Ezi-SERVO®Ⅱ Plus-E
Closed Loop Stepping System

User Manual

Text

(Rev.04)

FASTECH

Table of Contents

Manual Version : [ver04]

Applied GUI version : 6.40.8.13~
Firsts Edition : June,30, 2016

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 porition 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.

● It is not responsible for FASTECH to guarantee product randomly reconstructed because this kind of improper action is out of range of guarantee.

◆ 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	**Check the Product is damaged or parts are missing.** Otherwise, the machine may get damaged or the user may get injured.

◆ Installation

! Attention	**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. **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. **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℃ or lower.** Otherwise, a fire or other kinds of accidents may occur due to overheating.
! Warning	**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.

◆ Connect Cables

! Attention	**Keep the rated range of input Voltage for drive.** Otherwise, a fire or other kinds of accidents may occur. **Cable connection should be following the wiring diagram.** Otherwise, a fire or malfunction of machine may occur.
! Warning	**Before connecting cables, check if input power is off.** Otherwise, an electric shock or a fire may occur. **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.

◆ Operation & Setting change

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

◆ Check and Repair

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

1 - 2 . Note 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 20~60 series	EzS2-PE 86 series
Input Voltage	24VDC ± 10%	40~70VDC
Control Method	Closed Loop control with ARM based 32bit MCU	
Multi Axes Drive	Max 254 axes operating (Selectable IP : 1~255)	
Positon Table	It is possible to design 256 of Motion Step. (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℃ In Storage : -20~70℃	
Operating condition — Humidity	In Use : 35~85%RH (Non-condensing) In Storage : 10~90%RH (Non-condensing)	
Operating condition — Viv. Resist	0.5G	
Function — Rotation Speed	0~3,000rpm[*1]	
Function — 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)	
Function — Protection Function	Over current, Over Speed, Position tracking error, Over load, Over temperature, Regenerative voltage error, Motor connect error, Encoder connect error, Motor voltage error, Imposition error, ROM error, Position overflow error	
Function — LED Display	Power status, In-Position status, Servo On status, Alarm status	
Function — In-positon selection	0~63 (Selectable by parameter)	
Function — Position Gain selection	0~63 (Selectable by parameter)	
Function — Rotational Direction	CW/CCW (Selectable by parameter)	
Function — 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%	
Function — 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 (Photocoupler)	
I/O Signal — Output signal	1 dedicated output (Compare Out), 9 programmable output (Photocoupler), Brake signal	
Communication Function	Ethernet TCP, 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, ±Limit sensor, Torque	
GUI	User interface Program for Windows	
Library	Motion Library (DLL) for Windows XP/Vista/7/8/10	

*1 Maximum Rotation speed can be changed by Resolution. Up to Resolution 10,000, Max rotation speed is 3,000rpm. More than that resolution, Max rotation speed will be decreased

2 - 2 . Dimensions

1) General Drive
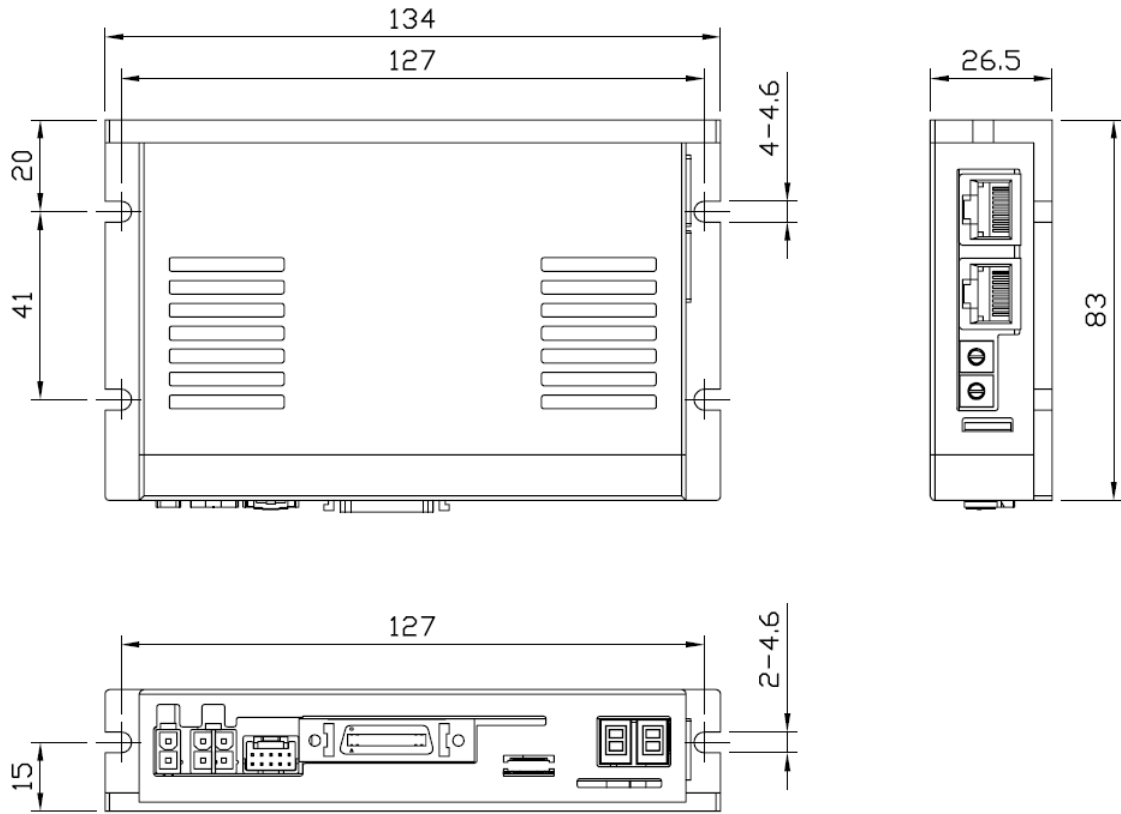
2) 86mm motor Drive
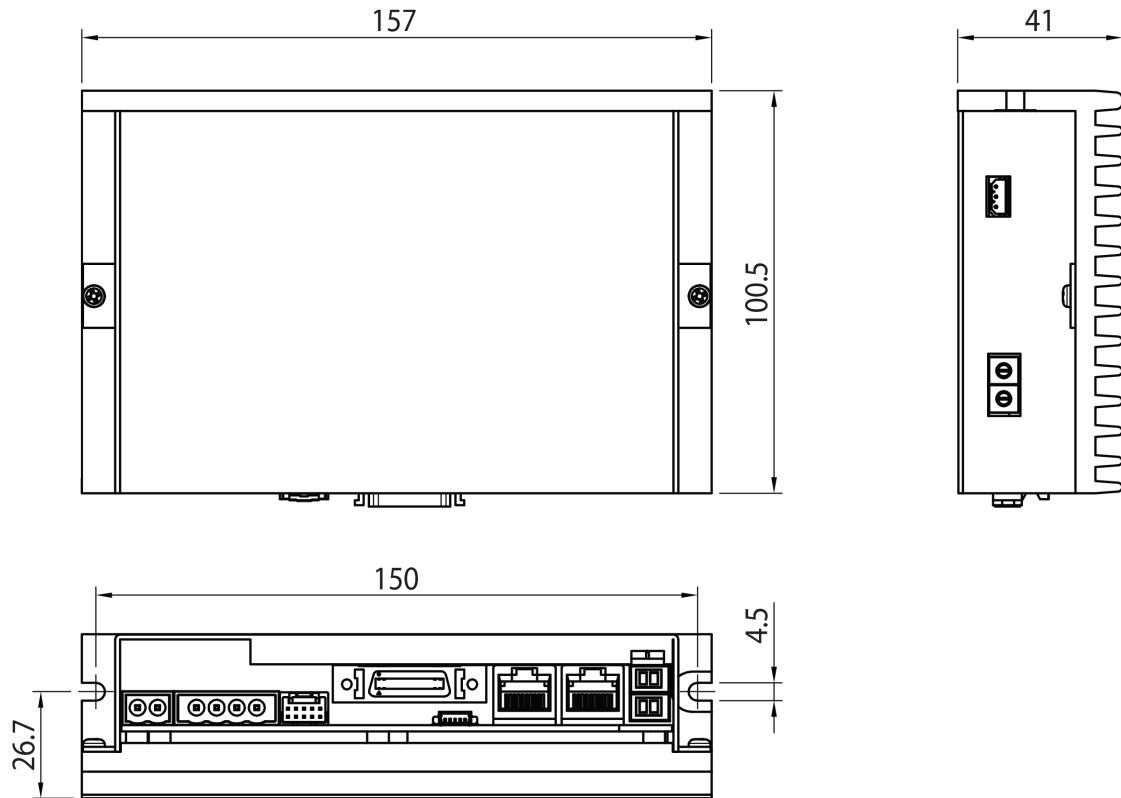
3 . Specifications & size of the Motor

3 - 1 . Motor Specification

Model	Unit		20		28			35	
			20M	20L	28S	28M	28L	35M	35L
DRIVE METHOD	-					BI-POLAR			
NUMBER OF PHASES	-		2	2	2	2	2	2	2
VOLTAGE	VDC		2.75	3	3	3	3	2.88	4.59
CURRENT per PHASE	A		0.5	0.5	0.95	0.95	0.95	0.6	0.85
RESISTANCE per PHASE	Ohm		5.5	6	3.2	3.2	3.2	4.8	5.4
INDUCTANCE per PHASE	mH		2	2.6	2	2.7	3.2	6.1	6.5
HOLDING TORQUE	N·m		0.016	0.025	0.069	0.098	0.118	0.050	0.176
ROTOR INERTIA	g·cm²		2.5	3.3	9	13	18	8	11
WEIGHTS	g		50	80	110	140	200	180	260
LENGTH(L)	mm		28	38	32	45	50	26	38
ALLOWABLE OVERHUNG LOAD (DISTANCE FROM END OF SHAFT)	3mm	N	18	18	30	30	30	22	22
	8mm		30	30	38	38	38	26	26
	13mm		-	-	53	53	53	33	33
	18mm		-	-	-	-	-	46	46
ALLOWABLE THRUST LOAD	N				Lower than motor weight				
INSULATION RESISTANCE	Mohm				100 MΩ MIN.(at 500VDC)				
INSULATION CLASS	-				CLASS B(130℃)				
OPERATING TEMPERATURE	℃				0 to 55				

Ezi-SERVO II Plus-E_ 20 Series
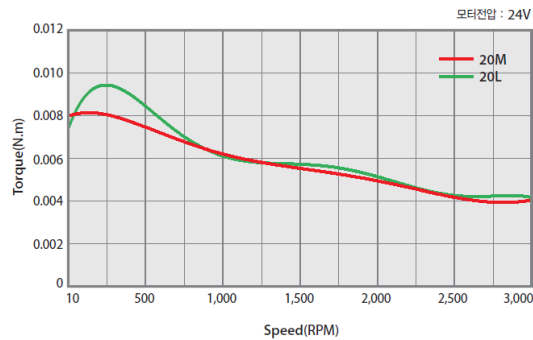
Ezi-SERVO II Plus-E_ 28 Series
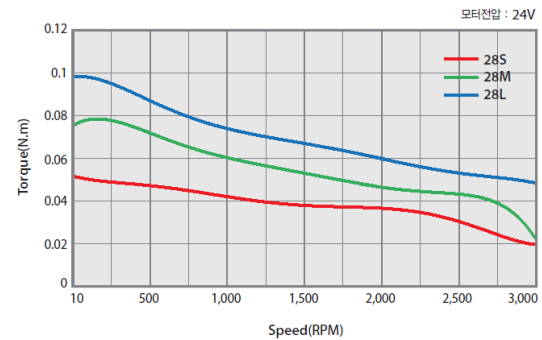
Ezi-SERVO II Plus-E_ 35 Series
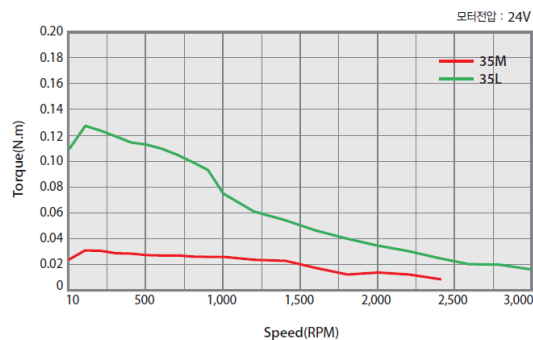
Ezi-SERVO II Plus-E_ 42 Series
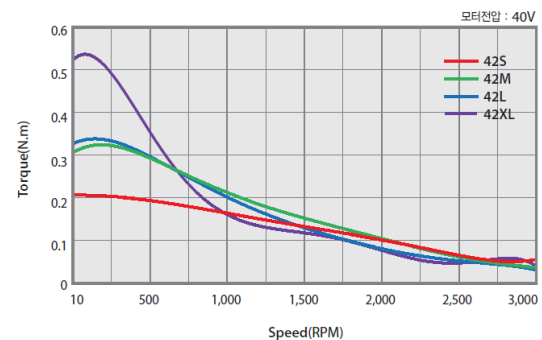
42				56			60			86		
42S	**42M**	**42L**	**42XL**	**56S**	**56M**	**56L**	**60S**	**60M**	**60L**	**86M**	**86L**	**86XL**
BI-POLAR												
2	2	2	2	2	2	2	2	2	2	2	2	2
3.36	4.32	4.56	7.2	1.56	1.62	2.64	1.32	1.48	2.2	2.34	3.6	4.8
1.2	1.2	1.2	1.2	3	3.0	3.0	4.0	4.0	4.0	6.0	6.0	6.0
2.8	3.6	3.8	6	0.52	0.54	0.88	0.33	0.37	0.55	0.39	0.6	0.8
5.4	7.2	8	15.6	1.2	2	4	0.75	1.1	2.7	3	6.5	8.68
0.32	0.44	0.5	0.65	0.64	1	1.5	0.88	1.28	2.4	4.5	8.5	12
35	54	77	114	180	280	520	240	490	690	1800	3600	5400
250	280	350	500	500	720	1150	600	1000	1300	2300	3800	5300
34	40	48	60	46	55	80	47	56	85	78	117	155
22	22	22	22	52	52	52	70	70	70	270	270	270
26	26	26	26	65	65	65	87	87	87	300	300	300
33	33	33	33	85	85	85	114	114	114	350	350	350
46	46	46	46	123	123	123	165	165	165	400	400	400
Lower than motor weight												
100 MΩ MIN.(at 500VDC)												
CLASS B(130℃)												
0 to 55												

Ezi-SERVO II Plus-E_ 56 Series

모터전압 : 40V
56S
56M
56L
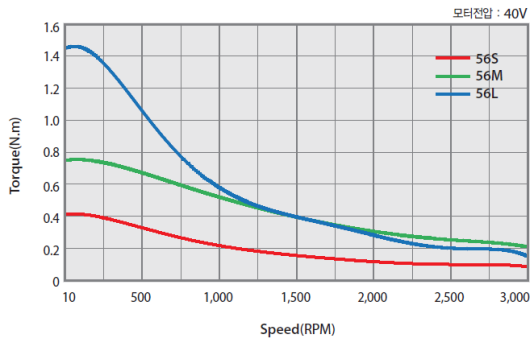
Ezi-SERVO II Plus-E_ 60 Series

모터전압 : 40V
60S
60M
60L
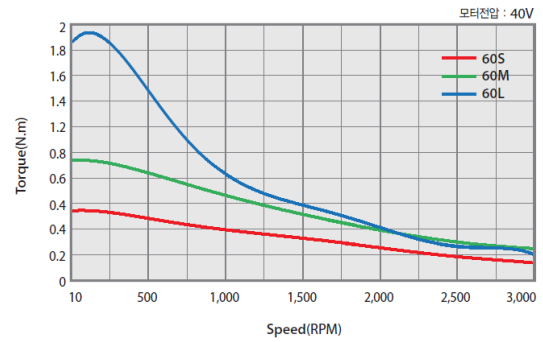
Ezi-SERVO II Plus-E_ 86 Series

모터전압 : 70V
86M
86L
86XL
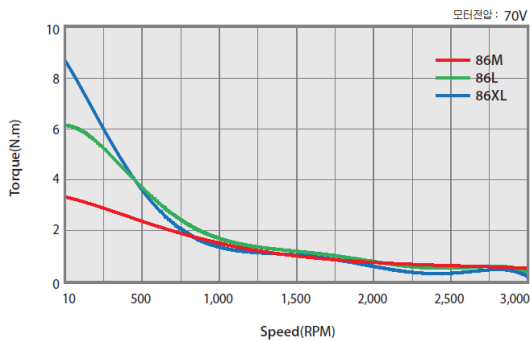
3 - 2 . Motor Size
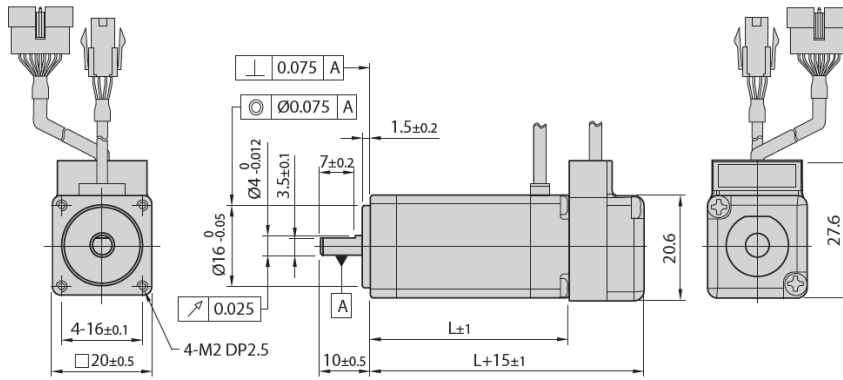
20mm

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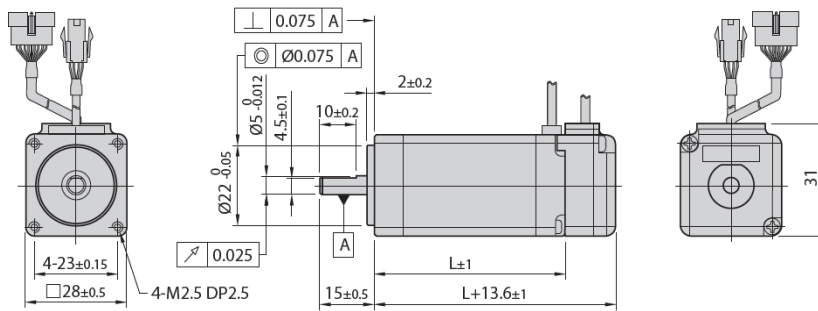
28mm

Model name	Length(L)
EzM2−28S	32
EzM2−28M	45
EzM2−28L	50
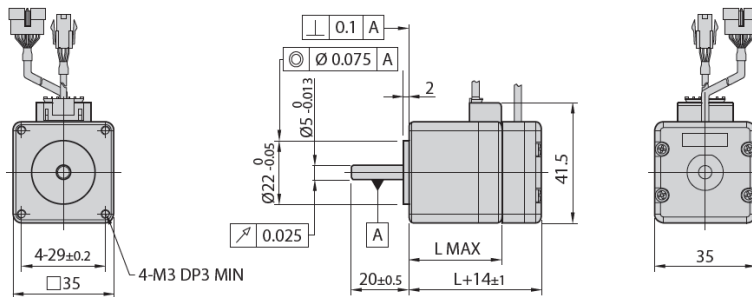
35mm

Model name	Length(L)
EzM2−35M	32
EzM2−35L	36
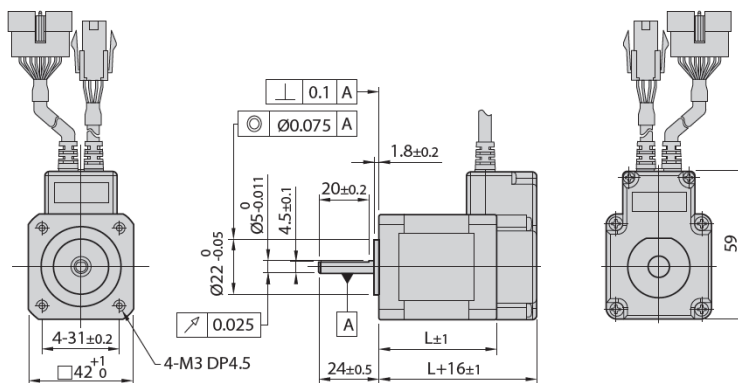
42mm

