

Ezi-SERVO[®] II Plus-E

Closed Loop Stepping System

User Manual

Text

(Rev.01)



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1 . Safety Pre-caution and Note on Installation

※ Before Operation

- Thank you for purchasing our Ezi-SERVOII Plus-E products.
- Ezi-SERVOII Plus-E is a high-performance 32bit ARM chip embedded Full Digital position control stepping driving unit.
- This manual describe the handling, maintenance, repair, diagnosis and troubleshooting of Ezi-SERVOII Plus-E.
- Before start operation of Ezi-SERVOII Plus-E, thoroughly read this manual.
- After reading this manual, keep the manual near Ezi-SERVOII Plus-E, so that any user can read this manual whenever needed.

1 - 1 . Precautions

◆ General Precautions

- Contents of this manual are subject to change without prior notice for functional improvements, change of specifications or user's better understanding. Thoroughly read is the manual which is provided with purchased Ezi-SERVOII Plus-E
- In case of manual is damaged or lost, please contact with FASTECH's agent or our company at the address on the last page of this manual.
- FASTECH is not responsible for

◆ Safety Precaution

- Before installation, operation, repairing the products, thoroughly read the manual and fully understand the contents. Before operating the products, please understand the mechanical characteristics of this products and related safety information and precautions.
- This manual divides safety precautions into **Attention** and **Warning**.

 Attention	If user does not properly handle the products, the user may seriously or slightly injured damages may occur in the machine.
 Warning	If user does not properly handle the products, a dangerous situation (such as an electric shock) may occur resulting in deaths or serious injuries.

- Although precaution is only a **Attention**, a serious result could be caused depending on the situation. Follow safety precaution.

◆ Check the Product

 Attention	<p>Check the Product is damaged or parts are missing. Otherwise, the machine may get damaged or the user may get injured.</p>
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◆ 설치

 Attention	<p>Please carry the Ezi-SERVOII Plus-E carefully. Otherwise, the product may get damaged or user's foot may get injured by dropping the product.</p> <p>Use non-flammable materials such as metal in the place where the Ezi-SERVOII Plus-E is to be installed. Otherwise, a fire may occur.</p> <p>When installing several Ezi-SERVOII Plus-E in a sealed place, install a cooling fan to keep the ambient temperature of the product as 50°C or lower. Otherwise, a fire or other kinds of accidents may occur due to overheating.</p>
 Warning	<p>The process of installation, Connection, Operation, Checking and Repairing should be done by qualified person. Otherwise, a fire or other kinds of accidents may occur.</p>

◆ Connect Cables

 Attention	<p>Keep the rated range of input Voltage for drive. Otherwise, a fire or other kinds of accidents may occur.</p> <p>Cable connection should be following the wiring diagram. Otherwise, a fire or malfunction of machine may occur.</p>
 Warning	<p>Before connecting cables, check if input power is off. Otherwise, an electric shock or a fire may occur.</p> <p>The case of this Ezi-SERVOII Plus-E is installed from the ground of the internal circuit by the condenser, Please Ground the Ezi-SERVOII Plus-E. Otherwise, an electric shock or a file may occur and a cause of malfunction of machine.</p>

◆ Operation & Setting change

 Attention	<p>If a protection function (Alarm) occurs, firstly remove its cause and then release (Alarm reset) the protection function.</p> <p>If you operate continuously without removing its cause, the machine may get damaged or the user may get injured.</p> <p>Make all input signals to OFF before supply input voltage to Ezi-SERVOII Plus-E drive.</p> <p>The machine may get damaged or the user may get injured by motor operation.</p> <p>All parameter values are set by default factory setting value. Change this value after reading this manual thoroughly.</p> <p>Otherwise, the machine may get damaged or other kinds of accidents may occur.</p>
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◆ Check and Repair

 Warning	<p>Stop to supply power to the main circuit and wait sufficient time before checking or repairing this Ezi-SERVOII Plus-E.</p> <p>Electricity remaining in the condenser may cause of electric shock.</p> <p>Do not change cabling while power is being supplied.</p> <p>Otherwise, the user may get injured or the product and machine may get damaged.</p> <p>Do not reconstruct the Ezi-SERVOII Plus-E.</p> <p>Otherwise, an electric shock may occur or the product and machine get damaged. And the reconstructed product cannot get after service.</p>
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1 - 1 . Notes on Installation

- 1) This product has been designed for indoor uses. The ambient temperature of the room should be 0°~ 55°C .
- 2) If the temperature of the case is 50°C or higher, radiate heat outside for cooling down.
- 3) Do not install this product under direct rays or near magnetic or radioactive objects.
- 4) If more than 2 drives are installed in a line, keep the interval of 20mm or more vertically and 50mm or more horizontally at least.

2 . Specifications of the Drive

2 - 1 . Characteristic Table

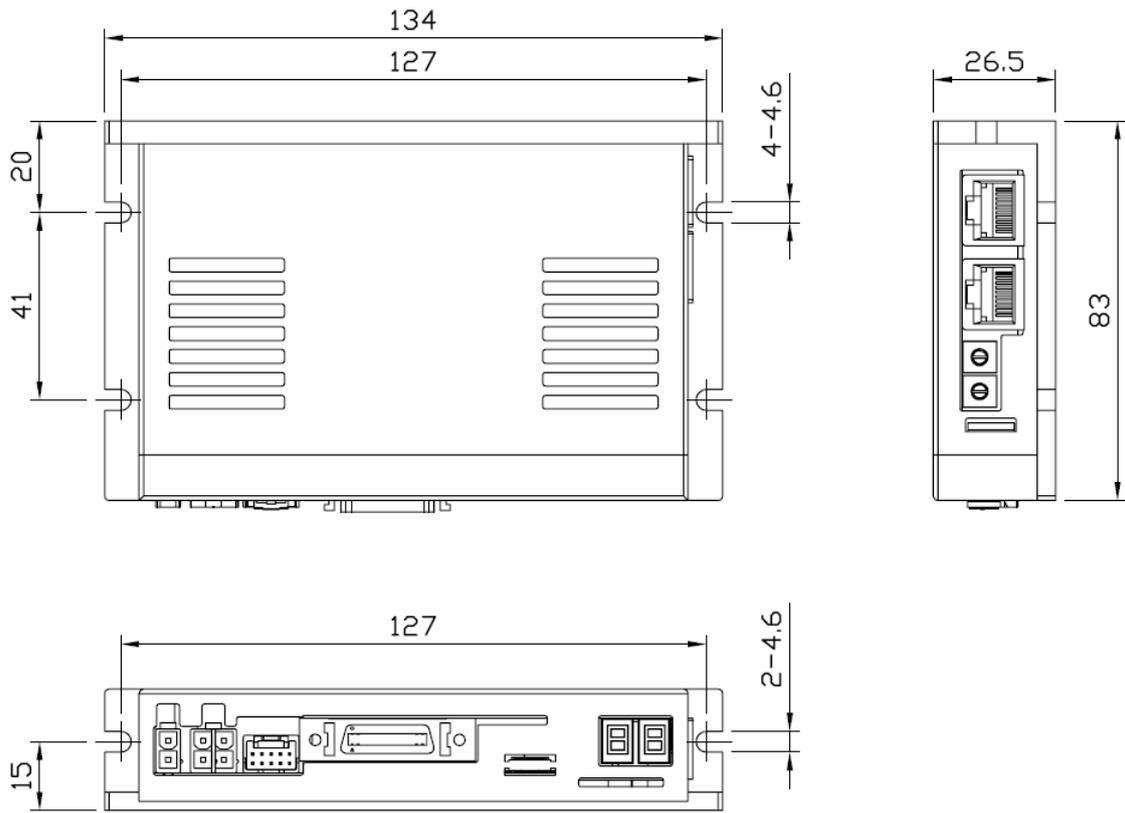
Type of Drive		EzS2-PE series
Input Voltage		24VDC \pm 10%
Control Method		Closed loop control with ARM-based 32-bit MCU
Multi Axes Drive		Maximum 254 axes operating (Selectable IP:2~255)
Positon Table		256 of Motion command steps (Speed, External start, Jump, Loop, Wait and PT finish etc.)
Current Consumption		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)
	Viv. Resist	0.5G
Function	Rotation Speed	0~3,000rpm*1
	Resolution [P/R]	4,000/Rev. Encoder model : 500 1,000 1,600 2,000 4,000, 3,600 5,000 6,400 7,200 10,000 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 (Resolution can be selected by parameter)
	Protection Function	Over current, Over Speed, Position tracking error, Over load, Over temperature, Over regenerated voltage, motor connect error, Encoder connect error, Motor voltage error, Imposition error, ROM error, Position overflow error
	LED Display	Power status, In-Position status, Enable status, Alarm status
	In-position selection	0~63 (Selectable by parameter)
	Position Gain selection	0~63 (Selectable by parameter)
	Rotational Direction	CW/CCW (Selectable by parameter)
	RUN Current	50%~150% (Selectable by parameter) RUN current is flowing current value in the motor when motor is operating (rotating), It is set based on constant current of motor * Default factory setting value : 100%
STOP Current	20%~100% (Selectable by parameter) It is set as setting value of STOP current 0.1 sec after motor stop. STOP current value is at a ratio against RUN current value of motor * Default factory setting value is : 50%	
I/O Signal	Input signal	3 dedicated input (LIMIT+, LIMIT-, ORIGIN), 9 programmable input (Photo coupler)
	Output signal	1 dedicated output (Compare Out), 9 programmable output (Photo coupler), Brake signal
Communication interface		Ethernet UDP communication with PC. Dual port Ethernet switch embedded, Communication Speed : 10/100base-T/TX Full duplex DHCP function embedded
Position Control		Incremental mode / Absolute mode Data range: -134,217,728 to +134,217,727 pulse, Operating: Max. 3,000rpm
Return to Origin		Origin Sensor, Z phase, \pm Limit sensor, Torque
GUI		User interface Program for Windows
Software		Motion Library (DLL) for Windows 2000/XP/Vista/7/8

*1 Maximum Rotation speed can be changed by Resolution.

Up to Resolution 10,000, Max rotation speed is 3,000rpm.

More than 4,000, Max rotation speed will be decreased

2 - 2 . Dimensions



3 . Specifications & size of the Motor

3 - 1 . Motor Specification

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Motor	Unit	EzM2-20M-F	EzM2-20L-F	EzM2-28S-D	EzM2-28M-D	EzM2-28L-D	EzM2-35S-D	EzM2-35M-D	EzM2-35L-D	EzM2-35XL-D
Current per Phase	A	0,5	0,5	0,95	0,95	0,95	0,6	0,6	0,85	0,7
Holding Torque	N · m	0,016	0,025	0,069	0,1	0,12	0,034	0,050	0,176	0,225
Rotor Inertia	g · cm ²	2,5	3,3	9	13	18	5	8	11	32
Weight	g	50	80	110	140	200	165	180	260	360
Length(L)	mm	28	38	32	45	50	22	26	38	53

* Holding Torque is based on 100% Run Current

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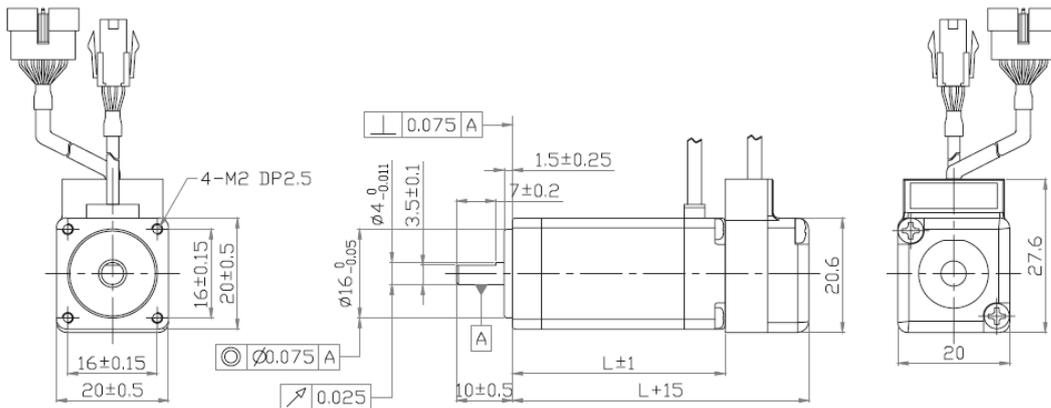
Motor	Unit	EzM2-42S-A	EzM2-42M-A	EzM2-42L-A	EzM2-42XL-A	EzM2-56S-A	EzM2-56M-A	EzM2-56L-A	EzM2-60S-A	EzM2-60M-A	EzM2-60L-A
Current per Phase	A	1,2	1,2	1,2	1,2	3	3	3	4	4	4
Holding Torque	N · m	0,32	0,44	0,5	0,65	0,64	1	1,5	0,88	1,28	2,4
Rotor Inertia	g · cm ²	35	54	77	114	180	280	520	240	490	690
Weight	g	250	280	350	500	500	720	1150	600	1000	1300
Length(L)	mm	34	40	48	60	46	55	80	47	56	85

* Holding Torque is based on 100% Run Current

3 - 2 . Motor Size

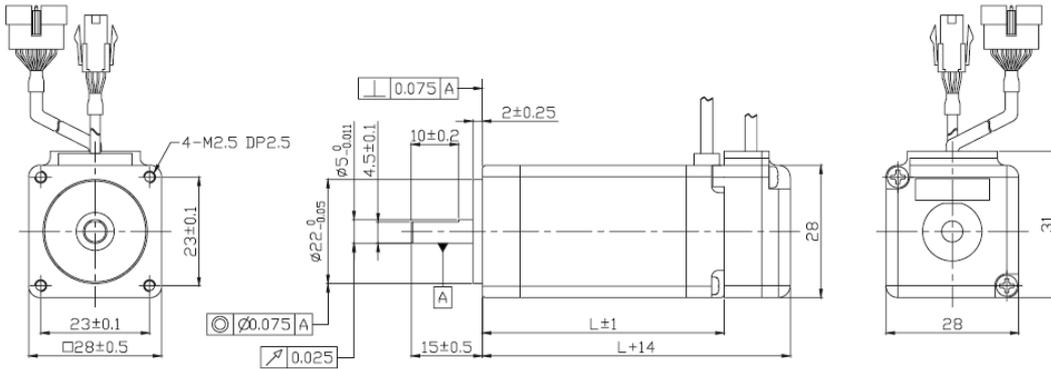
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Model name	Length(L)
EzM2-20M-F	28mm
EzM2-20L-F	38mm



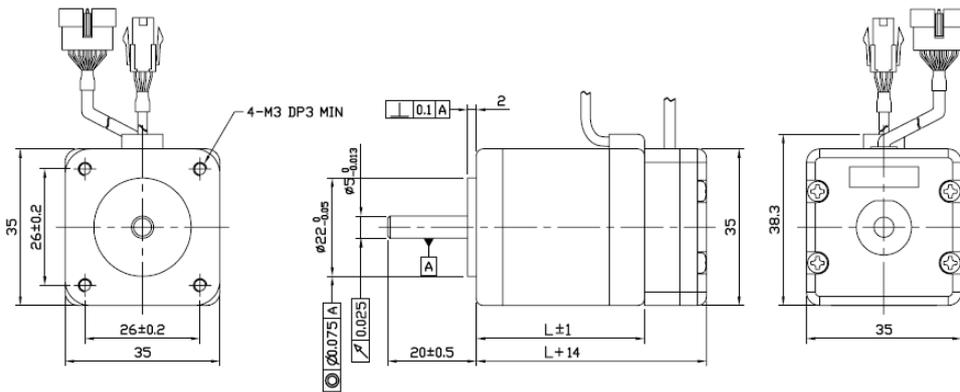
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Model name	Length(L)
EzM2-28S-D	32mm
EzM2-28M-D	45mm
EzM2-28L-D	50mm



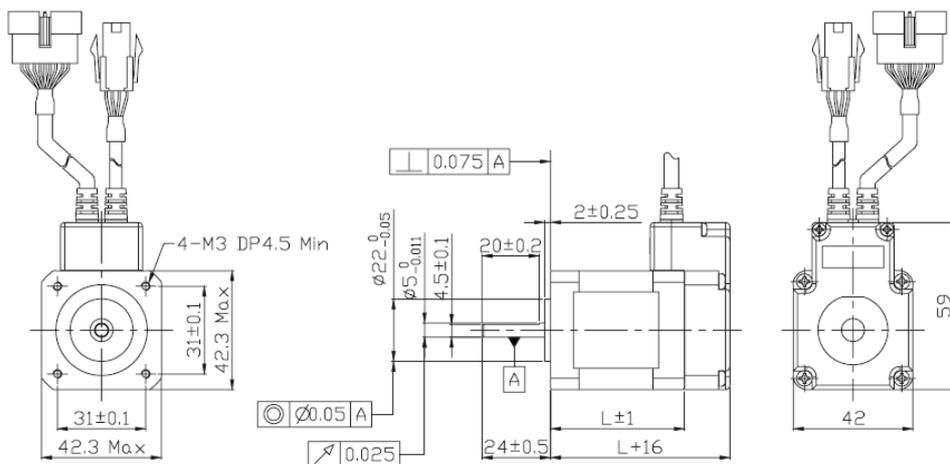
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Model name	Length(L)
EzM2-35S-D	22mm
EzM2-35M-D	26mm
EzM2-35L-D	38mm
EzM2-35XL-D	53mm

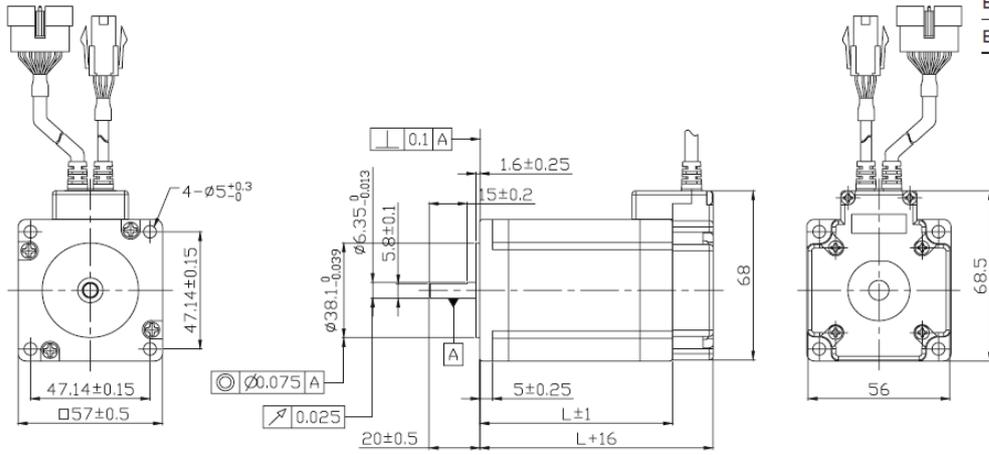


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Model name	Length(L)
EzM2-42S-A	34mm
EzM2-42M-A	40mm
EzM2-42L-A	48mm
EzM2-42XL-A	60mm

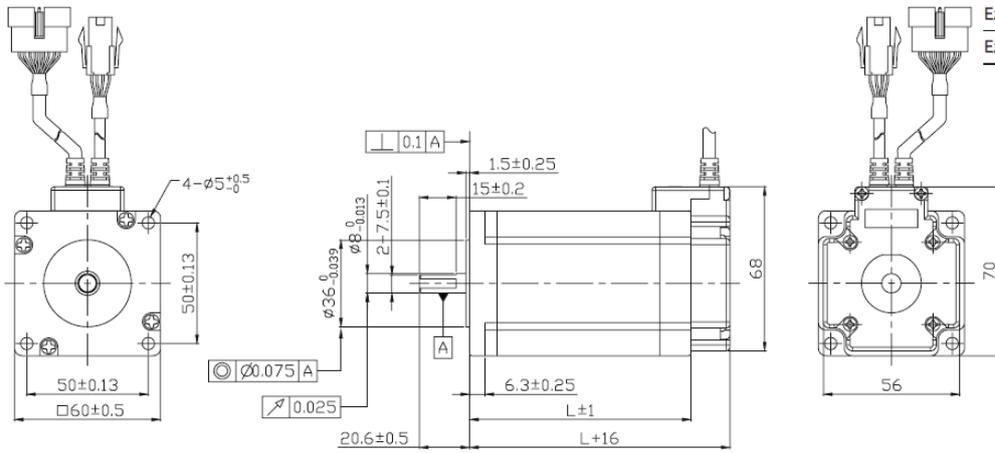


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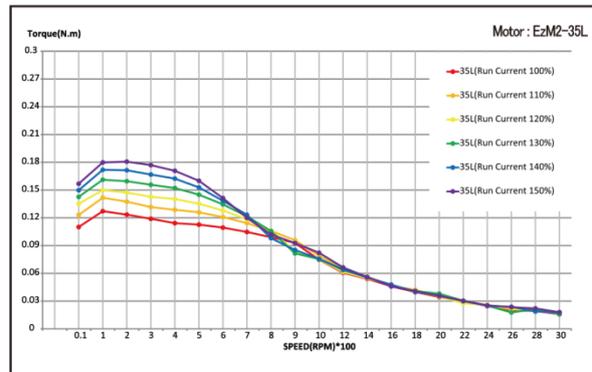
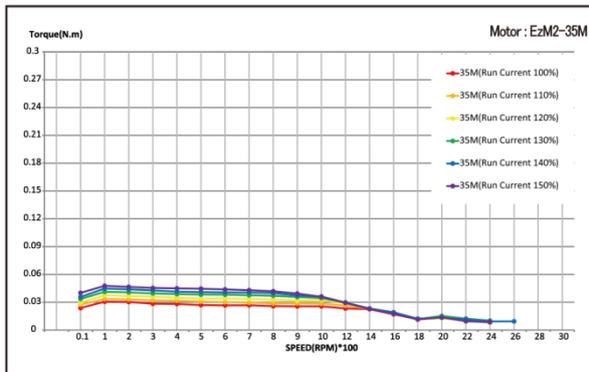
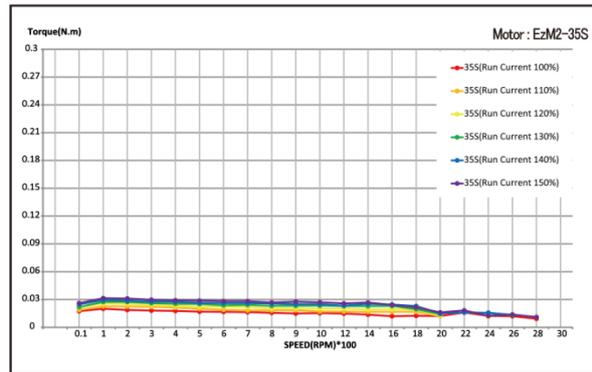
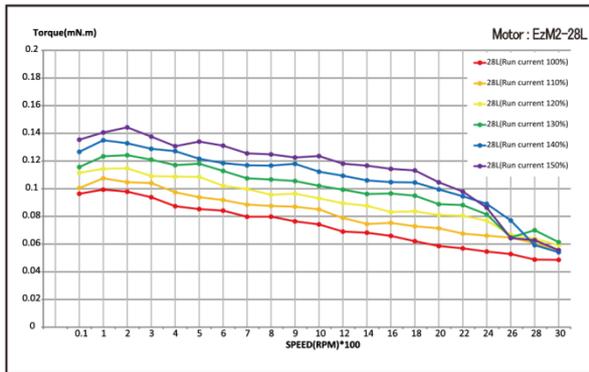
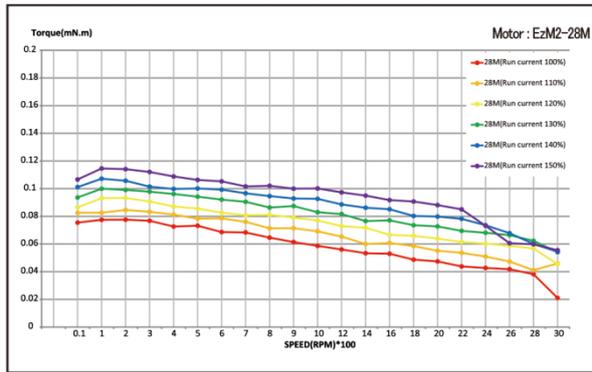
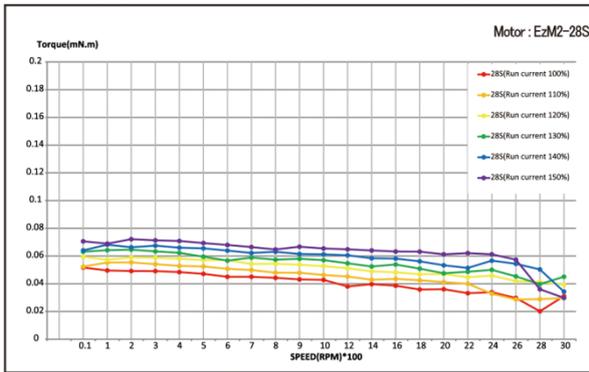
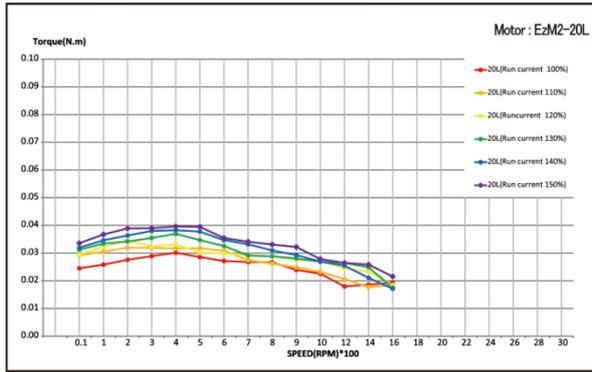
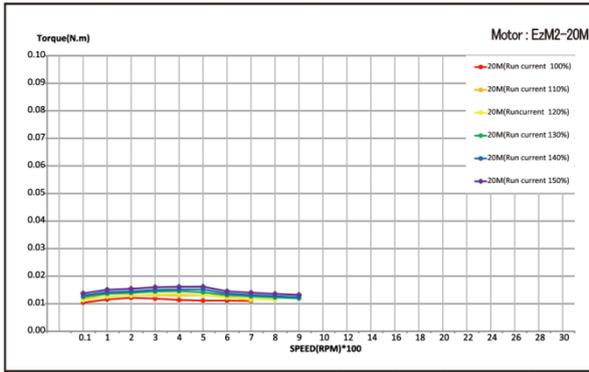
Model name	Length(L)
EzM2-56S-A	46mm
EzM2-56M-A	55mm
EzM2-56L-A	80mm

