

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

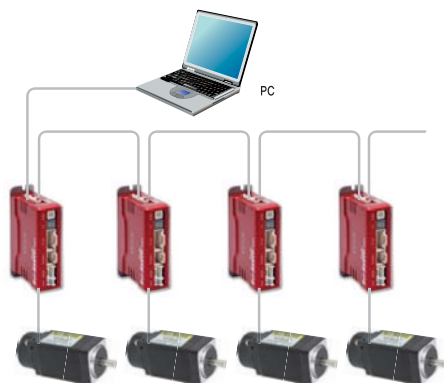
**Plus-R
MINI**



Features

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 / 7 / 8 / 10 / Vista.



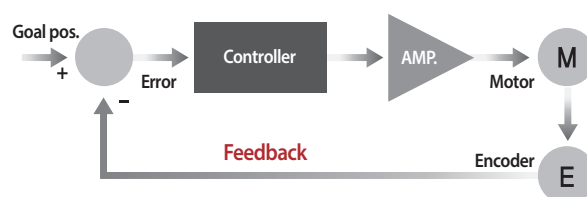
2. Position Table Function

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 64 positioning points can be set from PLC.



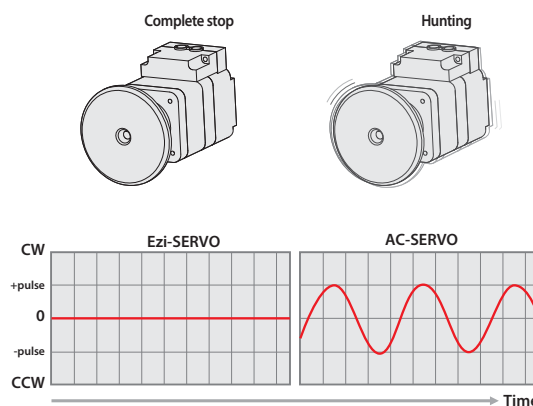
3. Closed Loop System

Ezi-SERVO Plus-R MINI 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 Plus-R MINI to update the current motor shaft position information every 25 micro seconds. This allows the Ezi-SERVO Plus-R MINI 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!



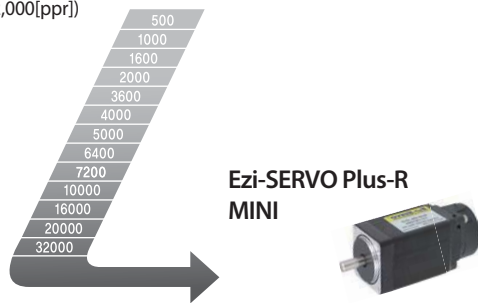
4. No Hunting

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 Plus-R MINI Motion Control System! Ezi-SERVO Plus-R MINI 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.



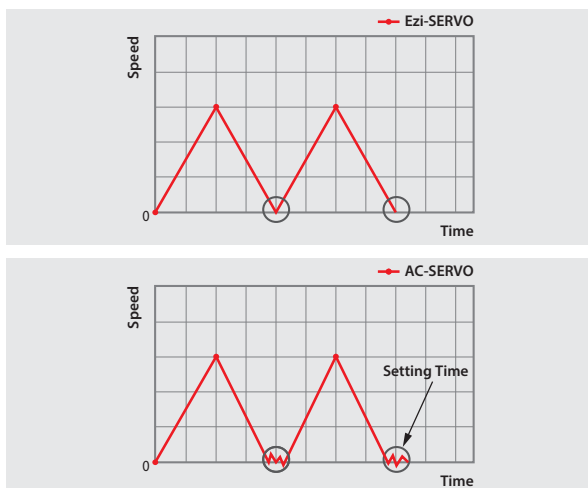
5. High Resolution

The unit of the position command can be divided precisely.
(Max. 32,000[ppr])



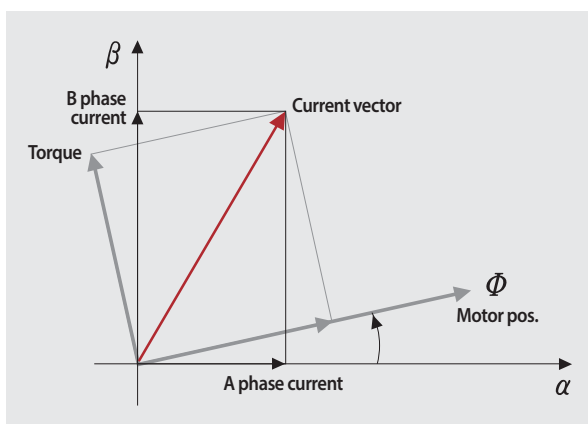
6. Fast Response

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



7. Smooth and Accurate

Ezi-SERVO Plus-R MINI is a high-precision servo drive, using a high-resolution encoder with 32,000[ppr]. 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.

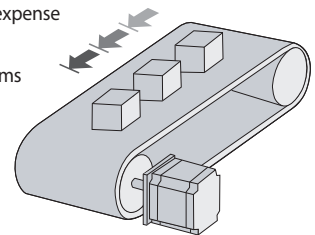


8. No Gain Tuning

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 autotuning require manual tweaking after the system is installed, especially if more than one axis are interdependent.