Model name	Length(L)
EzM2−42S	34
EzM2−42M	40
EzM2−42L	48
EzM2−42XL	60
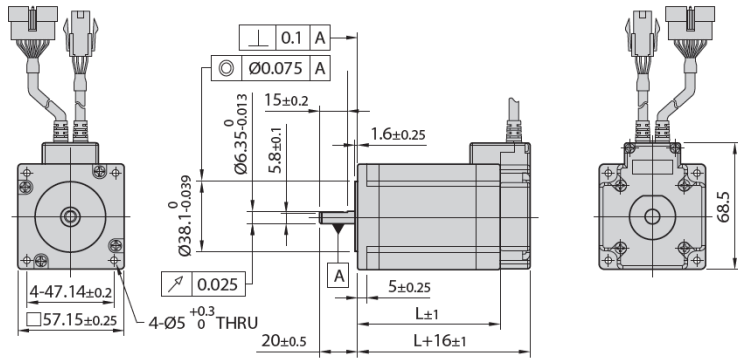
56mm

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

⊥ 0.1 A
◎ Ø0.075 A

15±0.2
Ø6.35 0 -0.013
5.8±0.1
1.6±0.25
Ø38.1 0 -0.039
68.5

↗ 0.025
A
5±0.25
4-47.14±0.2
L±1
□57.15±0.25
4-Ø5 +0.3 0 THRU
L+16±1
20±0.5

※ There are 2 kinds size of front shaft diameter for EzM2–56 series as Ø6.35 and Ø8.0.
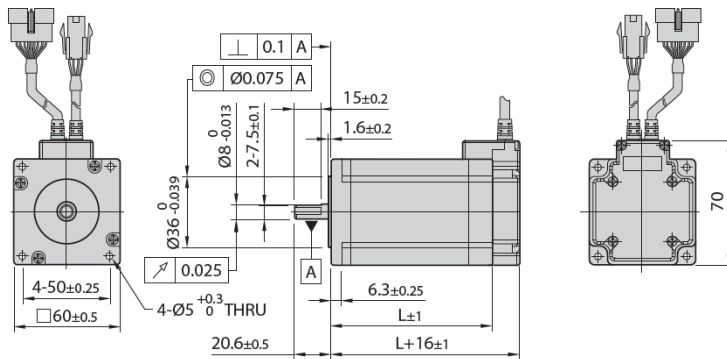
60mm

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

⊥ 0.1 A
◎ Ø0.075 A

15±0.2
Ø8 0 -0.013
2-7.5±0.1
1.6±0.2
Ø36 0 -0.039

↗ 0.025
A
6.3±0.25
4-50±0.25
L±1
□60±0.5
4-Ø5 +0.3 0 THRU
20.6±0.5
L+16±1
70
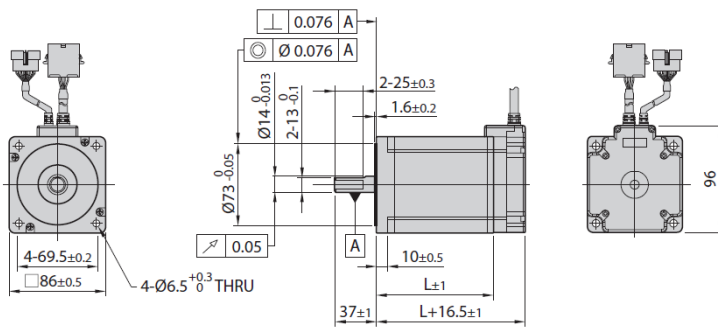
86mm

Model name	Length(L)
EzM2–86M	78
EzM2–86L	117
EzM2–86XL	155

⊥ 0.076 A
◎ Ø 0.076 A

2-25±0.3
Ø14 0 -0.013
2-13 0 -0.1
1.6±0.2
Ø73 0 -0.05

↗ 0.05
A
10±0.5
4-69.5±0.2
L±1
□86±0.5
4-Ø6.5 +0.3 0 THRU
37±1
L+16.5±1
96

4．Configuration

4－1．Motor and Drive Combination

1) Ezi-SERVOⅡ Plus-E Part Numbering

Ezi-SERVOⅡ-PE-42 S-A-BK-PN10-□

Product Name

PE : Plus Ethernet	Drive Series Type

Motor Flange Size
20 : 20mm	
28 : 28mm	
35 : 35mm	
42 : 42mm	Motor Flange Size
56 : 56mm	
60 : 60mm	
86 : 86mm	

Motor Length
S : Small	
M : Medium	Motor Length
L : Large	
XL : Extra Large	

User Code

Reduction Gear Ratio
Blank - Without Gear
PN03 - 1:3
PN05 - 1:5
PN08 - 1:8
PN10 - 1:10
PN15 - 1:15
PN25 - 1:25
PN40 - 1:40
PN50 - 1:50

Brake
Blank : Without Gear
BK : Brake

Encoder Resolution
A : 10,000[ppr]
B : 20,000[ppr]
D : 16,000[ppr]
F : 4,000[ppr]

2) Ezi-SERVOⅡ Plus-E 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
Ezi-SERVOⅡ-PE-86M-x	EzM2-86M-x	EzS2-PE-86M-x
Ezi-SERVOⅡ-PE-86L-x	EzM2-86L-x	EzS2-PE-86L-x
Ezi-SERVOⅡ-PE-86XL-x	EzM2-86XL-x	EzS2-PE-86XL-x

● x : A or B

3) Ezi-SERVOⅡ Plus-E Combination (Brake mounted)

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
Ezi-SERVOⅡ-PE-86M-x-BK	EzM2-86M-x-BK	EzS2-PE-86M-x
Ezi-SERVOⅡ-PE-86L-x-BK	EzM2-86L-x-BK	EzS2-PE-86L-x
Ezi-SERVOⅡ-PE-86XL-x-BK	EzM2-86XL-x-BK	EzS2-PE-86XL-x

● x : A or B

● **Brake Specifications**

Motor	Electromagnetic Brake				
	Type	Voltage Input(V)	Rated Current(A)	Power Consumption(W)	Statical Friction Torque(N·m)
EzM2-42S	Non-excitation run Type	24VDC	0.2	5	0.2
EzM2-42M					
EzM2-42L					
EzM2-42XL					
EzM2-56S			0.27	6.6	0.7
EzM2-56M					
EzM2-56L					
EzM2-60S			0.27	6.6	0.7
EzM2-60M					
EzM2-60L					
EzM2-86M			0.54	13	4
EzM2-86L					
EzM2-86XL					

Electric brake cannot be used for braking. Position hold purpose only when power OFF.

● **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 to happen or loads can fall down.

Also, please do not operate brake while the motor operation to prevent damage.
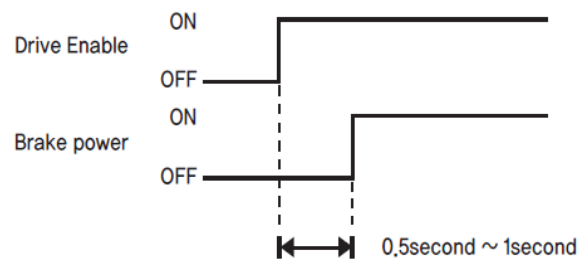
4) Ezi-SERVOⅡ Plus-E Motor, Drive combination (Gearbox integration)

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
Ezi-SERVOⅡ-PE-86M-x-PG-PNy	EzM2-86M-x-PG-PNy	EzS2-PE-86M-x
Ezi-SERVOⅡ-PE-86L-x-PG-PNy	EzM2-86L-x-PG-PNy	EzS2-PE-86L-x
Ezi-SERVOⅡ-PE-86XL-x-PG-PNy	EzM2-86XL-x-PG-PNy	EzS2-PE-86XL-x

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

4 - 2 . Controller configuration

1) General Drive (For 20~60[mm] motor)

⑤ Ethernet cable

⑤ Ethernet cable

PC / PLC

Input / Output

LIMIT-   ORIGIN   LIMIT+

- 3 dedicated inputs and 9 programmable inputs
- 1 dedicated output and 9 programmable outputs, Brake

① Signal cable
② Encoder extension cable
③ Motor extension cable

Input DC Power

④ Power cable
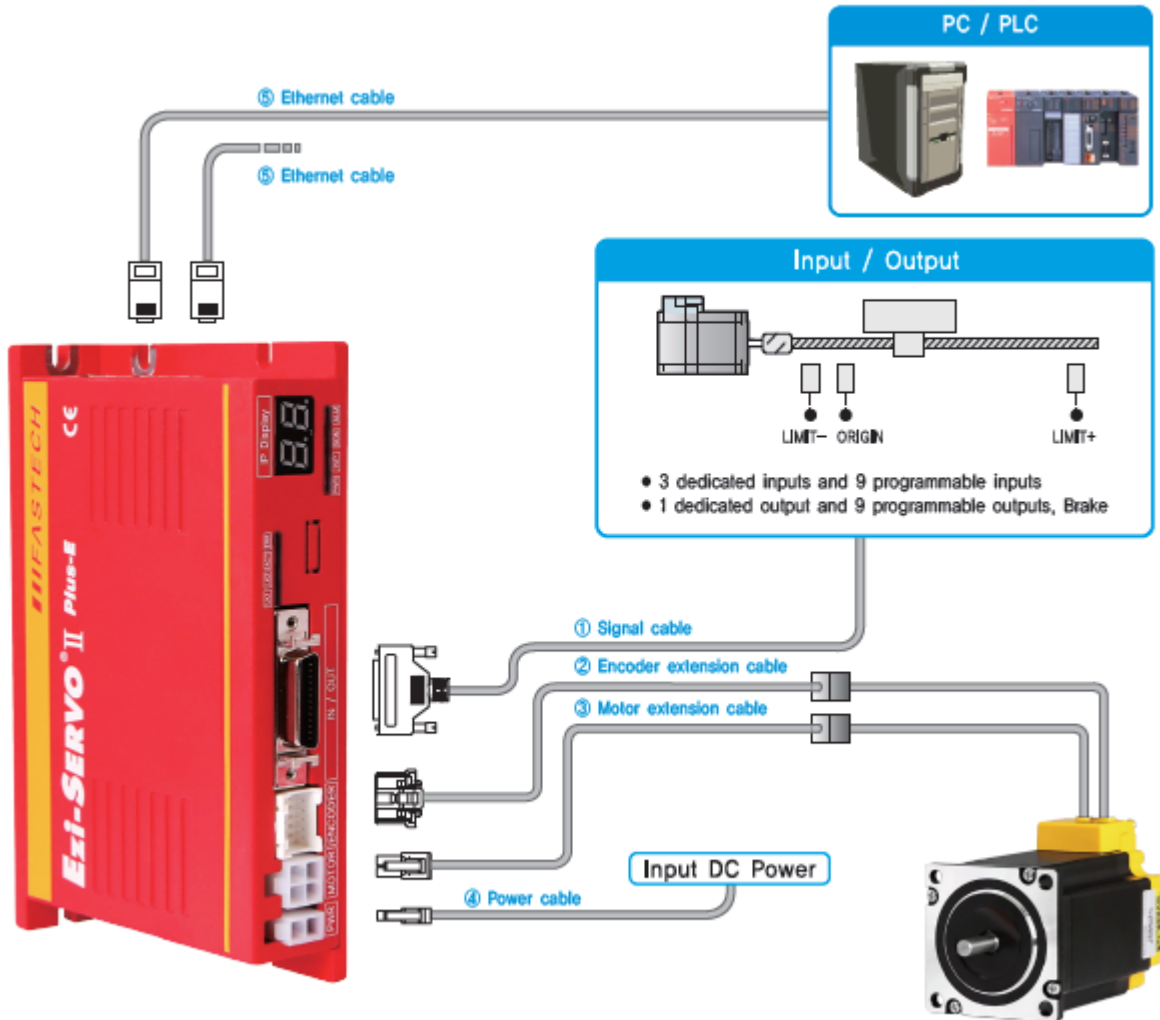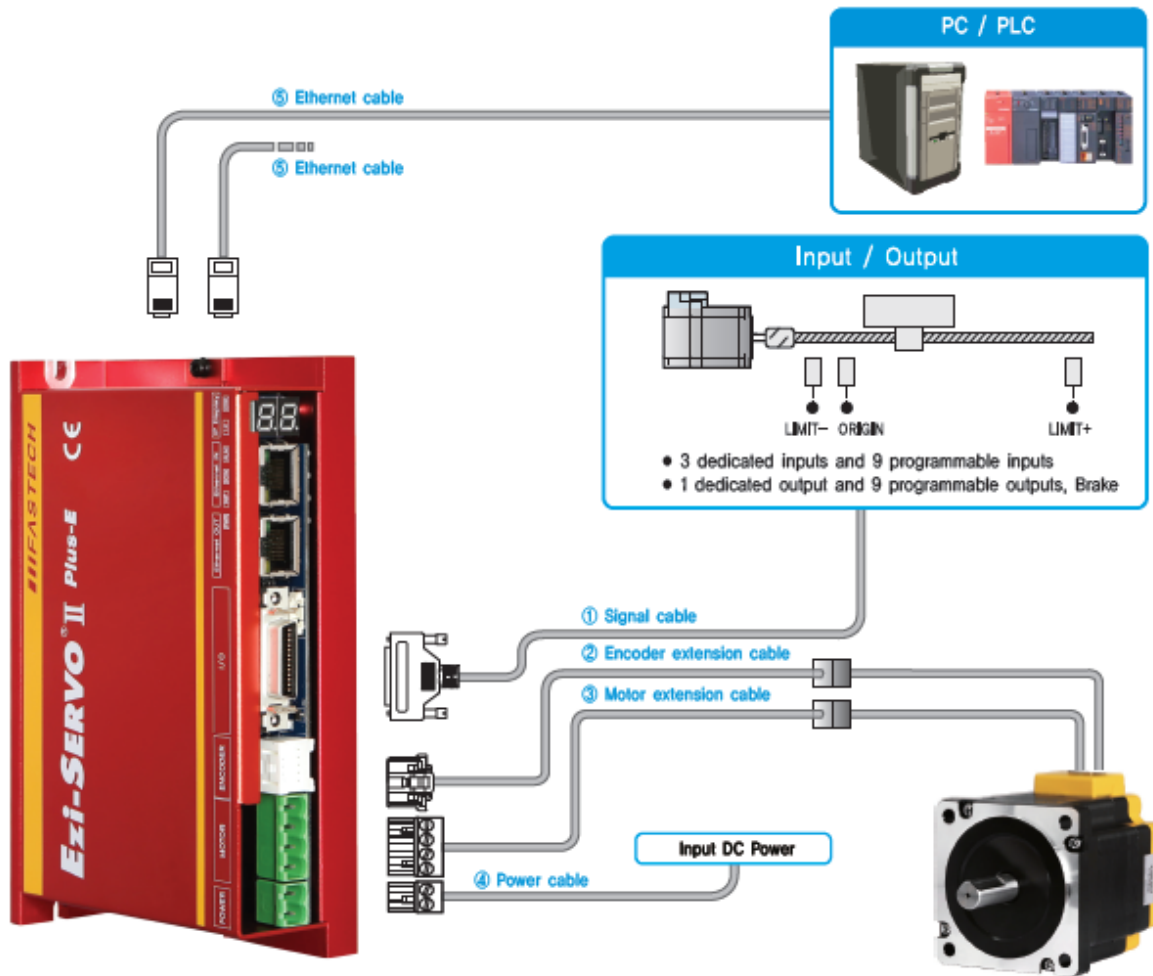
2) 86[mm] motor drive

4 - 3 . External Wiring Diagram
1) General Drive (For 20~60[mm] motor)

2) 86[mm] motor drive

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

5 - 1 . Appearance and Part name

1) General Drive (For 20~60[mm] motor)
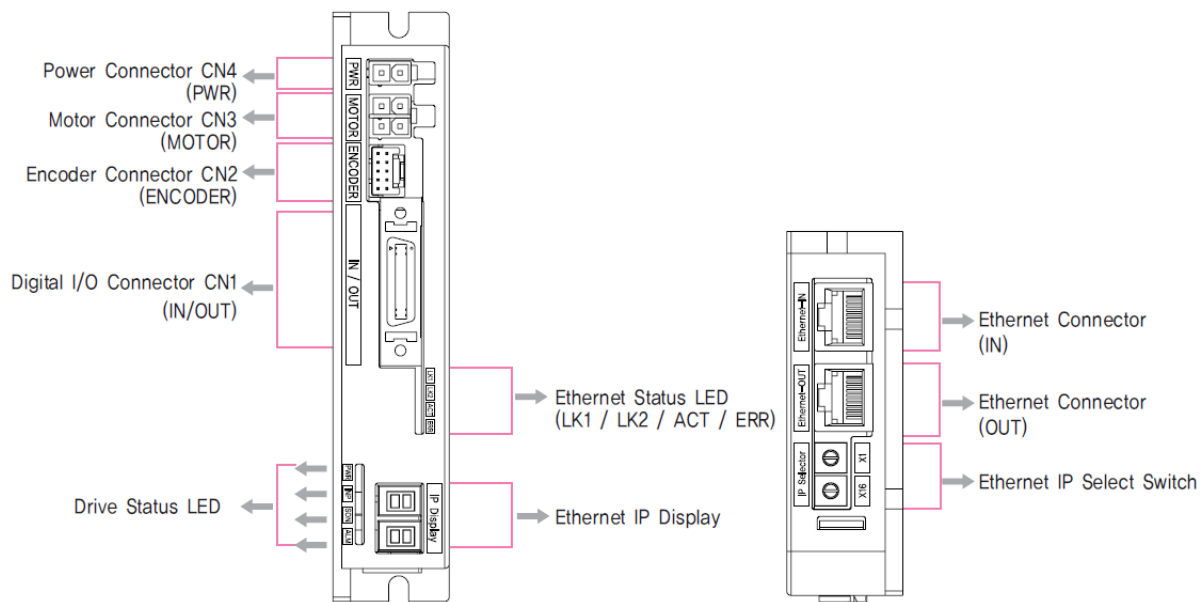
2) 86[mm] motor drive
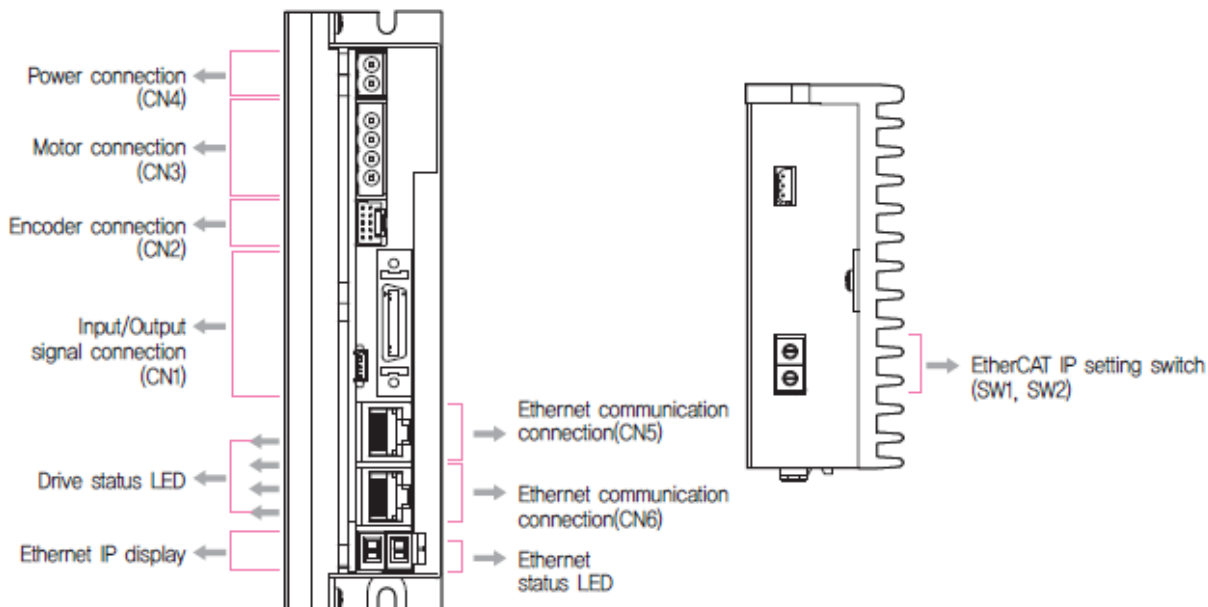
5 - 2 . Drive Status LED

Display	Color	Function	Lighting Condition
PWR	Green	Power Input Indication	Light on when power is applied.
INP	Yellow	In-position signal Indication	Light on when position command pulse input and then position deviation is within the parameter setting value.
SON	Orange	Servo On Indication	Servo On : Light On, Servo Off: 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.)