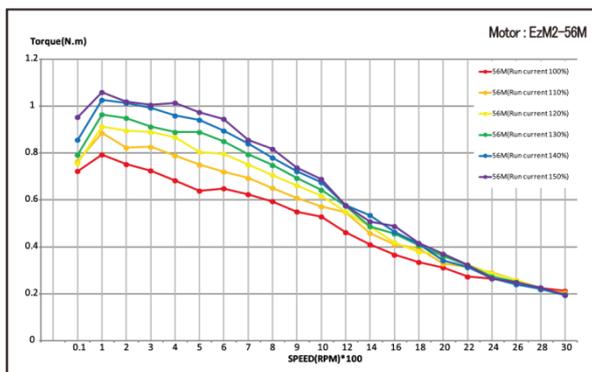
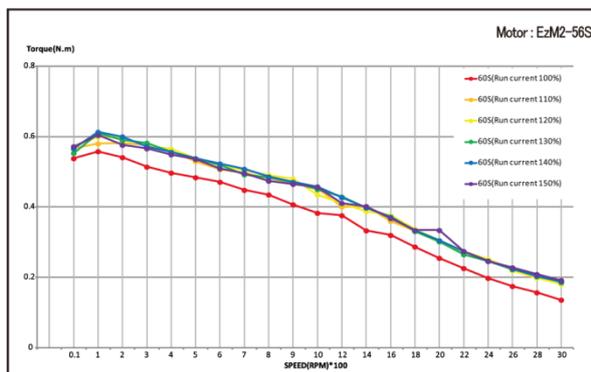
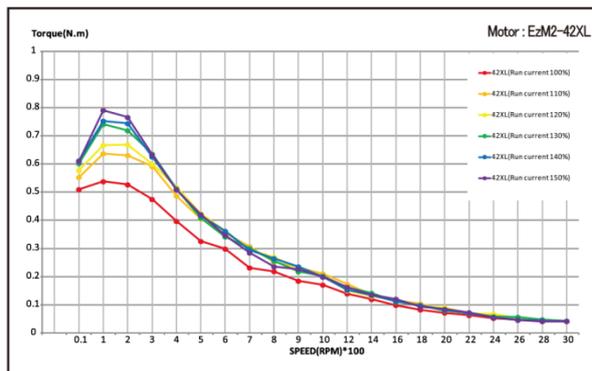
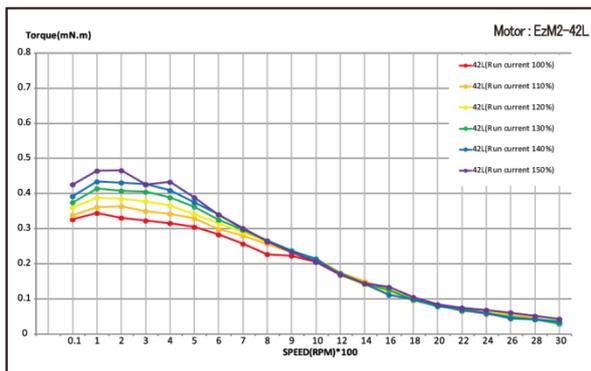
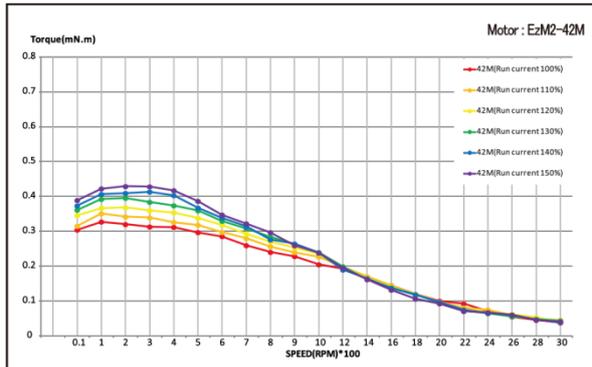
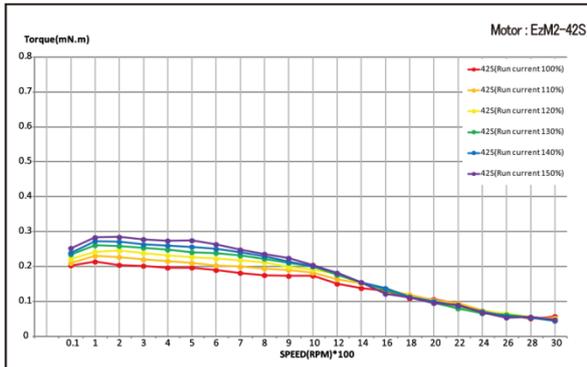
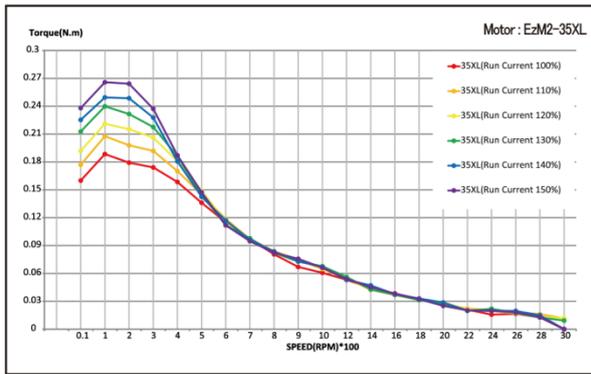
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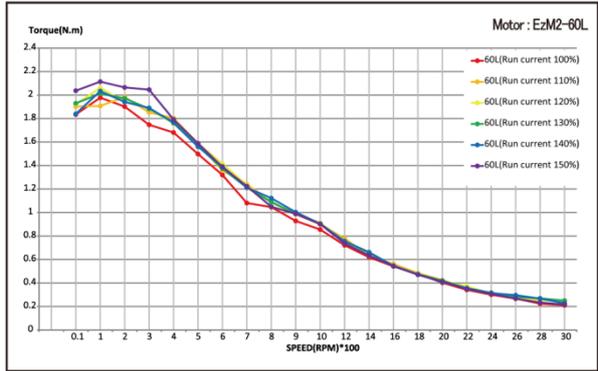
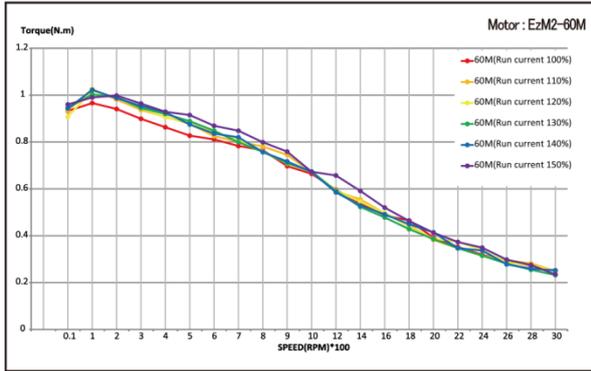
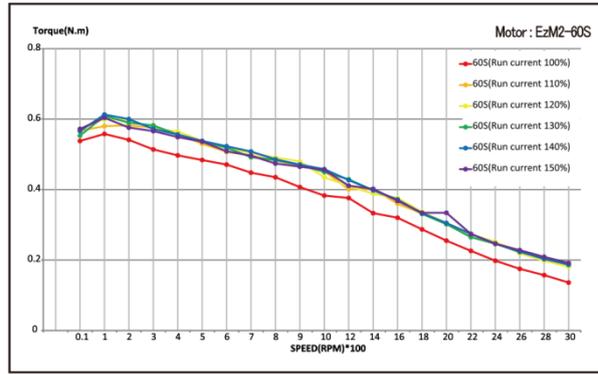
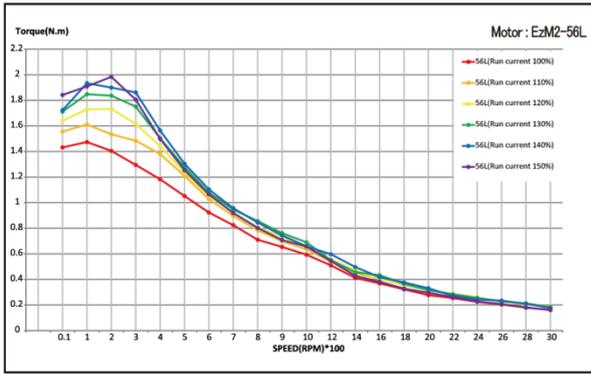


Model name	Length(L)
EzM2-60S-A	47mm
EzM2-60M-A	56mm
EzM2-60L-A	85mm

4 . Torque Characteristic





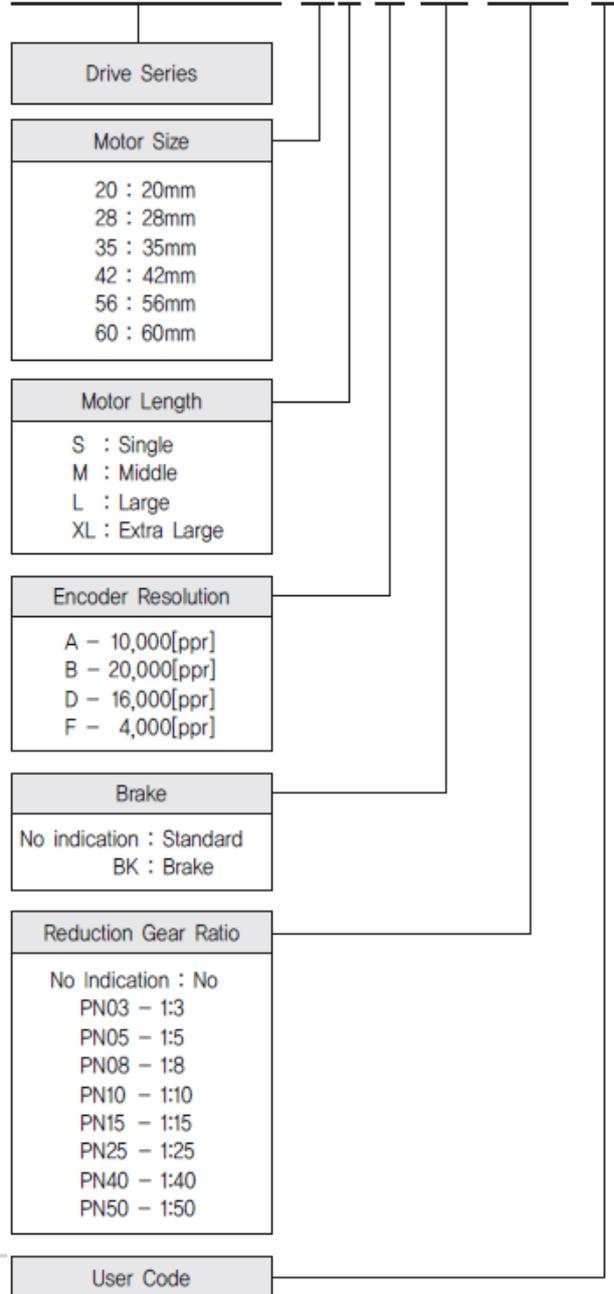


5 . Configuration

5 – 1 . Motor and Drive Combination

1) Ezi-SERVOII Plus-E Part Numbering

Ezi-SERVO II -PE-56L-A-BK-PN05-□



2) Ezi-SERVOⅡ Plus-E Motor, Drive combination (Standard)

Unit Part Number	Motor Part Number	Drive Part Number
Ezi-SERVOⅡ-PE-20M-F	EzM2-20M-F	EzS2-PE-20M-F
Ezi-SERVOⅡ-PE-20L-F	EzM2-20L-F	EzS2-PE-20L-F
Ezi-SERVOⅡ-PE-28S-D	EzM2-28S-D	EzS2-PE-28S-D
Ezi-SERVOⅡ-PE-28M-D	EzM2-28M-D	EzS2-PE-28M-D
Ezi-SERVOⅡ-PE-28L-D	EzM2-28L-D	EzS2-PE-28L-D
Ezi-SERVOⅡ-PE-35M-D	EzM2-35M-D	EzS2-PE-35M-D
Ezi-SERVOⅡ-PE-35L-D	EzM2-35L-D	EzS2-PE-35L-D
Ezi-SERVOⅡ-PE-42S-x	EzM2-42S-x	EzS2-PE-42S-x
Ezi-SERVOⅡ-PE-42M-x	EzM2-42M-x	EzS2-PE-42M-x
Ezi-SERVOⅡ-PE-42L-x	EzM2-42L-x	EzS2-PE-42L-x
Ezi-SERVOⅡ-PE-42XL-x	EzM2-42XL-x	EzS2-PE-42XL-x
Ezi-SERVOⅡ-PE-56S-x	EzM2-56S-x	EzS2-PE-56S-x
Ezi-SERVOⅡ-PE-56M-x	EzM2-56M-x	EzS2-PE-56M-x
Ezi-SERVOⅡ-PE-56L-x	EzM2-56L-x	EzS2-PE-56L-x
Ezi-SERVOⅡ-PE-60S-x	EzM2-60S-x	EzS2-PE-60S-x
Ezi-SERVOⅡ-PE-60M-x	EzM2-60M-x	EzS2-PE-60M-x
Ezi-SERVOⅡ-PE-60L-x	EzM2-60L-x	EzS2-PE-60L-x

● x : A or B

3) Ezi-SERVOⅡ Plus-E Motor, Drive combination (Brake integration)

Unit Part Number	Motor Part Number	Drive Part Number
Ezi-SERVOⅡ-PE-42S-x-BK	EzM2-42S-x-BK	EzS2-PE-42S-x
Ezi-SERVOⅡ-PE-42M-x-BK	EzM2-42M-x-BK	EzS2-PE-42M-x
Ezi-SERVOⅡ-PE-42L-x-BK	EzM2-42L-x-BK	EzS2-PE-42L-x
Ezi-SERVOⅡ-PE-42XL-x-BK	EzM2-42XL-x-BK	EzS2-PE-42XL-x
Ezi-SERVOⅡ-PE-56S-x-BK	EzM2-56S-x-BK	EzS2-PE-56S-x
Ezi-SERVOⅡ-PE-56M-x-BK	EzM2-56M-x-BK	EzS2-PE-56M-x
Ezi-SERVOⅡ-PE-56L-x-BK	EzM2-56L-x-BK	EzS2-PE-56L-x
Ezi-SERVOⅡ-PE-60S-x-BK	EzM2-60S-x-BK	EzS2-PE-60S-x
Ezi-SERVOⅡ-PE-60M-x-BK	EzM2-60M-x-BK	EzS2-PE-60M-x
Ezi-SERVOⅡ-PE-60L-x-BK	EzM2-60L-x-BK	EzS2-PE-60L-x

● x : A or B

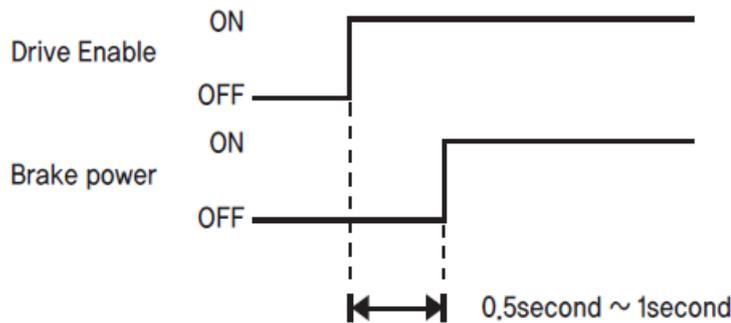
● Brake Specification

Package	Motor	Electronic Brake					Motor Unit Weight (g)	Permitted Overhung Load (N)				Permitted Thrust Load (N)
		Type	Voltage Input (V)	Rated Current (A)	Power Consumption	Statical Friction Torque (N · m)		Length from Motor Point (mm)				
								3	8	13	18	
Ezi-SERVO II-PE-42S-A-BK	EzM2-42S-A-BK	Non-excitation run Type	24VDC ±10%	0,2	5	0,2	510	22	26	33	46	Must be Lower than Unit's Weight
Ezi-SERVO II-PE-42M-A-BK	EzM2-42M-A-BK						570					
Ezi-SERVO II-PE-42L-A-BK	EzM2-42L-A-BK						640					
Ezi-SERVO II-PE-42XL-A-BK	EzM2-42XL-A-BK						770					
Ezi-SERVO II-PE-56S-A-BK	EzM2-56S-A-BK			0,27	6,6	0,7	870	52	65	85	123	
Ezi-SERVO II-PE-56M-A-BK	EzM2-56M-A-BK						1190					
Ezi-SERVO II-PE-56L-A-BK	EzM2-56L-A-BK						1380					
Ezi-SERVO II-PE-60S-A-BK	EzM2-60S-A-BK			0,27	6,6	0,7	1150	70	87	114	165	
Ezi-SERVO II-PE-60M-A-BK	EzM2-60M-A-BK						1350					
Ezi-SERVO II-PE-60L-A-BK	EzM2-60L-A-BK						1960					

Electric brake cannot be used for braking. Position hold purpose only when power OFF
 The weight means motor unit weight including motor and electric brake

● Brake Operation Timing Chart

The Brake is automatically controlled by Ezi-SERVOII Plus-E Drive.
 Please refer to below Timing Chart when control brake from upper controller other than using Ezi-SERVOII Plus-E brake control. .
 Otherwise, drive malfunction happen or loads can be fall down.
 Also, please do not operate brake while motor operation to prevent damage.



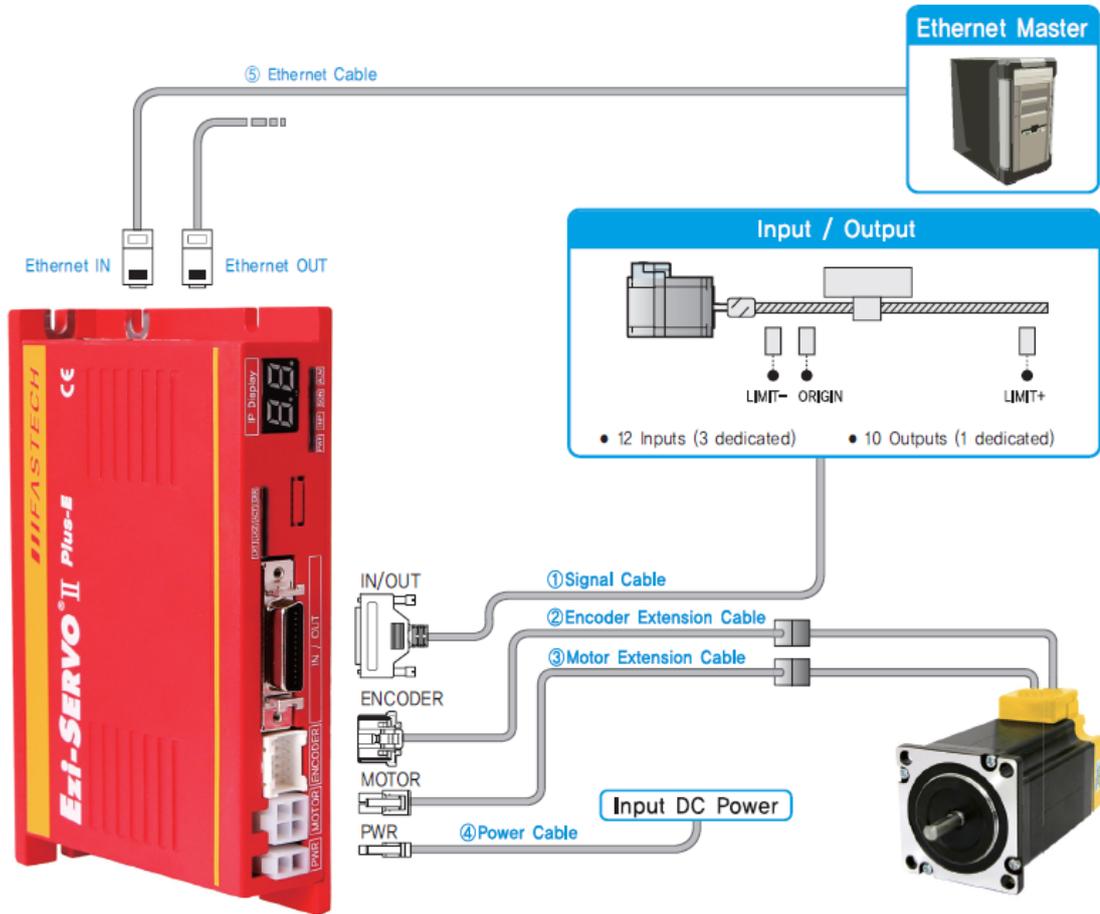
4) Ezi-SERVOⅡ Plus-E Motor, Drive combination (Gearbox integration)

Unit Part Number	Motor Part Number	Drive Part Number
Ezi-SERVOⅡ-PE-42S-x-PG-PNy	EzM2-42S-x-PG-PNy	EzS2-PE-42S-x
Ezi-SERVOⅡ-PE-42M-x-PG-PNy	EzM2-42M-x-PG-PNy	EzS2-PE-42M-x
Ezi-SERVOⅡ-PE-42L-x-PG-PNy	EzM2-42L-x-PG-PNy	EzS2-PE-42L-x
Ezi-SERVOⅡ-PE-42XL-x-PG-PNy	EzM2-42XL-x-PG-PNy	EzS2-PE-42XL-x
Ezi-SERVOⅡ-PE-56S-x-PG-PNy	EzM2-56S-x-PG-PNy	EzS2-PE-56S-x
Ezi-SERVOⅡ-PE-56M-x-PG-PNy	EzM2-56M-x-PG-PNy	EzS2-PE-56M-x
Ezi-SERVOⅡ-PE-56L-x-PG-PNy	EzM2-56L-x-PG-PNy	EzS2-PE-56L-x
Ezi-SERVOⅡ-PE-60S-x-PG-PNy	EzM2-60S-x-PG-PNy	EzS2-PE-60S-x
Ezi-SERVOⅡ-PE-60M-x-PG-PNy	EzM2-60M-x-PG-PNy	EzS2-PE-60M-x
Ezi-SERVOⅡ-PE-60L-x-PG-PNy	EzM2-60L-x-PG-PNy	EzS2-PE-60L-x