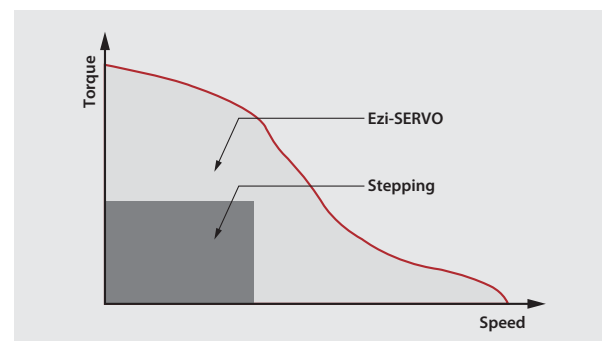
Ezi-SERVO Plus-R MINI employs the best characteristics of stepper and closed loop motion controls and algorithms to eliminate the need of tedious gain tuning required for conventional closed loop servo systems. This means that Ezi-SERVO Plus-R MINI is optimized for the application and ready to work right out of the box! The Ezi-SERVO Plus-R MINI 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 Plus-R MINI 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 added expense and bulk of a gearbox.

Ezi-SERVO Plus-R MINI also performs exceptionally, even under heavy loads and high speeds!



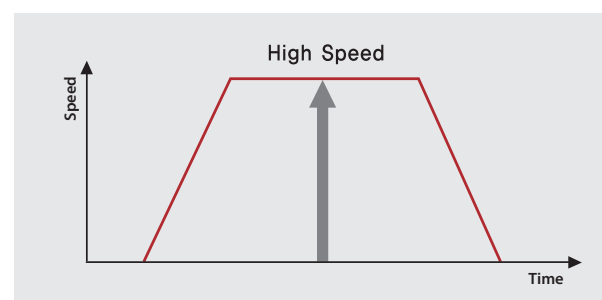
9. High Torque

Compared with common step motors and drives, Ezi-SERVO Plus-R MINI 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 Plus-R MINI exploits continuous high-torque operation during high-speed motion due to its innovative optimum current phase control.