5 - 3 . Ethernet IP Display

1) It displays the setting IO of SW1,2 (Drive ID Selection Switch).
2) If change ID setting after power input status, 7-segments are flushing and changed ID is not applied.
   - The IP must be changed when power off status.
3) When Alarm generating from drive, Alam value is displayed on 7-Segment, not ID value.
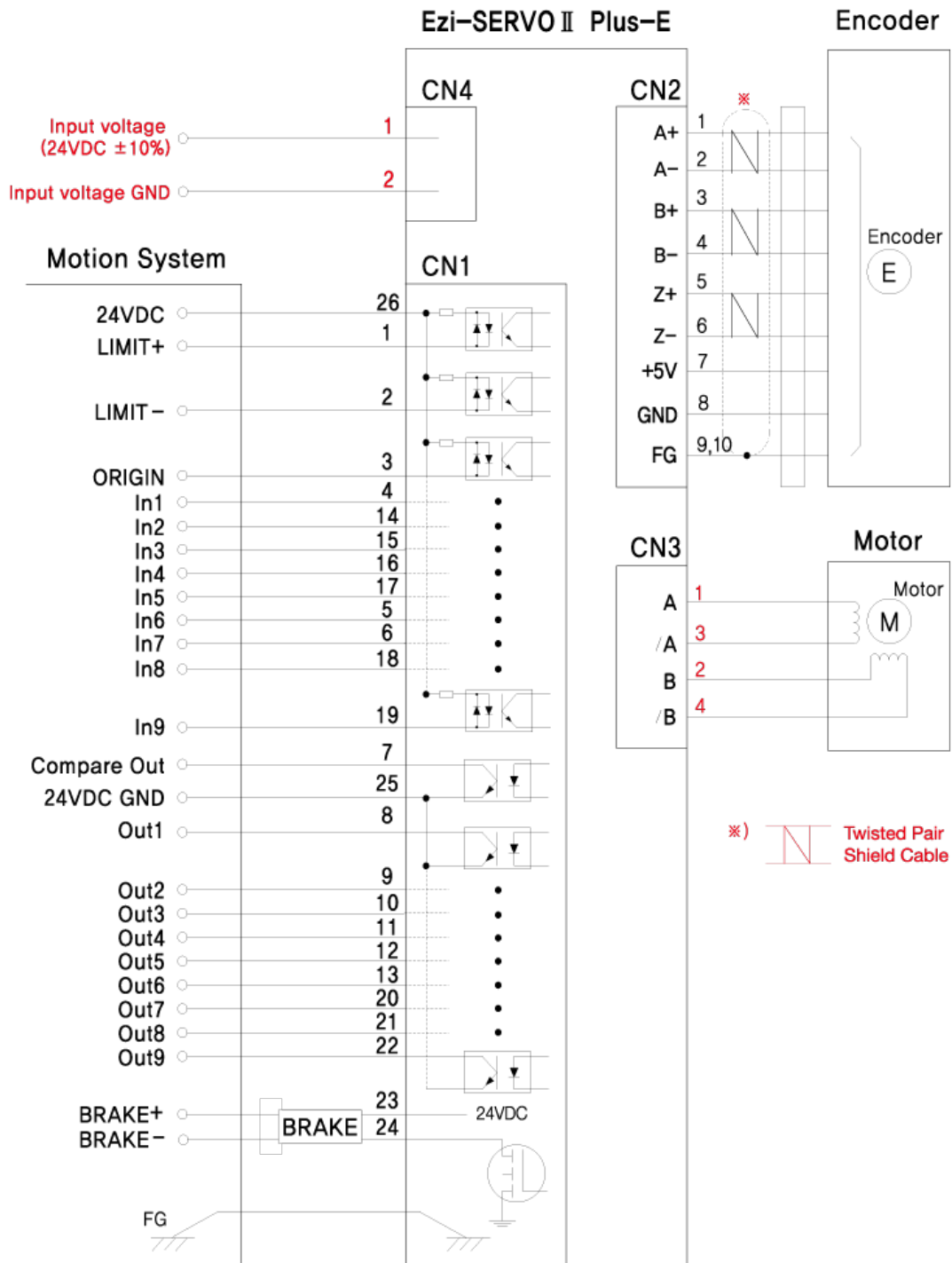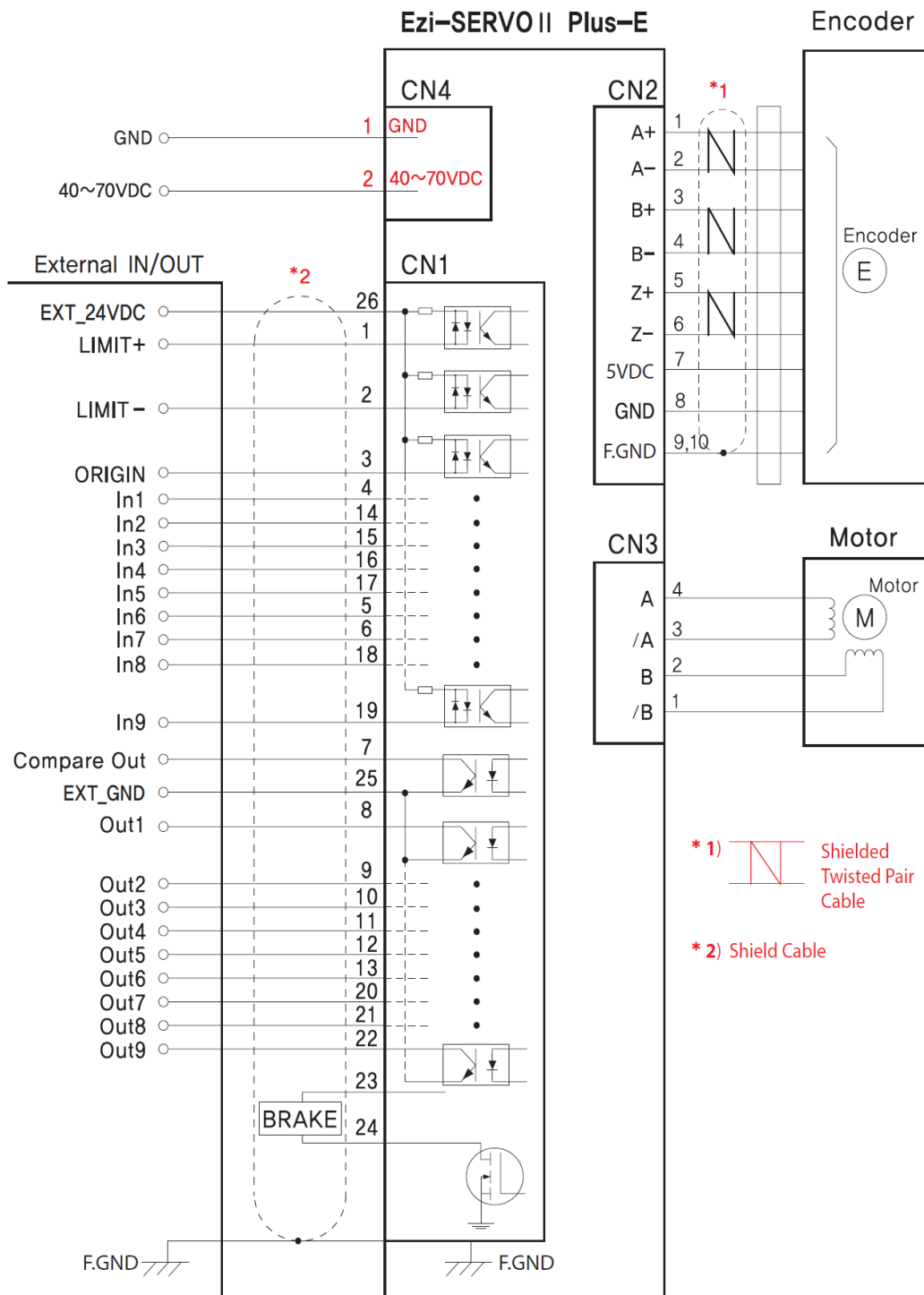   Alarm value is displayed on 7-Segment as 'E-000' type with one each dial.
   This dial is changing every one second. (ex. Display of Alarm No.15)
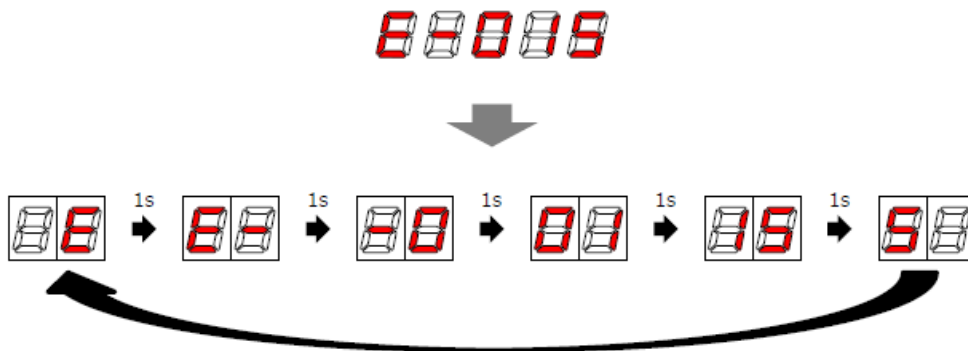
4) It displays the all of set ID on the drive after power input, it displays end number of IP address as hex code.
   Ex) IP Address : 192.168.0.10
       Firstly display 192.168.0.10 → only display 0A

5 - 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 of Power OFF
		Single Flash	Local Error
LK1/ LK2	Green	OFF	Link deactivated
		ON	Link activated
Activity	Yellow	OFF	Non operation
		Flickering	In operation
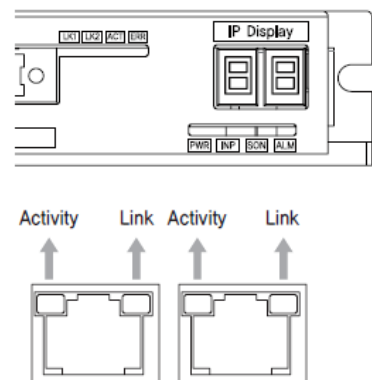
5－5 . IP Address selection switch (SW1, SW2)

  1) It can be set from 1 to 254. Please set IP without overlapping.
- "0", "255" cannot be used for IP setting. Be sure to set it to "1~254".
- 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.
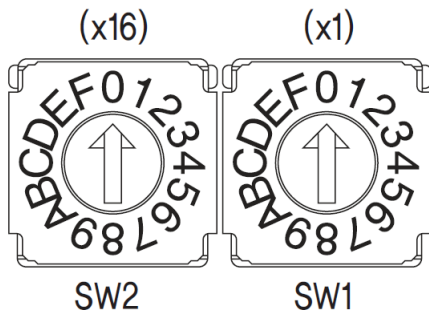
Ex.) In case of SW1 : 9, SW2 : 6

    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 set automatically.
    Because it uses DHCP, IP address is set automatically only when using a router.
    (Connect the Ethernet to Ethernet IN connector)
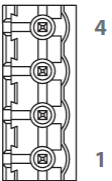
- When connecting directly to the controller (PC/PLC), it need to be sure to set the OP address with switch.
- Set the IP address automatically only when you do not use the default IP address. If IP is set automatically, connect the user program (GUI) and save the IP address. And turn off the power and set the last 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

5－6 . Motor connection connector(CN3)

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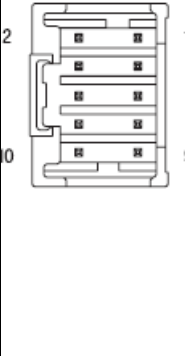
No.	Function
1	/B
2	B
3	/A
4	A

* For 86[mm] motor drive
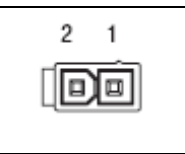
5 - 7 . Encoder connection connector(CN2)

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
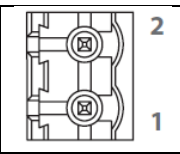
5 - 8 . Power connection connector(CN4)

No.	Function
1	24VDC ±10%
2	GND
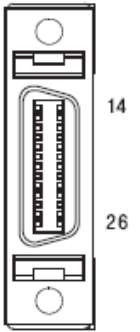
No.	Function
1	GND
2	40~70VDC

5 - 9 . I/O signal connector(CN1)

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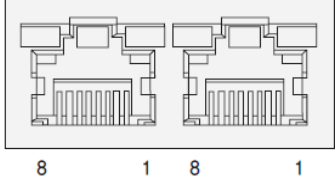
* This connector's fixing pin is connected to frame GND through a mount hall

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

⚠ Caution	In the control signal for the brake of Pin24, connect Brake that current consumption is under 200[mA]. Refer to 7.4 Output signal for any other brake

5 - 1 0 . Ethernet connector

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

6 . Control I/O signal
6 - 1 . Signal cabling

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

Input : 「Limit+」, 「Limit-」, 「Origin」 signals are fixed to each assigned No.

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)
		Position Table start execution (PT Start)
15	IN3	Soft Stop(Stop)
16	IN4	Jog+, Jog-
17	IN5	Alarm Reset, Servo ON
		Pause, Origin Search, Teaching
5	IN6	Emergency Stop(E-Stop)
6	IN7	Jump Position Table input 0 ~ Jump Position Table input 2
		(JPT IN 0~ JPT IN 2)
18	IN8	Jump Position Table start (JPT Start)
19	IN9	User input 0 ~ User input 8 (User IN 0 ~ User IN 8)
		Jog0~Jog2*

* Function Jog0~Jog2 can be used from Firmware [ver.6.1.20.11].

2) Output : 「COMP」 signal is fixed on each assigned No. Other signals like In-position use OUT1~OUT9.

1 dedicated Output + 9 programmable Output = total 10 Output pins

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

6 - 2 . Connection circuit

All drive I/O signals are insulated by a photocoupler. 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.
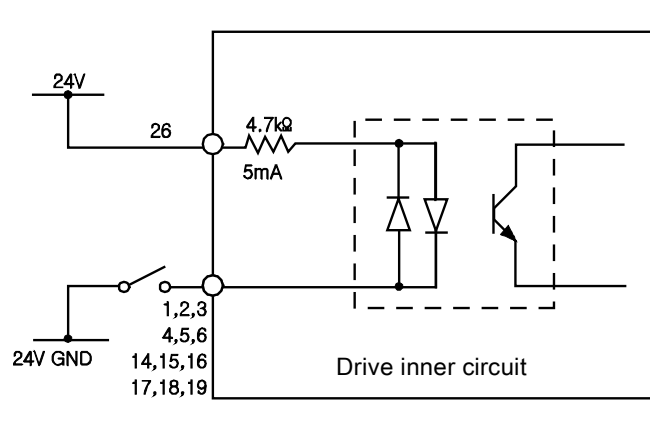
- **Connect NPN type Input signal**

    Connect the '+24V external' pin of drive to '+24V' of Controller.
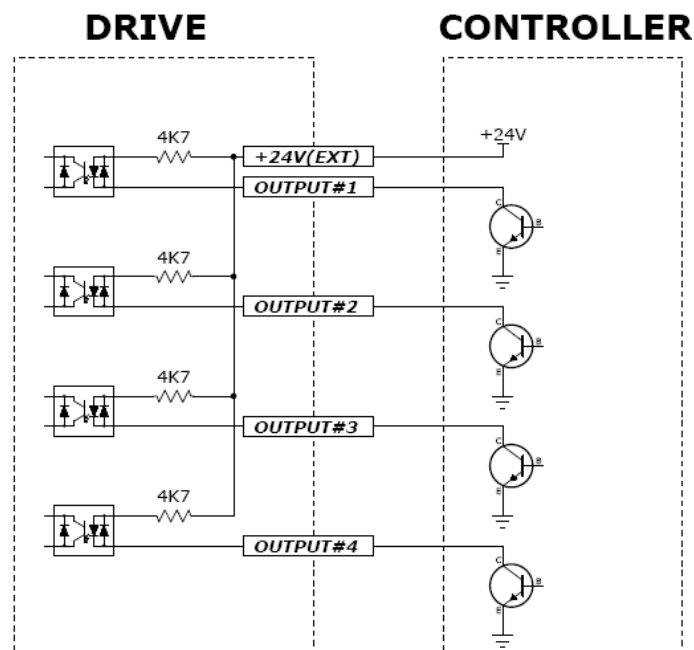
● **Connect PNP type Input signal**
Connect the '+24V external' pin of drive to 'GND' of Controller.

DRIVE   **CONTROLLER**
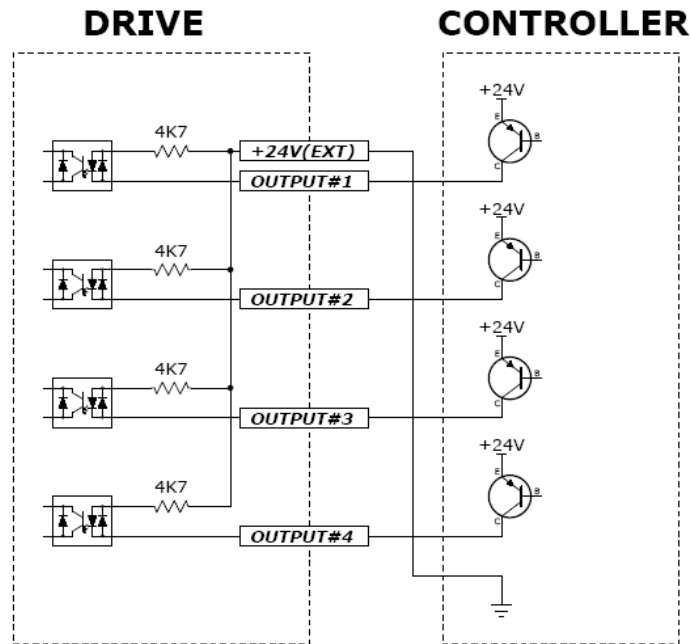
2)Output Circuit

Output circuit power should be separately prepared. This may share input circuit power. In this case, 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 ≤ 30V
·Electrified current ≤ 15mA
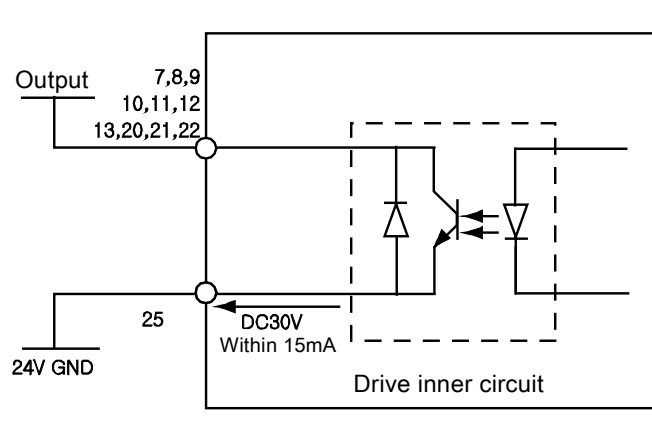
6 - 3 . Input signal

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.
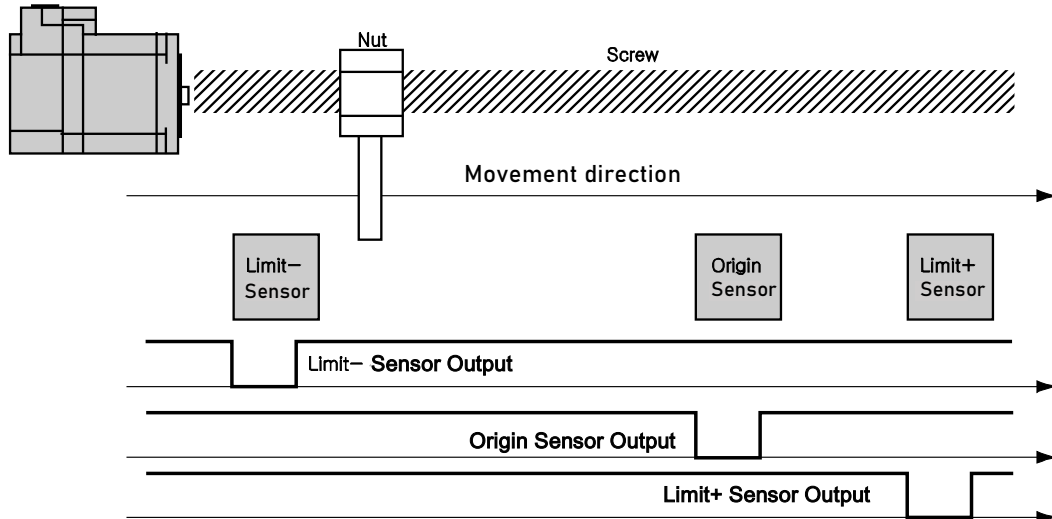
2) Clear Pos

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.