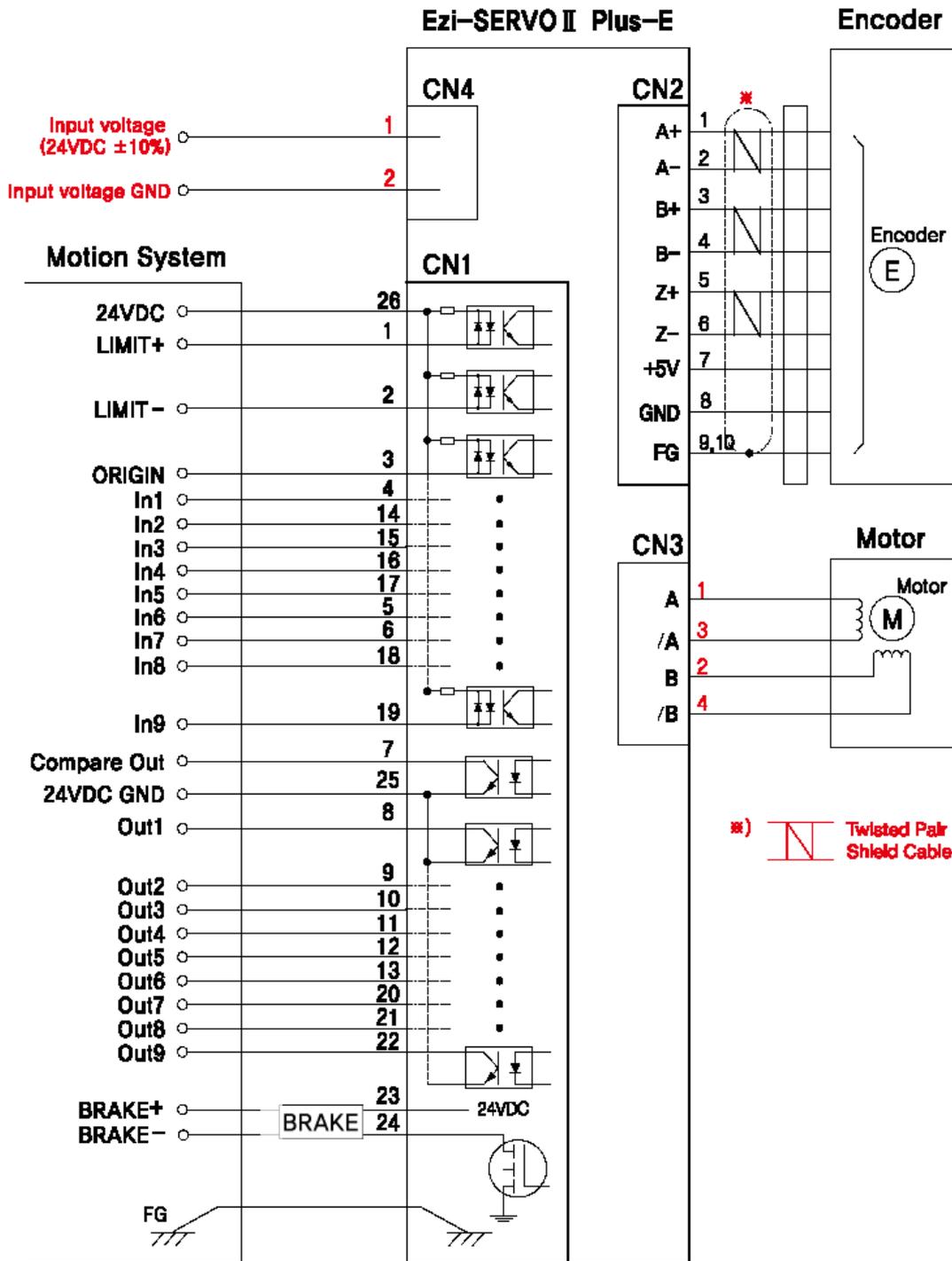
- x : A or B
- y (Reduction gear ratio): 3, 5, 8, 10, 15, 25, 40, 50

5 - 2 . Controller configuration

1) Ezi-SERVOII Plus-E configuration

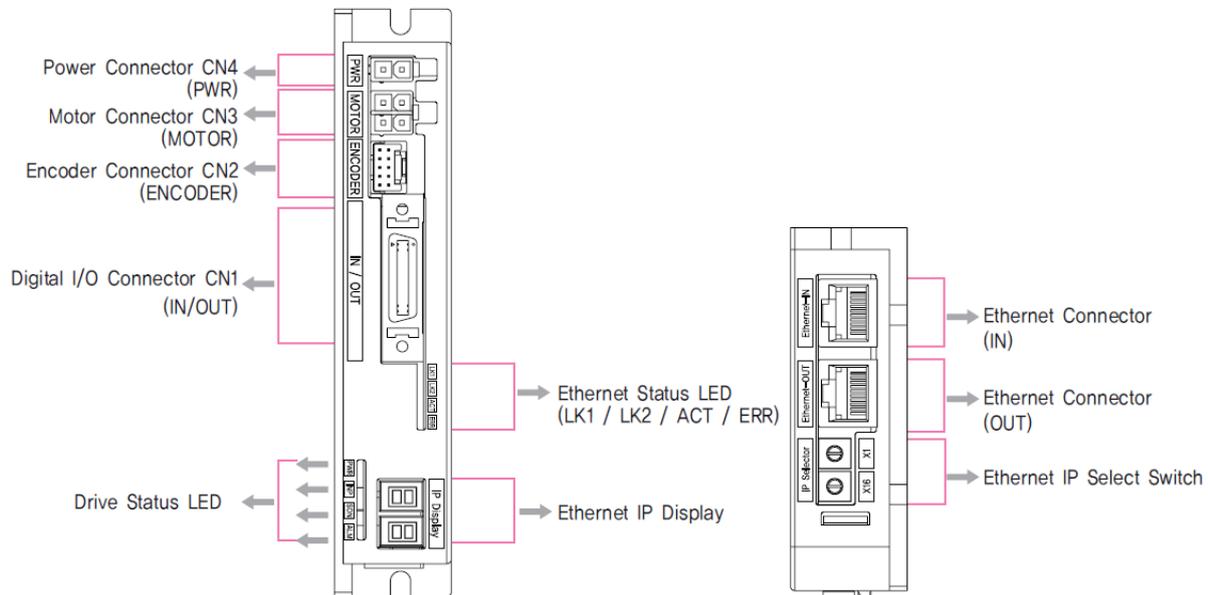


5 - 3 . External Wiring Diagram



6 . External Name and Function Setting of Ezi-SERVOII Plus-E

6 - 1 . Appearance and Part name

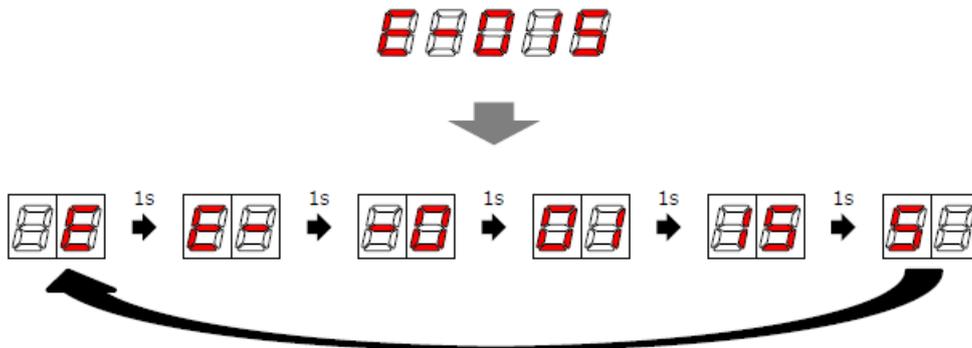


6 - 2 . Drive Status LED

Display	Color	Function	On / Off Condition
PWR	Green	Power Input Indication	Light on when power is applied.
INP	Yellow	Complete Positioning motion	Light on when position command pulse input and then position deviation is within the parameter setting value
EN	Orange	Motor enable status indication	Enable : Light On, Disable: Light Off
ALM	Red	Alarm indication	Flash repeat when protection function is activated. (if count LED flash time, it is possible to check which protection function is activating)

6 - 3 . Ethernet IP Display

- 1) It displays the setting ID of SW1,2 (Drive ID Selection Switch)
- 2) In case of ID setting after power input status, 7-Segments are flashing and changed ID is not applied.
 - The IP must be changed when power off status.
- 3) When Alarm generating from drive, Alarm value is displayed on 7-Segment, not ID value. Alarm value is displayed on 7-Segment as 'E-000' type with one each dial. This dial is changing every one second. (ex. Display of Alarm No. 15)



4) It displays the all of set ID on the drive after power input, it displays end number of IP address as hex code.

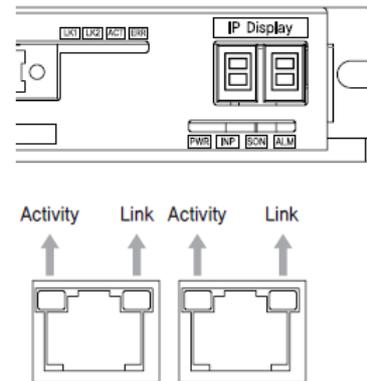
Ex) IP Address: 192.168.0.10

Firstly display 192.168.0.10 → only display 0A

6 - 4 . Ethernet status LED

1) This LED indicates the Ethernet communication status. The Link1 / Link2 LEDs are located on the top right of each Ethernet connector, and the Activity LED is on the top left.

Name	Color	Status	Description
Error	Red	OFF	Normal status or Power OFF
		Single Flash	Local Error
LK1/ LK2	Green	OFF	Link deactivated
		ON	Link activated
Activity	Yellow	OFF	Non operation
		Flickering	In operation

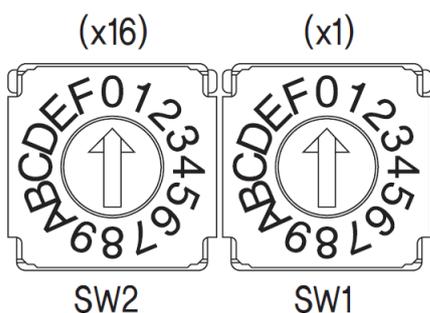


6 - 5 . IP Address selection switch (SW1, SW2)

1) It can be set from "1 to 254". Please set IP not to overlap.

- "0" and "255" cannot be used for IP setting. Be sure to set it to "1 to 254"..
- The default gateway is 192.168.0.1. When the switch is set to "1" Change Gateway. Refer to the [Manual - User Program 2-4] section for the change method. If the IP address and gateway are the same, Alarm (201 or 202) occurs.
- It is recommended to use "2 ~ 254" for IP setting. (Default: SW1: 2, SW2: 0)

2) Basic set is "192.168.0.xxx", and xxx are set by switch.



Ex.) In case of SW1 : 9, and SW2 : 6

$$9 * 1 + 6 * 16 = 105$$

IP address : 192.168.0.105 (7-Segment display : 69)

3) If set to switch as 255(FF), IP Address is setting automatically.

Because it uses DHCP, IP address is set automatically only when using router.

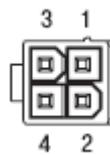
(Connect the Ethernet to Ethernet IN connector)

- When connecting directly to the controller (PC/PLC), it need to be sure to set the OP address with switch
- Set the IP address automatically only when you do not use the default IP address. If IP is set automatically, connect the user program (GUI) and save the IP address. And turn off the power and set the lasr number of IP with switch
- When the switch is set to 0, the IP setting becomes the initial (default) value.
In the initial state, communication is not connected.
- Basic IP Address : 192.168.0.xxx, Subnet Mask : 255.255.255.0, Gateway : 192.168.0.1

6 - 6 . Motor Connection connector (CN3)

(Connector Type : Molex 5569-04A2)

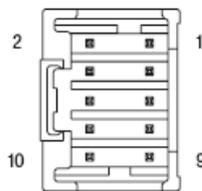
No	Function
1	A
2	B
3	/A
4	/B



6 - 7 . Encoder connection connector (CN2)

(Connector Type : Molex 55959-1030)

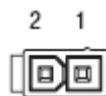
No	Function
1	A+
2	A-
3	B+
4	B-
5	Z+
6	Z-
7	5VDC
8	5VDC GND
9	Frame GND
10	Frame GND



6 - 8 . Power connection connector (CN4)

(Connector Type : Molex 5569-02A2)

No	Function
1	Input Power : 24VDC \pm 10%
2	Input Power : GND

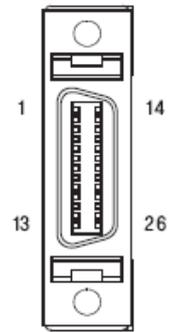


6 - 9 . I/O signal connector (CN1)

(Connector Type : 3M 10226-5A2JL)

No	Function	No	Function
1	LIMIT+ (Dedicated input)	14	Digital In2 (Programmable input)
2	LIMIT- (Dedicated input)	15	Digital In3 (Programmable input)
3	ORIGIN (Dedicated input)	16	Digital In4 (Programmable input)
4	Digital In1 (Programmable input)	17	Digital In5 (Programmable input)
5	Digital In6 (Programmable input)	18	Digital In8 (Programmable input)
6	Digital In7 (Programmable input)	19	Digital In9 (Programmable input)
7	Compare Out (Dedicated Output)	20	Digital Out7 (Programmable output)
8	Digital Out1 (Programmable output)	21	Digital Out8 (Programmable output)
9	Digital Out2 (Programmable output)	22	Digital Out9 (Programmable output)
10	Digital Out3 (Programmable output)	23	Brake +24V (Output)
11	Digital Out4 (Programmable output)	24	Control signal for Brake(Output)
12	Digital Out5 (Programmable output)	25	GND external(Input)
13	Digital Out6 (Programmable output)	26	+24V external(Input)

* This connector's fixing pin is connected to frame GND through a mount hall



The programmable input/output pin is set by using the user program (GUI) or DLL library.

Caution	<p>Connect the Brake (current consumption is under 200[mA]) for pin 24. Refer to 7.4 Output signal for the Brake that is over 200[mA].</p>
----------------	---

6 - 10 . Ethernet connector

No	Function	No	Function
1	TD+	6	RD-
2	TD-	7	-
3	RD+	8	-
4	-	Connector Hood	F.G
5	-		



7 . Control I/O signal

7 - 1 . Signal cabling

All control I/O signals use connector CN1 as specified below..

1) Input : 「Limit+」, 「Limit-」, 「Origin」 signals are fixed to CN1 No. 1,2,3.

Other signals as like 'Reset' and others are assigned to IN1~IN9 terminal blocks.

3 dedicated input + 9 programmable input = total 12 input pins

CN1 No.	Signal Name	Function
1	Limit+	Positive Limit sensor signal
2	Limit-	Negative Limit sensor signal
3	Origin	Origin sensor signal
4	IN1	Clear Pos
14	IN2	Position Table A0 ~ Position Table A7 (PT A0~PT A7)
15	IN3	Position Table start execution (PT Start)
16	IN4	Soft Stop(Stop)
17	IN5	Jog+, Jog-
5	IN6	Alarm Reset, Servo ON
6	IN7	Pause, Origin Search, Teaching
18	IN8	Emergency Stop(E-Stop)
19	IN9	Jump Position Table input 0 ~ Jump Position Table input 2 (JPT IN 0~ JPT IN 2)
		Jump Position Table start (JPT Start)
		User input 0 ~ User input 8 (User IN 0 ~ User IN 8)

2) Output : 「COMP」 signal is fixed on each assigned No, Other signals like

In-position are assigned to OUT1~OUT9 terminal blocks.

1 dedicated Out + 9 programmable Out = 10 Outputs

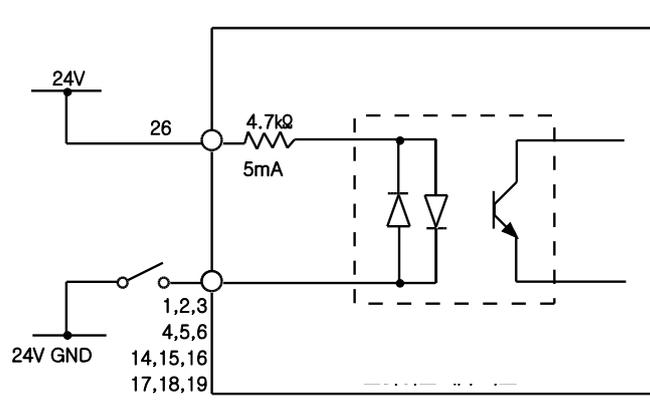
CN1 No.	Signal Name	Function
7	COMP	Specific output signal (Compare Out)
8	OUT1	In-Position, Alarm, Moving Acc/Dec ACK, END AlarmBlnk, OriginSearchOK ServoReady Brake Position Table output 0 ~ Position Table output 2 (PT OUT 0 ~ PT OUT 2) User Output 0 ~ User Output 8
9	OUT2	
10	OUT3	
11	OUT4	
12	OUT5	
13	OUT6	
20	OUT7	
21	OUT8	
22	OUT9	

7 - 2 . Connection Circuit

All drive I/O signals are insulated by a photo coupler. The signals display the internal photo coupler status - [ON: Conduction] and [OFF: Non- Conduction], not the signal voltage level.

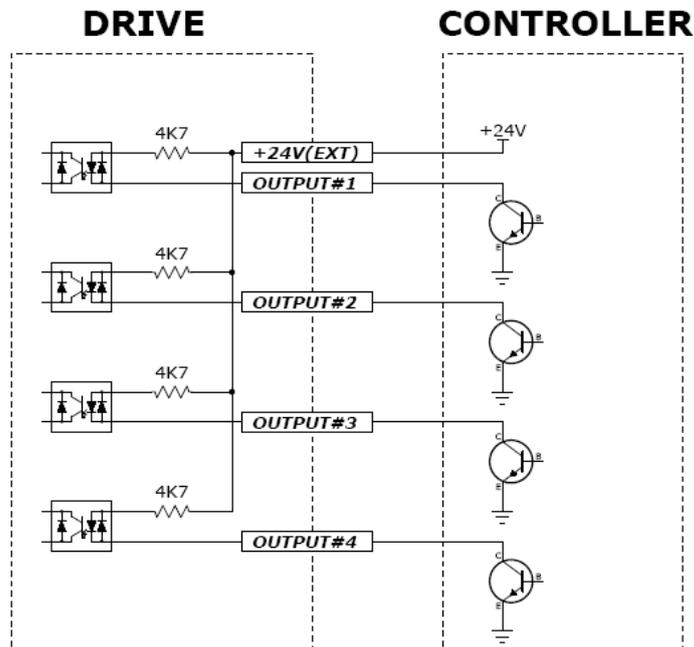
1) Input Circuit

Input circuit power of DC24V±10% (consumed current : about 5mA/circuit) should be separately prepared.



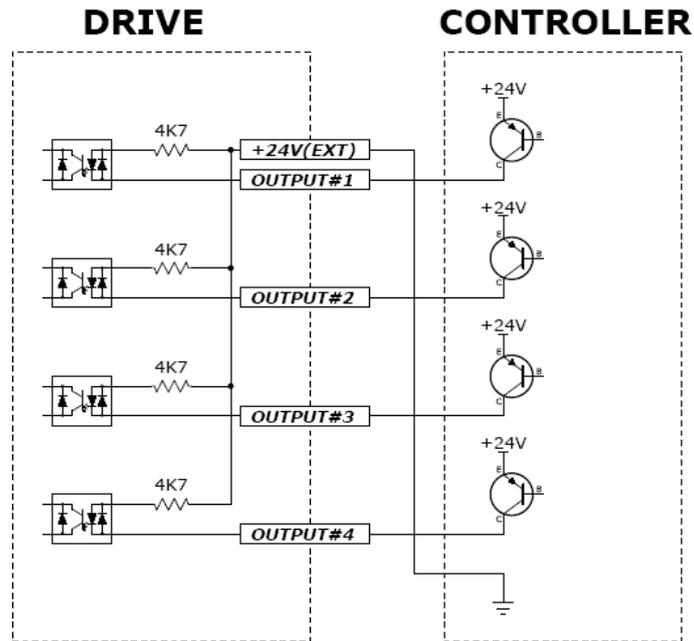
- **Connect NPN type Input signal**

Connect the '+24V external' signal of drive to '+24V' of Controller.



- **Connect PNP type Input signal**

Connect the '+24V external' signal of drive to 'GND' of Controller.

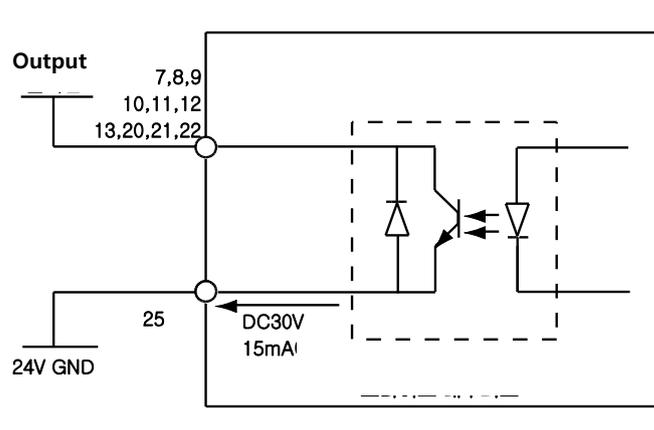


2) Output Circuit

Output circuit power should be separately prepared. This may share input circuit power. In this case, working power capacity should add output power capacity to input power capacity.

Applied voltage and power capacity in the control output port are as follows.

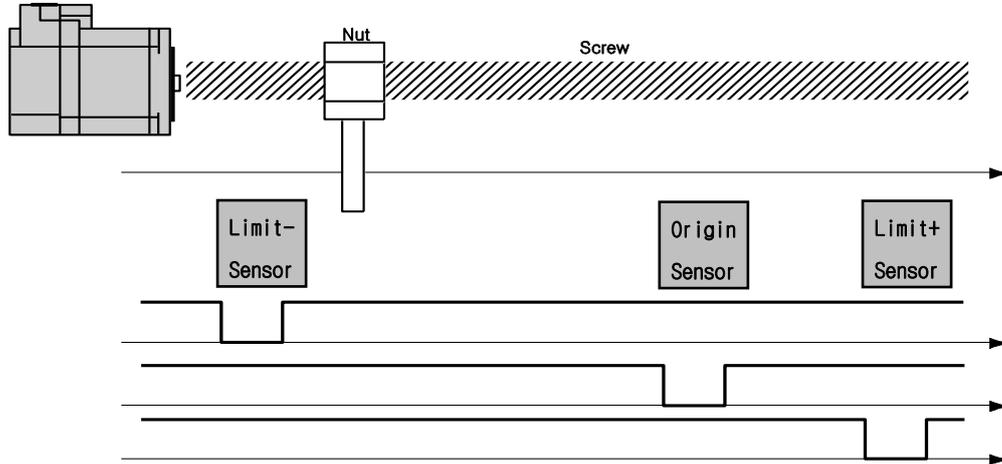
- Applied voltage $\leq 30V$
- Electrified current $\leq 15mA$



7 - 3 . Input signal

1) Limit Sensor and Origin Sensor

Limit sensor and origin sensor are assigned to LIMIT+, LIMIT- , and ORIGIN pin in the CN1 connector respectively. LIMIT+ and LIMIT- sensors are used to limit the motion of each axis to prevent mechanical collision. Origin sensor is to set the origin of equipment



2) Clear Pos

This input signal sets the command position and the actual position to 0 in relation to motion position control. The reset signal pulse scale is 10ms or more.



Position value is to be "0" from the rising/falling edge of this signal

3) Position Table A0 –A7 (PT A0~A7) Input

The position table supports the machine so that its motion can be controlled by I/O signals of central controller. It can directly transmit commands such as position table number, start/stop and origin return to the machine through the PLC. Also, the user can check output signals such as in-position, completion of origin return and Servo ready through the PLC.

「Position Table A0~A7」 Inputs are total 8 bits of input signal. It is used to set 256 position table numbers. There are two application methods as follows

- 1) To set position table number (0~255) to be set by 'PT start' input signal.
- 2) To set position table number (0~255) to save current position values by 'Teaching' input signal.