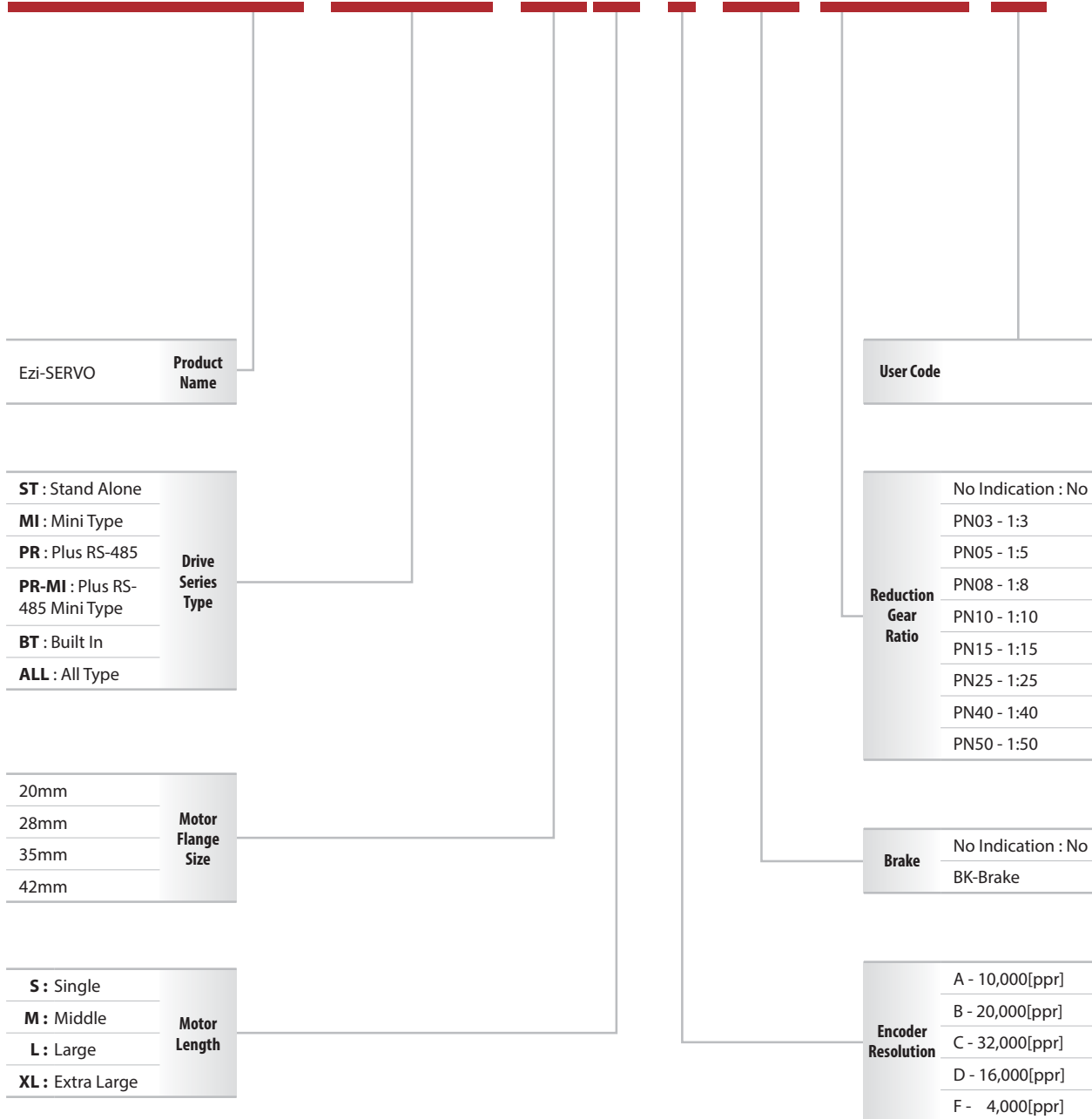
10. High Speed

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



Part Numbering Method

Ezi-SERVO-PR-MI-20M-F-BK-PN05-



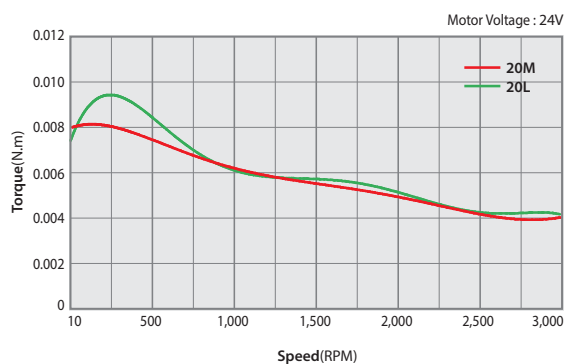
Motor, Drive Combination

UNIT No.	MOTOR No.	DRIVE No.
Ezi-SERVO-PR-MI-20M-F	EzM-20M-F	EzS-NDR-MI-20M-F
Ezi-SERVO-PR-MI-20L-F	EzM-20L-F	EzS-NDR-MI-20L-F
Ezi-SERVO-PR-MI-28S-D	EzM-28S-D	EzS-NDR-MI-28S-D
Ezi-SERVO-PR-MI-28M-D	EzM-28M-D	EzS-NDR-MI-28M-D
Ezi-SERVO-PR-MI-28L-D	EzM-28L-D	EzS-NDR-MI-28L-D
Ezi-SERVO-PR-MI-35M-D	EzM-35M-D	EzS-NDR-MI-35M-D
Ezi-SERVO-PR-MI-35L-D	EzM-35L-D	EzS-NDR-MI-35L-D
Ezi-SERVO-PR-MI-42S-A	EzM-42S-A	EzS-NDR-MI-42S-A
Ezi-SERVO-PR-MI-42S-B	EzM-42S-B	EzS-NDR-MI-42S-B
Ezi-SERVO-PR-MI-42S-C	EzM-42S-C	EzS-NDR-MI-42S-C
Ezi-SERVO-PR-MI-42M-A	EzM-42M-A	EzS-NDR-MI-42M-A
Ezi-SERVO-PR-MI-42M-B	EzM-42M-B	EzS-NDR-MI-42M-B
Ezi-SERVO-PR-MI-42M-C	EzM-42M-C	EzS-NDR-MI-42M-C
Ezi-SERVO-PR-MI-42L-A	EzM-42L-A	EzS-NDR-MI-42L-A
Ezi-SERVO-PR-MI-42L-B	EzM-42L-B	EzS-NDR-MI-42L-B
Ezi-SERVO-PR-MI-42L-C	EzM-42L-C	EzS-NDR-MI-42L-C
Ezi-SERVO-PR-MI-42XL-A	EzM-42XL-A	EzS-NDR-MI-42XL-A
Ezi-SERVO-PR-MI-42XL-B	EzM-42XL-B	EzS-NDR-MI-42XL-B
Ezi-SERVO-PR-MI-42XL-C	EzM-42XL-C	EzS-NDR-MI-42XL-C

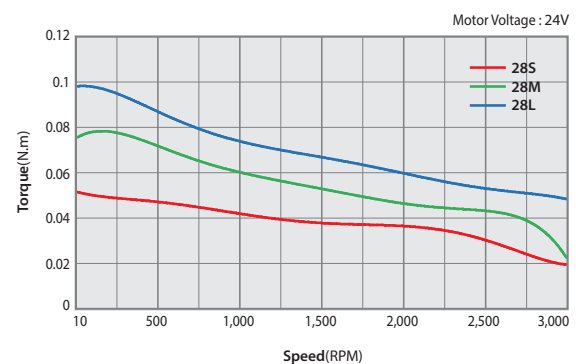
Motor Specification Table

Model	Unit	20		28			35		42			
		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	3	3	3	2.88	4.59	3.36	4.32	4.56	7.2
CURRENT per PHASE	A	0.5	0.5	0.95	0.95	0.95	0.6	0.85	1.2	1.2	1.2	1.2
RESISTANCE per PHASE	Ohm	5.5	6	3.2	3.2	3.2	4.8	5.4	2.8	3.6	3.8	6
INDUCTANCE per PHASE	mH	2	2.6	2	2.7	3.2	6.1	6.5	5.4	7.2	8	15.6
HOLDING TORQUE	N·m	0.016	0.025	0.069	0.098	0.118	0.050	0.176	0.32	0.44	0.5	0.65
ROTOR INERTIA	g·cm ²	2.5	3.3	9	13	18	8	11	35	54	77	114
WEIGHTS	g	50	80	110	140	200	180	260	250	280	350	500
LENGTH(L)	mm	28	38	32	45	50	26	38	34	40	48	60
ALLOWABLE OVERHUNG LOAD (DISTANCE FROM END OF SHAFT)	3mm	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
ALLOWABLE THRUST LOAD	N	Lower than motor weight										
INSULATION RESISTANCE	Mohm	100 MΩ MIN.(at 500VDC)										
INSULATION CLASS	-	CLASS B(130°C)										
OPERATING TEMPERATURE	°C	0 to 55										

