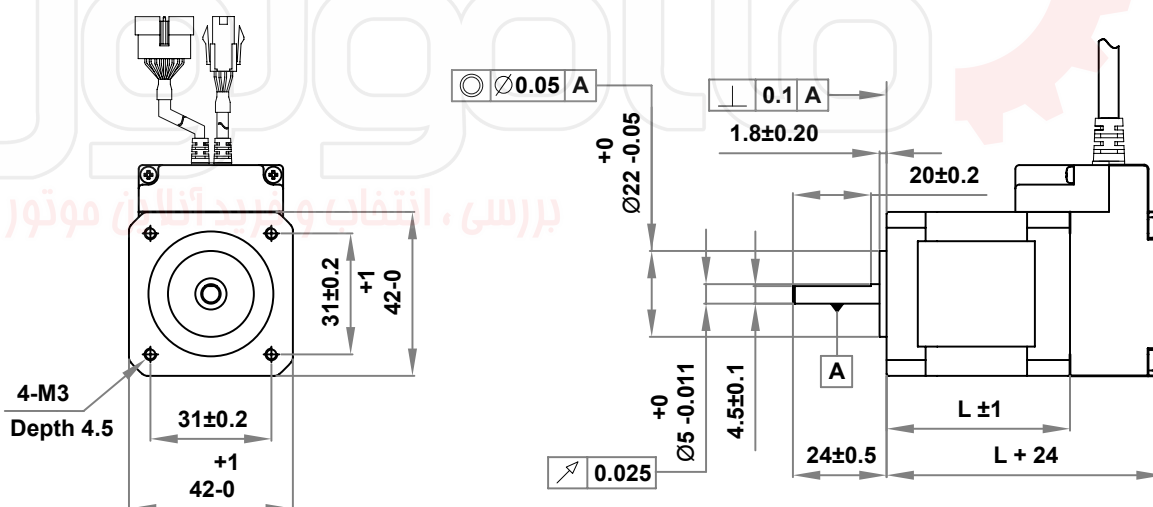


FASTECH Ezi-SERVO MINI Plus-R

● Motor Specifications

M O D E L	UNIT	EzM-42S-A	EzM-42M-A	EzM-42L-A	EzM-42XL-A
		EzM-42S-B	EzM-42M-B	EzM-42L-B	EzM-42XL-B
		EzM-42S-C	EzM-42M-C	EzM-42L-C	EzM-42XL-C
DRIVE METHOD	----	BI-POLAR	BI-POLAR	BI-POLAR	BI-POLAR
NUMBER OF PHASES	----	2	2	2	2
VOLTAGE	VDC	3,36	4,32	4,56	7,2
CURRENT per PHASE	A	1,2	1,2	1,2	1,2
RESISTANCE per PHASE	Ohm	2,8	3,6	3,8	6
INDUCTANCE per PHASE	mH	2,5	7,2	8	15,6
HOLDING TORQUE	N · m	0,32	0,44	0,54	0,8
ROTOR INERTIA	g · cm ²	35	54	77	114
WEIGHTS	g	220	280	350	500
LENGTH (L)	mm	33	39	47	59
ALLOWABLE OVERHUNG LOAD (DISTANCE FROM END OF SHAFT)	3mm	22	22	22	22
	8mm	26	26	26	26
	13mm	33	33	33	33
	18mm	46	46	46	46
ALLOWABLE THRUST LOAD	N	Lower than motor weight			
INSULATION RESISTANCE	MOhm	100min. (at 500VDC)			
INSULATION CLASS	----	CLASS B (130°C)			
OPERATING TEMPERATURE	°C	0 to 55			