By using PT A0~A7 signals, the position table address can be set from 0 to 255 with a binary number. A0 is least significant bit and A7 is most significant bit. The following table shows how to assign position table number.

*1. Save signal cabling: If 'PT A0~A7'signal is not connected when motioning by 'PT Start' signal, the position table number will be '0'.

A7	A6	A5 ~ A3	A2	A1	A0	PT No
0	0	0	0	0	0	0
0	0	0	0	0	1	1
0	0	0	0	1	0	2
0	0	0	0	1	1	3
0	0	0	1	0	0	4
... ..						
1	1	1	1	1	0	254
1	1	1	1	1	1	255

*2.'PT A5/UserIN 6' 'PT A6/UserIN 7' 'PT A7/UserIN 8' signal setting :

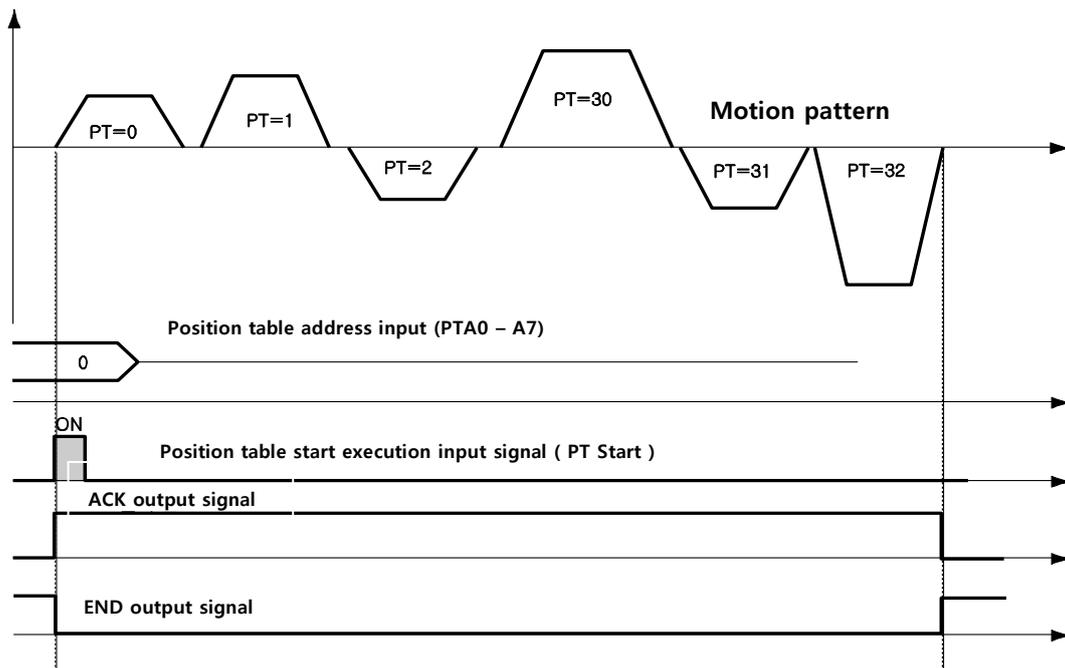
This signal can be used as'PT A5~A7', and also can be used as 'User IN6~IN8'signal when the input signal 'User IN0~IN5'is not enough.

4) Position Table start (PT Start) Input

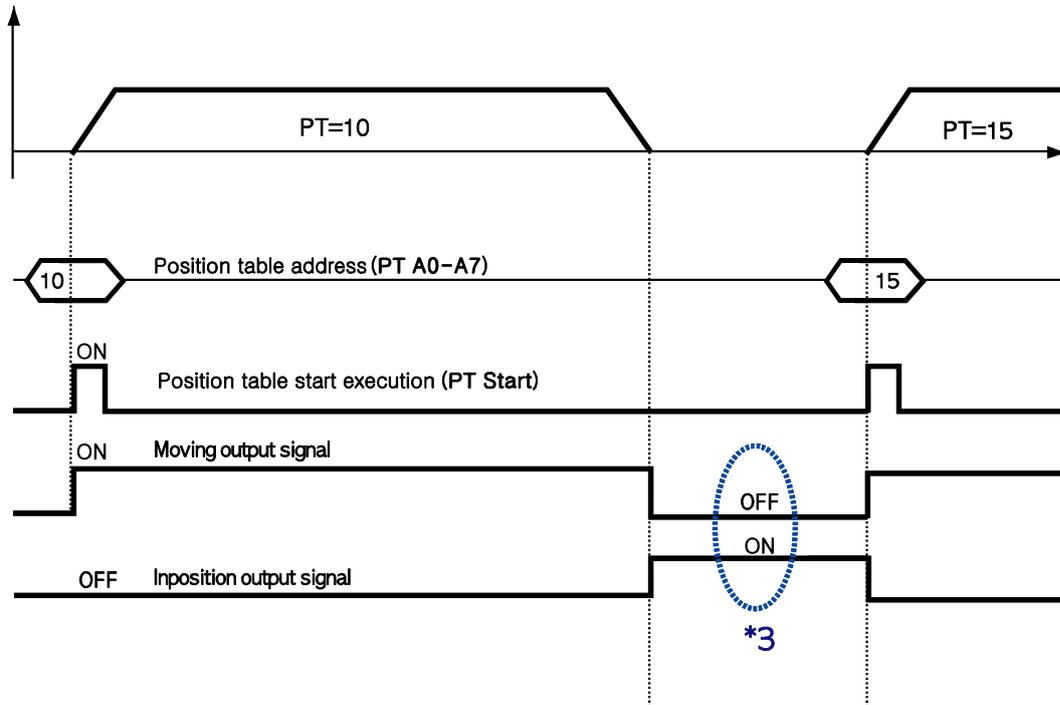
By using PT A0~A7 signals, set and input the running PT start number. Then the motion pattern corresponds to the PT No. will be executed.

Following example shows that total 6 motion patterns are in order to execute from No.0 to No.32 and then stopped.

- 1) All of PT A0~A7 is set to '0' and PT number is set to '0'.
- 2) Set PT Start signal to [ON], and PT No.0 motion pattern will be executed.
- 3) When the motion pattern is started by PT, ACK signal and END signal are displayed to [ON] at CN1 output port as illustrated below. The signal is kept until one motion pattern loop is stopped. After all motions are stopped, the output signal level is set to [OFF].
- 4) PT Start signal is **edge trigger** type and pulse scale is 10ms or more.

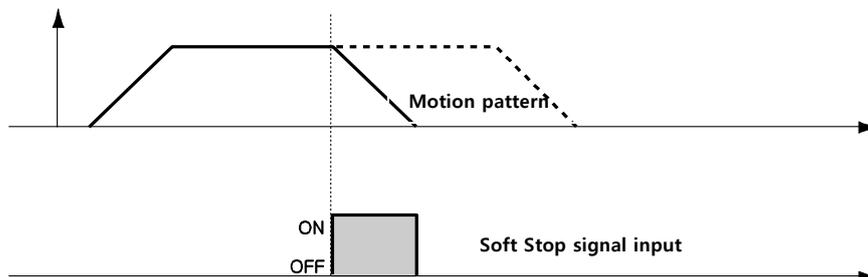


- *1. Timing of signals : PT A0~A7 signals must be set before(50msec) PT Start signal set to [ON].
- *2. If the PT A0~A7 signals are not used and the PT Start signal set to [ON] the PT No. 0 will be executed..
- *3. Checking the 'Moving' and 'In-position' signals:
Between sequential 'PT Start' motion command signal, the checking step for motion status (Moving, In-position) is needed before next motion command.



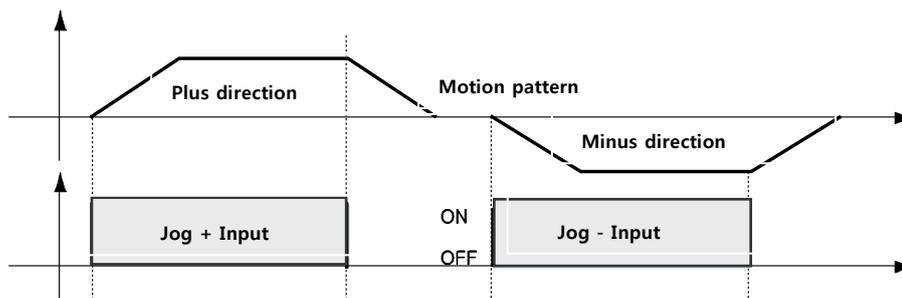
5) Stop Input

Soft stop input signal is to stop motion patterns under operation. The deceleration condition until they stop complies with the deceleration time value and the start speed value set previously. The soft stop signal is active in ON level and pulse scale is 10ms or more.



6) Jog+ and Jog- Input

When Jog+ or Jog- signal is ON, the motor rotates clockwise or counterclockwise until it reaches the hardware limit or the software limit. Jog motion pattern is subject to jog related parameters (No.7: start speed, No.6: speed, No.8: Acc Dec time).



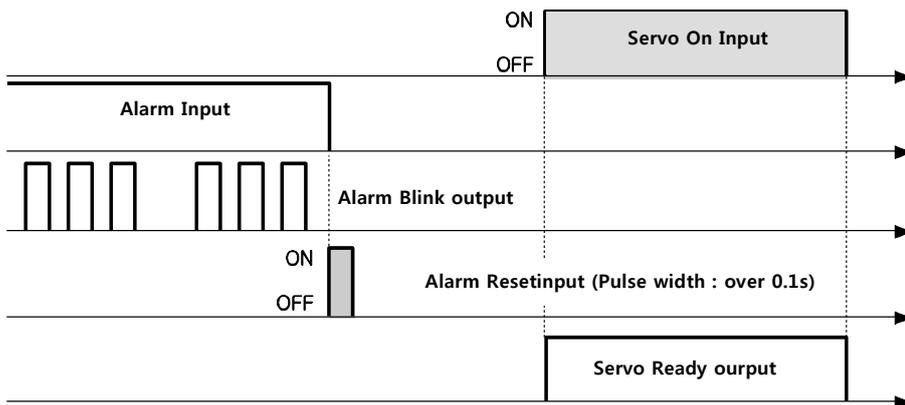
7) Servo ON and Alarm Reset Input

When the protective function of drive executes, alarm output is released. When AlarmReset input is set to ON, alarm output and alarm blink output are released. Before releasing alarm output, the user must remove any cause of alarm operating.

When Servo ON/OFF signal is set to OFF, the drive stops supplying the current to the motor and so the user can directly adjust the output position. When Servo ON/OFF signal is set to ON, the drive restarts to supply the current to the motor and its torque is recovered. Before operating the motor, the user must set it to ON.

When the drive is set to Servo ON, CN1 connector's <ServoReady > output signal is set to ON. Servo ON signal is **edge trigger** type and pulse scale is 10ms or more.

 Caution	If the 'Servo ON' signal is assigned to input pin, ServoON command from GUI or DLL library will not executed.
--	--



- *1. If 'No.0: Pulse per Revolution' in the parameter list is changed, the motor is set to Servo OFF.
- *2. After 'ServoON' signal is assigned to input pin, it is impossible to use 'SERVO ON' button in User Program(GUI).
- *3. After 'ServoON' is executed, the 'Command Position' value will be changed as same as 'Actual Position' value to remove 'Position Error'.

8) Pause Input

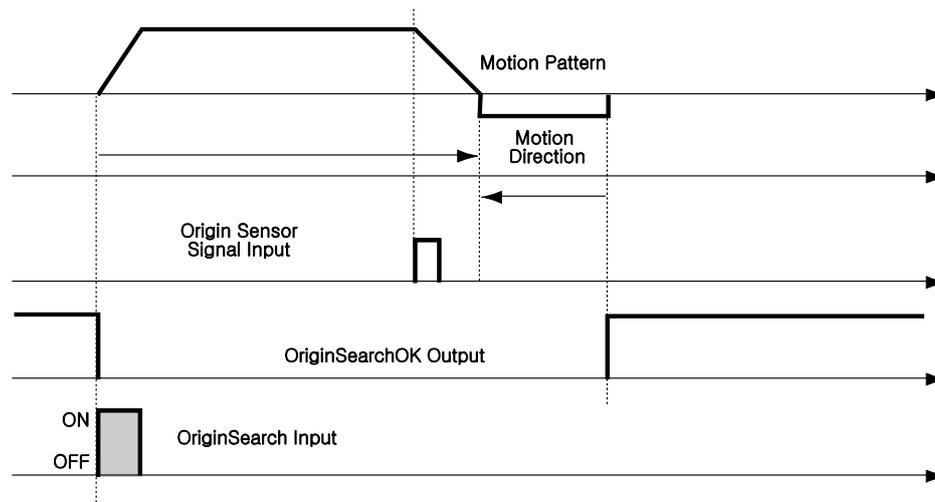
When Pause signal is set to ON, the motion in service is stopped

To start motion again, set the Pause signal to [OFF].

The pulse width of the pause signal is 10ms or more

9) Origin Search Input

When 'Origin Search' signal is set to ON (10ms or more), it starts to search the origin position according to selected conditions. The conditions are subject to parameters such as No.20:Org Method, No.17:Org Speed, No.18:Org Search Speed, No.19:Org AccDec Time, No.21:Org Dir. (For more information, refer to '1.2 Parameter'.) When the origin search command is completed, 'Origin Search OK' signal is set to ON to CN1 connector's output port.

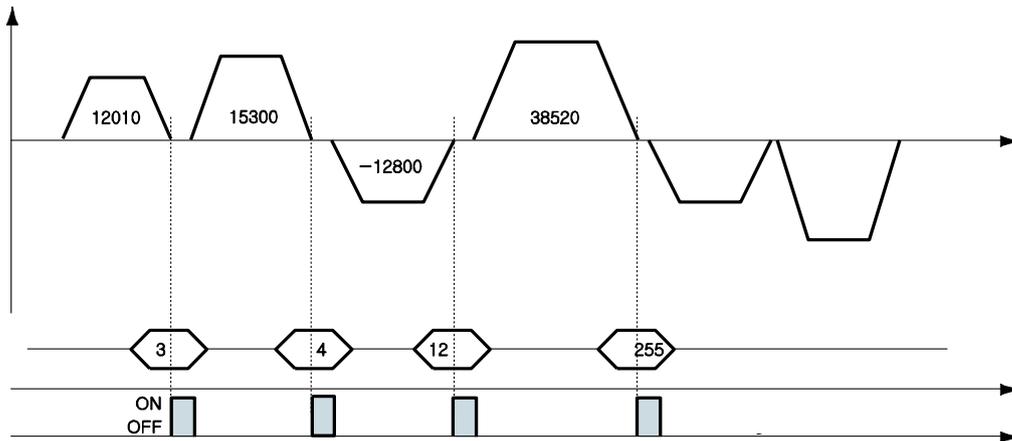


10) Teaching Input

[Teaching] signal functions that the position value [pulse] being working can be automatically inputted into a 'position' value of a specific position table. If it is hard to calculate the exact moving distance (position value) of specific motion mechanically, the user can measure and set the distance (position value) easily by using this signal.

- 1) By using User Program (GUI), set a command type of corresponding PT number among 4 kinds of **absolute moving commands (Absolute Move)**.
- 2) By using input signal (PT A0~A7), select corresponding PT number.
- 3) When Teaching signal is set to ON, the position value [pulse] is saved to the position value of corresponding PT. At this time, it becomes the absolute position value.
- 4) Teaching signal pulse scale is 10ms or more.

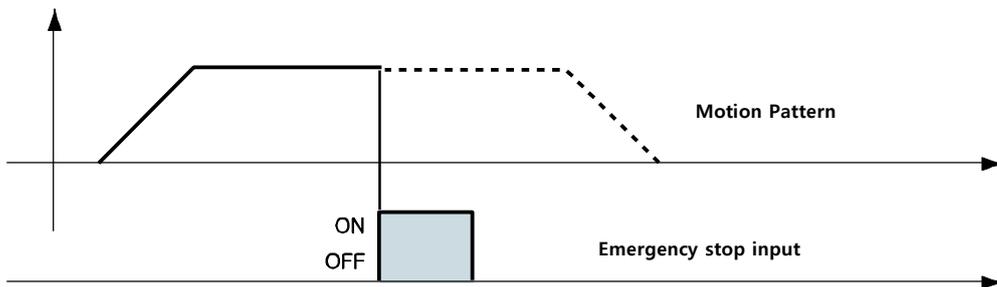
- * 1. After executing Teaching, click 'Refresh' icon, and the position value will be displayed to the position table.
- * 2. Click 'Save to ROM' icon, and the position value will be saved to the ROM area.
- * 3. Teaching signal can be used by two methods; the user assigns actual signal to the motor, or he clicks 'Teaching' icon at the 'I/O Monitoring' window of User Program(GUI).



PT No.	Position Value [pulse] of Corresponding PT
3	12010
4	15300
12	-12800
255	38520

11) E-Stop Input

When [Emergency stop] signal is set to [ON] the current motion is stopped immediately without deceleration. E-Stop signal is active in ON level and pulse scale is 10ms or more.



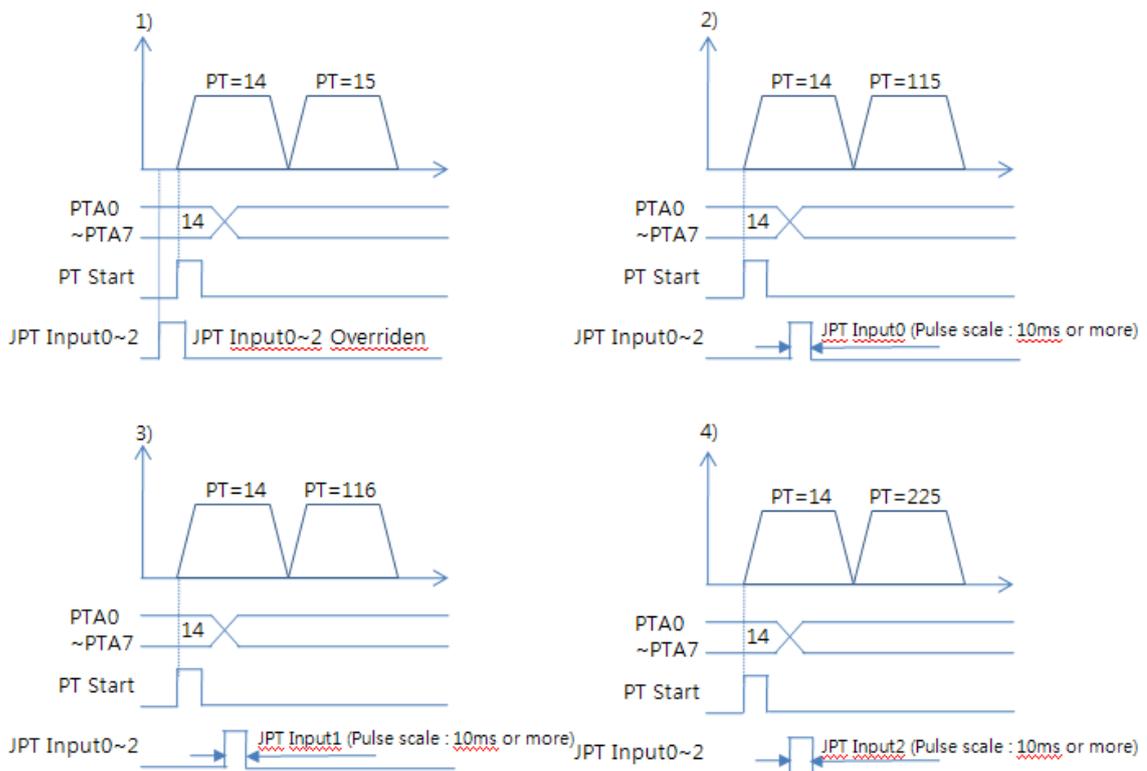
12) JPT Input0~Input2 (Jump Position Table Input) Input

Select motion pattern (position table number) to be subsequently executed according to input signal conditions.

[Example] If PT 14 motion operates, when there is no other input signal, next motion becomes PT 15 as shown in Figure 1). However, if 'JPT Input0~Input2' input signal is set to ON while PT 14 is executing, each corresponding position number is executed as shown in Figure 2)~4).

PT 14 Data

PT No	...	JP Table No.	JPT 0	JPT 1	JPT 2
14	...	15	115	116	225



13) JPT(Jump Position Table) Start Input

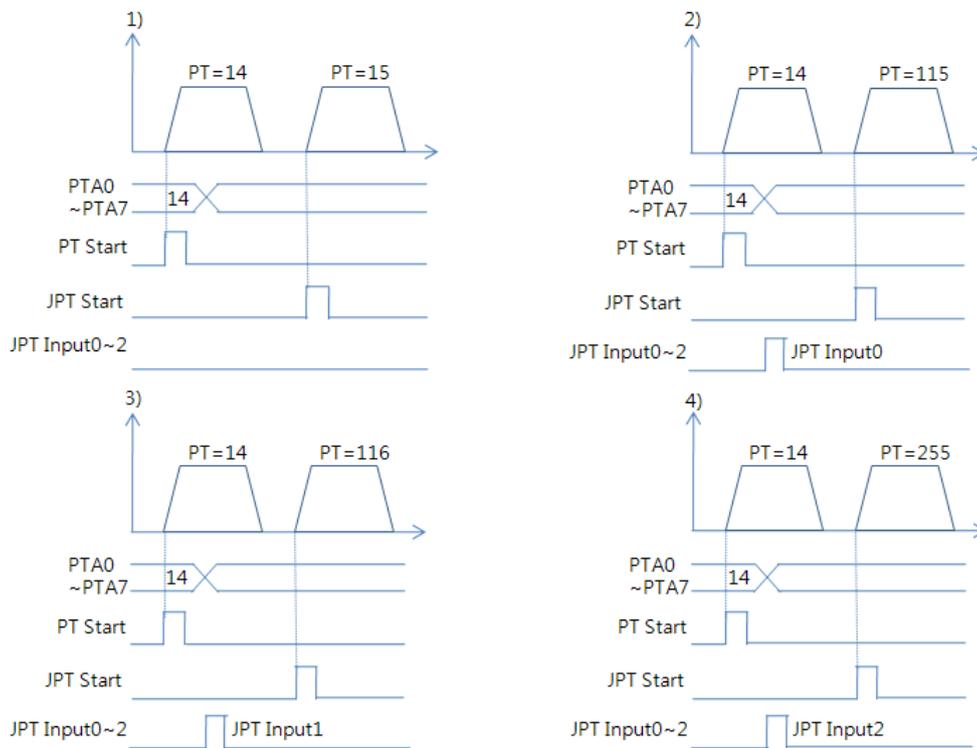
To select motion pattern (position table number) to be subsequently executed according to input signal conditions. The difference from Paragraph 「12) 'JPT Input0~Input2 Input」 is:

- 1) PT number to be jumped must be composed to 10XXX;
- 2) Next motion is not executed until 'JPT Start' is set to ON. If 'Wait Time' value of PT data is more than '0', the time lapses additionally and then next motion is executed.

【Example】

PT 14 Data

PT 번호	...	Wait Time	JP Table No	JPT 0	JPT 1	JPT 2
14	...	500	10015	10115	10116	10255



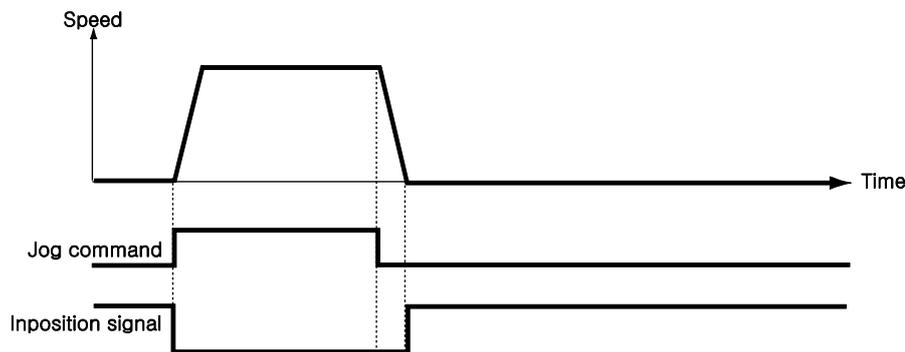
7 - 4 . Output Signal

1) 'Compare Out/Trigger Pulse Output' output

'Trigger Pulse Output' signal is displayed when specific conditions are performed. It is fixed to CN1 connector's COMP (Compare Out) pin. And it is available when the motor needs to be synchronously controlled by an external controller. Refer to [「9.5 Trigger Pulse Output」](#).