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(Command step). 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 LSB(least significant bit) and A7 is MSB(most significant bit). The following table shows how to assign position table number.

*1. Save signal cabling: If 'PT A0~A7'signal is not designated 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' when PT function is used, 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

If set and input the running start number at the same time by using PT A0~A7 signals, the motion pattern corresponds to the PT No. will be executed.다음의 예는 총 6 개의 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.
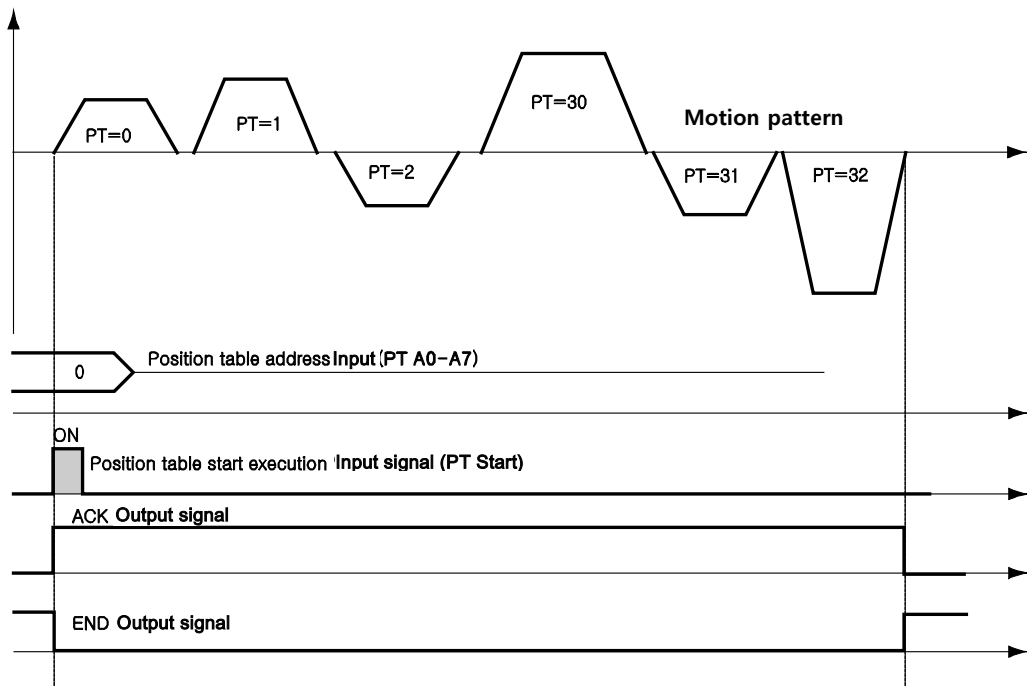
*1. Order of signal : 'PT A0~A7' signals must be set over 50[mesec] before 'PT Start' signal to be [ON].

*2. Save signal cabling : If it starts 'PT Start without designating 'PT A0~A7' signals, Start PT number set to be '0'.

*3. In case of using 'PT Start' command sequentially, Before executing the next 'PT Start' command check motion status('Moving' signal and 'Inpositon' signal).
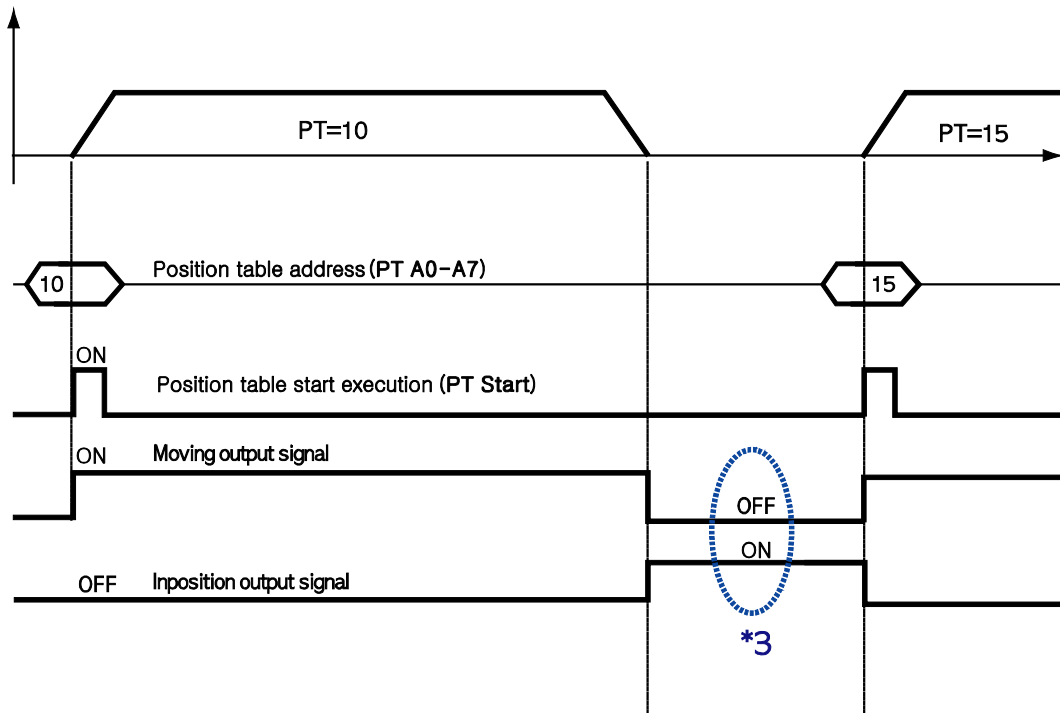
5) Stop Input

Stop(Soft) input signal is to stop motion patterns under operation. The deceleration condition until stop follows deceleration time value and start speed value which is set existing. Stop signal is recognized as ON status level, pulse width must be over 10ms.
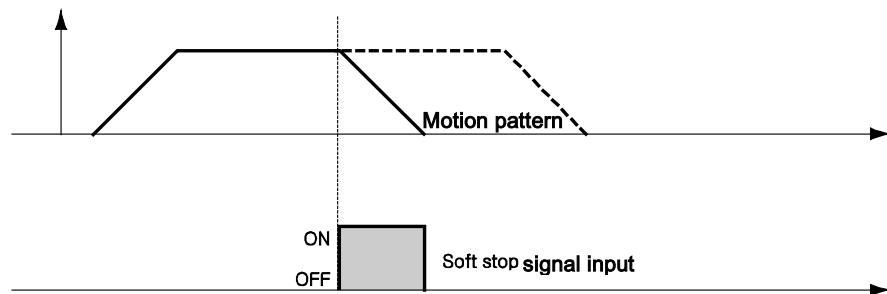
6) Jog+ and Jog- Input

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).
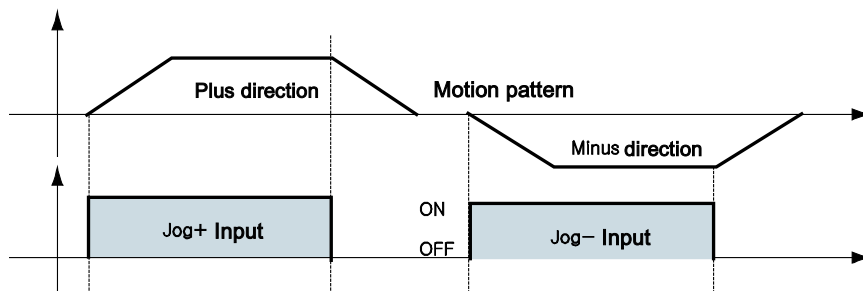
7) Servo ON and Alarm Reset Input

When the protective function of drive executes, alarm output is released. When 「Alarm Reset」 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 to be Servo ON status, CN1 connector's 「Servo Ready」 output signal is set to [ON].

⚠ Caution	If the Servo ON command is assigned to control input, Servo ON command from GUI or DLL library will not executed.
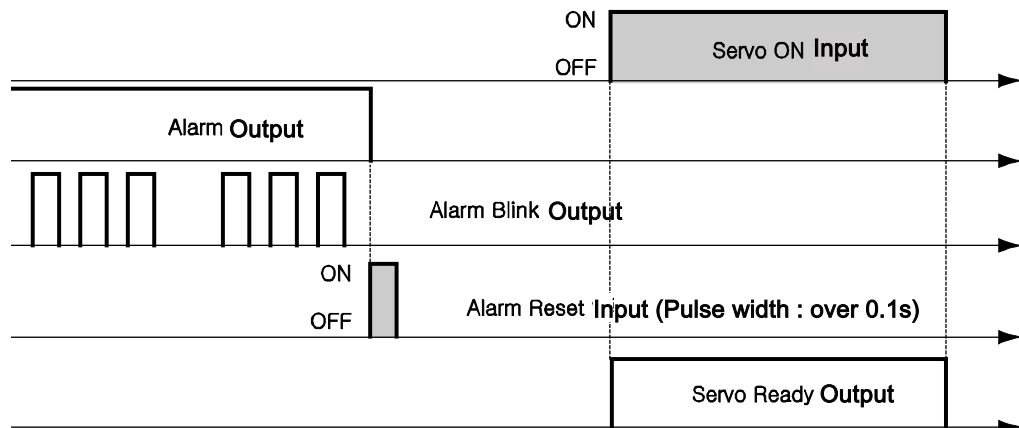
*1. In Step On status by an input signal, No.0 : Pulse per Revolution among the Parameter List is not changed.

*2. At the status which set "Servo On' at input signal, Servo On command is not executed at the user program(GUI). Also, 'FAS_ServoEnable' command of DLL program does not execute.

*3. After 'ServoON' is executed, the Command Position value of user program(GUI) will be changed as same as Actual Position value.

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 '11.Parameter').

When the origin search command is completed, 「Origin Search OK」 signal is set to [ON] to CN1 connector's output port.
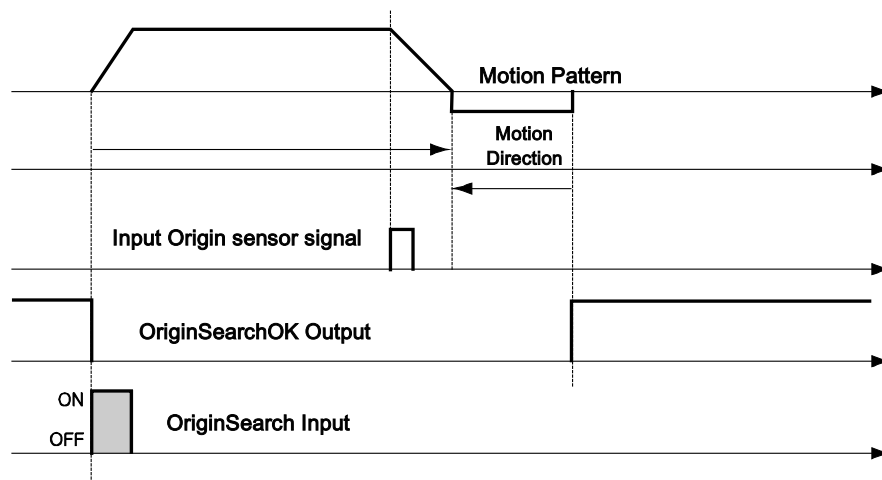
10) Teaching Input

「Teaching」 signal functions that the position value [pulse] being working can be automatically inputted into a 「position」 value of a specific position table. This is a function to easily measure and specify the position when it is difficult to mechanically obtain the exact actual moving position (position value) of a specific motion.

  1) By using User Program(GUI), set a 'Command' type of corresponding PT number among 'absolute position value moving command(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) Pulse width of Teaching signal is over 10ms.

*1. After executing Teaching, click 'Refresh' icon on Teaching Dialog window to display written position value on position table.

*2. Click 'Save to ROM' icon to save written position value in the ROM area.

*3. Teaching signal can be used by two methods; the user assigns actual signal to the motor, or the user clicks 'Teaching' icon at the 'I/O Monitoring' window of User Program(GUI).
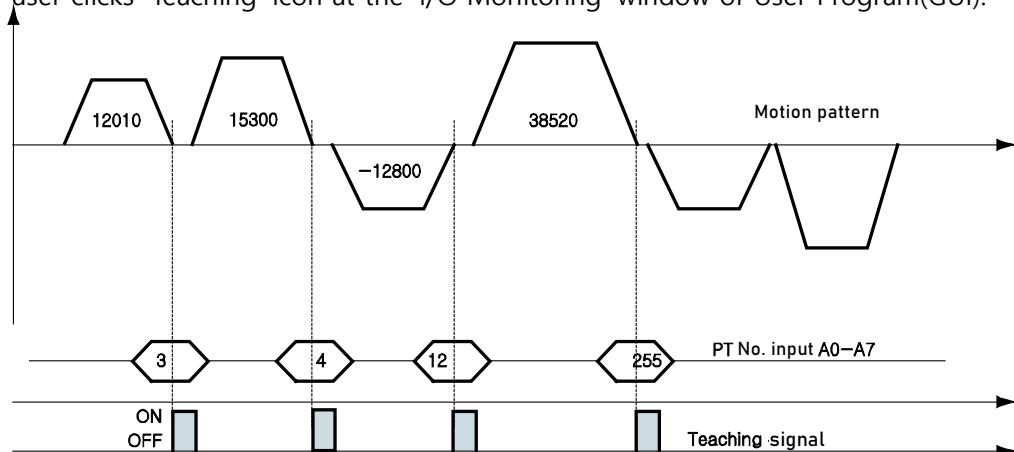
PT No.	Position Value of Corresponding PT [pulse]
3	12010
4	15300
12	-12800
255	38520

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 width is 10ms or more.
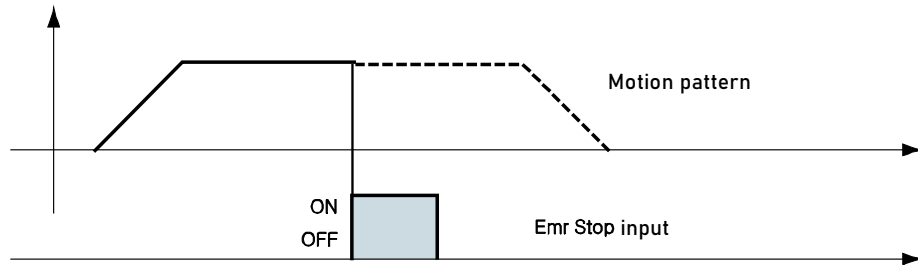
12) JPT Input0~Input2 (Jump Position Table Input) Input

This function selects the motion pattern (position table number) to be executed next according to the condition of the input signal.

【Example】 If there is no other input signal when PT 14 motion is running, the next motion PT15 like 1) will be executed. However, if the input signal of 「JPT Input 0 to Input 2」 becomes [ON] while PT No. 14 is in operation, the designated position numbers are executed as shown in 2) to 4).

PT 14 Data

PT No.	...	JP Table No.	JPT 0	JPT 1	JPT 2
14	...	15	115	116	225
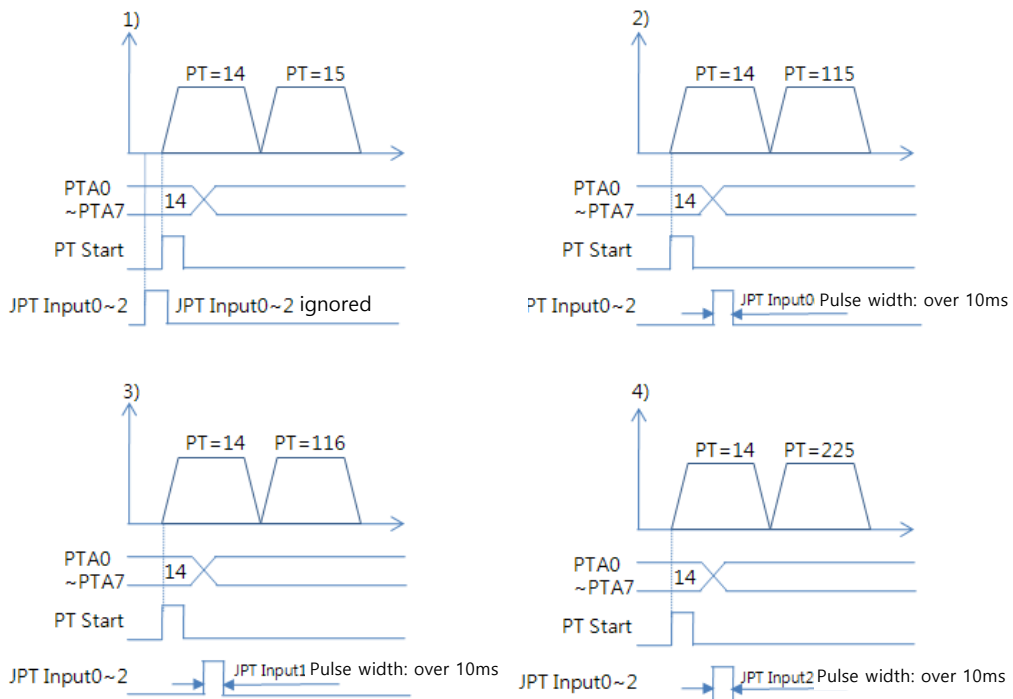
13) JPT(Jump Position Table) Start Input

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 No.	...	Wait Time	JP Table No	JPT 0	JPT 1	JPT 2
14	...	500	10015	10115	10116	10255
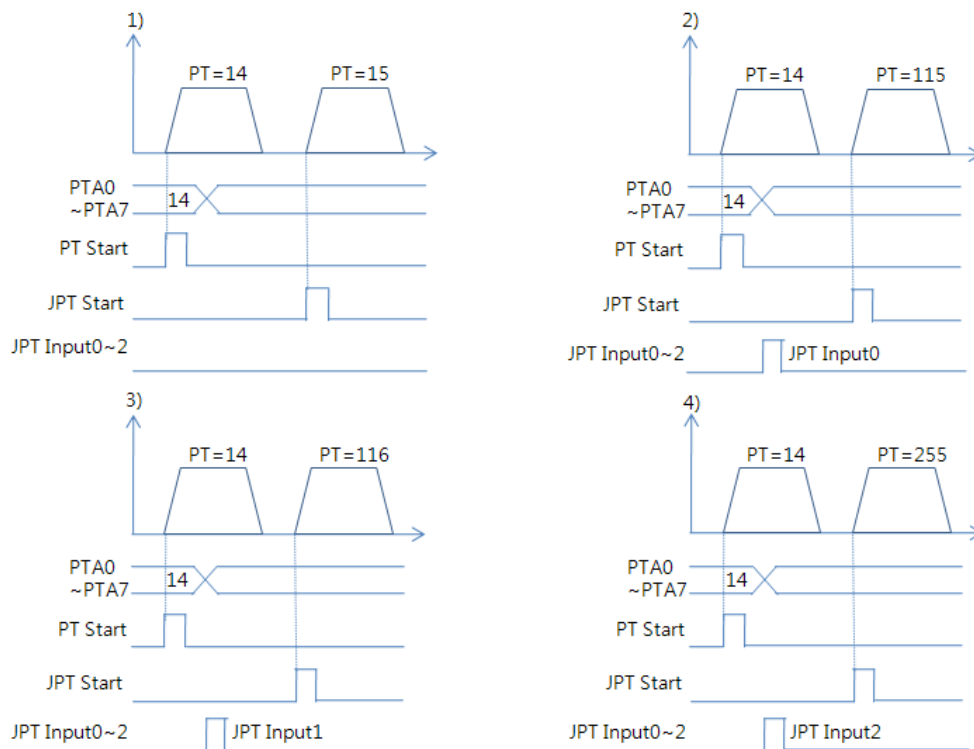
6 - 4 . Output signal