● Motor Dimension [mm] and Torque Characteristics



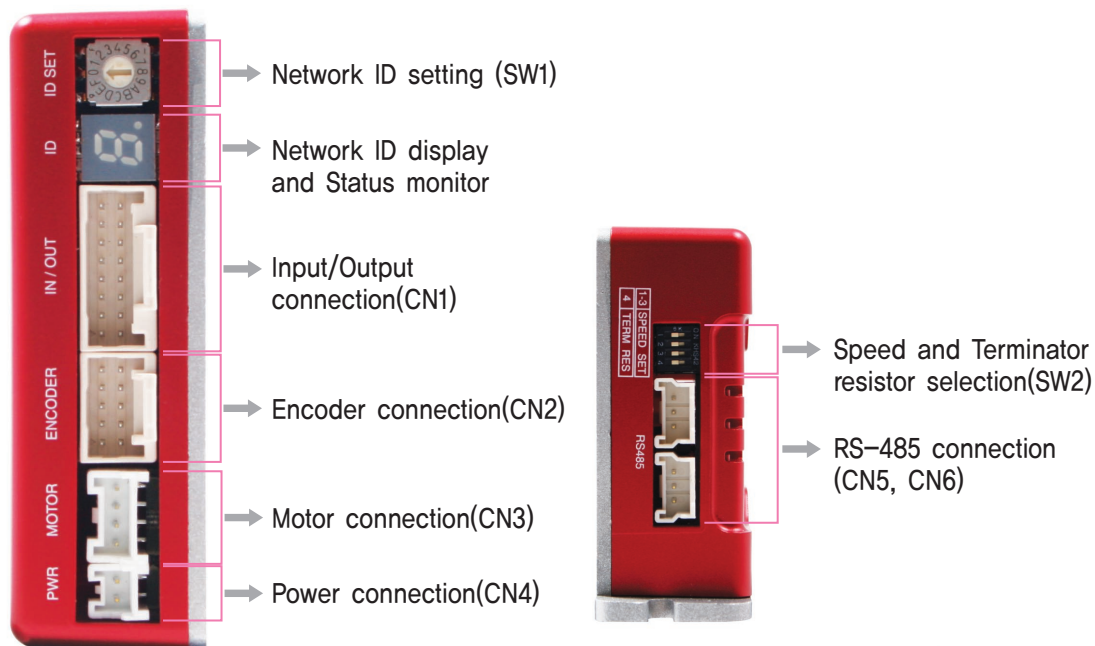
※ Measured Condition

Motor Voltage = 24VDC

Motor Current = Rated Current (Refer to Motor Specification)

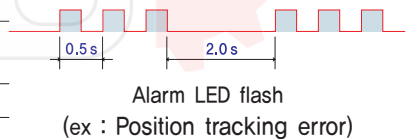
Drive = Ezi-SERVO-MI-PR

● Setting and Operating



1. Protection function and 7-Segment flash times

Times	Protection	Conditions
1	Over current	The current through power devices in inverter exceeds the limit value
2	Over speed	Motor speed exceed 3000rpm
3	Position tracking error	Position error value is higher than 90° in motor run state
4	Over load	The motor is continuously operated more than 5 second under a load exceeding the max. torque
5	Over temperature	Inside temperature of drive exceeds 55°C
6	Over regenerated voltage	Back-EMF more than 50V
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 connector in drive
9	Motor voltage error	Motor voltage is less than 20V
10	Inposition error	After operation is finished, a position error occurs
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 90° in motor stop state



2. Network ID selection switch(SW1)

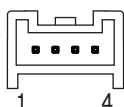
Position	ID number	Position	ID number
0	0	8	8
1	1	9	9
2	2	A	10
3	3	B	11
4	4	C	12
5	5	D	13
6	6	E	14
7	7	F	15



※Maximum 16 axis can be connected in one network.

3. Motor Connector(CN3)

NO.	Function
1	B Phase
2	/B Phase
3	/A Phase
4	A Phase



4. Speed and Terminator resistor selection switch(SW2)

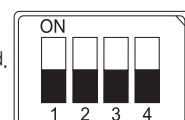
The purpose of this is to setting the communication speed and connect a terminator resistor if drive is installed at the end of network.

SW 2.1 used for connecting the terminator resistor.
SW 2.2~SW 2.4 used for setting speed as follows.

SW 2.1	SW 2.2	SW 2.3	SW 2.4	Baud rate[bps]
—	OFF	OFF	OFF	9600
—	ON	OFF	OFF	19200
—	OFF	ON	OFF	38400
—	ON	ON	OFF	57600
—	OFF	OFF	ON	115200*1
—	ON	OFF	ON	230400
—	OFF	ON	ON	460800
—	ON	ON	ON	921600

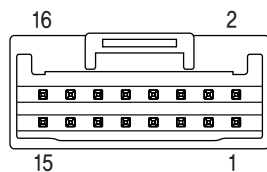
*1 : Default setting value

If SW2.1 is OFF, terminator resistor is disconnected.
If SW2.2 is ON, terminator resistor is connected.