2) In-position output

After the motor stop in target position exactly on Servo ON status, the signal becomes [ON]. The condition of this signal depends on parameter 'Position Loop Gain' and 'Inpos Value'.



* Time delay of Output signal depends on the parameter 'Inpos' Value':

Value	Mode	Description
0~63	Fast mode	Output the signal in 1[msec] after the motor stop in target position.
64~127	Accurate mode	Output the signal in maximum 100[msec] after the motor stop in target position. (Time is needed to check find exact positioning)

3) Alarm output

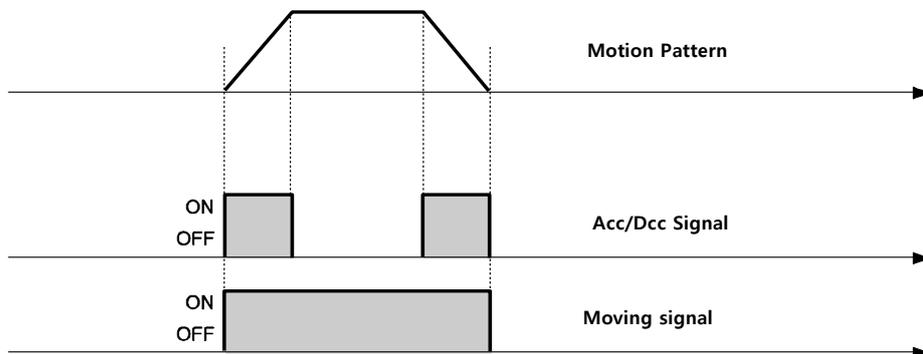
When the motor operates normally, alarm output becomes OFF. When the protective function operates, alarm output becomes ON. The upper controller being used by the user detects this alarm and then stops motor operation command. If overload or overcurrent occurs while the motor is operating, the drive detects it and cuts off the motor's current, In addition, alarm output is turned on and "Alarm LED" flashes to indicate the type of alarm occurrence.

4) PT ACK와 PT End output

'PT ACK' and 'PT End' signals are available only when the motion is executed by position table. When motion start, PT ACK signal is set to ON and PT End signal is set to OFF, if all of motion loops are finished. Then PT ACK signal becomes OFF and PT End signal becomes ON. If the 'Wait time' value in PT item is not 0, the defined time is needed to PT End signal becomes ON. Refer to [「Ezi-SERVO Plus-R User Manual – 'Position Table Function」](#).

5) Moving and Acc/Dec output

As shown below, the position starts to move by motion command, and Moving signal becomes ON and Acc/Dec signal becomes ON in the acceleration and deceleration section only.



* Moving signal is not related to actual position. The signal becomes to [OFF] Just after the 'position command' is finished.

6) Org Search OK output

When the origin return motion is executed by origin search command, 'Origin Search OK' signal is set to OFF. When the origin return motion is normally finished by the origin sensor, 'Origin Search OK' is set to ON. Refer to [「7.3 Input Signal - 8\) Origin Search Input」](#).

7) Servo Ready output

When the drive supplies power to the motor by Servo ON signal or command and is ready to perform motion command, 'ServoReady' signal displays ON signal. Refer to [「7.3 Input Signal - 7\) Servo On and AlarmReset Input」](#).

8) PT(Position Table) Output 0~2 output

Control output used for 'Start/Stop Message Function'. When these items are set, this signal enables the user to check if corresponding PT motion starts or stops through control output signal. If 'Start/Stop Message Function' is not used, this signal should be set to 0 or 8. At the position set with other values, the motion operates as follows.

- If PT set items are set to '1~7', when the position starts to move, PT Output HEX value is displayed to 'PT Output 0 ~ PT Output 2'.
- If PT set items are set to '9~15', the position motion is finished and then PT Output HEX value is displayed to 'PT Output 0 ~ PT Output 2'.

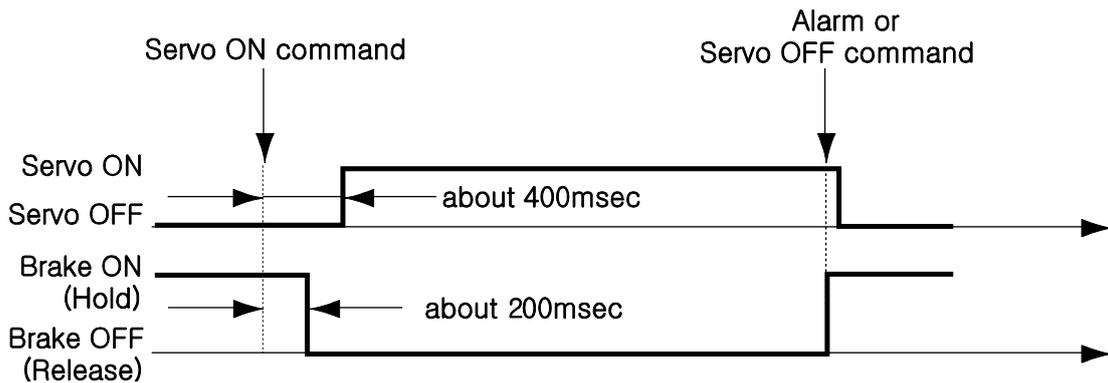
For more information, refer to [「S-SERVO Plus-R User Manual – Position Table Function」](#).

9) BRAKE+ and BRAKE-

This function is used to protect motor rotation in Servo ON status by pin23 And pin24 of CN1 connector. DC +24V is connect to 'BRAKE+' for brake logic and brake control signal is connect to 'BRAKE'

The control signal is automatically output according to the servo ON / OFF status and alarm occurrence.

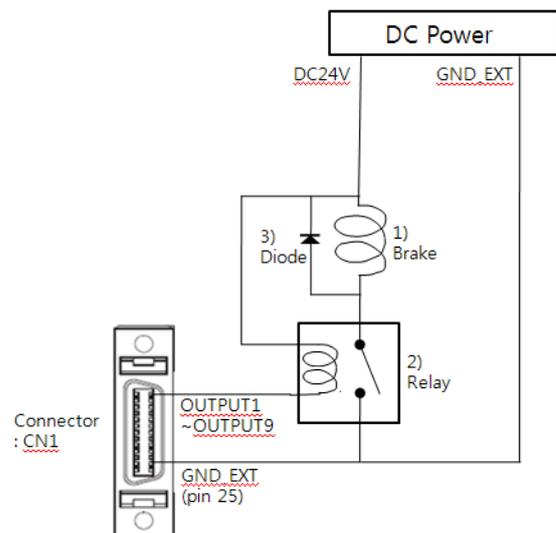
This output function must be used to the Brake that is under 200[mA]/DC24V of current consumption.



10) Brake for High current

This function can be used when the Brake signal is assigned to one of OUTPUT1~OUTPUT9 of CN1 connector. This is used for protect motor rotation in Servo ON status. The signal timing diagram between Servo ON command and Brake signal is same as 9) 'BRAKE+' and 'BRAKE-' Output.

This signal used for the Brake that is over 200[mA]/DC24V of current consumption. Brake, Relay and diode is needed for this function and the signal connection diagram is as follows.



*1 Brake : User selected Brake

*2 Relay : under 15[mA] / DC24V

*3 Diode : 1N4004 or equivalent

8 . Operation

8 - 1 . Power Supply Timing

The power supply of Ezi-SERVO II Plus-E is supplied to the motor through the drive module. Therefore, before supplying power, connect the cable between the drive and the motor, and then supply power to the drive module.

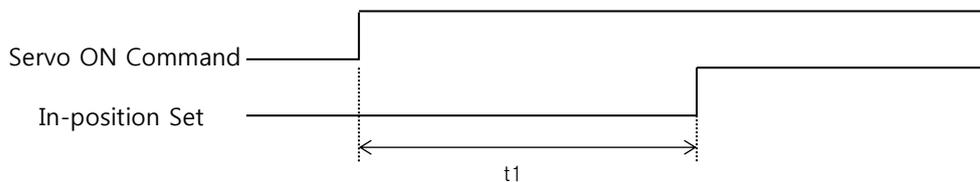
The default setting of Ezi-SERVO II Plus-E after power supply is Servo OFF.

8 - 2 . Servo ON Operation

After power is supplied, set the drive module to Servo ON as follows.

- ① Click 'Servo OFF' button at the User Program (GUI).
- ② Give the drive a command through DLL library.
- ③ Assign 'Servo ON' to control input pin, and supply the drive with signal through the pin.

After Servo ON command is given, In-position is finished to the time as shown below.



T1 can be different subject to the rising time of supplying power and the motor status.



Caution

If the 'Servo ON' signal is assigned to input pin, Servo ON command from GUI or DLL library will not executed.

8 - 3 . Operation Mode

This controller can do three control operations such as I/O command, communication command (DLL program), and User Program (GUI)

(1) I/O Command Mode

This controller can execute control operation like in-position by I/O command transmitted from the upper controller. The in-position control operation is executed by operating position table with I/O command.

(2) Communication Command Mode

This controller can execute control operation like in-position by command transmitted from the upper controller. The in-position control operation is executed by operating position table with I/O command

Position Table Operation Sequence

It is can executed continuous operation by position table at the I/O command mode.

- ① By using PT A0 ~ PT A7 input signal or DLL program, set PT number to be operated.

- ② In case of Servo OFF, set the controller to Servo ON by communication program or Servo ON control input.
- ③ Start to operate by rising edge of PT Start input signal or communication program.

Stopping Continuous Operation of Position Table

When the motor is executing continuous operation of position table with Ezi-SERVOII Plus-E, stop executing position table by following methods.

- ① To use DLL program or control input signal corresponding to 'Stop' and 'E-Stop'. In this case, operation is completely finished and is not connected to next operation.
- ② The user can click 「Pause」 at User Program(GUI) to temporarily stop operating. In this case, click 「Pause」 again, and remaining operation will be executed again.

Position control Operation

To operate the motor by parameters set by User Program(GUI) or DLL program. (This is not connected with PT operation.)

Once position control operation is started, PT operation command is overridden. Likewise, while PT operation is executing, position control operation command is overridden.

The followings show parameters applied to position control operation. All position table item values are overridden.

Parameter Name	Setting Content	Range
Axis Max Speed	Operation speed after acceleration is finished	1~2,500,000[pps]
Axis Start Speed	Operation start speed before acceleration starts	1~35,000[pps]
Axis Acc Time	Required time until the motor reaches the axis max speed from stop status	1~9,999[ms]
Axis Dec Time	Required time until the motor reaches from the axis max speed to the stop status	1~9,999[ms]
Motion Dir	To select motion direction (CW or CCW)	0~1
Pulse per Revolution	Number of pulses per revolution. The range of 'Axis Max Speed'parameter is depend on this value.	0~9

Teaching Function

Teaching can be executed only by User Program(GUI). For more information, refer to 「[User Manual – Position Table Function](#)」.

9 . Other Operation Functions

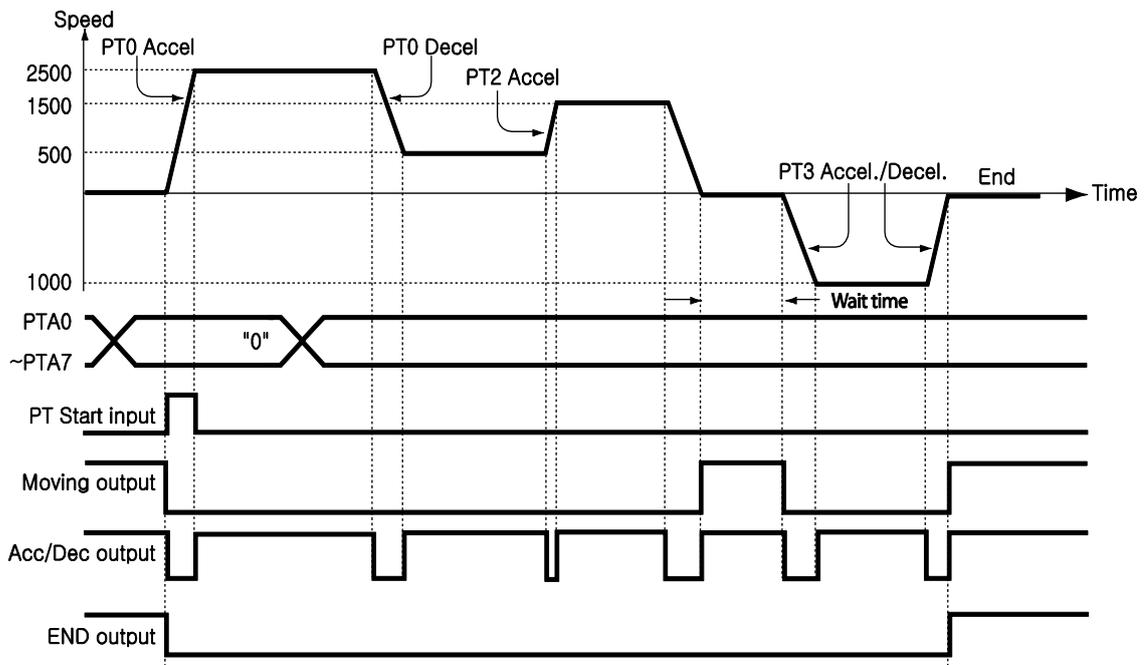
9 - 1 . Position Table (PT) Operation Examples

Input 'PT A0~ PT A7' signals to set PT number.

Input 'PT Start' number to execute speed control operation. For more information, refer to 「User Manual – Position Table Function」.

【 Position Table Setting 】

PT No	Command type	Position	Low Speed	High Speed	Accel. time	Decel. time	Wait time	Continuous Action	JP Table No.
0	3	10000	1	2500	50	300	0	1	1
1	3	1000	1	500	-	-	0	1	2
2	3	5000	1	1500	50	300	300	0	3
3	3	-2500	1	1000	300	300	0	0	-

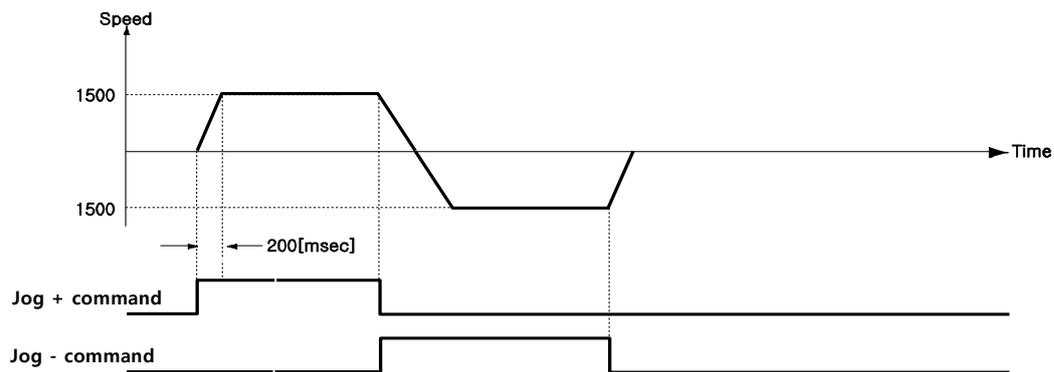


9 - 2 . Jog Operation Examples

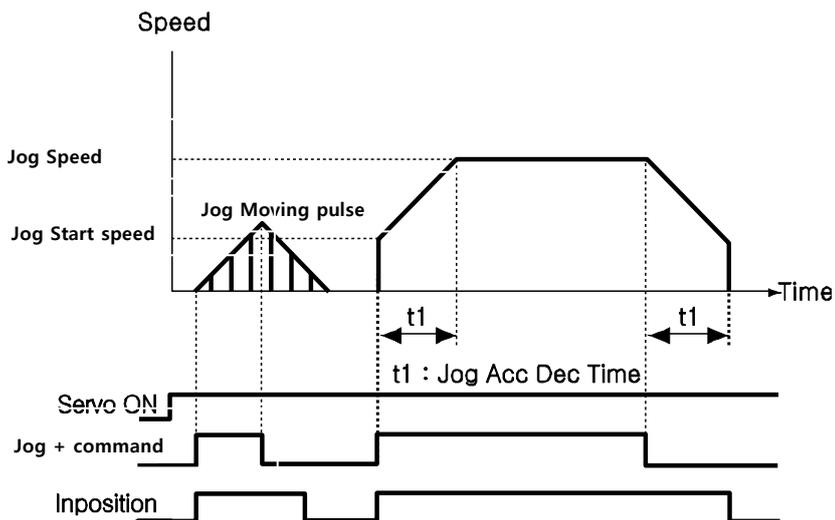
The machine executes speed control operation at the speed set by parameters according to inputting 'Jog+' and 'Jog-' signals.

【 Parameter Setting 】

No.	Parameter Name	Setting Value	Unit
6	Jog Speed	1500	[pps]
7	Jog Start Speed	100	[pps]
8	Jog Acc Dec Time	200	[msec]



Also, when any value except 0 is set to the 'Jog Start Speed' parameter, the relation between jog command and in-position is indicating as below diagram.



9 - 3 . Origin Return

If the machine is operated by I/O signals, the motor can execute origin return by inputting 'Origin Search' signal. Also, the motor can execute origin return with User Program(GUI) and DLL program.

The following table shows parameter types related to origin return.

Parameter Name	Description	Range
Org Speed	Operation speed when origin return starts	1~500,000[pps]
Org Search Speed	Low-speed operation speed after origin sensor is sensed and operation start speed when origin starts.	1~50,000[pps]
Org Acc Dec Time	The time assigned to the acceleration/deceleration section when origin return starts and stops.	1~9,999[ms]
Org Method	To select how to return the origin	0~5
Org Dir	To select operation direction(CW or CCW)	0~1
Org Offset	After origin return is finished, the motor moves additionally as this setting value and then stops.	-134,217,727 ~ 134,217,727
Org Position Set	After origin return is finished, 'Command Pos' value is set to this setting value.	-134,217,727 ~ 134,217,727
Org Sensor Logic	To set the origin sensor signal level.	0~1
Org Torque Ratio	To set the torque ratio during Torque origin method	10~100[%]

(1) Origin Return method setting

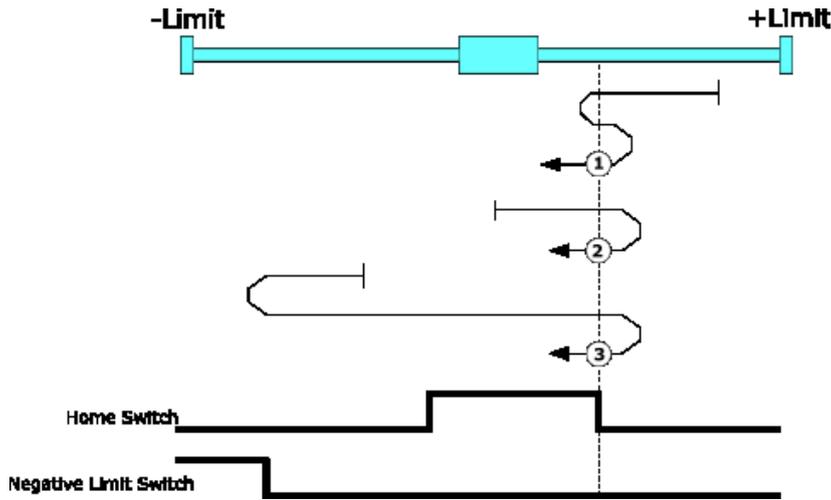
To execute origin return, 'Org Method' parameter should be set as follows.

- Arrow mark is for moving direction in below picture.
- ○ is origin end position in below pic..

(Numbers in ○ mark is indication the sensor Dog position or following example of origin direction.

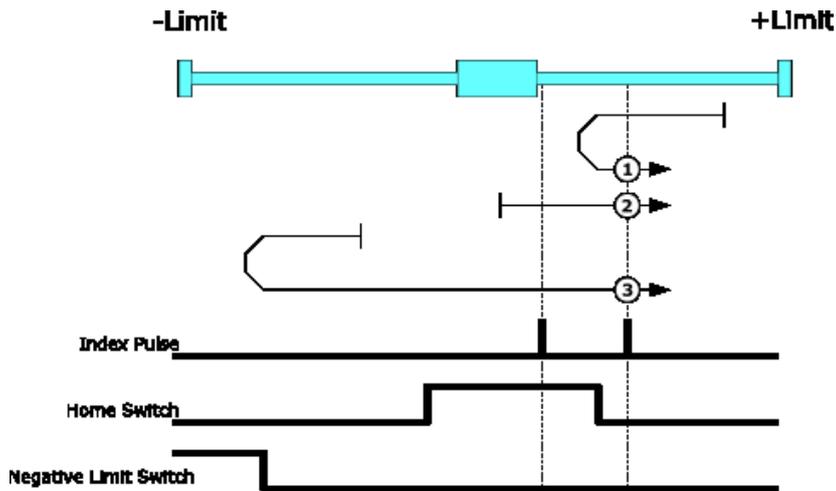
- Index Pulse is Z Phase
- In the case of origin return by a Z-pulse , after the completion of low speed origin return in 'Org Search Speed' value, Z-pulse origin return (fixed rate) is done twice to complete the return to origin with 10[pps] speed. (Fixed speed)
(It is method for precise return to Z-pulse origin.)
- When limit sensor is detected, stop by the stop method set in H / W Limit Stop Method (parameter No. 12, E-STOP / Stop) and then execute the remaining homing routine.

1) Origin (In case of Org Method = 0)



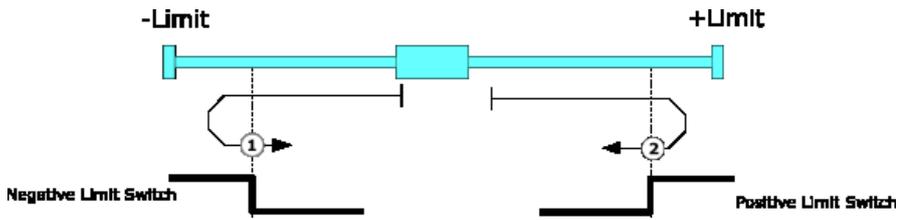
- ① : In case of position of sensor Dog is between the origin and +Limit Sensor
- ② : In case of position of sensor Dog is in the origin sensor
- ③ : In case of position of sensor Dog is between origin and -Limit Sensor

2) Z Origin (In case of Org Method = 1)



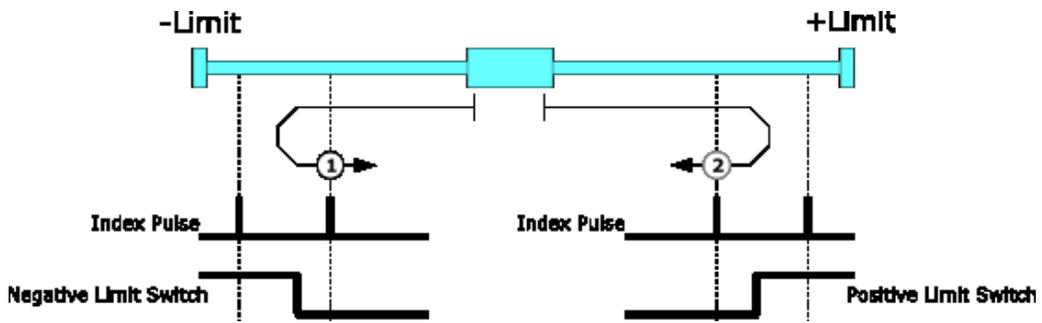
- ① : In case of position of sensor Dog is between the origin and +Limit Sensor
- ② : In case of position of sensor Dog is in the origin sensor
- ③ : In case of position of sensor Dog is between origin and -Limit Sensor

3) Limit Origin (In case of Org Method = 2)



- ① : In case of Org Dir is 1 (CCW)
- ② : In case of Org Dir is 0 (CW)
 - Home search is completed at the position when Limit Sensor is off

4) Z Limit Origin (In case of Org Method = 3)

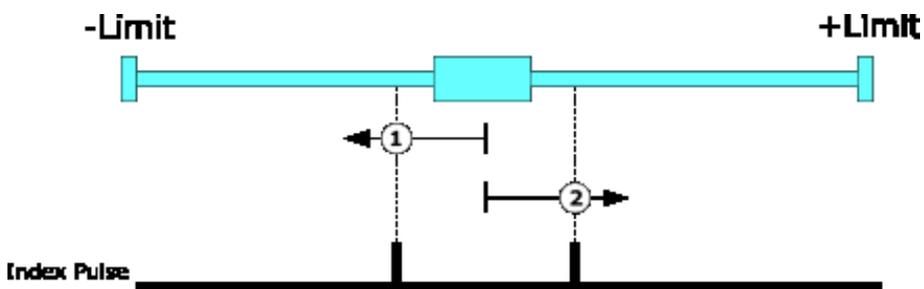


- ① : In case of Org Dir is 1 (CCW)
- ② : In case of Org Dir is 0 (CW)

5) Set Origin (In case of Org Method = 4)

It designates current mechanics position as origin irrespective sensor.