1) Compare Out/Trigger Pulse 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.
(For more information, refer to '9-5.Trigger Pulse Output')

2) Inposition 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'.
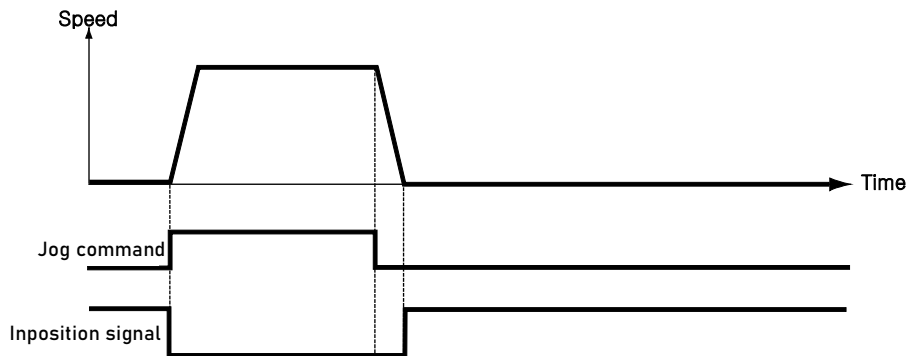
* Time delay of Output signal depends on the parameter 'Inpos' Value':

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

3) Alarm
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 ACK and 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]. And if all of motion loops are finished, 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.
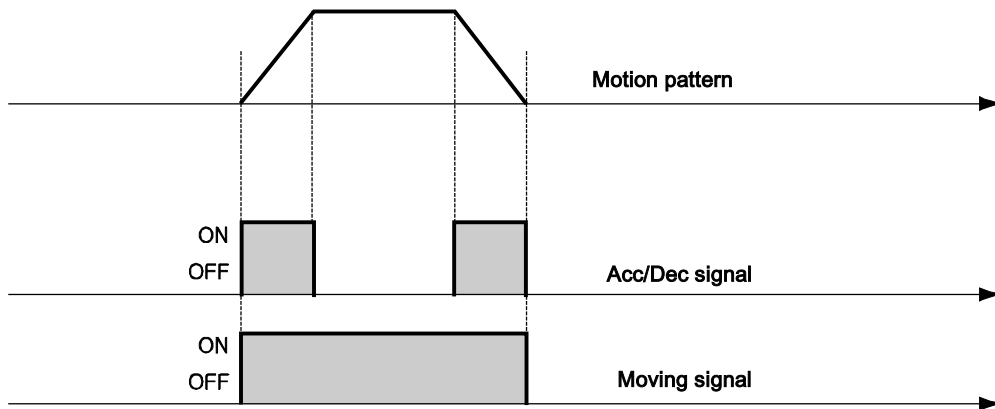
　*「Moving」 signal is not related to actual position. The signal becomes to [OFF]
　　just after the 'position command 'is finished.

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, 「Servo Ready」 signal displays [ON] signal.
Refer to 「7.3 Input signal 7) Servo ON and Alarm Reset Input」.

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

It is 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(PT Output 0~2). If 「Start/Stop Message Function」 is not used, "PT Set' item of position table should be set to 0~8. At the position set with other values, the motion operates as follows.

‧ In case that PT Set items are set to '1~7', if the position starts to move, 'PT set' setting value is outputted as 「PT Output 0~PT Output 2」, the value of PT Output Hex is outputted.
‧ In case that PT Set items are set to '9~15', after completed the position movement, 'PT set' setting value is outputted as 「PT Output 0~PT Output 2」, the value of PT Output Hex is outputted.

For more information, refer to 「Ezi-SERVOⅡ Plus-E User Manual - Position Table Function」.

9) BRAKE+ and BRAKE-

This brake function is used to protect a motor rotation in Servo OFF status by using pin23 and pin24 of CN1. 'BRAKE+' is +24V which supplied to the brake, 'BRAKE-' is an output signal for real brake control.

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 of current consumption is under 200[mA]/DC24V.
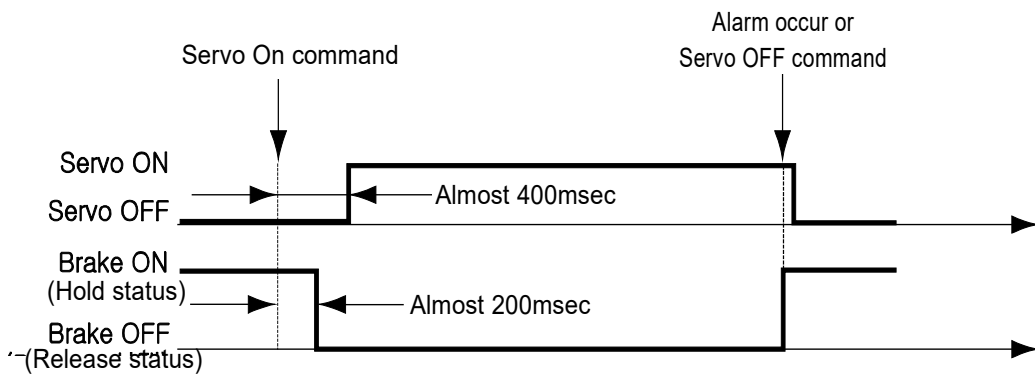
10) Brake for High current

This brake function is for preventing motor rotation under Servo OFF status through pertinent pin if the inverter output terminal is selected among OUT1~OUT9. The output relation between Servo ON command and Brake signal is same as 9) BRAKE+ and BRAKE-. 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.
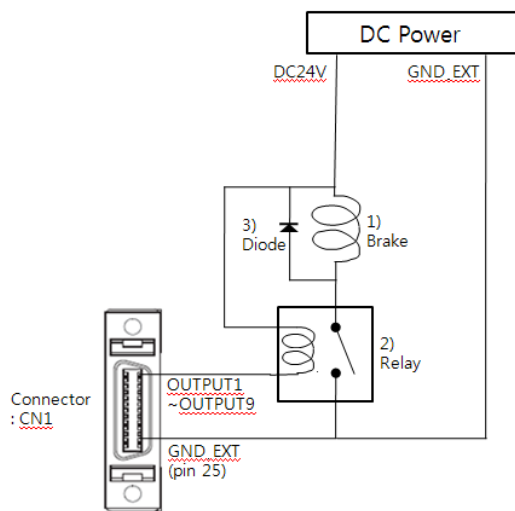
*1 Brake : User selected Brake

*2 Relay : Under 15[mA] / DC24V

*3 Diode : 1N4004 or equivalent

7 . Operation

7 - 1 . Power Supply Timing

The power supply of Ezi-SERVOⅡ 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-SERVOⅡ Plus-E after power supply is Servo OFF.

7 - 2 . Servo ON Operation

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

① Click 「SERVO ON」 button at the User Program(GUI).

② Give a command through communication by using DLL library.

③ Assign 「Servo ON」 to control input pin, and supply signal through the pin.

After Servo ON command is given, In-position is finished to the time as shown below.
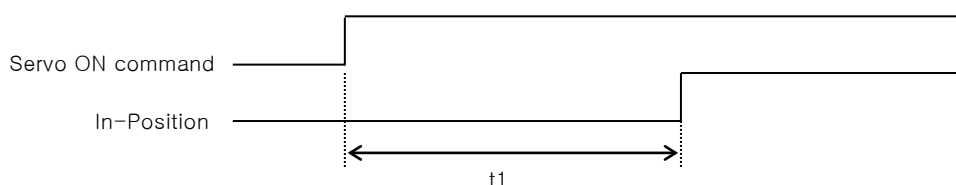
t1 can be different subject to the rising time of supplying power and motor status.

⚠ Caution	If the Servo ON signal is assigned to control input, Servo ON command from User Program(GUI) or DLL Library will not be executed.

7 - 3 . Operation Mode

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

(1) I/O Command Mode

This drive 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 drive can execute control operation like in-position by communication command from the upper controller. Also, it can operate using a position table among communication commands.

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 drive 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-SERVO II Plus-E, it can 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	Description	Range
Axis Max Speed	Constant 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 depends on this value.	0~15

Teaching Function

Teaching can be executed by User Program(GUI) and control input signal.

For more information, refer to 「User manual – Position Table Function」.

8 . Other Operation Functions

8 - 1 . Position Table(PT) operation Example

Set PT number by 'PT A0 ~ PT A7' input and start speed control operation inputting 'PT Start' signal. 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	-
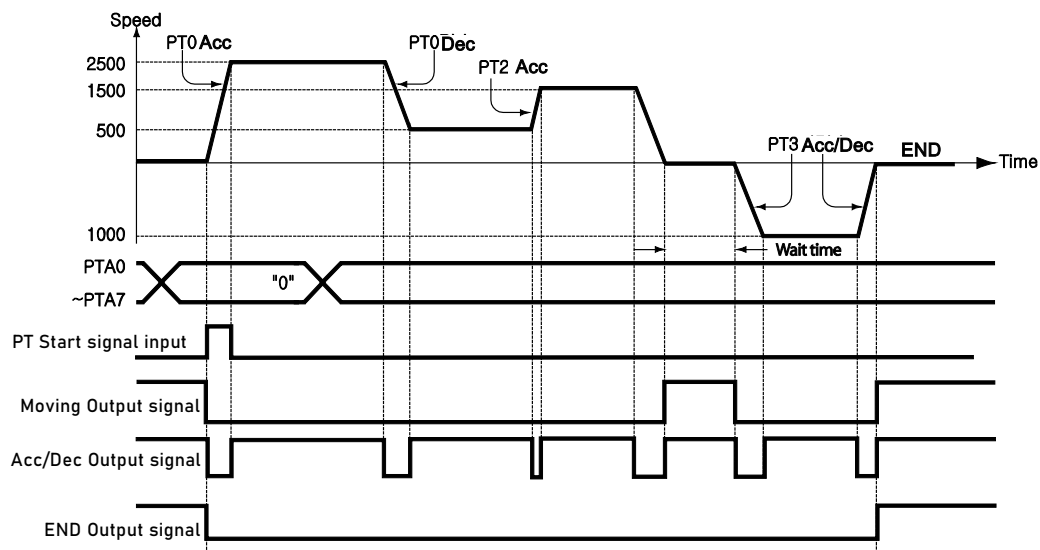
8 - 2 . Jog operation Example

It starts speed control operation using a parameter condition by Jog+, Jog- signal input.

【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]
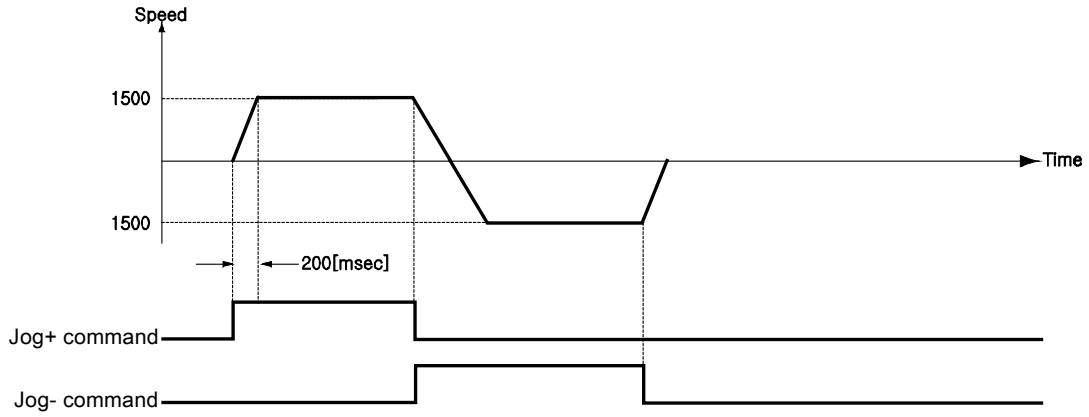
Also, when any value except 0 is set to the 'Jog Start Speed' parameter, the relation between jog command and in-position is indicating as below diagram.
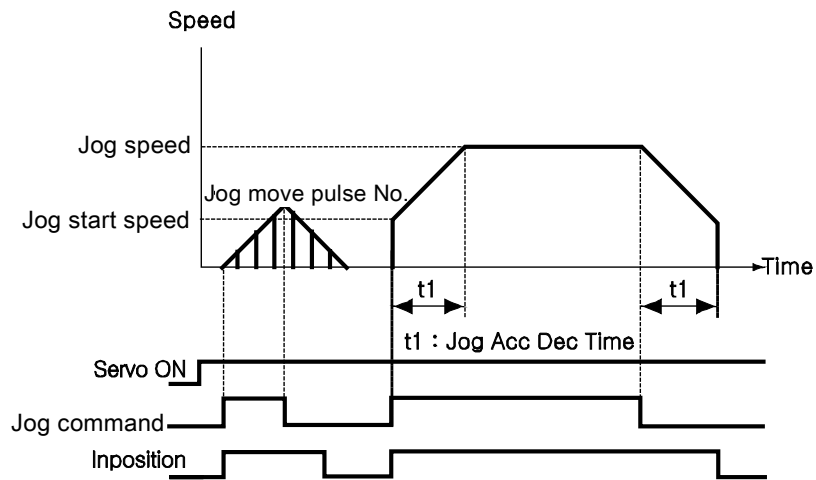
8 - 3 . Origin Return

If a machine operates as I/O command mode, it can execute origin return by inputting 「Origin Search」 signal. Also, it can execute origin return by a command from User Program(GUI) or 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(8 types)	0~7
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.	-134,217,728 ~ 134,217,727
Org Position Set	After origin return is finished, 'Command Pos' value is set to this setting value.	-134,217,728~ 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 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)
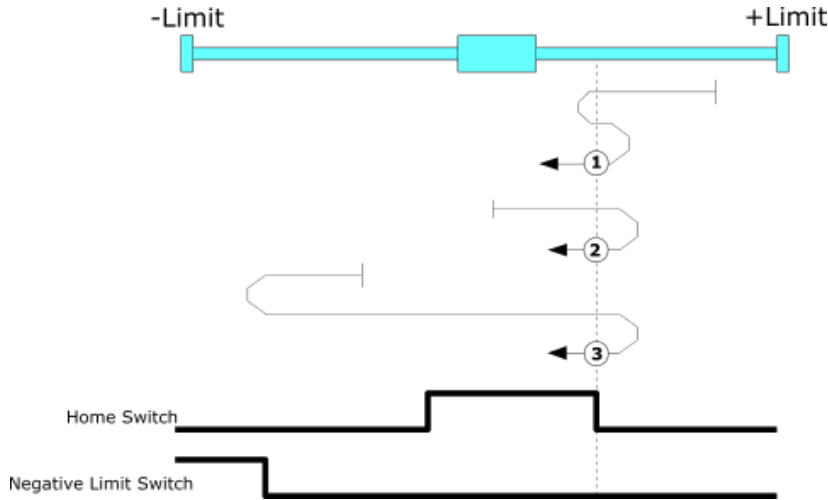
① : In case of position of sensor dog is between the origin and +Limit Sensor

② : In case of position of sensor dog is in the origin Sensor

③ : In case of position of sensor dog is between the origin and -Limit Sensor

2) Z Origin (In case of Org Method = 1)
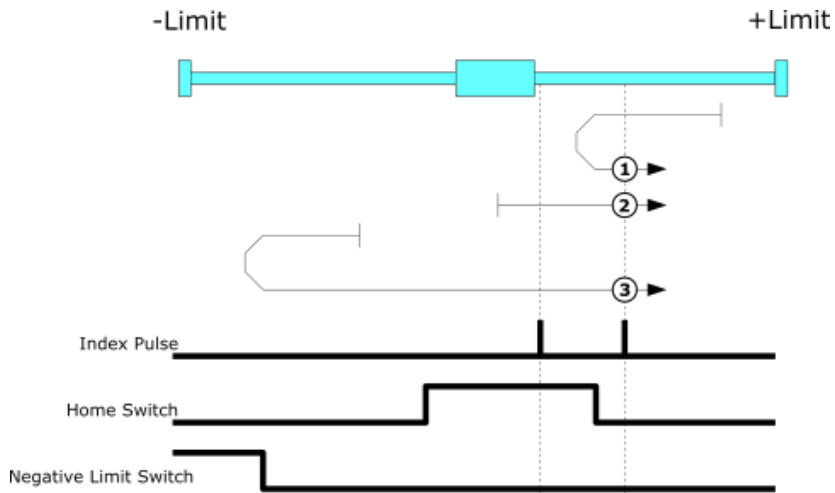
① : In case of position of sensor dog is between the origin and +Limit Sensor

② : In case of position of sensor dog is in the origin Sensor

③ : In case of position of sensor dog is between the origin and -Limit Sensor

3) Limit Origin (In case of Org Method = 2)
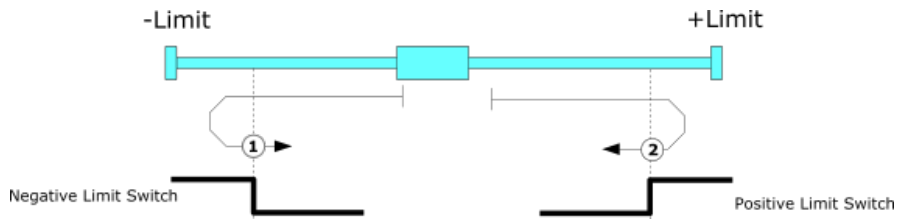
① : In case of Org Dir is 1(CCW)
② : In case of Org Dir is 0(CW)
● Home search is completed at the position that Limit Sensor is OFF.

4) Z Limit Origin (In case of Org Method = 3)
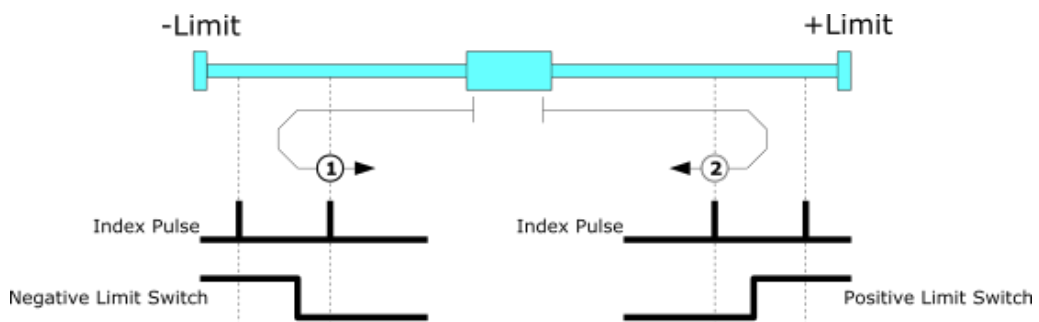
① : In case of Org Dir is 1(CCW)
② : In case of Org Dir is 0(CW)

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

Regardless of sensor, it designates current apparatus position as origin.