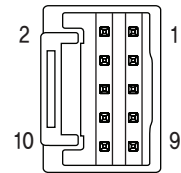
5. Input/Output signal(CN1)

NO.	Function	I/O
1	24VDC	Input
2	24VDC GND	Input
3	BRAKE+	Output
4	BRAKE-	Output
5	+Limit Sensor	Input
6	-Limit Sensor	Input
7	Origin Sensor	Input
8	Digital IN 1	Input
9	Digital IN 2	Input
10	Digital IN 3	Input
11	Digital IN 4	Input
12	Digital IN 5	Input
13	Digital IN 6	Input
14	Digital IN 7	Input
15	Compare Out	Output
16	Digital OUT 1	Output



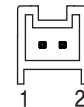
6. Encoder connector(CN2)

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	5VDC GND	Output
9	Frame GND	----
10	Frame GND	----



7. Power connector(CN4)

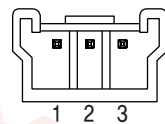
NO.	Function
1	24VDC $\pm 10\%$
2	GND



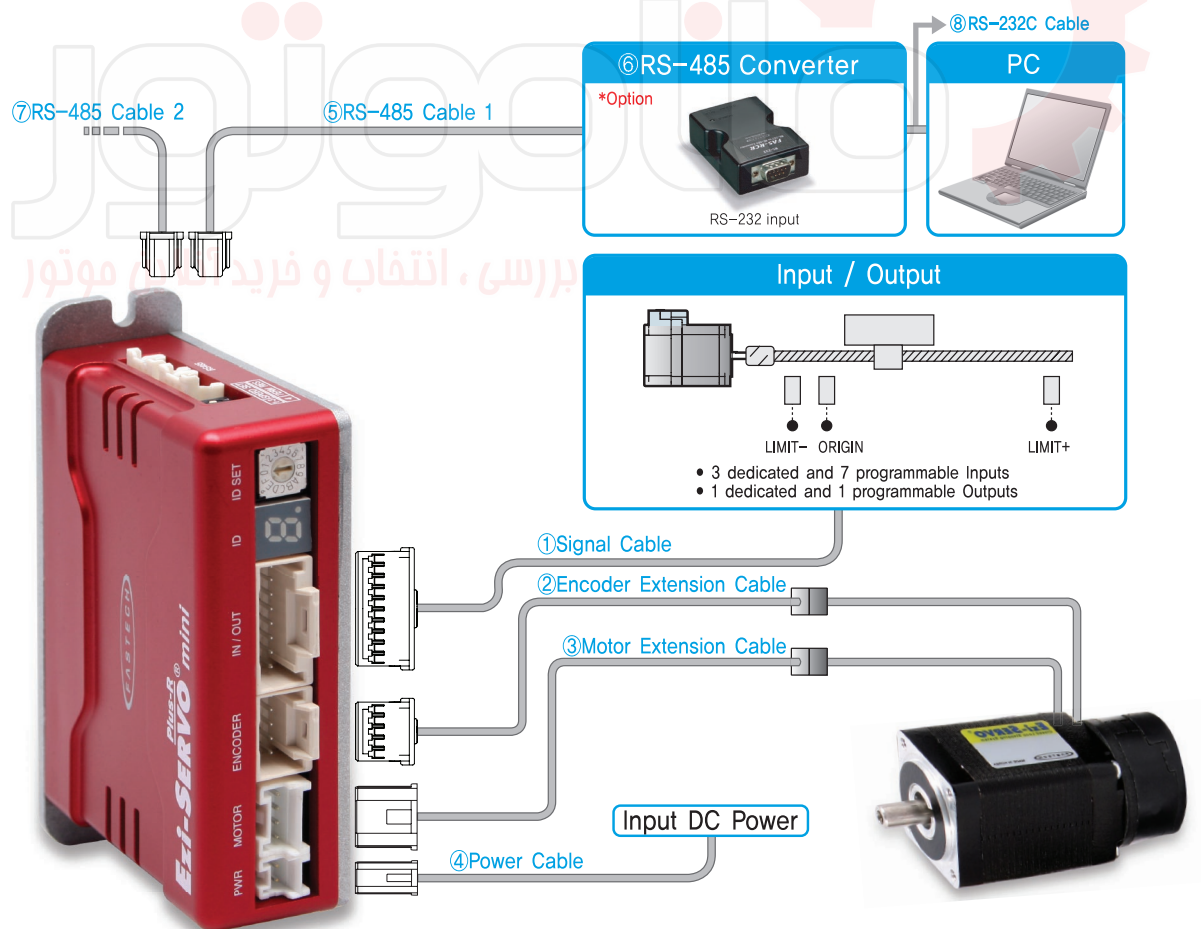
8. RS-485 Communication Connector(CN5, CN6)

RS-485 Communication Port to connect with Host Controller.