6) Z Phase (In case of Org Method = 5)

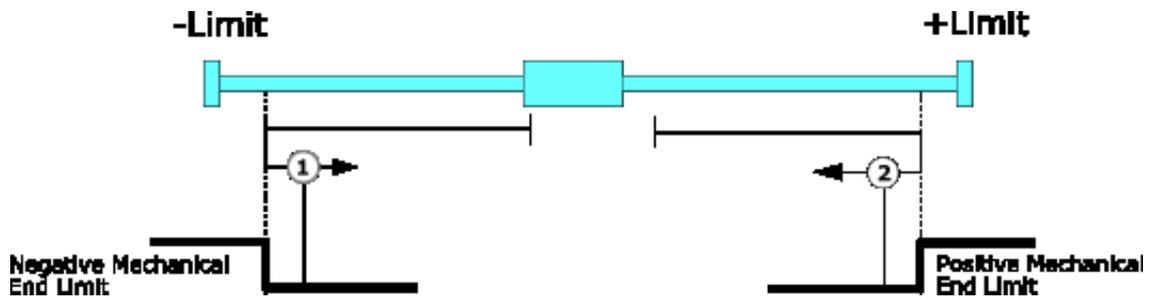


- ① : In case of Org Dir is 1 (CCW)
- ② : In case of Org Dir is 0 (CW)

7) Torque Origin (In case of Org Method=6)

During In movement motion by 'Org Speed' value , motion stop when detecting the force as much as 'Org Torque Ratio' by contact with particular object, and finished origin return after moving to opposite origin return direction of certain position.

This method can be used in system of origin sensor or no Limit sensor supporting.



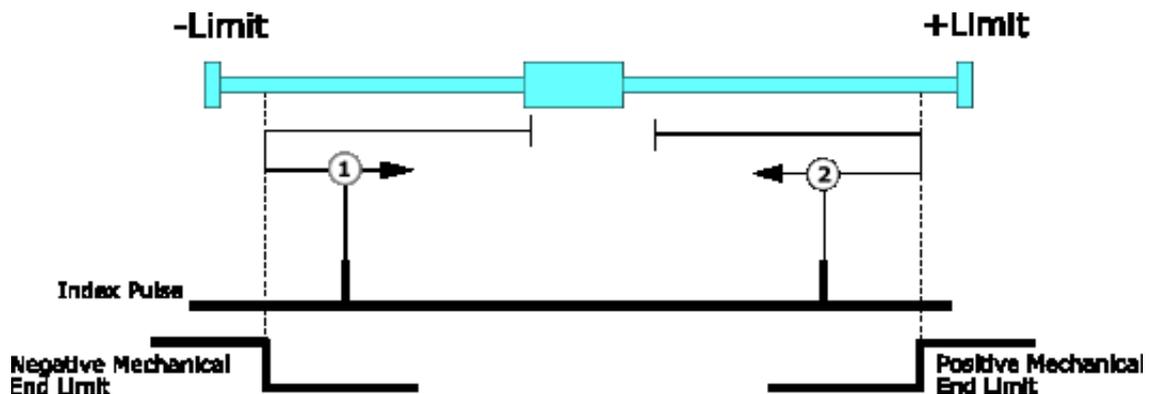
① : In case of Org Dir is 1 (CCW)

② : In case of Org Dir is 0 (CW)

8) Torque Origin (In case of Org Method=7)

'During In movement motion by 'Org Speed' value , motion stop when detecting the force as much as 'Org Torque Ratio' by contact with particular object, finished origin return when detecting the Z phase during the moving to opposite origin return direction.

This method can be used in system of origin sensor or no Limit sensor supporting.



① : In case of Org Dir is 1 (CCW)

② : In case of Org Dir is 0 (CW)

(2) Origin return Procedure

Origin return is executed according to the following procedure.

- ① Set parameters required to origin return.
- ② If the Servo is OFF, (reset an alarm when it occurs) input a control input Servo ON command or send a communication program so that the Servo can be ON.
- ③ Start origin return operation to the rising edge of control input origin search or the communication program.

(3) Interruption of Origin Return

When the machine is under origin return, click 'Stop' or 'E-Stop' to stop the machine. In this case, the machine's origin is not edited and origin return is not completed either.

(4) 'Origin return finish' output

The completion of origin return operation can be decided with related bit values of either 'Origin Search OK' of control output or 'Axis Status' of communication program.

9 - 4 . Stop Operation

By using two methods of control input and communication program command, the user can input stop and emergency stop commands. Even though the emergency stop command is inputted, the Servo will be not OFF. In case emergency stop, the machine stops immediately without deceleration. So, a special caution for mechanical impact is required.

9 - 5 . Trigger Pulse Output

This function is used when the output signal becomes ON periodically in specific condition.

(1) Control Method

This function is working with RS-485 communication (DLL library) method only.

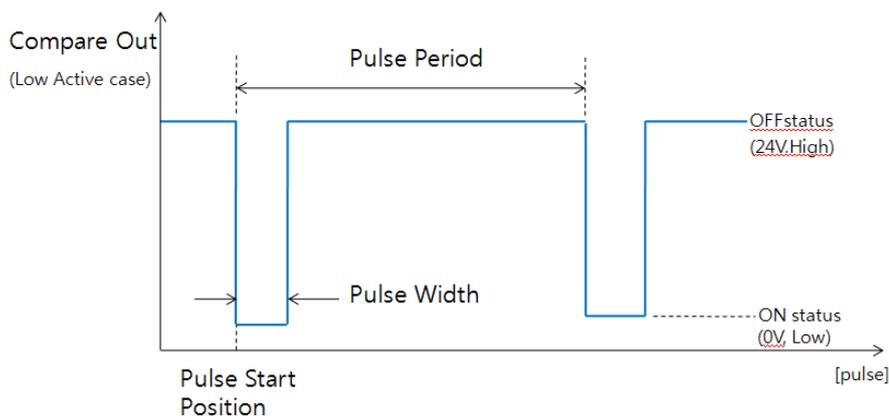
This command can be executed during the positioning command or before the positioning command also. The following table shows the setting conditions and refers to

[「User Manual – Communication Function」](#).

Setting Item	Description	Range
Start/Stop	Setting start/stop of pulse output.	0~1
Pulse Start Position	Setting the start position of first pulse output.	-134,217,727 ~ 134,217,727
Pulse Period	Setting the pulse period. (0 : pulse output only 1 time in Pulse start position. 1~ : pulse output repeatedly depends on setting.)	0~134,217,727 [pulse]
Pulse Width	Setting the pulse width.	1~1000[ms]

(2) Output signal

This output pin of CN1 connector for Trigger Pulse is fixed to 「Compare Out」 and the signal diagram is as follows.





The pulse is output only in bigger position area than 'pulse starts position' and is output in both motion directions.

(3) Output Status Check

By using DLL program, the user can check the trigger pulse output status.

Refer to 「User Manual – Communication Function」.

9 - 6 . Push Motion Function

This function is that motor moves while maintaining a predetermined force from a specific position by the position command. And if the work is detected by drive while motor is moving, motor will stop (Stop mode)

(1) Function

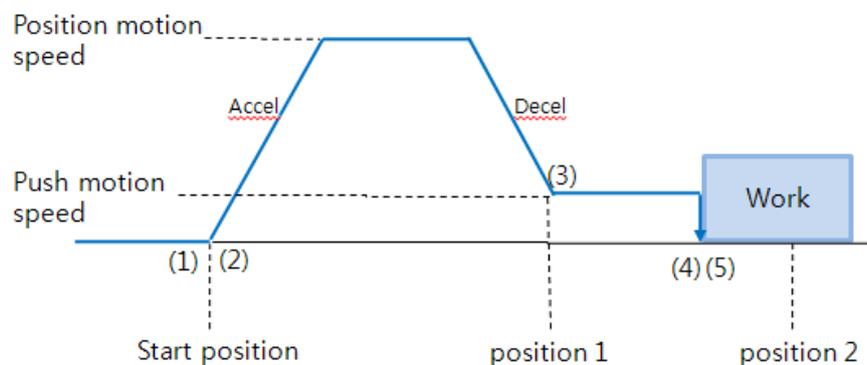


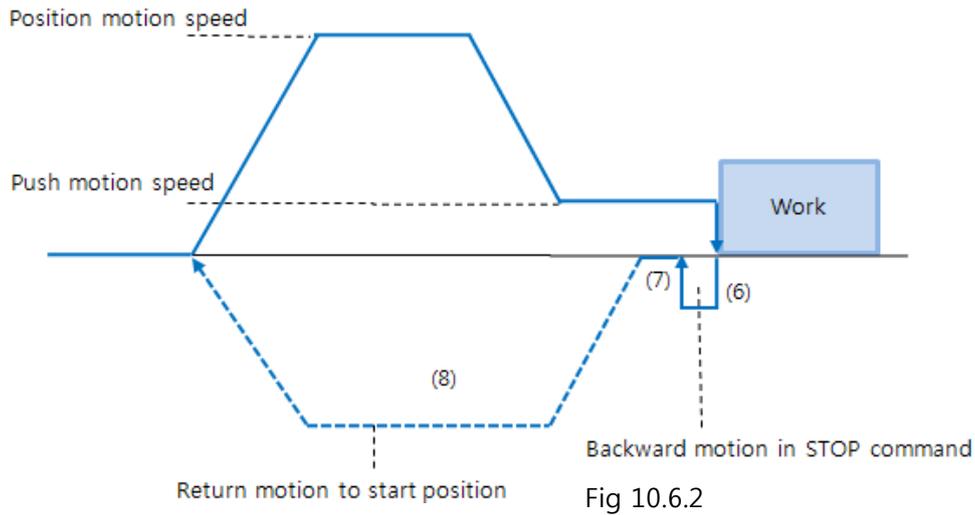
Fig 10.6.1

- ① Start Push Motion command
- ② Normal position motion command is executed.
(status : position mode)
- ③ Decelerate the speed from normal position motion to push motion.
(push motion speed must be lower than 200[rpm].)
- ④ Push motioning until the work detected with specified motor torque.
(status : push mode)
The motioning will stop just after the work detected.
- ⑤ When Push mode is 'Stop':
After the work detected, the motor will stop but the motor torque will be maintained and the 'inposition' / 'PT Stopped' / 'END' signal is effective.
The maintained motor torque will be return to normal (Servo ON) status by 'stop' command.
(status : release push mode and return to position mode)

When Push mode is 'Non-stop':

After the work detected, the motor will not stop and the motor torque will be maintained and the 'inposition' and other signal is effective

- ⑥ Additional next step is needed as below diagram (Figure 10.6.2).



The 'Stop' command must be executed before next motion command. (In Stop mode it does not need to 'stop' when there is no shock in mechanism) At this 'stop' procedure, the motor move to backward as much as the 'Push mode' parameter values. This motion will be reduce the shock in mechanism. So if the Stop command is not used, 'Backward motion' is also not executed. 'Backward motion' speed is set to 5000[pps] at this moment.

- ⑦ Time delay can be needed before returning to start position depends on mechanical conditions.
- ⑧ Return to start position.

 Caution	Non-stop mode : must be execute the 'Stop' command before next motion command in the work detect situation.
--	--

 Caution	If a shock occurs to the structure when returning to the position, it takes a certain delay time to relieve the impact.
--	--

(3) Control Method

This function is working only in absolute position value. The position error can be happened due to the work status in push mode. Push motion command can be executed by 2 methods. One is RS-485 communication (DLL library) method and the other is external digital signal(PT Start command) method.

① DLL library method

The following table shows the setting conditions and refer to 「User Manual – Communication Function」.

There is another library for status checking of push motioning.

The position values of using for Push Motion are all absolute coordinate values

Setting Item	Description	Range *1
Position command Start speed	Start speed value of position motion	1~35000[pps]
Position command Moving speed	Moving speed of position motion	1~500000[pps]
Position command Target position	Absolute target position value of position command ('position 1' of Figure 10.6.1)	134,217,727 ~ 134,217,727
Accel time	Accel time of position motion	1~9,999[ms]
Deceleration time	Decelerate time of position motion	1~9,999[ms]
Push ratio	Motor torque value in push mode	20~90[%]
Push command Moving speed	Moving speed of Push motion (max 200[rpm])	1~33333[pps]
Push command Target position	Absolute target position value of push command ('position 2' of Figure10.6.1) *Non-stop mode : the value must be set more than ' Position command Target Position' value.	134,217,727 ~ 134,217,727
Push mode	Set Stop mode(0) or Non-stop mode(1~10000) after the work detect. In case of Non-stop mode, the motor move backward as much as this value[pulse] distances.	0~10,000

*1 : The unit of [pps] in this item is referenced to 10,000[ppr] encoder.

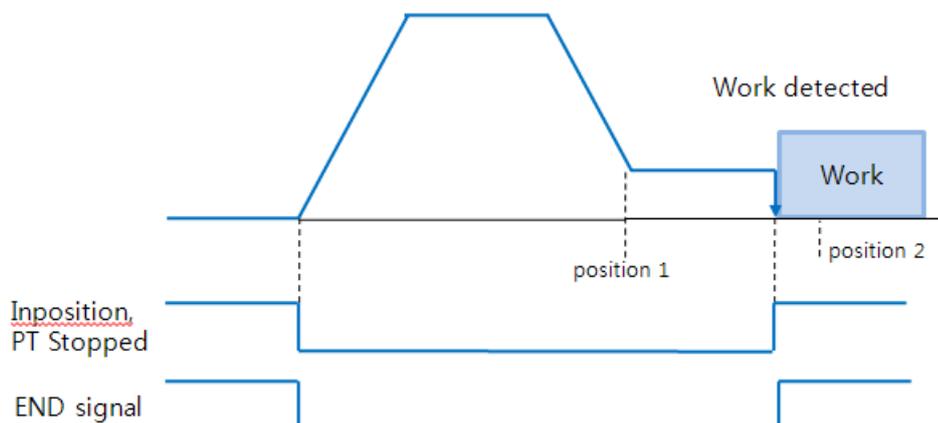
② Input signal (PT Start) Method

Firstly the position table data must be entered before the push motioning and refer to 「[User Manual – Position Table Function](#)」.

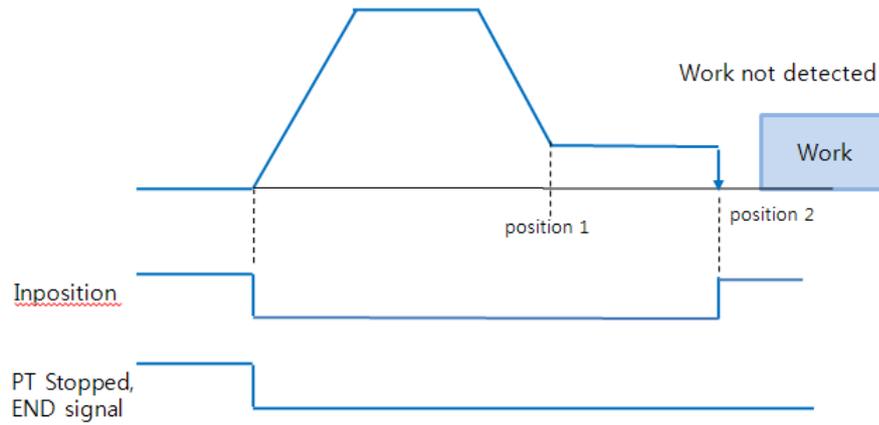
(4) Output Status Check

Basically the current push motion status can be checked by DLL library and Additionally can be checked by Flag (In-position & PT Stopped signal) and Output (END signal) as follows.

① When Work detected



② When Work not detected (Stop mode)



The 'Inposition' signal is still OFF when the work is not detected in **Non-stop mode**. The push command is stopped at 'position 2' (absolute position value in push command).

1 0 . Communication function

- 1) It has embedded 2 Port Ethernet switching Hub for daisy-chain connection.
- 2) Make an UDP Protocol.
- 3) By using of UDP, two application programs can be connected to one drive, so the provided GUI and user program can be used at the same time.
- 4) Please refer to 「[5.2 System Configuration](#)」 for PC connection example
- 5) The signal contents of the RJ45 connector of the drive are as follows.

(Same as general Ethernet 10/100 Base-T)

RJ45 Pin No.	Function
1	TD+
2	TD
3	-
4	-
5	RD+
6	RD-
7	-
8	-
case	Frame GND

- 6) Basic IP Address : 192.168.0.xxx
 Basic Gateway : 192.168.0.1
 Basic Subnet Mask : 255.255.255.0

1 1 . Parameter

1 1 - 1 . Parameter List

No.	Name	Unit	Lower Limit	Upper Limit	Default
0	Pulse Per Revolution		0	8	8
1	Axis Max Speed	[pps]	1	2,500,000	500,000
2	Axis Start Speed	[pps]	1	35,000	1
3	Axis Acc Time	[msec]	1	9,999	100
4	Axis Dec Time	[msec]	1	9,999	100
5	Speed Override	[%]	1	500	100
6	Jog Speed	[pps]	1	2,500,000	5,000
7	Jog Start Speed	[pps]	1	35,000	1
8	Jog Acc Dec Time	[msec]	1	9,999	100
9	S/W Limit Plus Value	[pulse]	-134,217,728	134,217,727	134,217,727
10	S/W Limit Minus Value	[pulse]	-134,217,728	134,217,727	-134,217,728
11	S/W Limit Stop Method		0	2	2
12	H/W Limit Stop Method		0	1	0
13	Limit Sensor Logic		0	1	0
14	Org Speed	[pps]	1	500,000	5,000
15	Org Search Speed	[pps]	1	50,000	1,000
16	Org Acc Dec Time	[msec]	1	9,999	50
17	Org Method		0	7	0
18	Org Dir		0	1	1
19	Org OffSet	[pulse]	-134,217,728	134,217,727	0
20	Org Position Set	[pulse]	-134,217,728	134,217,727	0
21	Org Sensor Logic		0	1	0
22	Position Loop Gain		0	63	4
23	Inpos Value		0	63	0
24	Pos Tracking Limit	[pulse]	1	134,217,727	2,500
25	Motion Dir		0	1	0
26	Limit Sensor Dir		0	1	0
27	Org Torque Ratio	[%]	20	90	50
28	Pos. Error Overflow Limit	[pulse]	1	134,217,727	2,500
29	Brake Delay Time	[msec]	10	5,000	200
30	Run Current	*10[%]	5	15	10
31	Boost Current	*50[%]	0	7	0
32	Stop Current	*10[%]	2	10	5

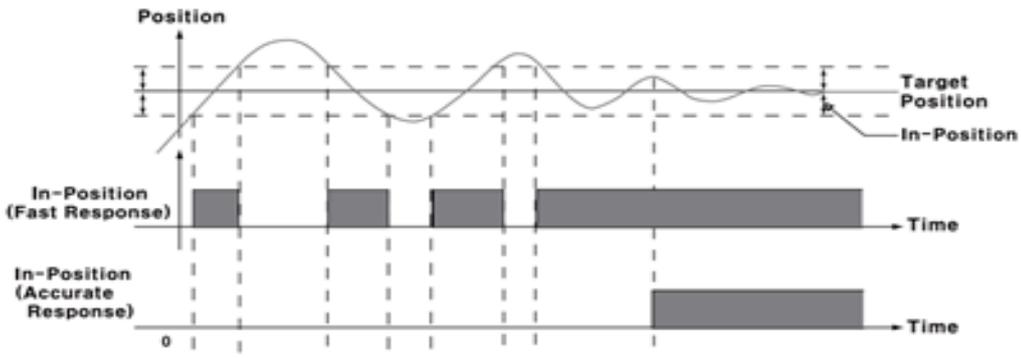
1 1 - 2 . Parameter Description

No.	Description	Unit	Lower Limit	Upper Limit	Default																																				
0	<p>Pulse per Revolution : It means number of pulses per revolution. If this value is changed, the motor is set to Servo OFF..</p> <table border="1"> <thead> <tr> <th>Value</th> <th>Pulse/Revolution</th> <th>Value</th> <th>Pulse/Revolution</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>500</td> <td>8</td> <td>10,000</td> </tr> <tr> <td>1</td> <td>1,000</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>1,600</td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>2,000</td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>3,600</td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>5,000</td> <td></td> <td></td> </tr> <tr> <td>6</td> <td>6,400</td> <td></td> <td></td> </tr> <tr> <td>7</td> <td>7,200</td> <td></td> <td></td> </tr> </tbody> </table>	Value	Pulse/Revolution	Value	Pulse/Revolution	0	500	8	10,000	1	1,000			2	1,600			3	2,000			4	3,600			5	5,000			6	6,400			7	7,200				0	8	8
Value	Pulse/Revolution	Value	Pulse/Revolution																																						
0	500	8	10,000																																						
1	1,000																																								
2	1,600																																								
3	2,000																																								
4	3,600																																								
5	5,000																																								
6	6,400																																								
7	7,200																																								
1	<p>Axis Max Speed : When position moving commands (absolute move, incremental move) are given, this mode sets the maximum speed which the motor can operate. So, the motor cannot be operated faster than this value in any case. This value is set to [pps] unit. Upper Limit value has limited by Pulse per resolution value *In case of 10000 : 500,000 In case of 20000 : 1,000,000</p>	pps	1	2,500,000	500,000																																				
2	<p>Axis Start Speed : When position moving commands (absolute move, incremental move) are given, this mode sets the operation start speed to [pps] unit.</p>	pps	1	35,000	1																																				
3	<p>Axis Acc Time : When position moving commands (absolute move, incremental move) are given, this mode sets the acceleration section of operation start segment to [msec] unit. Possible range is different from Axis Speed. (Ex.1) Axis Start Speed=1, Move Speed=400000 : 1~1430 [msec] (Ex.2) Axis Start Speed=1, Move Speed=10000 : 1~350 [msec]</p>	msec	1	9,999	100																																				
4	<p>Axis Dec Time : When position moving commands (absolute move, incremental move) are given, this mode sets the deceleration section of operation stop segment to [msec] unit. Possible range is different from Axis Speed same as 'Axis Acc Time' parameter</p>	msec	1	9,999	100																																				
5	<p>Speed Override : When position moving commands (absolute move, incremental move) are given, the operation speed is subject to the ratio set to 'Move Speed'. (Ex) If current move speed is 10,000 and speed override is 200, actual motion speed is set to 20,000.</p>	%	1	500	100																																				

6	Jog Speed : When jog position moving command is given, this mode sets the motor revolution value to [pps] unit.	pps	1	2,500,000	5,000
7	Jog Start Speed : When jog position moving command is given, this mode sets the operation start speed to [pps] unit.	pps	1	35,000	1
8	Jog Acc Dec Time : In case of jog operation, this mode sets the time of acceleration and deceleration sections to [msec] unit.	msec	1	9,999	100
9	S/W Limit Plus Value : When position moving commands (absolute move, incremental move, jog) are given, this mode set the maximum input limit value that the motor can move to the plus (+) direction with 28 bits.	pulse	-134,217,728	+134,217,727	+134,217,727
10	S/W Limit Minus Value : When position moving commands (absolute move, incremental move, jog) are given, this mode set the minimum input limit that the motor can move to the minus (-) direction with 28 bits.	pulse	-134,217,728	+134,217,727	-134,217,728
11	S/W Limit Stop Method : Sets how to stop the motor by SW Limit Plus/Minus Value', not stop motion by the limit sensor. ◆ 0 : stops the motor immediately by emergency stop mode. ◆ 1 : stops the motor gradually by soft stop mode. ◆ 2 : Do not use S/W Limit.		0	2	0
12	H/W Limit Stop Method: In case of stop motion by the limit sensor, this mode sets how to stop the motor. ◆ 0 : stops the motor immediately by emergency stop mode. ◆ 1 : stops the motor gradually by soft stop mode. ● The above stop method is applied even when the limit sensor is detected during Home Search motion		0	1	0
13	Limit Sensor Logic : Sets the signal level so that the motor can recognize limit sensor's input to ON. ◆ 0 : 0 V (Active low level) ◆ 1 : 24V(Active high level)		0	1	0
14	Org Speed : In case of origin return command, this modes sets the operation speed until the motor senses the origin sensor to [pps] unit	pps	1	500,000	5,000
15	Org Search Speed : In case of origin return command, The low operation speed for precise origin return after the motor senses the origin sensor is set to [pps] unit by this mode	pps	1	500,000	1,000