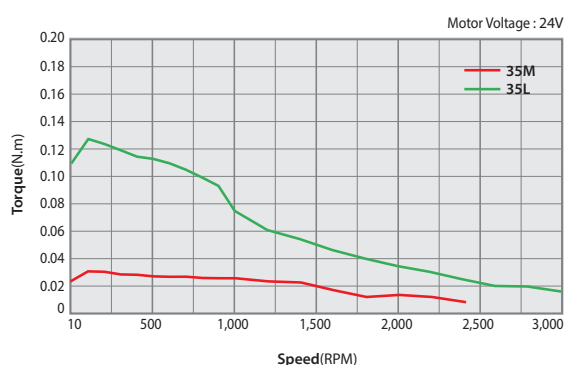
Ezi-SERVO Plus-R MINI_ 20 Series



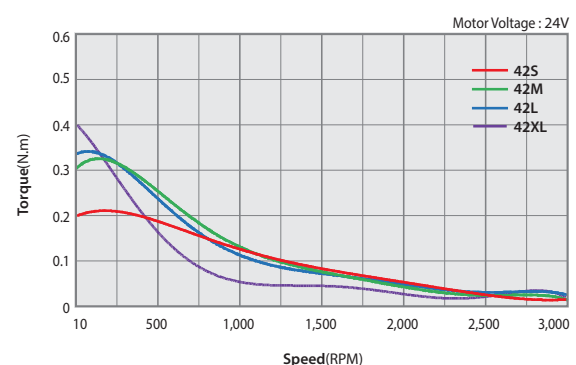
Ezi-SERVO Plus-R MINI_ 28 Series



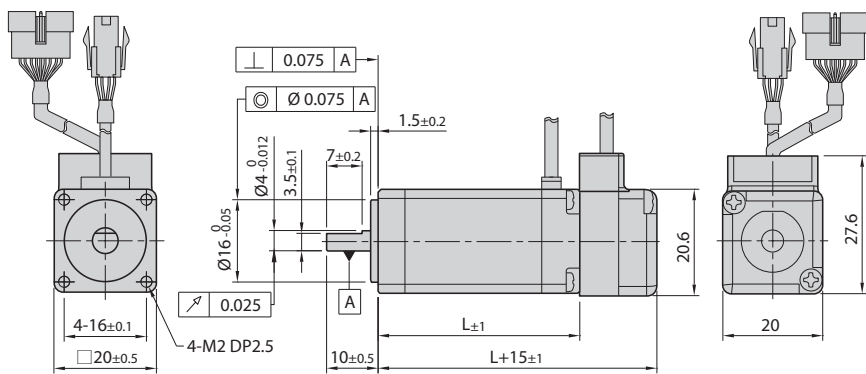
Ezi-SERVO Plus-R MINI_ 35 Series



Ezi-SERVO Plus-R MINI_ 42 Series

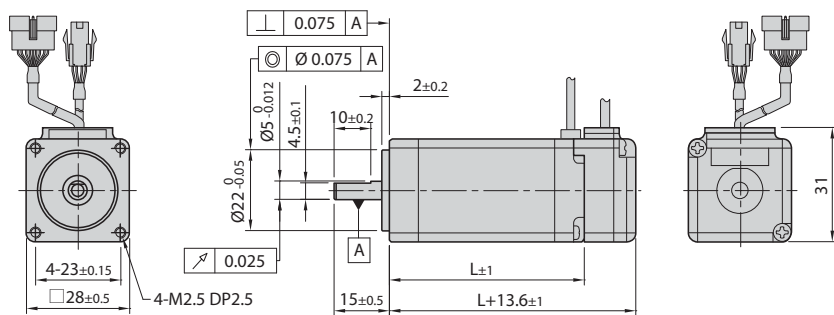


Motor Drawing



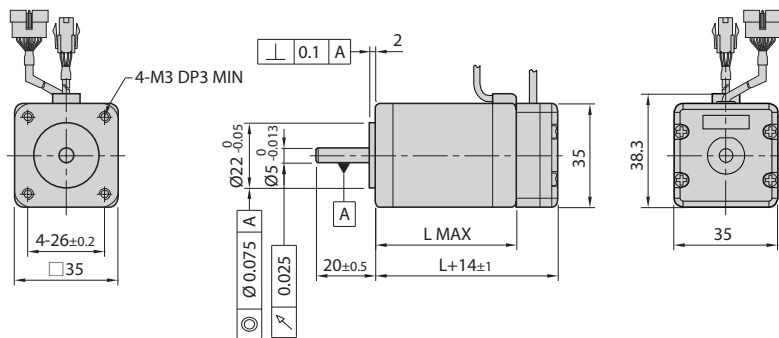
20_{mm}

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



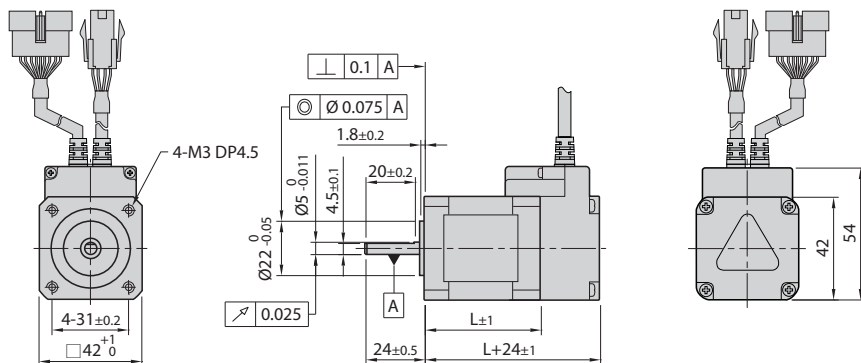
28_{mm}

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



35_{mm}

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



42_{mm}

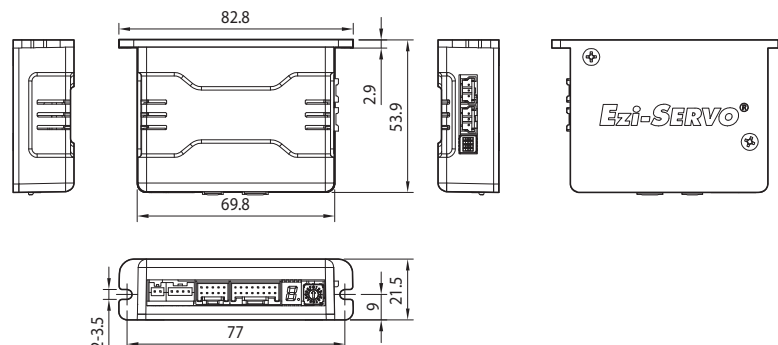
Model name	Length(L)
EzM-42S	34
EzM-42M	40
EzM-42L	48
EzM-42XL	60