NO.	Function
1	+DATA
2	-DATA
3	GND



System Configuration



Type	Signal Cable	Encoder Cable	Motor Cable	Power Cable	RS-485 Cable
Standard Length	—	30cm	30cm	—	—
Max. Length	20m	20m	20m	2m	30m

1. Cable Option

①Signal Cable

Available to connect between Control System and Ezi-SERVO Plus-R MINI.

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

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

③Motor Extension Cable

Available to Extended connection between motor and Ezi-SERVO Plus-R 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.

②Encoder Extension Cable

Available to extended connection between Encoder and Ezi-SERVO Plus-R 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.

④Power Cable

Available to connect between Power and Ezi-SERVO Plus-R 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.

⑦RS-485 Cable 2

Item	Length[m]	Remark
CGNB-R-0R6F	0,5	Normal Cable
CGNB-R-001F	1	
CGNB-R-1R5F	1,5	
CGNB-R-002F	2	
CGNB-R-003F	3	
CGNB-R-005F	5	

*Common cable to connect Ezi-SERVO-ALL, Ezi-STEP-ALL, Ezi-MotionLink and Ezi-SERVO-MINI-Plus-R thru by Network.

2. Option

⑥FAS-RCR(RS-232C to RS-485 Converter)

Item	Specification
Comm, Speed	Max, 115,2Kbps
Comm, Distance	RS-232C : Max, 15m RS-485 : Max, 1,2km
Connector Type	RS-232C : DB9 Female RS-485 : RJ-45
Operating System	Windows 98/2000/XP/Vista
Dimension	50X75X23mm
Weight	38g
Power	Powered from PC (Usable for external DC5~24V)

⑤RS-485 Cable 1

(FAS-RCR to Ezi-SERVO-ALL, FAS-RCR to Ezi-STEP-ALL, FAS-RCR to Ezi-SERVO-MINI-Plus R, FAS-RCR to Ezi-MotionLink)

Item	Length[m]	Remark
CGNA-R-0R6F	0,5	Normal Cable
CGNA-R-001F	1	
CGNA-R-1R5F	1,5	
CGNA-R-002F	2	
CGNA-R-003F	3	
CGNA-R-005F	5	