16	<p>Org Acc Dec Time : In case of origin return command, the acceleration/deceleration section time of the operation start/stop segment is set to [msec] unit by this mode</p>	msec	1	9,999	50
17	<p>Org Method : The user can select origin return command types.</p> <ul style="list-style-type: none"> ◆ 0 : The motor moves up to the origin sensor spot by 'Org Speed' and then executes precise origin return at the low value of 'Org Search Speed'. ◆ 1 : The motor moves up to the origin sensor spot by 'Org Speed' and then executes Z-pulse origin return at the low value of 'Org Search Speed'. ◆ 2 : The motor moves up to the limit sensor spot by 'Org Speed' and then immediately stops. ◆ 3 : The motor moves up to the limit sensor spot by 'Org Speed' and then executes Z-pulse origin return at the low value of 'Org Search Speed'. ◆ 4 : To set origin in current mechanical position. ◆ 5 : To execute the Z-pulse origin return at the low value of 'Org Search Speed'. ◆ 6 : The motor moves up to the wall by 'Org Torque Ratio' and then immediately stops. ◆ 7 : The motor moves up to the wall by 'Org Torque Ratio' and then executes Z-pulse origin return at the low value of 'Org Search Speed'. <p>For more information, refer to '9.3 Origin Return'.</p> <p>※ In the case of origin return by a Z-pulse , after the completion of low speed origin return in 'Org Search Speed' value, Z-pulse origin return (fixed rate) is done twice to complete the return to origin with 10[pps] speed. (Fixed speed) (It is method for precise return to Z-pulse origin.)</p>		0	7	0
18	<p>Org Dir : In case of origin return, this mode sets the revolution direction of the motor.</p> <ul style="list-style-type: none"> ◆ 0 : moves the motor clockwise. ◆ 1 : moves the motor counterclockwise. 		0	1	0
19	<p>Org Offset : After origin return is completed, the motor moves additionally as this setting value and then stops. 'Command Pos/Actual Pos' is set to '0'.</p>	pulse	-134,217, 728	+134,217, 727	0
20	<p>Org Position Set : After origin return is completed, 'Command Pos/Actual Pos' value is set to this setting value.</p>	pulse	-134,217, 728	+134,217, 727	0

21	<p>Org Sensor Logic : Sets the origin sensor signal level so that the motor can recognize origin sensor's input to ON.</p> <p>◆ 0 : 0 V (low level) ◆ 1 : 24V(high level)</p>		0	1	0																																																																																																																																																																																																						
22	<p>Position Loop Gain : After the motor stops, this mode controls the motor's response by a load attached to the motor. This value is a relative value, not a real value In use of internal drive. For example, if this value is changed 3 to 6, not increased the response time two times.</p> <p>If this parameter value is small, motor stop motion become sensitive, motor stop time is getting shorter, and , if value is big stop motion becomes insensitive , motor stop time is getting longer relatively. Set this mode as follows. 1) Set the value to '0' 2) Increase the value until the motor's response is stabilized. 3) Previously adjust the setting status by increasing/decreasing one or two steps of the current setting value.</p> <table border="1" data-bbox="272 958 954 2063"> <thead> <tr> <th>Value</th> <th>Integral Part's Time Constant*</th> <th>Proportional Gain*</th> <th>Value</th> <th>Integral Part's Time Constant*</th> <th>Proportional Gain*</th> </tr> </thead> <tbody> <tr><td>0</td><td>1</td><td>1</td><td>32</td><td>5</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>2</td><td>33</td><td>5</td><td>2</td></tr> <tr><td>2</td><td>1</td><td>3</td><td>34</td><td>5</td><td>3</td></tr> <tr><td>3</td><td>1</td><td>4</td><td>35</td><td>5</td><td>4</td></tr> <tr><td>4</td><td>1</td><td>5</td><td>36</td><td>5</td><td>5</td></tr> <tr><td>5</td><td>1</td><td>6</td><td>37</td><td>5</td><td>6</td></tr> <tr><td>6</td><td>1</td><td>7</td><td>38</td><td>5</td><td>7</td></tr> <tr><td>7</td><td>1</td><td>2</td><td>39</td><td>5</td><td>2</td></tr> <tr><td>8</td><td>2</td><td>1</td><td>40</td><td>6</td><td>1</td></tr> <tr><td>9</td><td>2</td><td>2</td><td>41</td><td>6</td><td>2</td></tr> <tr><td>10</td><td>2</td><td>3</td><td>42</td><td>6</td><td>3</td></tr> <tr><td>11</td><td>2</td><td>4</td><td>43</td><td>6</td><td>4</td></tr> <tr><td>12</td><td>2</td><td>5</td><td>44</td><td>6</td><td>5</td></tr> <tr><td>13</td><td>2</td><td>6</td><td>45</td><td>6</td><td>6</td></tr> <tr><td>14</td><td>2</td><td>7</td><td>46</td><td>6</td><td>7</td></tr> <tr><td>15</td><td>2</td><td>8</td><td>47</td><td>6</td><td>8</td></tr> <tr><td>16</td><td>3</td><td>1</td><td>48</td><td>7</td><td>1</td></tr> <tr><td>17</td><td>3</td><td>2</td><td>49</td><td>7</td><td>2</td></tr> <tr><td>18</td><td>3</td><td>3</td><td>50</td><td>7</td><td>3</td></tr> <tr><td>19</td><td>3</td><td>4</td><td>51</td><td>7</td><td>4</td></tr> <tr><td>20</td><td>3</td><td>5</td><td>52</td><td>7</td><td>5</td></tr> <tr><td>21</td><td>3</td><td>6</td><td>53</td><td>7</td><td>6</td></tr> <tr><td>22</td><td>3</td><td>7</td><td>54</td><td>7</td><td>7</td></tr> <tr><td>23</td><td>3</td><td>2</td><td>55</td><td>7</td><td>2</td></tr> <tr><td>24</td><td>4</td><td>1</td><td>56</td><td>8</td><td>1</td></tr> <tr><td>25</td><td>4</td><td>2</td><td>57</td><td>8</td><td>2</td></tr> <tr><td>26</td><td>4</td><td>3</td><td>58</td><td>8</td><td>3</td></tr> <tr><td>27</td><td>4</td><td>4</td><td>59</td><td>8</td><td>4</td></tr> <tr><td>28</td><td>4</td><td>5</td><td>60</td><td>8</td><td>5</td></tr> <tr><td>29</td><td>4</td><td>6</td><td>61</td><td>8</td><td>6</td></tr> <tr><td>30</td><td>4</td><td>7</td><td>62</td><td>8</td><td>7</td></tr> <tr><td>31</td><td>4</td><td>8</td><td>63</td><td>8</td><td>8</td></tr> </tbody> </table>	Value	Integral Part's Time Constant*	Proportional Gain*	Value	Integral Part's Time Constant*	Proportional Gain*	0	1	1	32	5	1	1	1	2	33	5	2	2	1	3	34	5	3	3	1	4	35	5	4	4	1	5	36	5	5	5	1	6	37	5	6	6	1	7	38	5	7	7	1	2	39	5	2	8	2	1	40	6	1	9	2	2	41	6	2	10	2	3	42	6	3	11	2	4	43	6	4	12	2	5	44	6	5	13	2	6	45	6	6	14	2	7	46	6	7	15	2	8	47	6	8	16	3	1	48	7	1	17	3	2	49	7	2	18	3	3	50	7	3	19	3	4	51	7	4	20	3	5	52	7	5	21	3	6	53	7	6	22	3	7	54	7	7	23	3	2	55	7	2	24	4	1	56	8	1	25	4	2	57	8	2	26	4	3	58	8	3	27	4	4	59	8	4	28	4	5	60	8	5	29	4	6	61	8	6	30	4	7	62	8	7	31	4	8	63	8	8		0	63	4
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	<p>Inpos Value : Sets the output condition of the in-position finish signal. After position command pulse is finished, when the position deviation from target position is within 'Inpos Value', this mode displays in-position finish signal The position deviation to output the In-position is 0~63.. According to control mode set value is as follows: 1) Fast Response Mode : 0~63 2) Accurate Response Mode : 64~127 According to each mode, the position deviation range is 0~63.</p>		0	127	3
23	<p>Fast Response and Accurate Response control method is as below pig.</p> 				
24	<p>Pos Tracking Limit : Acts to protect the motor and the drive. While the motor is run, when 'Position Error' is greater than this setting value, this mode generates an alarm to stop a flow of electricity to the motor and then set it to Servo OFF.</p>	pulse	1	+134,217, 727	2,500
25	<p>Motion Dir : When the motor operates by position command, this mode sets the revolution direction of the motor. ◆ 0 : moves the motor clockwise. ◆ 1 : moves the motor counterclockwise.</p>		0	1	0
26	<p>Limit Sensor Dir : Sets the limit sensor direction to stop the motor to the limit spot under operation. ◆ 0 : When operation direction is 'CW', input the sensor signal to the Limit+ direction, and the motor will stop. ◆ 1 : When operation direction is 'CW', input the sensor signal to the Limit- direction, and the motor will stop.</p>		0	1	0
27	<p>Org Torque Ratio : In case of 'Origin Method' parameter is set to '5' or '6' to set the maximum torque value to stop the motor.</p>	%	20	90	50

28	<p>Pos. Error Overflow Limit :</p> <p>Acts to protect the motor and the drive. While the motor stops and is set to Servo ON, when 'Position Error' is greater than this setting value, this mode generates an alarm to stop a flow of electricity to the motor and then set it to Servo OFF.</p>	pulse	1	+134,217, 727	2,500
29	<p>Brake Delay Time :</p> <p>According to the SERVO ON command, It can be set the brake operation time.. *3</p>	msec	10	5,000	200
30	<p>Run Current:</p> <p>Run Current is value of running current during the operating of motor, it is set based on rated current of motor. This value is related with torque in operating of motor, if this value is big, motor torque getting high in operation. So, in case of lack of torque, it can be raising the torque by increasing the run current value.</p> <p>Precaution)</p> <ol style="list-style-type: none"> 1) To be notified If Run Current value is high, heat temperature can be increasing. 2) Maximum set value of Run Current (150%) is limited by 4[A]. So, in case of motor (56,60mm) of rated current value is exceed 2.7[A], set value is not increased as much as set-up, even increasing the set value. 3) Run Current is automatically controlled according to load, so please use in case of lacking torque in operation. 	*10[%]	5	15	10
31	<p>Boost Current :</p> <p>It is the parameter of supplied current to motor to improve for character of acceleration in case of cannot set the acceleration time sufficiently. . (it is applied to acceleration .) Example of use)</p> <ol style="list-style-type: none"> 1) SM-42XL (Current : 1.2[A]) 2) Run Current : 10(100[%]) 3) Boost Current : 1(50[%]) 4) Control current in case of acceleration : $1.2[A] + 1.2[A] * 50[\%] = 1.8[A]$ <p>* The control current is limited by 4[A] same as Run Current case. * In case of motor (56,60mm) of rated current value is exceed 2.7[A], set value is not increased as much as set-up, even increasing the set value.</p>	*50[%]	0	7	0
32	<p>Stop Current:</p> <p>Stop Current is meaning of motor current which is automatically set after 0.1 second since motor stop. This parameter is using to decrease the temperature when motor stopped long- time. It also can be increased the motor temperature in case set-up more than 60%.</p>	*10[%]	20	10	5

1 2 . Protection Function

1 2 - 1 . Type of Alarm

- 1) If an alarm occurs during drive operation, the red LED of the status display LED flashes and the LED flashes like the alarm number and the protection function as shown in the following table is activated.
- 2) After alarm number 15, alarm LED does not flash and alarm number is displayed in 7-segment.

Flash Count	Alarm Name	Description
1	Overcurrent	The current through power devices in inverter exceeds the limit value *1
2	Overspeed	Command speed for motor exceeds 3300[rpm].
3	Position Tracking	Position error value is higher than specified value*1 in-position command status. *2
4	Overload	The motor is continuously operated more than 5 second under a load exceeding the max. torque.
5	Overheat	The internal temperature of the drive exceeds 55°C.
6	Over regenerative voltage	Back-EMF more than limit value. *3
7	Motor connection	The connection of drive and motor is defective.
8	Encoder connection	The connection of drive and encoder is defective.
9	Motor voltage error	The power supplied to the motor is less than low limit value.*4
10	In-position error	After operation is finished, a position error occurs.
11	System error	Drive system is halted (Watch Dog Timer).
12	ROM error	Read/Write error on ROM device in drive system.
15	Pos. Error Overflow	Position error value is higher than specified value*1 in motor stop status. *6
50	Internal communication	A communication error has occurred between parts in the drive.
51	SERVO ON failure	If the SERVO ON command fails
60		
201	IP setting error	In case of IP and Gateway set value is same
202	IP conflict	If there are any product that has the same IP address existing on the connected network. (Including other products)

*1 Detection current: 4.5A

*2 Set value [pulse] in 'Pos Tracking Limit[No.24]' parameter

*3 Limiting value: 70V

*4 Lower bound: 20V

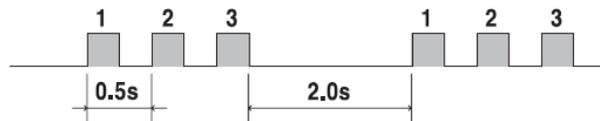
*5 Set value [pulse] in 'Pos Error Overflow Limit[No.28]' parameter

1 2 - 2 . Acquiring the alarm information

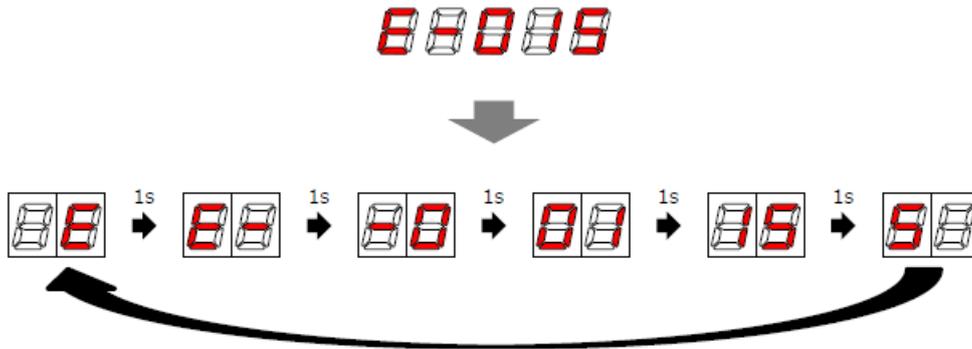
If an alarm occurs, the motor will go into Servo OFF state and will stop if it is running. At the same time, the control output "Alarm" is output and the alarm number is displayed in the 7-segment for ID Display.

The "Alarm Blink" signal repeats ON / OFF at the timing shown in the figure below. Depending on the type of alarm that is currently occurring, it blinks at the rate of flickering every 0.5 seconds, waits for 2 seconds, and then it outputs repeatedly until the alarm is released by "Alarm Reset" command or signal.

Ex1) Alarm 3 : 'AlarmBlink' display signal occurred when the step-out is occurred



Ex2) Alarm 15 : 7-Segment displays when position error overflow is occurred.



1 2 - 3 . Alarm check and Release

If an alarm occurs, remove its cause and then release it. The alarm can be released as follows. In case of alarms of which 'Reset 'column is indicated to 'Invalid', power must get down prior to releasing the alarms

Flash Count	Alarm Name	Description	Reset
1	Overcurrent	1)Check the motor's short-circuit (A, /A, B, /B) 2)Check the mechanical status such as parameter setting.	Valid
2	Overspeed	1)Check parameter setting, and abnormal operation of the motor. 2)Check the speed command of upper controller(ex:PLC).	Valid
3	Position Tracking	1)Get down the load or increase the acceleration or deceleration speed. 2)Check assemble status of mechanism. 3)Check the brake signal cable. 4)Check the motor's short-circuit (A, /A, B, /B) 5)Check the encoder cable connection status. 6)Check the parameter setting value.	Valid
4	Overload	1)Compare the motor's rating with load scale. 2)Check assemble status of mechanism. 3)Check 'SW limit'value of parameter. 4)Check the status of sensors. 5)Check the motorDB for driver and motor. 6) Check the motor's short-circuit (A, /A, B, /B)	Valid
5	Overheat	1)Get down the ambient temperature or install a cooling fan. 2)Check the distance is over 50mm between drivers.	Valid
6	Over regenerated voltage	1)In case of high-speed operation, check if the acceleration or deceleration speed is low.	Valid
7	Motor connection	1)Check the connection status of drive and motor.	Invalid
8	Encoder connection	1)Check the connection status of drive and encoder. 2)Check the screw condition, cabling short-circuit of encoder.	Invalid
9	Motor voltage error	1)Check if power is supplied to the drive. 2)Check the diameter and length of power cable to driver.	Invalid
10	Inposition error	1)Check if parameters are set correctly or the machine is over-loaded. 2)Check the vibration of mechanism and belt tension. 3)Check the cabling status of motor and encoder.	Valid
11	System error	1)Check if current of power supply is supplied to the drive.	Invalid
12	ROM error	1)Contact to distributor.	Invalid
14	Drive voltage error	1)Check if power is supplied to the drive.	Invalid
15	Pos. Error Overflow	1)Get down the load or increase the acceleration or deceleration speed. 2)Check the brake and encoder is working correctly or not.	Valid
50	Internal	1) Power on the drive again.	Invalid

	communication		
51,60	SERVO ON failure	1) Pass the SERVO ON command again. 2) Power on the drive again.	Valid
201	IP setting error	1) Set the last number of IP and Gateway differently. 2) If using the basic IP address, set the IP setting from 2 to 254	Invalid
202	IP conflict	1) IP conflict with other drives (including other products), so check the settings of each drive (including other products).	Invalid

1 3 . Appendix

1 3 - 1 . Option for Interface Board: Ezi-SERVOⅡ Plus-E

■ Interface Board

All Input & Output signals are connected through the connector CN1.

Type	Item	
Interface Board (Terminal Block)	TB-Plus	

No. of CN1	Signal name	Signal name of TB-Plus	No. of CN1	Signal name	Signal name of TB- Plus
1	Limit+	L+	7	COMP	CO
2	Limit-	L-	8	OUT1	O1
3	Origin	ORG	9	OUT2	O2
4	IN1	I1	10	OUT3	O3
5	IN6	I6	11	OUT4	O4
6	IN7	I7	12	OUT5	O5
14	IN2	I2	13	OUT6	O6
15	IN3	I3	20	OUT7	O7
16	IN4	I4	21	OUT8	O8
17	IN5	I5	22	OUT9	O9
18	IN8	I8	23	Brake+	B+
19	IN9	I9	24	Brake-	B-

■ Extension cable for Interface Board

It is used to connect the CN1 terminal block of the drive to the interface board.

Item	Length[m]	Remark
CIFD-S-□□□F	□□□	Normal cable
CIFD-S-□□□M	□□□	Robot cable

□ is cable length.

The unit is 1[m] , maximum length is 20[m].

The cable connection is 1:1 straight type.

Use	Item	Specification	Maker
Terminal Block connector	Connector	DB-26 male type	
	Drive connector(CN1)	Connector Housing	10126-30000VE
	Backshell	10320-52AO-008	3M

1 3 - 2 . Option for Motor Drive

■ I/O connection cable

Available to connect between drive and I/O

Item	Length[m]	Remark
CSV-R-S-□□□F	□□□	Normal cable
CSV-R-S-□□□M	□□□	Robot cable

□ is cable length.

The unit is 1[m] , maximum length is 20[m].

Refer to ① of 「5.2 Controller Configuration (1)」

■ Drive power cable

Available to connect between Power and Drive

Item	Length[m]	Remark
CSV-O-P-□□□F	□□□	Normal cable
CSV-O-P-□□□M	□□□	Robot cable

□ is cable length.

The unit is 1[m] , maximum length is 2 [m].

Refer to ④ of 「5.2 Controller Configuration (1) (2)」

■ Extension cable for motor

Available to extended connection between motor & Drive

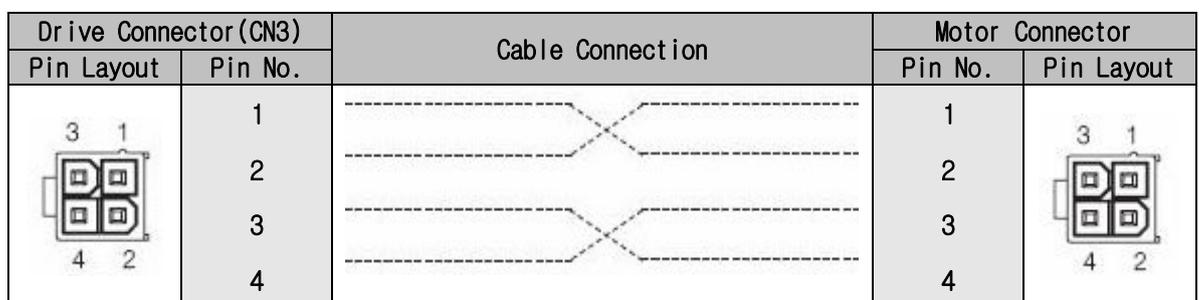
Item	Length[m]	Remark
CSV-O-M-□□□F	□□□	Normal cable
CSV-O-M-□□□M	□□□	Robot cable

□ is cable length.

The unit is 1[m] , maximum length is 20[m].

Refer to ③ of 「5.2 Controller Configuration (1)」

※ Wiring Diagram



Connector Specification

Item	Specification	Maker
Housing	5557-04	MOLEX
Terminal	5556	MOLEX

■ Extension cable for Encoder

Available to extend the distance between the encoder and drive

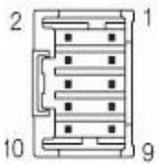
Item	Length[m]	Remark
CSVO-E-□□□F	□□□	Normal cable
CSVO-E-□□□M	□□□	Robot cable

□ is cable length.

The unit is 1[m] , maximum length is 20[m].

Refer to ② of 「5.2 Controller Configuration (1)」

※ Wiring Diagram

Drive Connector (CN2)		Cable Connection	Motor Connector	
Pin Layout	Pin No.		Pin No.	Pin Layout
	1	---	1	
	2	---	2	
	3	---	3	
	4	---	4	
	5	---	5	
	6	---	6	
	7	---	7	
	8	---	8	
	9	---	9	

Connector Specification

Type	Item	Specification	Maker
Drive Connector (CN2)	Housing	51353-100	MOLEX
	Terminal	56134-9000	MOLEX
Motor Connector	Housing	SMP-09V-NC	JST
	Terminal	SHF-001T-0.8BS	JST

■ Ethernet Cable for : Ezi-SERVOII Plus-E

Use STP (Shielded Twisted Pair) cable (CAT5E)

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

□ is cable length.

The unit is 1[m] , maximum length is 100[m].