Drive Specification

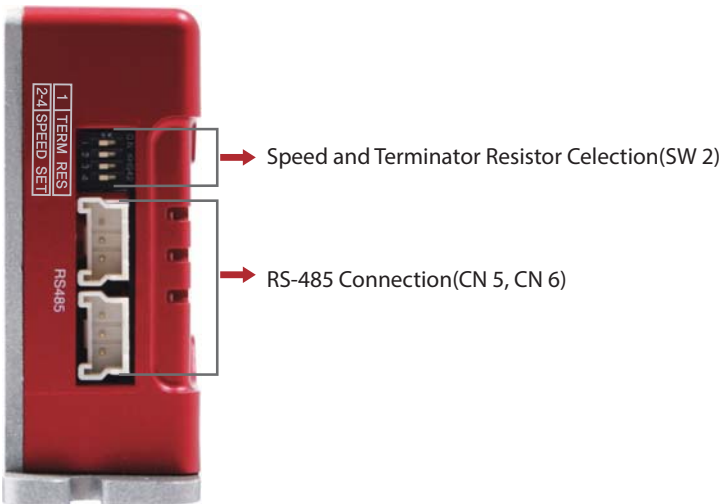
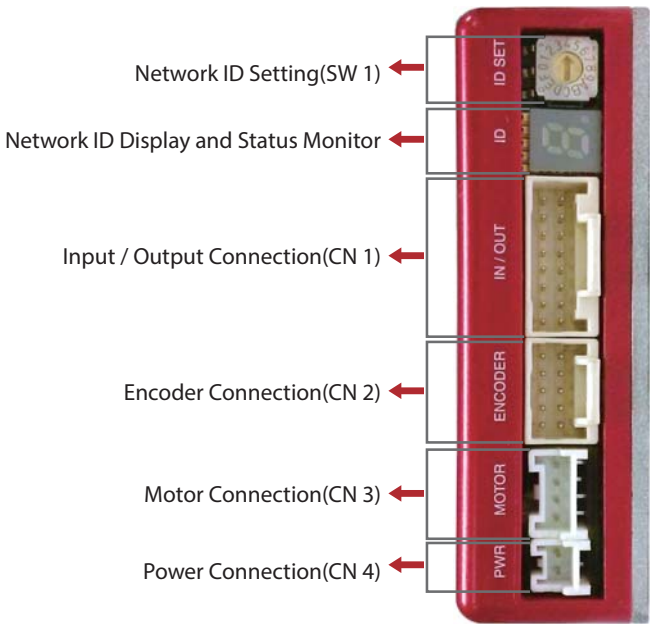
Specifications

Motor Model		EzM-20 Series	EzM-28 Series	EzM-35 Series	EzM-42 Series
Drive Model		EzS-NDR-MI-20 Series	EzS-NDR-MI-28 Series	EzS-NDR-MI-35 Series	EzS-NDR-MI-42 Series
Input Voltage		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(Speed, External start, Jump, Loop, Wait and PT finish etc.)			
Current Consumption		Max. 500mA(Except Motor Current)			
Operating Condition	Ambient Temperature	· In Use : 0 ~ 50°C · In Storage : -20 ~ 70°C			
	Humidity	· In Use : 35 ~ 85% RH(Non-Condensing) · In Storage : 10 ~ 90% RH(Non-Condensing)			
	Vib. Resist.	0.5G			
Function	Rotation Speed	0 ~ 3,000[rpm]			
	Resolution[ppr]	· 4,000[ppr] Encoder model : 500 / 1,000 / 1,600 / 2,000 / 3,600 / 5,000 / 6,400 / 7,200 / 10,000 / 4,000 · 10,000[ppr] Encoder model : 500 / 1,000 / 1,600 / 2,000 / 3,600 / 5,000 / 6,400 / 7,200 / 10,000 · 16,000[ppr] Encoder model : 500 / 1,000 / 1,600 / 2,000 / 3,600 / 5,000 / 6,400 / 7,200 / 10,000 / 16,000 · 20,000[ppr] Encoder model : 500 / 1,000 / 1,600 / 2,000 / 3,600 / 5,000 / 6,400 / 7,200 / 10,000 / 20,000 · 32,000[ppr] Encoder model : 500 / 1,000 / 1,600 / 2,000 / 3,600 / 5,000 / 6,400 / 7,200 / 10,000 / 32,000 (Selectable by Parameter)			
	Protection	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, Motor Voltage Error, In-Position Error, System Error, ROM Error, Position Overflow Error			
	In-Position Selection	0~15(Selectable by Parameter)			
	Position Gain Selection	0~15(Selectable by Parameter)			
	Rotational Direction	CW / CCW(Selectable by Parameter)			
	Input Signal	3dedicated input(LIMIT+, LIMIT-, ORIGIN), 7 programmable output(Photocoupler Input)			
I/O Signal	Output Signal	1 dedicated output(Compare Out), 1programmable output(Photocoupler Output), Brake signal			
Communication Interface		The RS-485 serial communication with PC Transmission speed : 9,600 ~ 921,600bps			
Position Control		Incremental mode / Absolute mode (Data Range : -134,217,727 to +134,217,727pulse, Operating speed : Max. 3,000[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 / 7 / 8 / 10 / Vista			

Drive Dimension(mm)



Setting and Operation



System Operation Manual

Status Monitor LED

1. Protection function and 7-Segment flash times

Times	Protection	Conditions
1	Over Current Error	The current through power devices in inverter exceeds the limit value
2	Over Speed Error	Motor speed exceed 3,000[rpm]
3	Position Tracking Error	Position error value is higher than 90° in motor run state *1
4	Over Load Error	The motor is continuously operated more than 5 second under a load exceeding the Max. torque
5	Over Temperature Error	Inside temperature of drive exceeds 55℃
6	Over Regenerated Voltage Error	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
10	In-Position 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 *1

*1 : The given value can be changed by parameter.