6) Z Phase (In case of Org Method = 5)
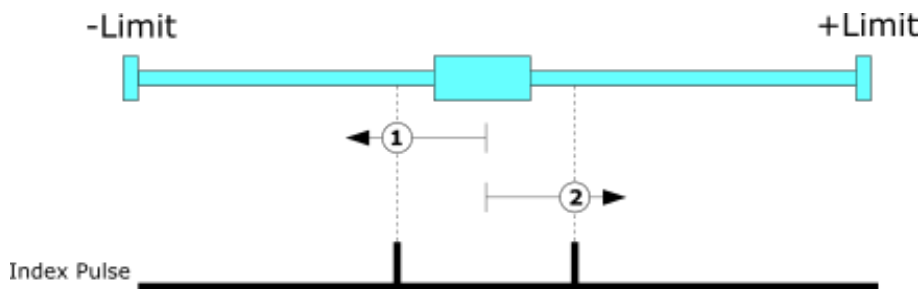
① : In case of Org Dir is 1(CCW)
② : In case of Org Dir is 0(CW)

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

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

This method can be used in a system that origin sensor or Limit sensor is not supported.
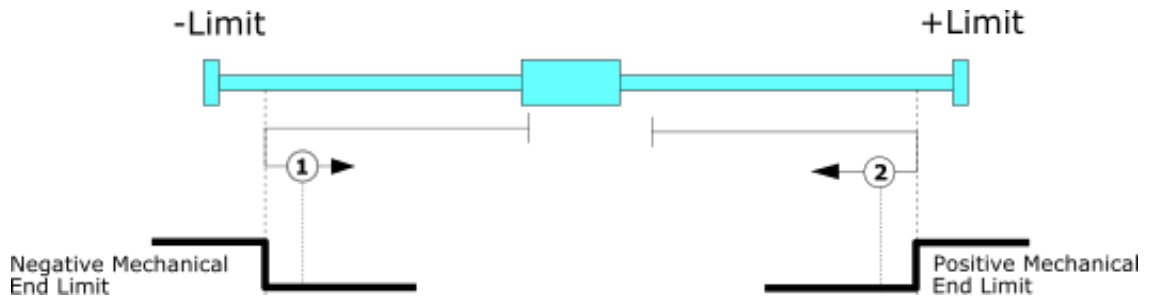
   ①   : In case of Org Dir is 1(CCW)

   ②   : In case of Org Dir is 0(CW)

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

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

This method can be used in a system that origin sensor or Limit sensor is not supported.
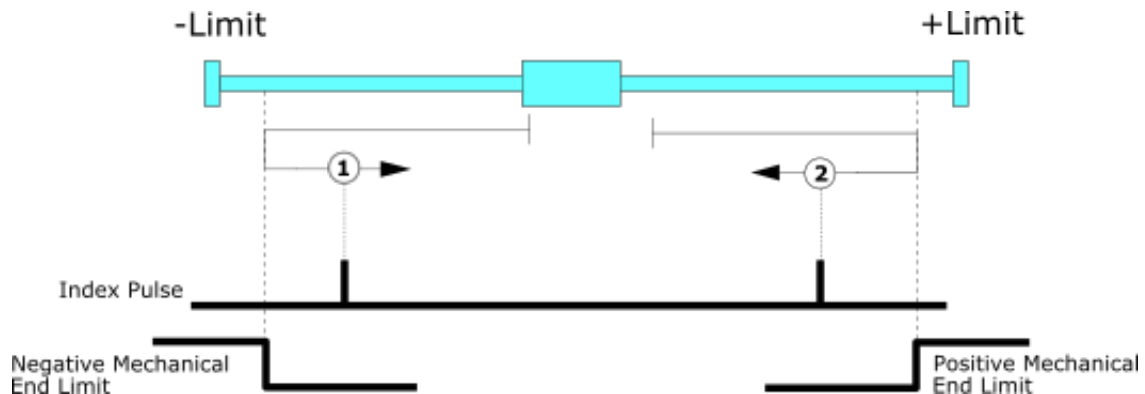
   ①   : In case of Org Dir is 1(CCW)

   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 Servo ON on control or send a communication program so that the Servo can be ON.

   ③ Start origin return operation by inputting ON signal of 「Origin Search」 on control or inputting the command of the communication program.

(3) Interruption of Origin Return

When the machine is under origin return, it stops according to 'Stop' or 'E-stop' command. the machine's origin is not edited and the origin return is canceled.

(4) Origin return finish output

The completion of origin return operation can check by using control output 「Origin Search OK」 or using bit value(Origin Search OK) of 「Axis status」 of communication program.

8 - 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 motor will be not Servo OFF. In case of emergency stop, the machine stops immediately without deceleration. So, a special caution for mechanical impact is required.

8 - 5 . Trigger Pulse Output

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

(1) Control Method

This function is only available control by DLL program method by communication.

This method can be set during the positioning command having target position or before the positioning command also. The following table shows the control command and for more information, refer to 「User Manual – Communication Function」.

Control Condition	Description	Range
Start/Stop	Setting start/stop of output	0~1
Start Position	The first start position to output a signal	-134,217,728~ 134,217,727
Pulse Period	Setting the period of the output signal (0 : Pulse output in start position only 1 time)	0~134,217,727 [pulse]
Pulse Width	Setting width(time) of output signal	1~1000[ms]

● Trigger output can be output normally when the pulse period is 2[ms] or more(include pulse width).

Pulse period[ms] =

Pulse period[pulse] / moving velocity[pps]*1000(unit converter constant [s]->[ms]) + Pulse width[ms]

    ex) Pulse period : 100[pulse], Moving velocity: 10,000[pps], Pulse width : 1[ms]

        Pulse period[ms] = 100/10000 * 1000 + 1

                   = 11

● In case that Start/End is not set as '0', if moving command having target position be transferred, trigger output is operated.

● After trigger output, if command having no target position as like Jog command, Start/End set as '0' automatically.

(2) Output signal

Pin that signal is outputted is fixed on 「Compare Out」 of CN1 connector, the signal shape is like as below.
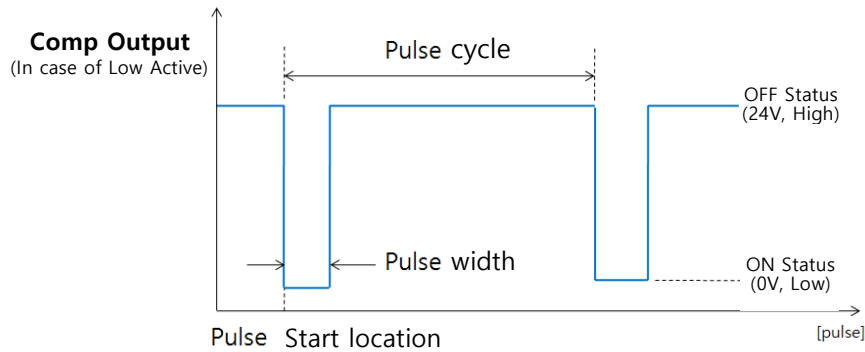
(3) Output check

By using DLL program, the user can check the trigger pulse output status.
For more information, refer to 「User Manual – Communication Function」.

8 - 6 . Push Motion Function

While moving by position command, it moves while maintaining a fixed force from a certain position. When it comes into contact with work during movement, it stops movement (Stop mode method), but it keeps the force.

(1) Function Description
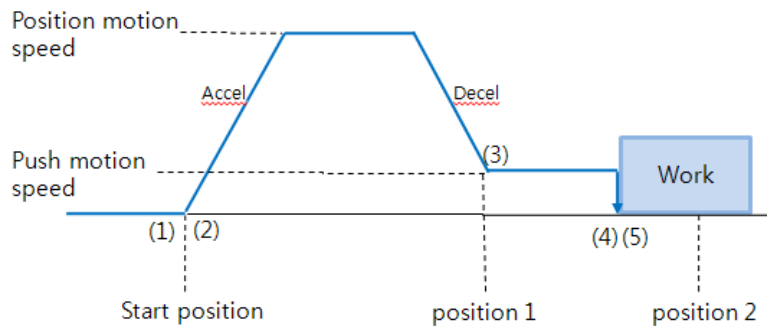
Fig 10.6.1

① Send Push Motion command

② Normal position motion command is executed. (**position mode** status)

③ Decelerate the speed from normal position motion and reach to **push motion velocity**. (At this time, the speed must be lower than 200[rpm].)

④ Push motioning until the work detected with specified motor torque.
    (**push mode** status)

⑤ When push mode is set as **Stop mode** method :
    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 held force is automatically changed to Servo ON (push mode release and switch to position mode) during stop command or normal position motion command.

    When push mode is set as **Non-stop mode** method :
    After the work detected, the motor will not stop. It keeps pushing and the motor torque will be maintained. The complete signal of 'Inposition' / 'PT Stopped' / 'END' be occurred.

⑥   Additional next step is needed as below diagram.
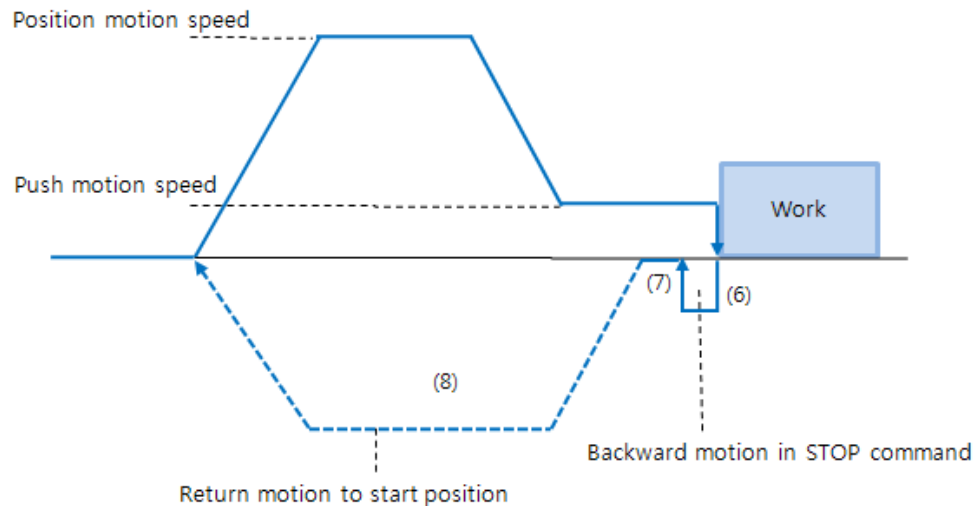
Fig 10.6.2

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 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 for shock ease till position return after stop. It depends on
mechanical conditions.
⑧ Return to start position.

⚠ Caution	**Non-stop mode : It must be executed 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 command
The following table shows the control conditions and for more information, refer to
「User Manual – Communication Function」.
Also, we provide a control command that can check the status of push motion
command. The position values of using for Push Motion **are all absolute coordinate
values**.

Control Condition	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)	-134,217,728 ~ 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 ratio 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.	-134,217,728 ~ 134,217,727
Push mode setting	Set Stop mode(0) or Non-stop mode(1~ 10000) after the work detect. In case of Non-stop mode, the motor moves backward as much as this value[pulse] distances. This function is for relaxing shock that possible to occur according to a mechanism condition when changing the direction.	0~10,000

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

② Input signal(PT Start) command
It is a method that Input push motion command on the position table and then execute by an external signal. For more information, refer to 「User Manual – Position Table」.

(4) Output check
It can check the progress status of current push motion command through DLL library. At the same time, it can check Flag(Inposition and PT Stopped signal) and output(END signal) as below.

① When Work detected
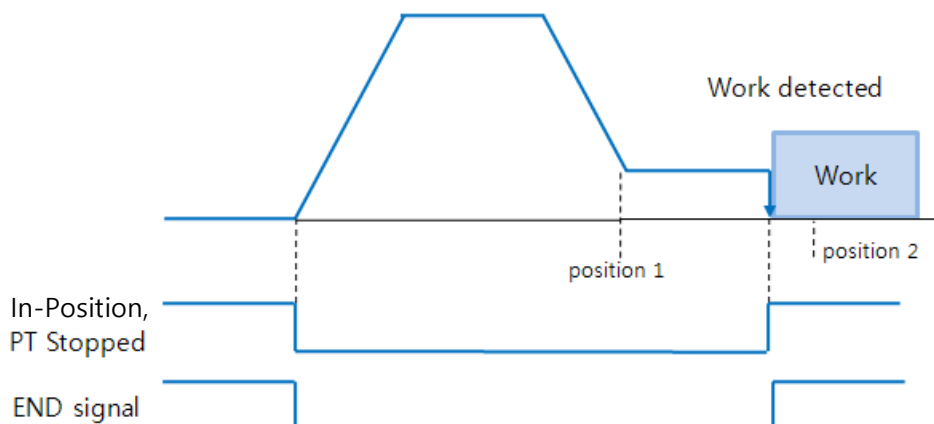
② When Work not detected (Stop mode)
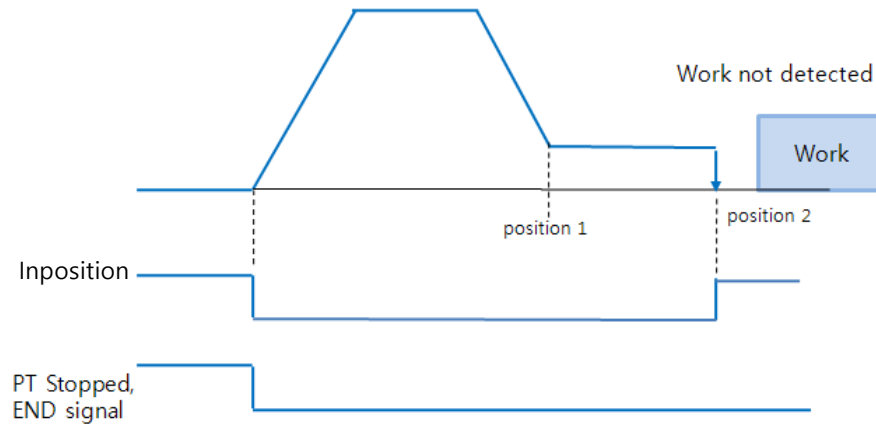
The 'Inposition' signal is still OFF when the work is not detected in **Non-stop mode**. The push command is stopped at 'position 2' (absolute position value in push command).

9 . Communication Function

1) It has embedded 2 Port Ethernet switching Hub for daisy-chain connection.
2) It uses TCP and UDP Protocol.
3) By using TCP, it can connect and use drive at the same time at GUI(Graphical User Interface) and user program.
4) By using UDP, it can connect and use drive at the same time at GUI(Graphical User Interface) and one more user program. But if a user connects application programs over 2, it can generate communication delay.
5) Refer to 「4.2 Controller configuration」 for PC connection example.
6) 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

7) Default IP Address : 192.168.0.xxx
   Default Gateway : 192.168.0.1
   Default Subnet Mask : 255.255.255.0

1 0 . Parameter

1 0 - 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[1]	[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
33	Jog EXT FUNC USE		0	1	0
34	Jog Speed1	[pps]	1	500,000	5,000

35	Jog Speed2	[pps]	1	500,000	5,000
36	Jog Speed3	[pps]	1	500,000	5,000
37	Jog Speed4	[pps]	1	500,000	5,000
38	Jog Speed5	[pps]	1	500,000	5,000
39	Jog Speed6	[pps]	1	500,000	5,000
40	Jog Speed7	[pps]	1	500,000	5,000
41	Use Motion Queue		0	1	0
42	Disconnection Option		0	4	0
43	Communication Timeout	msec	100	60,000	100

*1 In the case of drive for 86[mm] motor, this parameter not be used.
- Parameter No.33~40 are used from Firmware [ver.6.1.20.11].
- Parameter No.41~43 are used from Firmware [ver.6.1.20.16].

1 0 - 2 . Parameter Description
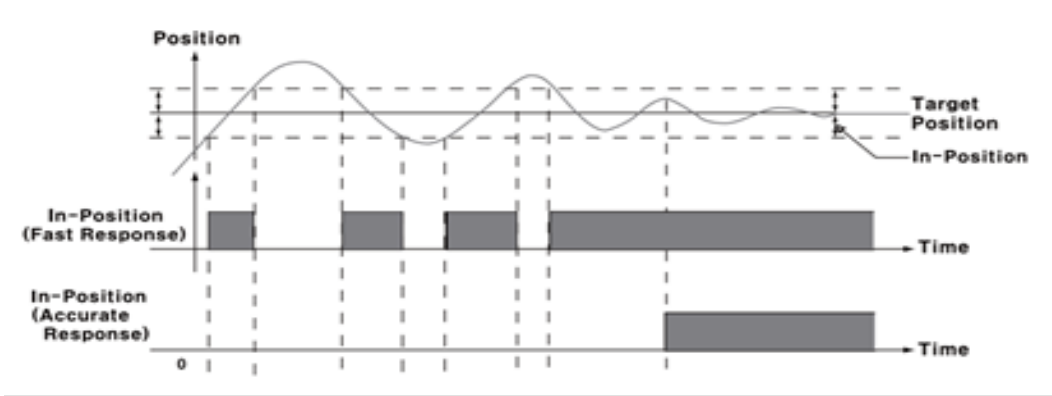
No.	Description	Unit	Lower Limit	Upper Limit	Default
0	**Pulse per Revolution :** It means number of pulses per revolution. It this value is changed, the motor is set to Servo OFF. 	Value	Pulse/Revolution	Value	Pulse/Revolution
---	---	---	---
0	500	8	10,000
1	1,000		
2	1,600		
3	2,000		
4	3,600		
5	5,000		
6	6,400		
7	7,200		| ●When use Encoder as 16000,20000,32000, it can input as 16000, 20000, 32000, not 0~8. ● When 'Servo On' status by an input signal, Pulse per Revolution is not changed.		0		8
1	**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	pps	1	2,500,000	500,000
2	**Axis Start Speed :** When position moving commands (absolute move, incremental move) are given, this mode sets the operation start speed to [pps] unit.	pps	1	35,000	1
3	**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]	msec	1	9,999	100
4	**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 limited according to Axis Speed as like as 'Axis Acc Time'.	msec	1	9,999	100

5	**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.	%	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 move 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 move 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 mode 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	**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	msec	1	9,999	50
17	**Org Method :** The user can select origin return command types. ◆ 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'. For more information, refer to 「9.3 Origin Return」. ※ 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.)		0	7	0
18	**Org Dir :** In case of origin return, this mode sets the revolution direction of the motor. ◆ 0 : moves to CW direction. ◆ 1 : moves to CCW direction.		0	1	0

19	**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'.	pulse	-134,217,728	+134,217,727	0
20	**Org Position Set :** After origin return is completed, 'Command Pos/Actual Pos' value is set to this setting value.	pulse	-134,217,728	+134,217,727	0
21	**Org Sensor Logic :** Sets the origin sensor signal level so that the motor can recognize origin sensor's input to [ON]. ◆ 0 : 0 V (low level) ◆ 1 : 24V(high level)		0	1	0

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.

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.

Value	Integral part's Time Constant	Proportion-al Gain	Value	Integral part't Time Constant	Proportion-al 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

Parameter number: 22

Values: 0, 63, 4

No	Description	Unit	Min	Max	Default
23	**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. Fast Response and Accurate Response control method is as below. 		0	127	3
24	**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.	pulse	1	+134,217,727	2,500
25	**Motion Dir :** When the motor operates by position command, this mode sets the revolution direction of the motor. ◆ 0 : moves to CW direction. ◆ 1 : moves to CCW direction.		0	1	0
26	**Limit Sensor Dir :** Sets the limit sensor direction to stop the motor to the limit spot under operation. In the general system, set the same as parameter '28'. ◆ 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.		0	1	0
27	**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.	%	20	90	50

28	**Pos. Error Overflow Limit :** 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.	pulse	1	+134,217,727	2,500
29	**Brake Delay Time :** According to the SERVO ON command, tt can be set the brake operation time. ※ 86[mm] drive cannot apply Brake Delay Time.	msec	10	5,000	200
30	**Run Current:** 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. Precaution) 　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	**Boost Current :** 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) 　1) EzM2-42XL (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] 　* **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.**	*50[%]	0	7	0
32	**Stop Current:** 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%.	*10[%]	20	10	5

33	**Jog EXT FUNC USE:**
	It is used to change Jog movement command by input signal to other speed than setting speed in parameter No.6.
	◆ 0 : No using Jog speed expand function
	◆ 1 : Using Jog speed expand function
	
	There are seven additional speeds to choose from.
	Speed selection is determined by the input signals Jog0, Jog1, and Jog2.
	
	<table><tr><td>Jog2</td><td>Jog1</td><td>Jog0</td><td>Setting Speed</td></tr><tr><td>OFF</td><td>OFF</td><td>OFF</td><td>Parameter No.6</td></tr><tr><td>OFF</td><td>OFF</td><td>ON</td><td>Parameter No.34</td></tr><tr><td>OFF</td><td>ON</td><td>OFF</td><td>Parameter No.35</td></tr><tr><td>OFF</td><td>ON</td><td>ON</td><td>Parameter No.36</td></tr><tr><td>ON</td><td>OFF</td><td>OFF</td><td>Parameter No.37</td></tr><tr><td>ON</td><td>OFF</td><td>ON</td><td>Parameter No.38</td></tr><tr><td>ON</td><td>ON</td><td>OFF</td><td>Parameter No.39</td></tr><tr><td>ON</td><td>ON</td><td>ON</td><td>Parameter No.40</td></tr></table>
	※ 1) Only jog speed by input is applied.
	   2) Since Jog0~Jog2 are used in common with PT5~7, the number of position table may be limited when using the above function.
	   3) After Jog0 ~ Jog2 is input, it to be normal operate becoming Jog movement command by a signal is inputted.
			0	1	0

34 ~40	**Jog Speed1~Jog Speed7:** Set Jog speed which is extended according to input signal Jog0, Jog1, Jog2.	pps	1	500,000	5000

41	**Use Motion Queue:**
	If another move command is received before the move command is completed, the current move command is executed and the next move command is executed.
	