⑧RS-232C Cable

Item	Length[m]	Remark
CGNR-C-002F	2	Normal Cable
CGNR-C-003F	3	
CGNR-C-005F	5	

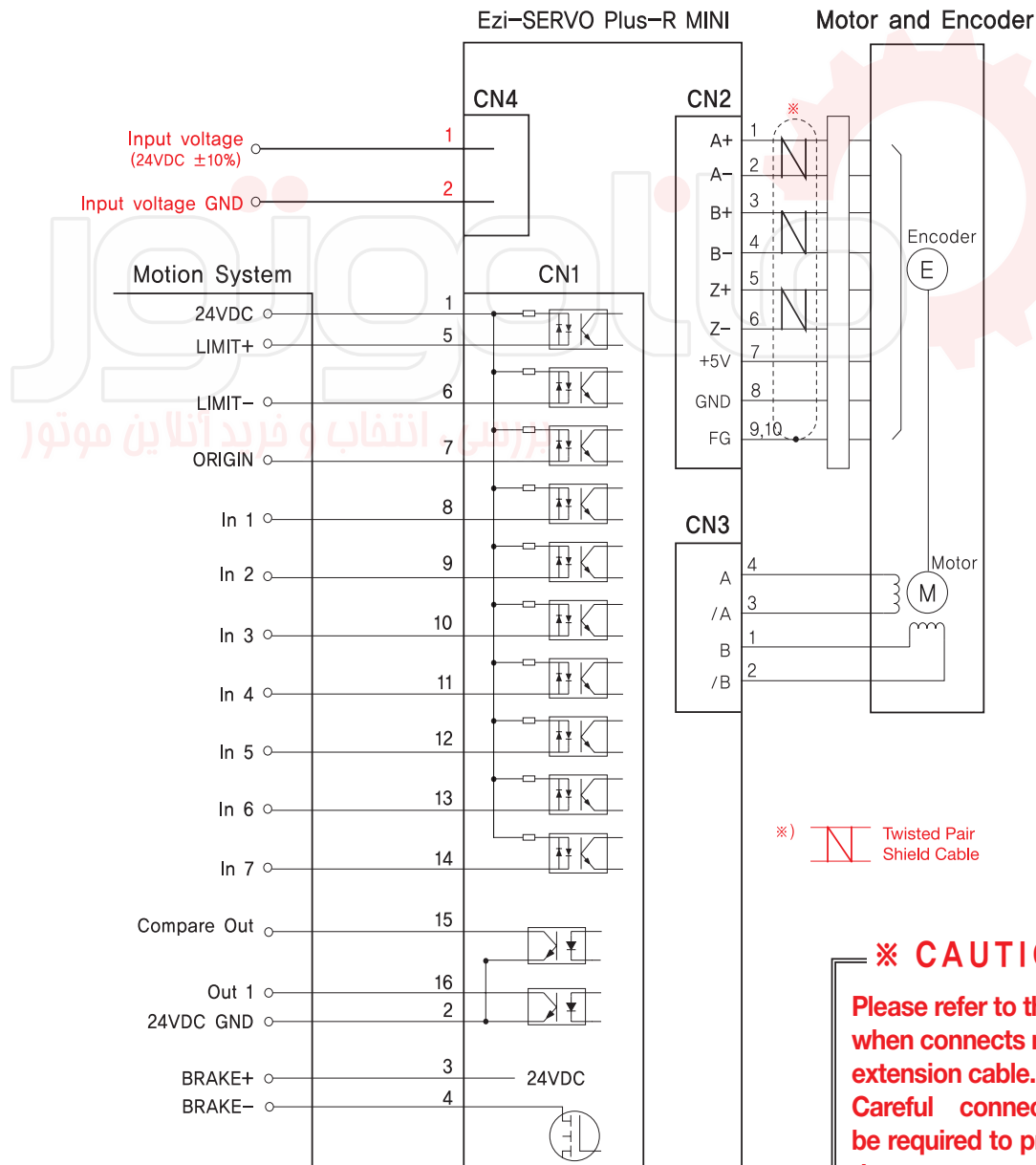
3. Connector for Cabling

ITEM		Specification	Marker
Signal Connector (CN1)	Housing	501646-1600	MOLEX
	Terminal	501648-1000(AWG 26~28)	MOLEX
Encoder Connector (CN2)	Housing	501646-1000	MOLEX
	Terminal	501648-1000(AWG 26~28)	MOLEX
Motor Connector (CN3)	Housing	PAP-04V-S	JST
	Terminal	SPHD-001T-P0,5	JST
Power Connector (CN4)	Housing	PAP-02V-S	JST
	Terminal	SPHD-001T-P0,5	JST
RS-485 Connector (CN5, CN6)	Housing	33507-0300	MOLEX
	Terminal	50212-8100	MOLEX

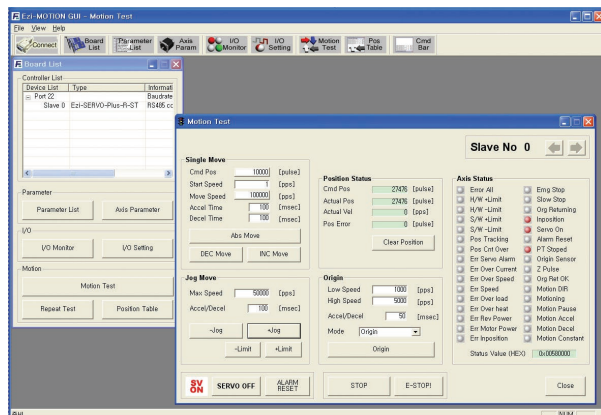
※These connectors are serviced together with Ezi-SERVO Plus-R MINI except when purchasing option cables.

※Above connector is the most suitable product for Ezi-SERVO Plus-R MINI. Another equivalent connector can be used.