※Please refer to the manual

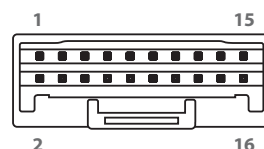
7-Segment Flash(ex : Position Tracking Error)



Connector

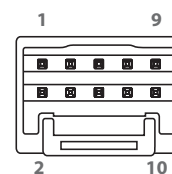
1. Input / Output Signal(CN 1)

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



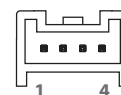
2. Encoder Connector(CN 2)

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	F. GND	----
10	F. GND	----



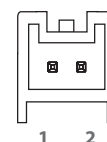
3. Motor Connection(CN 3)

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



4. Power Connection(CN 4)

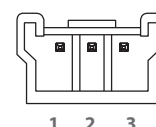
No.	Function
1	24VDC ±10%
2	GND



5. RS-485 Communication Connector(CN 5, CN 6)

RS-485 Communication Port to connect with Host Controller.

No.	Function
1	+DATA
2	-DATA
3	GND



Cable Connector

1. Input / Output Signal(CN 1)

ITEM	Specification	Marker
Housing	501646-1600	MOLEX
Terminal	501648-1000(AWG 26~28)	MOLEX

2. Encoder Connector(CN 2)

ITEM	Specification	Maker
Housing	501646-1000	MOLEX
Terminal	501648-1000(AWG 26~28)	MOLEX

3. Motor Connection(CN 3)

ITEM	Specification	Maker
Housing	PAP-04V-S	JST
Terminal	SPHD-001T-P0.5	JST

4. Power Connection(CN 4)

ITEM	Specification	Maker
Housing	PAP-02V-S	JST
Terminal	SPHD-001T-P0.5	JST

5. RS-485 Communication Connector(CN 5, CN 6)

ITEM	Specification	Maker
Housing	35507-0300	MOLEX
Terminal	50212-8100	MOLEX

Switch

1. Network ID Selection Switch(SW 1)

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.

2. Speed and Terminator Resistor Selection Switch(SW 2)

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.

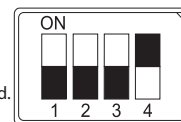
SW 2.1	SW 2.2	SW 2.3	SW 2.4	Baud Rate[bps]
-	OFF	OFF	OFF	9,600
-	ON	OFF	OFF	19,200
-	OFF	ON	OFF	38,400
-	ON	ON	OFF	57,600
-	OFF	OFF	ON	115,200 ^{*1}
-	ON	OFF	ON	230,400
-	OFF	ON	ON	460,800
-	ON	ON	ON	921,600

※ Possible to use common PCI Bus type RS-485 communication board for High speed communication.
(Please contact with Distributor)