	◆ 0 : Using Motion Queue function
	◆ 1 : No using Motion Queue function
	  (Return error (0x85) if another move is made during the move)
	※ Move commands are only available for Incremental / Absolute commands.
	  If more than one command is received, only one is executed and the other commands return an error.
			0	1	0

42	**Disconnection Option Code:** This function is used to stop the move command when communication end or communication cable disconnection is issued while moving command is being executed. ◆ 0 (None) : Executing moving command ◆ 1 (Stop) : Deceleration stop ◆ 2 (E-Stop) : Emergency stop ◆ 3 (Stop&Servo Off) : Servo Off after deceleration stop ◆ 4 (E-Stop&Servo Off) : Servo Off after emergency stop		0	4	0

	※ Only available when connecting communication by TCP. The above function does not apply to GUI program connection termination.				
43	**Communication Timeout:** This parameter sets the timeout time for communication. ※ If timeout occurs, it executes the function set in parameter 42.	msec	100	60,000	100

● Parameter No.33~40 are used from Firmware [ver.6.1.20.11].

● Parameter No.41~43 are used from Firmware [ver.6.1.20.16].

1 1 . Protection Function
1 1 - 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.

Alarm No.	Alarm Name	Description
1	Overcurrent	The current through power devices in inverter exceeds the limit value *1
2	Overspeed	Command speed for motor exceeds 3,300[rpm].
3	Position Tracking	Position error value is higher than specified value*2 in-position command status.
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 85℃.
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(over 1) occurs for over 3sec.
11	System error	Drive system is halted (Watch Dog Timer).
12	ROM error	Error is occurred in parameter saving device(ROM).
15	Pos. Error Overflow	Position error value is higher than specified value*6 in motor stop status.
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 1 - 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 outputted 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.
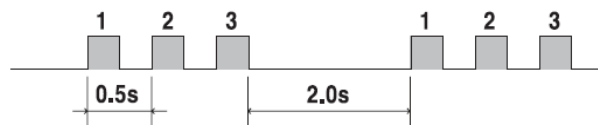
Ex2) Alarm 15 : 7-Segment displays when position error overflow is occurred.
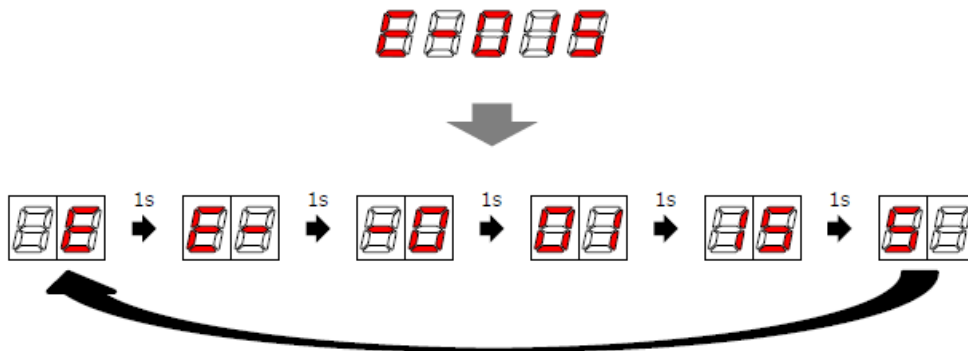
1 1 - 3 . Alarm check and Release

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

Alarm No.	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 regenerative 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
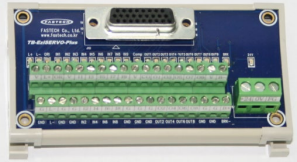
50	Internal communication	1) Power on the drive again.	Invalid
51,60	SERVO ON failure	1) Pass the SERVO ON command again. 2) Power on the drive again.	Valid
201	IP setting error	1) Set the last number of IP and Gateway differently. 2) If using the basic IP address, set the IP setting from 2 to 254.	Invalid
202	IP conflict	1) IP conflict with other drives (including other products), so check the settings of each drive (including other products).	Invalid

12. Appendix

12-1. Option for interface board : Ezi-SERVOⅡ Plus-E

■ Interface board

All I/O signal for control are connected through the connector CN1.

Type	Product Name	
Interface Board (Terminal Block)	TB-Plus	

CN1 No.	Signal Name	TB- Plus Signal Name	CN1No.	Signal Name	TB- Plus Signal Name
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-

■ Interface board connection cable

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

Part Name	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	Manufacturer
Terminal Block connector	Connector	DB-26 male type	
Drive connectorCN1)	Connector Housing	10126-30000VE	3M
	Backshell	10320-52AO-008	3M

12-2. Option for Motor Drive

■ I/O connection cable

It is used to connect between drive and I/O.

Part Name	Length[m]	Remark
CSVR-S-□□□F	□□□	Normal cable
CSVR-S-□□□M	□□□	Robot cable

□ is cable length.

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

Refer to ① of 「4-2 Controller configuration (1)」.

■ Drive power cable

It is used to connect between drive and power.

Part Name	Length[m]	Remark
CSVO-P-□□□F	□□□	Normal cable
CSVO-P-□□□M	□□□	Robot cable

□ is cable length.

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

It is used to connect between drive for 86[mm] motor and power.

Part Name	Length[m]	Remark
CSVP-P-□□□F	□□□	Normal cable
CSVP-P-□□□M	□□□	Robot cable

□ is cable length.

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

Refer to ④ of 「4-2 Controller configuration (1) (2)」.

■ Extension cable for motor

It is an extension cable for connecting between drive and motor.

Part Name	Length[m]	Remark
CSVO-M-□□□F	□□□	Normal cable
CSVO-M-□□□M	□□□	Robot cable

□ is cable length.

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

Refer to ③ of 「4-2 Controller configuration」.

※ Wiring Diagram

Drive Connector(CN3)		Cable Connection	Motor Connector	
Pin Layout	Pin No.		Pin No.	Pin Layout
	1		1	
	2		2	
	3		3	
	4		4	
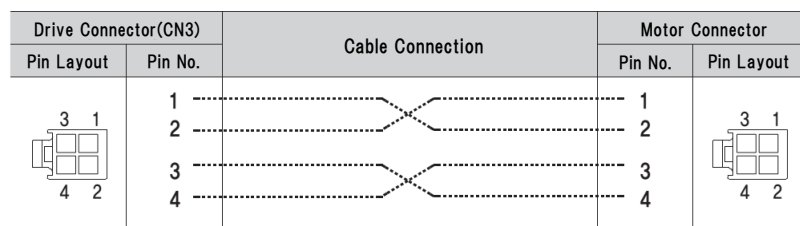
Connector Specification

ITEM	Specification	Manufacturer
Housing	5557–04R	MOLEX
Terminal	5556T	MOLEX

It is an extension cable to connect between drive for 86[mm] motor and motor.

Part Name	Length[m]	Remark
CSVO-M-□□□F	□□□	Normal cable
CSVO-M-□□□M	□□□	Robot cable

□ is cable length.

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

Refer to ③ of 「4-2 Controller configuration」.

※ Wiring Diagram

Drive Connector(CN3)		Cable Connection	Motor Connector	
Pin Layout	Pin No.		Pin No.	Pin Layout
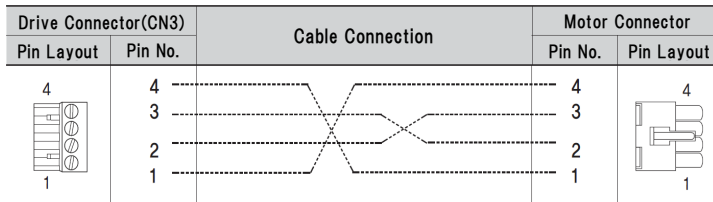
Connector Specification (Drive for 86mm motor)

Use	ITEM	Specification	Manufacturer
Drive connector(CN3)	Terminal Block	AK950−4	PTR
Motor connector	Housing	3191−4RI	MOLEX
	Terminal	1381T	MOLEX

■ Extension cable for encoder

It is an extension cable to connect between drive and encoder.

Part Name	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 「4-2 Controller configuration」.

※ Wiring Diagram

Drive Connector(CN2)		Cable Connection	Motor Connector	
Pin Layout	Pin No.		Pin No.	Pin Layout
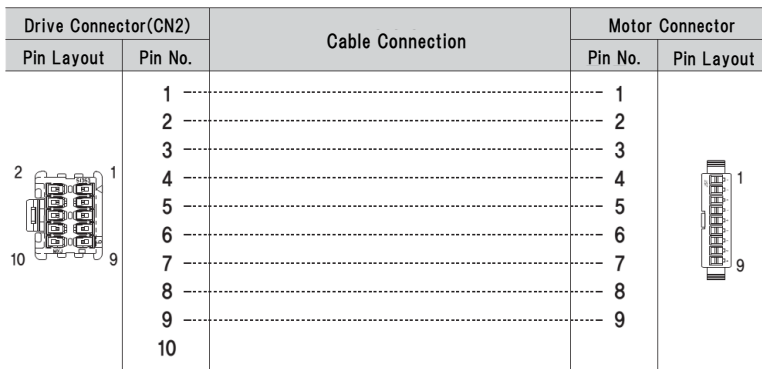
Connector Specification

Use	ITEM	Specification	Manufacturer
Drive connector(CN2)	Housing	51353−1000	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

It uses STP(Shielded Twisted Pair) cable.(CAT5E)

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

□ is cable length.

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

Refer to ⑤ 「4-2 Controller configuration」.

■ Connector

Connector specification to connect the drive.

Use		ITEM	Specification	Manufacturer
Power connection(CN4)		Housing	5557-02R	MOLEX
		Terminal	5556T	MOLEX
		Terminal Block[*1]	AK950-2	PTR
Motor Connection	Drive (CN3)	Housing	5557-04R	MOLEX
		Terminal	5556T	MOLEX
		Terminal Block[*1]	AK950-4	PTR
	Motor	Housing	5557-04R	MOLEX
		Terminal	5556T	MOLEX
		Housing[*1]	3191-4RI	MOLEX
		Terminal[*1]	1381T	MOLEX
Encoder Connection	Drive (CN2)	Housing	51353-1000	MOLEX
		Terminal	56134-9000	MOLEX
	Motor	Housing	SMP-09V-NC	JST
		Terminal	SHF-001T-0.8BS	JST
I/O connection (CN1)		Connector	10126-3000VE	3M
		Backshell	10326-52AO-008	3M

*1 Drive for 86[mm] motor.

※ The above connectors are suitable to Ezi-SERVOⅡ Plus-E. Equivalent or alternative items can be used.

1 2 - 3 . Brake Installed Motor Specifications and Size
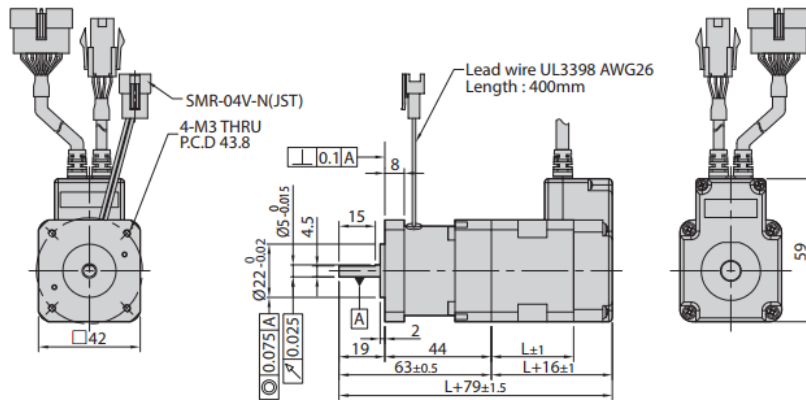
42mm

Model Name	Length(L)	Weight(kg)
EzM2−42S	34	0.51
EzM2−42M	40	0.57
EzM2−42L	48	0.64
EzM2−42XL	60	0.77
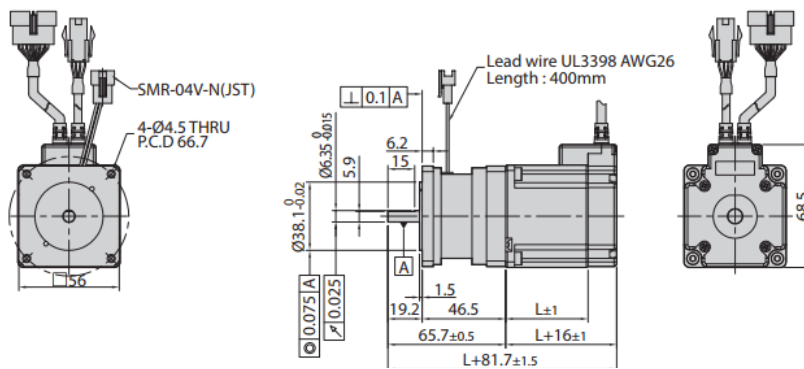
56mm

Model Name	Length(L)	Weight(kg)
EzM2−56S	46	1.03
EzM2−56M	55	1.19
EzM2−56L	80	1.63
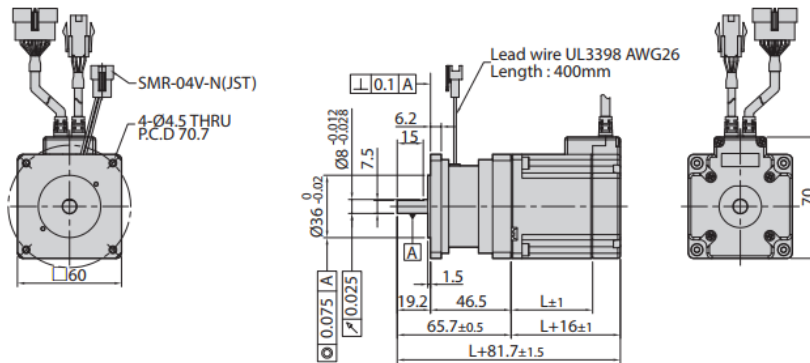
60mm

Model Name	Length(L)	Weight(kg)
EzM2−60S	47	1.15
EzM2−60M	56	1.35
EzM2−60L	85	1.96
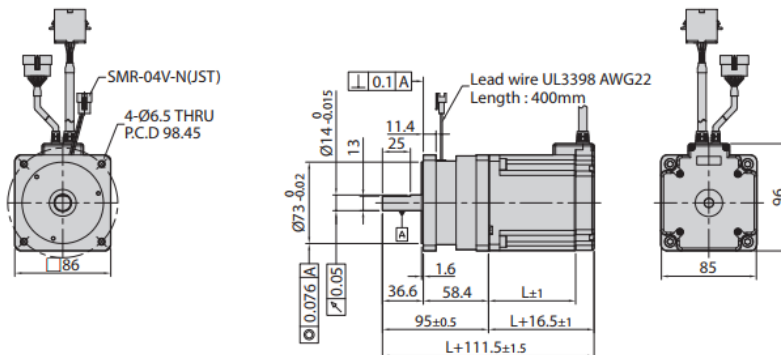
86mm

Model Name	Length(L)	Weight(kg)
EzM2−86M	78	3.6
EzM2−86L	117	5.1
EzM2−86XL	155	6.6

1 2 - 4 . Gearbox Installed Motor Specifications and Size

1) Gearbox for 42mm Motor Specifications

42mm

Unit Part Number	Maximum Holding Torque [N·m]	Rotor Inertia Moment [kg·m²]	Back-lash [min]	Angle Trans-mission Error [min]	Re-duction Gear Ratio	Resolution (10,000 [ppr] Standard)	Permitted Torque [N·m]	Maximum Torque [N·m]	Permitted Speed Range [rpm]	Unit Weight [kg]	Permitted Overhung Load [N] Axis Center Standard	Permitted Thrust Load [N]
Ezi-SERVO II -PE-42S-■-PN3	0.57	35×10⁻⁷	3	5	3	0.012*	6	12	0~1000	0.89	240	270
Ezi-SERVO II -PE-42S-■-PN5	0.95				5	0.0072*	9	18	0~600		290	330
Ezi-SERVO II -PE-42S-■-PN8	1.52				8	0.0045*	9	18	0~375		340	410
Ezi-SERVO II -PE-42S-■-PN10	1.90				10	0.0036*	6	12	0~300		360	450
Ezi-SERVO II -PE-42S-■-PN15	2.76		5	7	15	0.0024*	6	12	0~200	0.99	410	540
Ezi-SERVO II -PE-42S-■-PN25	4.60				25	0.00144*	9	18	0~120		490	640
Ezi-SERVO II -PE-42S-■-PN40	7.36				40	0.0009*	9	18	0~75		570	640
Ezi-SERVO II -PE-42S-■-PN50	9.00				50	0.00072*	9	18	0~60		620	640
Ezi-SERVO II -PE-42M-■-PN3	0.85	54×10⁻⁷	3	5	3	0.012*	6	12	0~1000	0.96	240	270
Ezi-SERVO II -PE-42M-■-PN5	1.42				5	0.0072*	9	18	0~600		290	330
Ezi-SERVO II -PE-42M-■-PN8	2.28				8	0.0045*	9	18	0~375		340	410
Ezi-SERVO II -PE-42M-■-PN10	2.85				10	0.0036*	6	12	0~300		360	450
Ezi-SERVO II -PE-42M-■-PN15	4.14		5	7	15	0.0024*	6	12	0~200	1.06	410	540
Ezi-SERVO II -PE-42M-■-PN25	6.90				25	0.00144*	9	18	0~120		490	640
Ezi-SERVO II -PE-42M-■-PN40	9.00				40	0.0009*	9	18	0~75		570	640
Ezi-SERVO II -PE-42M-■-PN50	9.00				50	0.00072*	9	18	0~60		620	640
Ezi-SERVO II -PE-42L-■-PN3	0.92	77×10⁻⁷	3	5	3	0.012*	6	12	0~1000	1.02	240	270
Ezi-SERVO II -PE-42L-■-PN5	1.54				5	0.0072*	9	18	0~600		290	330
Ezi-SERVO II -PE-42L-■-PN8	2.47				8	0.0045*	9	18	0~375		340	410
Ezi-SERVO II -PE-42L-■-PN10	3.09				10	0.0036*	6	12	0~300		360	450
Ezi-SERVO II -PE-42L-■-PN15	4.49		5	7	15	0.0024*	6	12	0~200	1.12	410	540
Ezi-SERVO II -PE-42L-■-PN25	7.49				25	0.00144*	9	18	0~120		490	640
Ezi-SERVO II -PE-42L-■-PN40	9.00				40	0.0009*	9	18	0~75		570	640
Ezi-SERVO II -PE-42L-■-PN50	9.00				50	0.00072*	9	18	0~60		620	640
Ezi-SERVO II -PE-42XL-■-PN3	1.45	114×10⁻⁷	3	5	3	0.012*	6	12	0~1000	1.15	240	270
Ezi-SERVO II -PE-42XL-■-PN5	2.42				5	0.0072*	9	18	0~600		290	330
Ezi-SERVO II -PE-42XL-■-PN8	3.87				8	0.0045*	9	18	0~375		340	410
Ezi-SERVO II -PE-42XL-■-PN10	4.84				10	0.0036*	6	12	0~300		360	450
Ezi-SERVO II -PE-42XL-■-PN15	6.00		5	7	15	0.0024*	6	12	0~200	1.25	410	540
Ezi-SERVO II -PE-42XL-■-PN25	9.00				25	0.00144*	9	18	0~120		490	640
Ezi-SERVO II -PE-42XL-■-PN40	9.00				40	0.0009*	9	18	0~75		570	640
Ezi-SERVO II -PE-42XL-■-PN50	9.00				50	0.00072*	9	18	0~60		620	640