Refer to ⑤ of 「5.2 Controller Configuration (1)」

■ Connector for cabling

It is the connector specification to connect with Drive

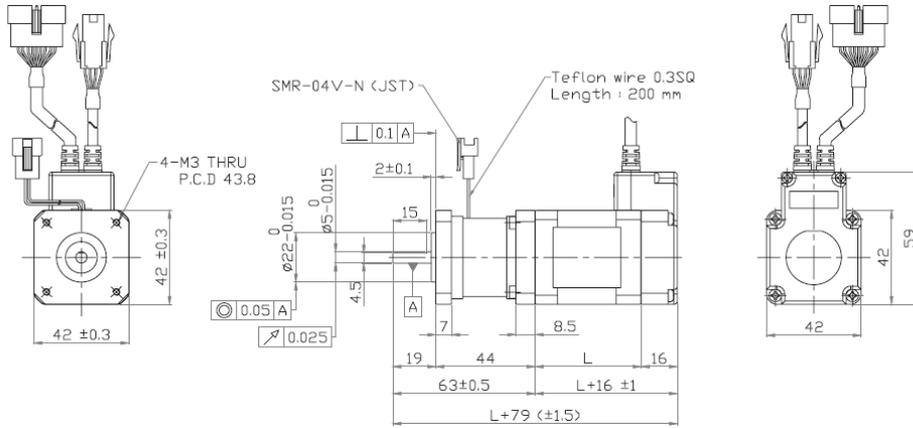
Type		ITEM	Specification	Maker
Power connection (CN4)		Housing	5557-02R	MOLEX
		Terminal	5556T	MOLEX
Motor connection	Drive (CN3)	Housing	5557-04R	Motor connection
		Terminal	5556T	
	Motor	Housing	5557-04R	
		Terminal	5556T	
Encoder connection	Drive (CN2)	Housing	51353-1000	Encoder connection
		Terminal	56134-9000	
	Motor	Housing	SMP-09V-NC	
		Terminal	SHF-001T-0.8BS	
I/O connection (CN1)		Connector	10126-3000VE	3M
		Backshell	10326-52AO-008	3M

※ Connectors in the above list are most suitable for Ezi-SERVOII Plus-E. Equivalent or alternative items can be used.

1 3 - 3 . Brake Installed Motor Specification and Size

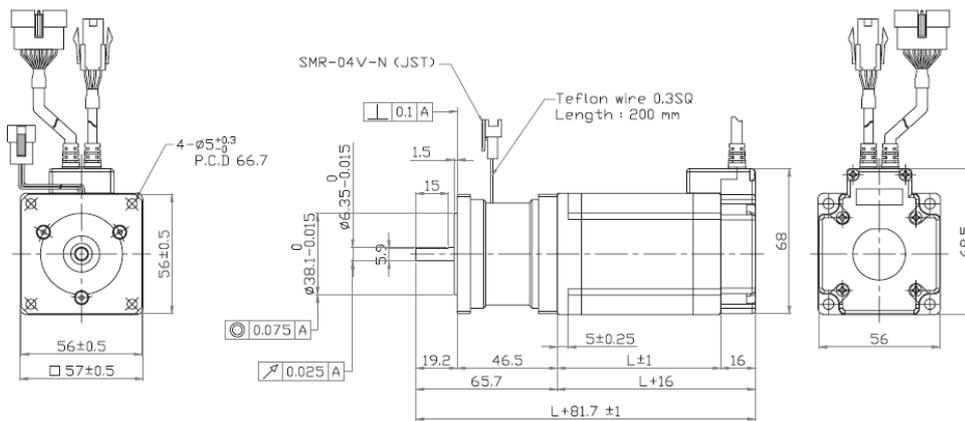
2. Motor Size(mm)

42



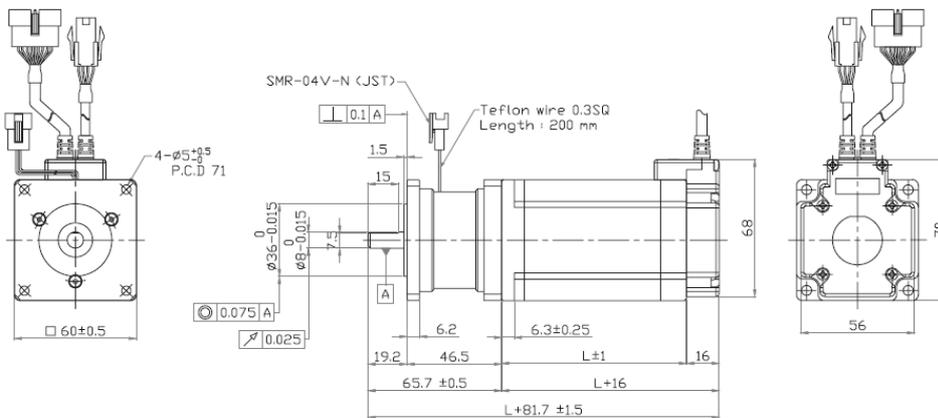
Model name	Length(L)
EzM2-42S-A	34mm
EzM2-42M-A	40mm
EzM2-42L-A	48mm
EzM2-42XL-A	60mm

56



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

60



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

1 3 - 4 . Gear box Installed Motor Specification and Size

1) Gearbox for 42mm Motor Specification

Package	Maximum Holding Torque (N · m)	Rotor Inertia Moment (Kg · m ²)	Backlash (min)	Angle Transmission Error (min)	Reduction Gear Ratio	Resolution (10,000ppr Standard)	Permitted Torque (N · m)	Maximum Torque (N · m)	Permitted Speed Range (rpm)	Unit Weight (Kg)	Permitted Overhung Load (N)		Permitted Thrust Load (N)
											Axis Center Standard	Standard	
Ezi-SERVO II -PE-42S-A-PN3	0.8	35x10 ⁻⁷	3	5	3	0,012 °	6	18	0~1000	0.89	240	270	
Ezi-SERVO II -PE-42S-A-PN5	1.4				5	0,0072 °	9	18	0~600		290	330	
Ezi-SERVO II -PE-42S-A-PN8					8	0,0045 °	9	18	0~375		340	410	
Ezi-SERVO II -PE-42S-A-PN10					10	0,0036 °	6	12	0~333		360	450	
Ezi-SERVO II -PE-42S-A-PN15	4.0		5	7	15	0,0024 °	6	12	0~300	0.99	410	540	
Ezi-SERVO II -PE-42S-A-PN25	6.6				25	0,00144 °	9	18	0~120		490	640	
Ezi-SERVO II -PE-42S-A-PN40	9.0				40	0,0009 °	9	18	0~75		570	640	
Ezi-SERVO II -PE-42S-A-PN50					50	0,00072 °	9	18	0~60		620	640	
Ezi-SERVO II -PE-42M-A-PN3	1.1	54x10 ⁻⁷	3	5	3	0,012 °	6	18	0~1000	0.96	240	270	
Ezi-SERVO II -PE-42M-A-PN5	1.9				5	0,0072 °	9	18	0~600		290	330	
Ezi-SERVO II -PE-42M-A-PN8					8	0,0045 °	9	18	0~375		340	410	
Ezi-SERVO II -PE-42M-A-PN10					3.7	10	0,0036 °	6	12		0~333	360	450
Ezi-SERVO II -PE-42M-A-PN15	5.4		5	7	15	0,0024 °	6	12	0~300	1.06	410	540	
Ezi-SERVO II -PE-42M-A-PN25	9.0				25	0,00144 °	9	18	0~120		490	640	
Ezi-SERVO II -PE-42M-A-PN40					40	0,0009 °	9	18	0~75		570	640	
Ezi-SERVO II -PE-42M-A-PN50					50	0,00072 °	9	18	0~60		620	640	
Ezi-SERVO II -PE-42L-A-PN3	1.4	77x10 ⁻⁷	3	5	3	0,012 °	6	18	0~1000	1.02	240	270	
Ezi-SERVO II -PE-42L-A-PN5	2.4				5	0,0072 °	9	18	0~600		290	330	
Ezi-SERVO II -PE-42L-A-PN8	3.8				8	0,0045 °	9	18	0~375		340	410	
Ezi-SERVO II -PE-42L-A-PN10	4.7				10	0,0036 °	6	12	0~333		360	450	
Ezi-SERVO II -PE-42L-A-PN15	6.0		5	7	15	0,0024 °	6	12	0~300	1.12	410	540	
Ezi-SERVO II -PE-42L-A-PN25	9.0				25	0,00144 °	9	18	0~120		490	640	
Ezi-SERVO II -PE-42L-A-PN40					40	0,0009 °	9	18	0~75		570	640	
Ezi-SERVO II -PE-42L-A-PN50					50	0,00072 °	9	18	0~60		620	640	
Ezi-SERVO II -PE-42XL-A-PN3	1.8	114x10 ⁻⁷	3	5	3	0,012 °	6	18	0~1000	1.15	240	270	
Ezi-SERVO II -PE-42XL-A-PN5	3.0				5	0,0072 °	9	18	0~600		290	330	
Ezi-SERVO II -PE-42XL-A-PN8	4.8				8	0,0045 °	9	18	0~375		340	410	
Ezi-SERVO II -PE-42XL-A-PN10	6.0				10	0,0036 °	6	12	0~333		360	450	
Ezi-SERVO II -PE-42XL-A-PN15			9.0	5	7	15	0,0024 °	6	12	0~300	1.25	410	540
Ezi-SERVO II -PE-42XL-A-PN25	25					0,00144 °	9	18	0~120	490		640	
Ezi-SERVO II -PE-42XL-A-PN40	40					0,0009 °	9	18	0~75	570		640	
Ezi-SERVO II -PE-42XL-A-PN50	50					0,00072 °	9	18	0~60	620		640	

2) Gearbox for 56mm Motor Specification

Package	Maximum Holding Torque (N · m)	Rotor Inertia Moment (Kg · m ²)	Backlash (min)	Angle Transmis-sion Error (min)	Reduction Gear Ratio	Resolution (10,000ppr Standard)	Permitted Torque (N · m)	Maximum Torque (N · m)	Permitted Speed Range (rpm)	Unit Weight (Kg)	Permitted Overhung Load (N)	Permitted Thrust Load (N)
											Axis Center Standard	
Ezi-SERVO II-PE-56S-A-PN3	1,6	120x10 ⁻⁷	3	5	3	0,012 °	27	50	0~1000	1,34	430	310
Ezi-SERVO II-PE-56S-A-PN5	2,7				5	0,0072 °	27	50	0~600	1,88	510	390
Ezi-SERVO II-PE-56S-A-PN8	4,3				8	0,0045 °	27	50	0~375		600	480
Ezi-SERVO II-PE-56S-A-PN10	5,3				10	0,0036 °	18	35	0~333	2,08	640	530
Ezi-SERVO II-PE-56S-A-PN15	7,7				15	0,0024 °	18	35	0~300		740	630
Ezi-SERVO II-PE-56S-A-PN25	12,9				25	0,00144 °	27	50	0~120		870	790
Ezi-SERVO II-PE-56S-A-PN40	20,6				40	0,0009 °	27	50	0~75		1000	970
Ezi-SERVO II-PE-56S-A-PN50	25,8				50	0,00072 °	27	50	0~60		1100	1000
Ezi-SERVO II-PE-56M-A-PN3	2,6	200x10 ⁻⁷	3	5	3	0,0012 °	18	35	0~1000		1,4	430
Ezi-SERVO II-PE-56M-A-PN5	4,4				5	0,0072 °	27	50	0~600	2,15	510	390
Ezi-SERVO II-PE-56M-A-PN8	7,0				8	0,0045 °	27	50	0~375		600	480
Ezi-SERVO II-PE-56M-A-PN10	8,7				10	0,0036 °	18	35	0~333	2,35	640	530
Ezi-SERVO II-PE-56M-A-PN15	12,7				15	0,0024 °	18	35	0~300		740	630
Ezi-SERVO II-PE-56M-A-PN25	21,1				25	0,00144 °	27	50	0~120		870	790
Ezi-SERVO II-PE-56M-A-PN40	27,0				40	0,0009 °	27	50	0~75		1000	970
Ezi-SERVO II-PE-56M-A-PN50					50	0,00072 °	27	50	0~60		1100	1000
Ezi-SERVO II-PE-56L-A-PN3	4,3	480x10 ⁻⁷	3	5	3	0,012 °	18	35	0~1000		1,1	430
Ezi-SERVO II-PE-56L-A-PN5	7,2				5	0,0072 °	27	50	0~600	2,22	510	390
Ezi-SERVO II-PE-56L-A-PN8	11,4				8	0,0045 °	27	50	0~375		600	480
Ezi-SERVO II-PE-56L-A-PN10	14,3				10	0,0036 °	18	35	0~333	2,42	640	530
Ezi-SERVO II-PE-56L-A-PN15	18,0				15	0,0024 °	18	35	0~300		740	630
Ezi-SERVO II-PE-56L-A-PN25	27,0				25	0,00144 °	27	50	0~120		870	790
Ezi-SERVO II-PE-56L-A-PN40					40	0,0009 °	27	50	0~75		1000	970
Ezi-SERVO II-PE-56L-A-PN50					50	0,00072 °	27	50	0~60		1100	1000

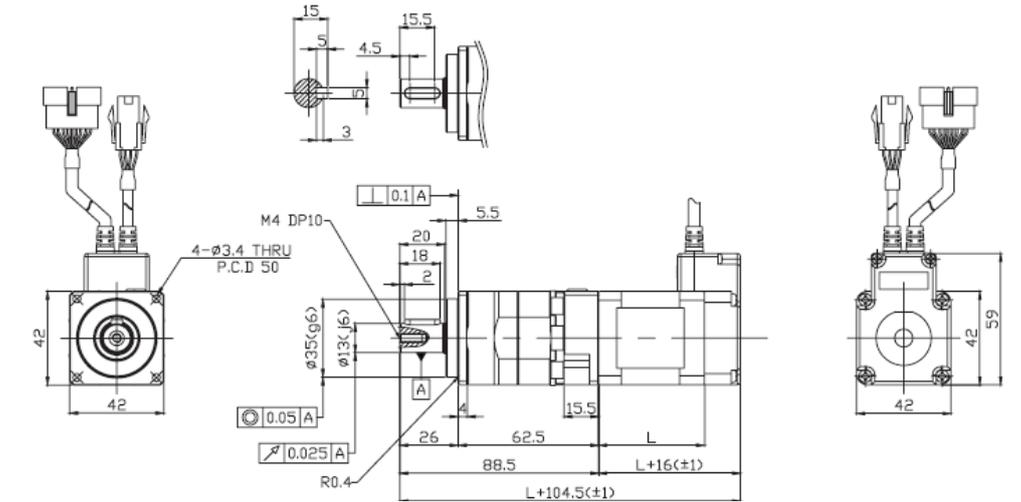
3) Gearbox for 60mm Motor Specification

Package	Maximum Holding Torque (N · m)	Rotor Inertia Moment (Kg · m ²)	Backlash (min)	Angle Transmission Error (min)	Reduction Gear Ratio	Resolution (10,000ppr Standard)	Permitted Torque (N · m)	Maximum Torque (N · m)	Permitted Speed Range (rpm)	Unit Weight (Kg)	Permitted Overhung Load (N)						
											Axis Center Standard	Permitted Thrust Load (N)					
Ezi-SERVO II-PE-60S-A-PN3	2,6	140x10 ⁻⁷	3	5	3	0,012 °	18	35	0~1000	1,4	430	310					
Ezi-SERVO II-PE-60S-A-PN5	4,4				5	0,0072 °	27	50	0~600				2,0	510	390		
Ezi-SERVO II-PE-60S-A-PN8	7,0				8	0,0045 °	27	50	0~375							600	480
Ezi-SERVO II-PE-60S-A-PN10	8,8				10	0,0036 °	18	35	0~333								
Ezi-SERVO II-PE-60S-A-PN15	12,7				15	0,0024 °	18	35	0~300	2,2	740	630					
Ezi-SERVO II-PE-60S-A-PN25	21,2				25	0,00144 °	27	50	0~120				870	790			
Ezi-SERVO II-PE-60S-A-PN40	27,0				40	0,0009 °	27	50	0~75						1000	970	
Ezi-SERVO II-PE-60S-A-PN50					50	0,00072 °	27	50	0~60								1100
Ezi-SERVO II-PE-60M-A-PN3	3,6	320x10 ⁻⁷	3	5	3	0,012 °	18	35	0~1000	1,4	430	310					
Ezi-SERVO II-PE-60M-A-PN5	6,0				5	0,0072 °	27	50	0~600				2,3	510			
Ezi-SERVO II-PE-60M-A-PN8	9,6				8	0,0045 °	27	50	0~375						600	480	
Ezi-SERVO II-PE-60M-A-PN10	12,0				10	0,0036 °	18	35	0~333								640
Ezi-SERVO II-PE-60M-A-PN15	17,4				15	0,0024 °	18	35	0~300	2,5	740	630					
Ezi-SERVO II-PE-60M-A-PN25	27,0				25	0,00144 °	27	50	0~120				870	790			
Ezi-SERVO II-PE-60M-A-PN40					40	0,0009 °	27	50	0~75						1000	970	
Ezi-SERVO II-PE-60M-A-PN50					50	0,00072 °	27	50	0~60								1100
Ezi-SERVO II-PE-60L-A-PN3		7,1	800x10 ⁻⁷	3	5	3	0,012 °	18	35	0~1000	1,4	430					
Ezi-SERVO II-PE-60L-A-PN5	11,9	5				0,0072 °	27	50	0~600	3,0			510	390			
Ezi-SERVO II-PE-60L-A-PN8	19,0	8				0,0045 °	27	50	0~375						600	480	
Ezi-SERVO II-PE-60L-A-PN10	18,0	10				0,0036 °	18	35	0~333								640
Ezi-SERVO II-PE-60L-A-PN15		15				0,0024 °	18	35	0~300		2,2	740					
Ezi-SERVO II-PE-60L-A-PN25	27,0	25				0,00144 °	27	50	0~120	870			790				
Ezi-SERVO II-PE-60L-A-PN40		40				0,0009 °	27	50	0~75					1000	970		
Ezi-SERVO II-PE-60L-A-PN50		50				0,00072 °	27	50	0~60							3,2	1100

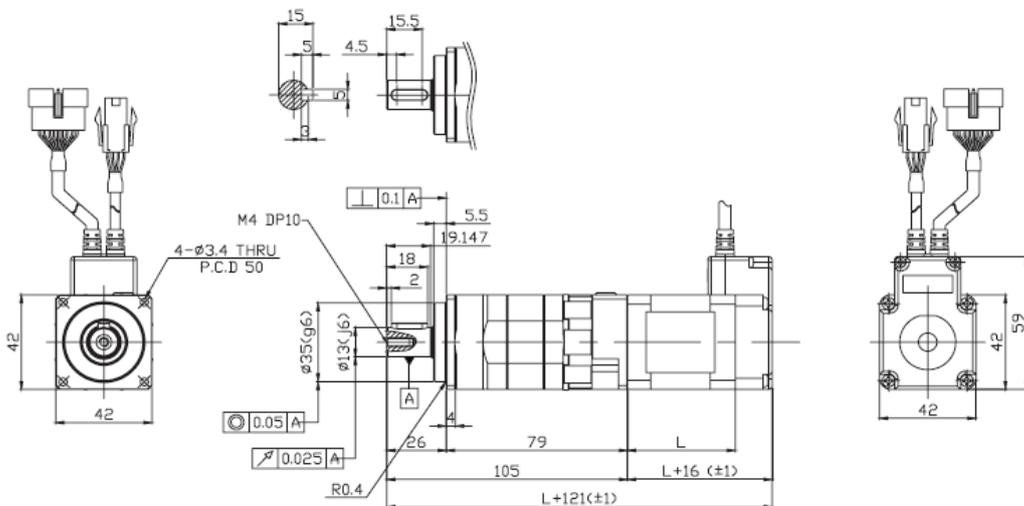
4) 42mm motor size with Gearbox

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Package	Motor	Stage	□Second Stage	L Length (mm)
Ezi-SERVO II -PE-42S-A-PN □	EzM2-42S-A-PN □	Single Stage	3, 5, 8, 10	34
Ezi-SERVO II -PE-42M-A-PN □	EzM2-42M-A-PN □		3, 5, 8, 10	40
Ezi-SERVO II -PE-42L-A-PN □	EzM2-42L-A-PN □		3, 5, 8, 10	48
Ezi-SERVO II -PE-42XL-A-PN □	EzM2-42XL-A-PN □		3, 5, 8, 10	60



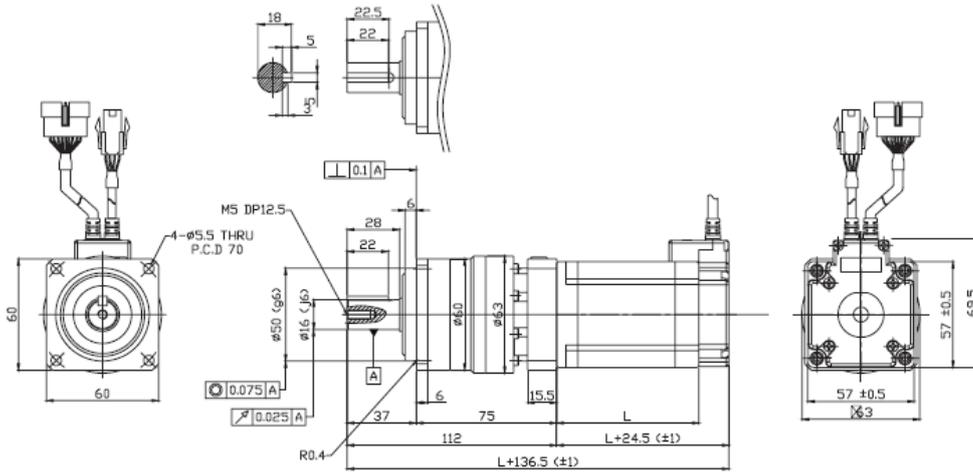
Package	Motor	Stage	□Second Stage	L Length (mm)
Ezi-SERVO II -PE-42S-A-PN □	EzM2-42S-A-PN □	Second Stage	15, 25, 40, 50	34
Ezi-SERVO II -PE-42M-A-PN □	EzM2-42M-A-PN □		15, 25, 40, 50	40
Ezi-SERVO II -PE-42L-A-PN □	EzM2-42L-A-PN □		15, 25, 40, 50	48
Ezi-SERVO II -PE-42XL-A-PN □	EzM2-42XL-A-PN □		15, 25, 40, 50	60



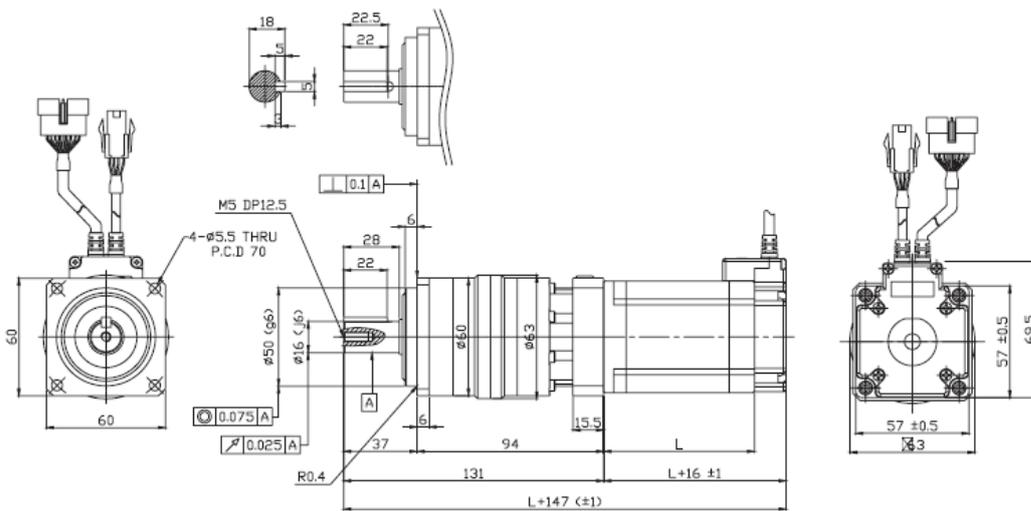
5) 56mm motor size with Gearbox

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Package	Motor	Stage	□Second Stage	L Length (mm)
Ezi-SERVO II-PE-56S-A-PN □	EzM2-56S-A-PN □	Single Stage	3, 5, 8, 10	46
Ezi-SERVO II-PE-56M-A-PN □	EzM2-56M-A-PN □		3, 5, 8, 10	55
Ezi-SERVO II-PE-56L-A-PN □	EzM2-56L-A-PN □		3, 5, 8, 10	80



Package	Motor	Stage	□Second Stage	L Length (mm)
Ezi-SERVO II-PE-56S-A-PN □	EzM2-56S-A-PN □	Second Stage	15, 25, 40, 50	46
Ezi-SERVO II-PE-56M-A-PN □	EzM2-56M-A-PN □		15, 25, 40, 50	55
Ezi-SERVO II-PE-56L-A-PN □	EzM2-56L-A-PN □		15, 25, 40, 50	80





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