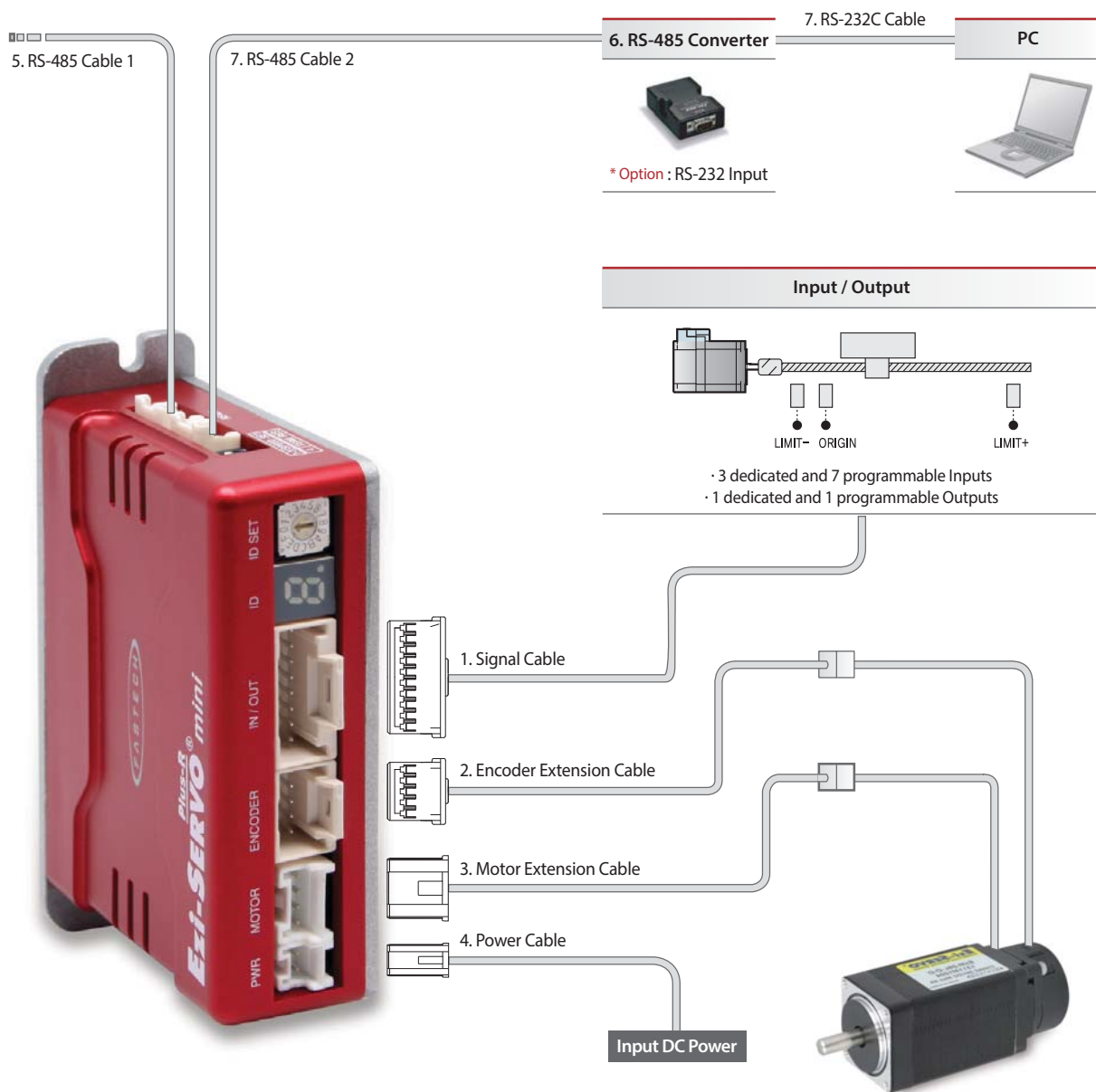
^{*1} : Default setting value

If SW 2.1 is OFF, terminator resistor is disconnected.

If SW 2.2 is ON, terminator resistor is connected.



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

Option

1. Signal Cable

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

Model Name	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.

2. Encoder Extension Cable

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

Model Name	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 Plus-R MINI.

Model Name	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 Plus-R MINI.

Model Name	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.

5.RS-485 Cable 1

Model Name	Length[m]	Remark
CGNB-R-0R6F	0.6	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 Plus-R MINI thru by Network.

6. FAS-RCR(RS-232C to RS-485 Converter)

Item	Specification
Transmission speed	Max. 115.2Kbps
Comm. Distance	RS-232C : Max. 15m RS-485 : Max. 1.2km
Connector	RS-232C : DB9 Female RS-485 : RJ-45
Dimension	50×75×23mm
Weight	38g
Power	Powered from PC (Usable for external DC5~24V)

7. RS-485 Cable 2

FAS-RCR to Ezi-SERVO ALL, FAS-RCR to Ezi-STEP ALL,
FAS-RCR to Ezi-SERVO Plus-R MINI, FAS-RCR to Ezi-MOTIONLINK

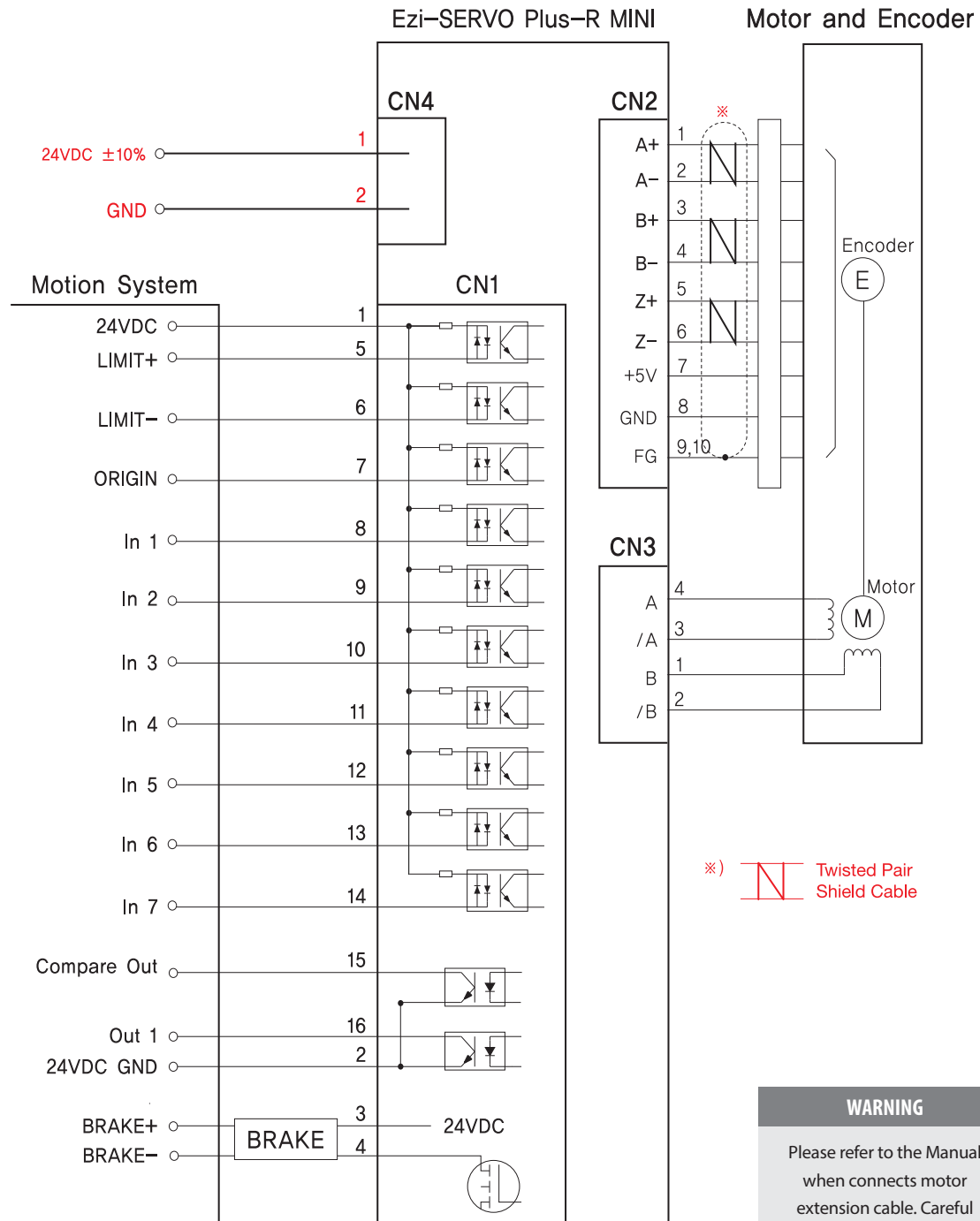
Model Name	Length[m]	Remark
CGNA-R-0R6F	0.6	Normal Cable
CGNA-R-001F	1	
CGNA-R-1R5F	1.5	
CGNA-R-002F	2	
CGNA-R-003F	3	
CGNA-R-005F	5	