● External Wiring Diagram

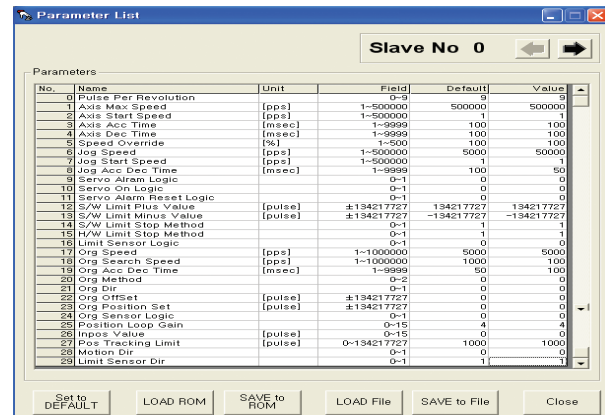


- GUI(Graphic User Interface) Screenshot



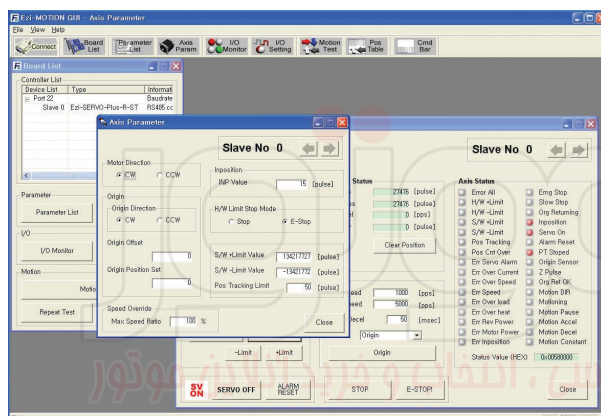
◆ Controller Lists and Motion Test

This screen display the controller list that connected to system. You can make a single move, jog and origin command and also the motor status is displayed.



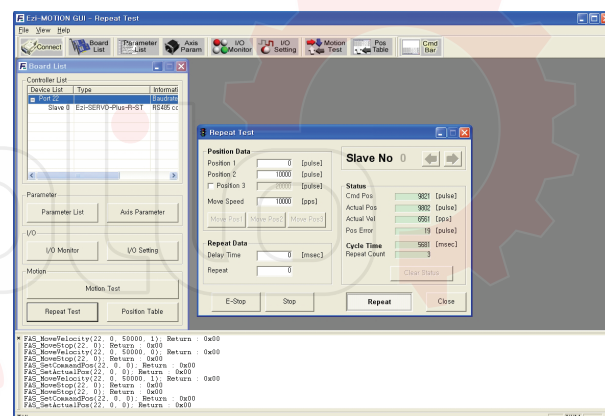
◆ Parameter List

All of the parameters are displayed and modified on this screen.



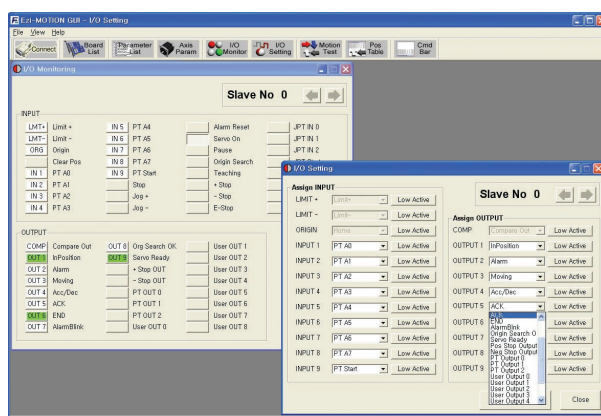
◆ Axis Parameter Setup

You can select various parameters that frequently used.
(ex : sensor input logic)



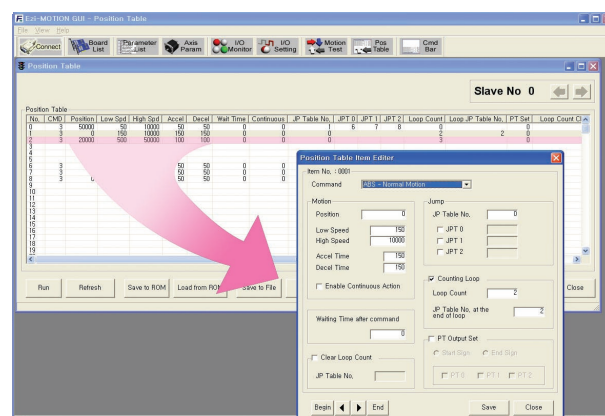
◆ Motion Repeat and Monitor Status

Target position, speed, delay time and repeat count are selected for repeat motion test. Motion library(DLL) is also displayed on screen.



◆ I/O Monitoring and Setting

You can select various digital input and output signals of controller.



◆ Position Table

You can edit the position table and execute it. The position table data can be saved and loaded from Flash ROM and Windows file.



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