8. RS-232C Cable

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

External Wiring Diagram

Ezi-SERVO Plus-R MINI



WARNING

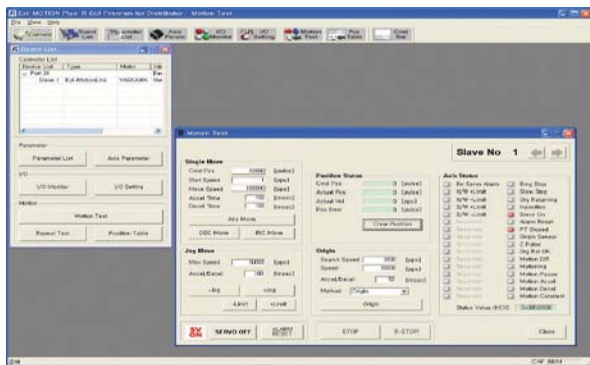
Please refer to the Manual when connects motor extension cable. Careful connection will be required to protect from any damages.

Graphic User Interface(GUI)

Screen Configuration

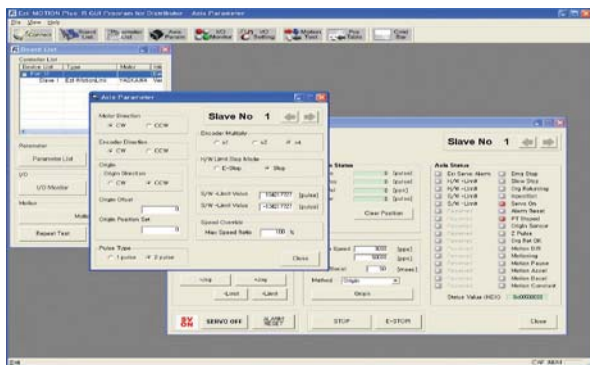
1. Controller Lists and Motion Test

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.



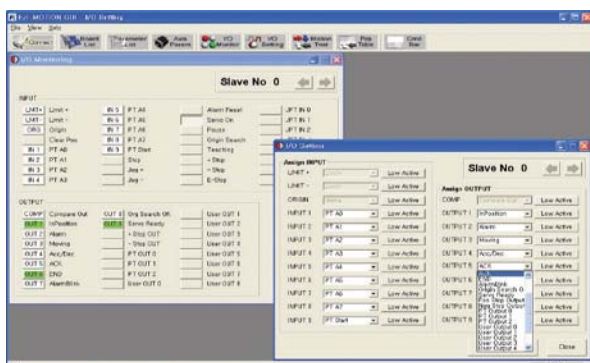
2. Axis Parameter Setup

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



3. I/O Monitoring and Setting

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



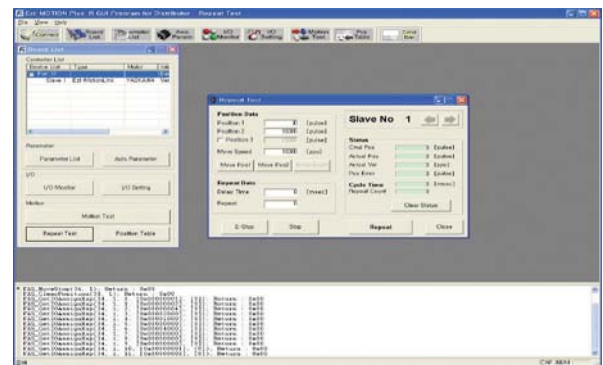
4. Parameter List

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



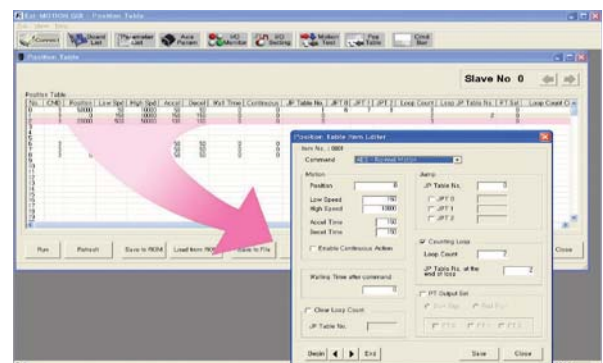
5. Motion Repeat and Monitor Status

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



6. 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.





Fast, Accurate, Smooth Motion

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