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

2) Gearbox for 56mm Motor Specifications

56mm

Unit Part Number	Maximum Holding Torque [N·m]	Rotor Inertia Moment [kg·m²]	Back-lash [min]	Angle Transmission Error [min]	Reduction Gear Ratio	Resolution (10,000 [ppr] Standard)	Permitted Torque [N·m]	Maximum Torque [N·m]	Permitted Speed Range [rpm]	Unit Weight [kg]	Permitted Overhung Load [N] Axis Center Standard	Permitted Thrust Load [N]
Ezi-SERVO II -PE-56S-■-PN3	1,1	180x10⁻⁷	3	5	3	0,012*	18	35	0~1000	1,94	430	310
Ezi-SERVO II -PE-56S-■-PN5	1,9				5	0,0072*	27	50	0~600		510	390
Ezi-SERVO II -PE-56S-■-PN8	3,0				8	0,0045*	27	50	0~375		600	480
Ezi-SERVO II -PE-56S-■-PN10	3,8				10	0,0036*	18	35	0~300		640	530
Ezi-SERVO II -PE-56S-■-PN15	5,5				15	0,0024*	18	35	0~200	2,14	740	630
Ezi-SERVO II -PE-56S-■-PN25	9,3				25	0,00144*	27	50	0~120		870	790
Ezi-SERVO II -PE-56S-■-PN40	14,9				40	0,0009*	27	50	0~75		1000	970
Ezi-SERVO II -PE-56S-■-PN50	18,6				50	0,00072*	27	50	0~60		1100	1100
Ezi-SERVO II -PE-56M-■-PN3	2,0	280x10⁻⁷	3	5	3	0,012*	18	35	0~1000	2,15	430	310
Ezi-SERVO II -PE-56M-■-PN5	3,4				5	0,0072*	27	50	0~600		510	390
Ezi-SERVO II -PE-56M-■-PN8	5,4				8	0,0045*	27	50	0~375		600	480
Ezi-SERVO II -PE-56M-■-PN10	6,8				10	0,0036*	18	35	0~300		640	530
Ezi-SERVO II -PE-56M-■-PN15	9,9				15	0,0024*	18	35	0~200		740	630
Ezi-SERVO II -PE-56M-■-PN25	16,6				25	0,00144*	27	50	0~120	2,35	870	790
Ezi-SERVO II -PE-56M-■-PN40	27,0				40	0,0009*	27	50	0~75		1000	970
Ezi-SERVO II -PE-56M-■-PN50	27,0				50	0,00072*	27	50	0~60		1100	1100
Ezi-SERVO II -PE-56L-■-PN3	4,0	520x10⁻⁷	3	5	3	0,012*	18	35	0~1000	2,52	430	310
Ezi-SERVO II -PE-56L-■-PN5	6,8				5	0,0072*	27	50	0~600		510	390
Ezi-SERVO II -PE-56L-■-PN8	10,8				8	0,0045*	27	50	0~375		600	480
Ezi-SERVO II -PE-56L-■-PN10	13,6				10	0,0036*	18	35	0~300		640	530
Ezi-SERVO II -PE-56L-■-PN15	18,0				15	0,0024*	18	35	0~200		740	630
Ezi-SERVO II -PE-56L-■-PN25	27,0				25	0,00144*	27	50	0~120	2,72	870	790
Ezi-SERVO II -PE-56L-■-PN40	27,0				40	0,0009*	27	50	0~75		1000	970
Ezi-SERVO II -PE-56L-■-PN50	27,0				50	0,00072*	27	50	0~60		1100	1100

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

3) Gearbox for 60mm Motor Specifications

60mm

Unit Part Number	Maximum Holding Torque [N·m]	Rotor Inertia Moment [kg·m²]	Back-lash [min]	Angle Trans-mission Error [min]	Re-duction Gear Ratio	Resolution (10,000 [ppr] Standard)	Permitted Torque [N·m]	Maximum Torque [N·m]	Permitted Speed Range [rpm]	Unit Weight [kg]	Permitted Overhung Load [N] Axis Center Standard	Permitted Thrust Load [N]
Ezi-SERVO II-PE-60S-■-PN3	1.5	240x10⁻⁷	3	5	3	0.012*	18	35	0~1000	2.0	430	310
Ezi-SERVO II-PE-60S-■-PN5	2.5				5	0.0072*	27	50	0~600		510	390
Ezi-SERVO II-PE-60S-■-PN8	4.0				8	0.0045*	27	50	0~375		600	480
Ezi-SERVO II-PE-60S-■-PN10	5.1				10	0.0036*	18	35	0~300		640	530
Ezi-SERVO II-PE-60S-■-PN15	7.4				15	0.0024*	18	35	0~200		740	630
Ezi-SERVO II-PE-60S-■-PN25	12.3				25	0.00144*	27	50	0~120	2.2	870	790
Ezi-SERVO II-PE-60S-■-PN40	19.8				40	0.0009*	27	50	0~75		1000	970
Ezi-SERVO II-PE-60S-■-PN50	24.7				50	0.00072*	27	50	0~60		1100	1100
Ezi-SERVO II-PE-60M-■-PN3	2.6	490x10⁻⁷	3	5	3	0.012*	18	35	0~1000	2.0	430	310
Ezi-SERVO II-PE-60M-■-PN5	4.4				5	0.0072*	27	50	0~600		510	390
Ezi-SERVO II-PE-60M-■-PN8	7.0				8	0.0045*	27	50	0~375		600	480
Ezi-SERVO II-PE-60M-■-PN10	8.8				10	0.0036*	18	35	0~300		640	530
Ezi-SERVO II-PE-60M-■-PN15	12.8				15	0.0024*	18	35	0~200		740	630
Ezi-SERVO II-PE-60M-■-PN25	21.4				25	0.00144*	27	50	0~120	2.2	870	790
Ezi-SERVO II-PE-60M-■-PN40	27.0				40	0.0009*	27	50	0~75		1000	970
Ezi-SERVO II-PE-60M-■-PN50	27.0				50	0.00072*	27	50	0~60		1100	1100
Ezi-SERVO II-PE-60L-■-PN3	5.2	690x10⁻⁷	3	5	3	0.012*	18	35	0~1000	3.0	430	310
Ezi-SERVO II-PE-60L-■-PN5	8.7				5	0.0072*	27	50	0~600		510	390
Ezi-SERVO II-PE-60L-■-PN8	13.9				8	0.0045*	27	50	0~375		600	480
Ezi-SERVO II-PE-60L-■-PN10	18.0				10	0.0036*	18	35	0~300		640	530
Ezi-SERVO II-PE-60L-■-PN15	18.0				15	0.0024*	18	35	0~200		740	630
Ezi-SERVO II-PE-60L-■-PN25	27.0				25	0.00144*	27	50	0~120	3.2	870	790
Ezi-SERVO II-PE-60L-■-PN40	27.0				40	0.0009*	27	50	0~75		1000	970
Ezi-SERVO II-PE-60L-■-PN50	27.0				50	0.00072*	27	50	0~60		1100	1100

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

4) Gearbox for 86mm Motor Specifications

86mm

| Unit Part Number	Maximum Holding Torque [N·m]	Rotor Inertia Moment [kg·m²]	Back-lash [min]	Angle Trans-mission Error [min]	Re-duction Gear Ratio	Resolution (10,000 [ppr] Standard)	Permitted Torque [N·m]	Maximum Torque [N·m]	Permitted Speed Range [rpm]	Unit Weight [kg]	Permitted Overhung Load [N] Axis Center Standard	Permitted Thrust Load [N]
Ezi-SERVO II -PE-86M-■-PN3	9.6	1800x10⁻⁷	3	5	3	0.012*	50	80	0~1000	6.0	810	930
Ezi-SERVO II -PE-86M-■-PN5	16.0				5	0.0072*	75	125	0~600		960	1200
Ezi-SERVO II -PE-86M-■-PN8	25.7				8	0.0045*	75	125	0~375		1100	1400
Ezi-SERVO II -PE-86M-■-PN10	32.1				10	0.0036*	50	80	0~300		1200	1600
Ezi-SERVO II -PE-86M-■-PN15	46.6				15	0.0024*	50	80	0~200	6.5	1200	1900
Ezi-SERVO II -PE-86M-■-PN25	75.0				25	0.00144*	75	125	0~120		1600	2200
Ezi-SERVO II -PE-86M-■-PN40	75.0				40	0.0009*	75	125	0~75		1900	2200
Ezi-SERVO II -PE-86M-■-PN50	75.0				50	0.00072*	75	125	0~60		2100	2200
Ezi-SERVO II -PE-86L-■-PN3	17.1	3600x10⁻⁷	3	5	3	0.012*	50	80	0~1000	7.5	810	930
Ezi-SERVO II -PE-86L-■-PN5	28.5				5	0.0072*	75	125	0~600		960	1200
Ezi-SERVO II -PE-86L-■-PN8	45.6				8	0.0045*	75	125	0~375		1100	1400
Ezi-SERVO II -PE-86L-■-PN10	50.0				10	0.0036*	50	80	0~300		1200	1600
Ezi-SERVO II -PE-86L-■-PN15	50.0				15	0.0024*	50	80	0~200	8.0	1200	1900
Ezi-SERVO II -PE-86L-■-PN25	75.0				25	0.00144*	75	125	0~120		1600	2200
Ezi-SERVO II -PE-86L-■-PN40	75.0				40	0.0009*	75	125	0~75		1900	2200
Ezi-SERVO II -PE-86L-■-PN50	75.0				50	0.00072*	75	125	0~60		2100	2200
Ezi-SERVO II -PE-86XL-■-PN3	23.6	5400x10⁻⁷	3	5	3	0.012*	50	80	0~1000	9.0	810	930
Ezi-SERVO II -PE-86XL-■-PN5	39.4				5	0.0072*	75	125	0~600		960	1200
Ezi-SERVO II -PE-86XL-■-PN8	63.0				8	0.0045*	75	125	0~375		1100	1400
Ezi-SERVO II -PE-86XL-■-PN10	50.0				10	0.0036*	50	80	0~300		1200	1600
Ezi-SERVO II -PE-86XL-■-PN15	50.0				15	0.0024*	50	80	0~200	9.5	1200	1900
Ezi-SERVO II -PE-86XL-■-PN25	75.0				25	0.00144*	75	125	0~120		1600	2200
Ezi-SERVO II -PE-86XL-■-PN40	75.0				40	0.0009*	75	125	0~75		1900	2200
Ezi-SERVO II -PE-86XL-■-PN50	75.0				50	0.00072*	75	125	0~60		2100	2200

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

5) 42mm motor size with Gearbox

42mm

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

* The code of encoder resolution will be marked in "■"
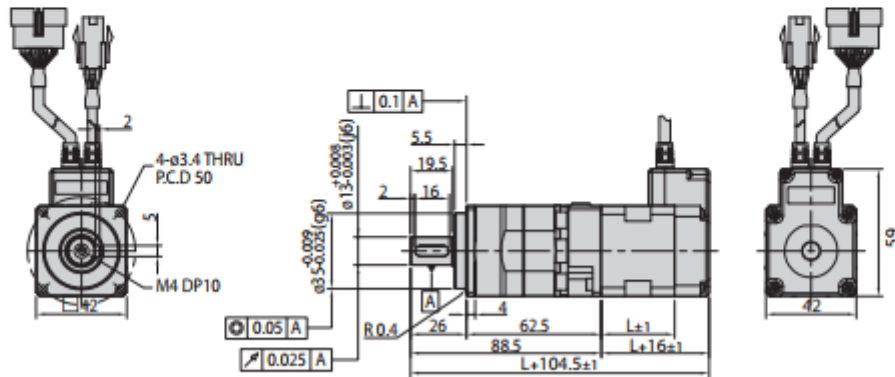
Unit Part Number	Motor	Stage	□Reduction Gear Ratio	L Length [mm]
Ezi-SERVO II -PE-42S-■-PN□	EzM2-42S-■-PN□	Double Stage	15, 25, 40, 50	34
Ezi-SERVO II -PE-42M-■-PN□	EzM2-42M-■-PN□		15, 25, 40, 50	40
Ezi-SERVO II -PE-42L-■-PN□	EzM2-42L-■-PN□		15, 25, 40, 50	48
Ezi-SERVO II -PE-42XL-■-PN□	EzM2-42XL-■-PN□		15, 25, 40, 50	60

* The code of encoder resolution will be marked in "■"
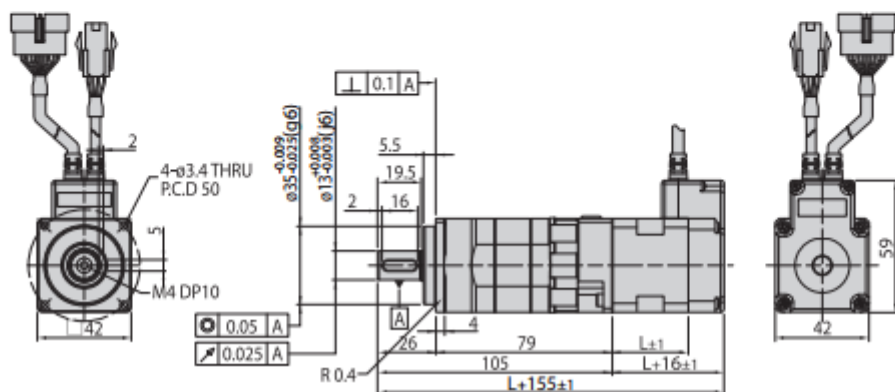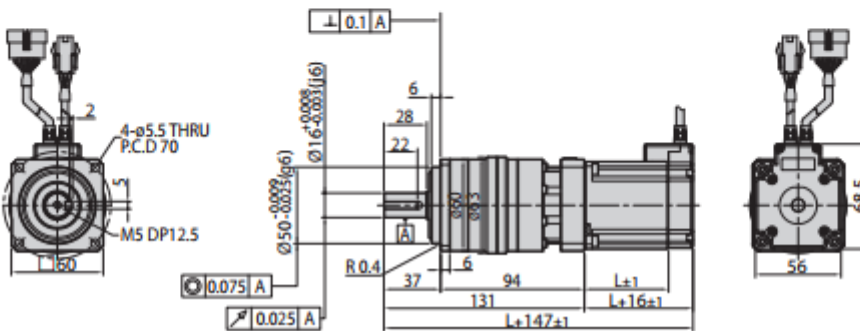
6) 56mm motor size with Gearbox

56mm

Unit Part Number	Motor	Stage	□Reduction Gear Ratio	L Length [mm]
Ezi-SERVO II -PE-56S-■-PN□	EzM2-56S-■-PN□	Single Stage	3, 5, 8, 10	46
Ezi-SERVO II -PE-56M-■-PN□	EzM2-56M-■-PN□		3, 5, 8, 10	55
Ezi-SERVO II -PE-56L-■-PN□	EzM2-56L-■-PN□		3, 5, 8, 10	80

* The code of encoder resolution will be marked in "■"
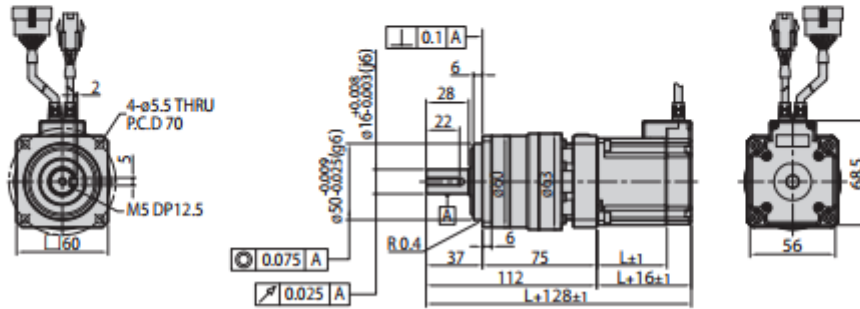
Unit Part Number	Motor	Stage	□Reduction Gear Ratio	L Length [mm]
Ezi-SERVO II -PE-56S-■-PN□	EzM2-56S-■-PN□	Double Stage	15, 25, 40, 50	46
Ezi-SERVO II -PE-56M-■-PN□	EzM2-56M-■-PN□		15, 25, 40, 50	55
Ezi-SERVO II -PE-56L-■-PN□	EzM2-56L-■-PN□		15, 25, 40, 50	80

* The code of encoder resolution will be marked in "■"
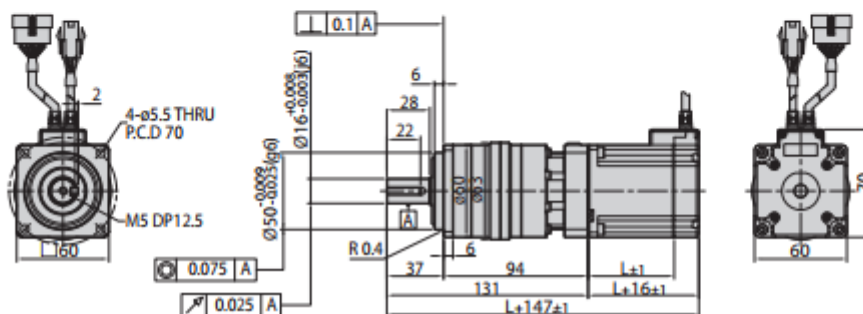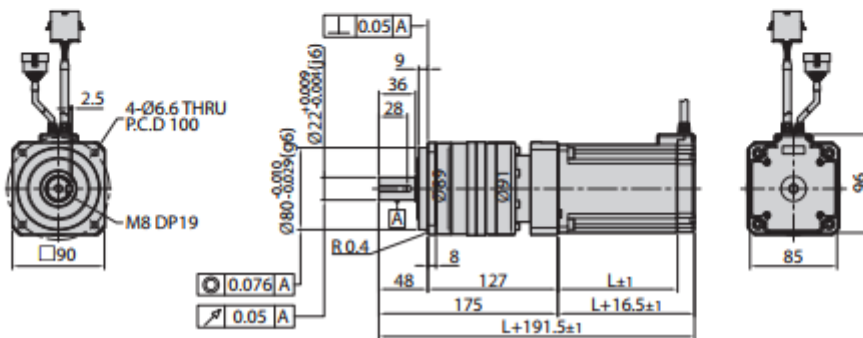
7) 60mm motor size with Gearbox

60mm

Unit Part Number	Motor	Stage	□ Reduction Gear Ratio	L Length [mm]
Ezi-SERVO II -PE-60S-■-PN□	EzM2-60S-■-PN□	Single Stage	3, 5, 8, 10	47
Ezi-SERVO II -PE-60M-■-PN□	EzM2-60M-■-PN□		3, 5, 8, 10	56
Ezi-SERVO II -PE-60L-■-PN□	EzM2-60L-■-PN□		3, 5, 8, 10	85

* The code of encoder resolution will be marked in "■"
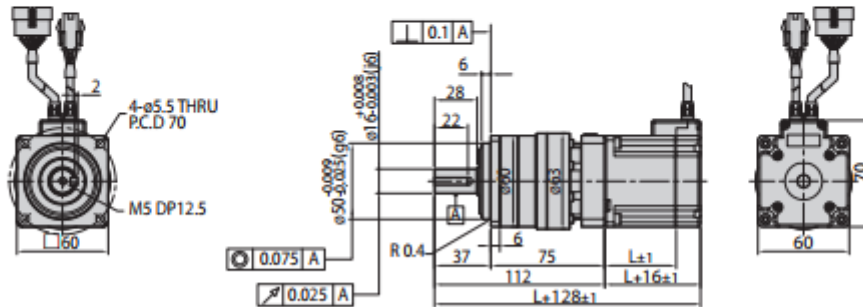
Unit Part Number	Motor	Stage	□ Reduction Gear Ratio	L Length [mm]
Ezi-SERVO II -PE-60S-■-PN□	EzM2-60S-■-PN□	Double Stage	15, 25, 40, 50	47
Ezi-SERVO II -PE-60M-■-PN□	EzM2-60M-■-PN□		15, 25, 40, 50	56
Ezi-SERVO II -PE-60L-■-PN□	EzM2-60L-■-PN□		15, 25, 40, 50	85

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

8) 86mm motor size with Gearbox

86mm

Unit Part Number	Motor	Stage	□Reduction Gear Ratio	L Length [mm]
Ezi-SERVO II –PE-86M-■-PN□	EzM2-86M-■-PN□	Single Stage	3, 5, 8, 10	78
Ezi-SERVO II –PE-86L-■-PN□	EzM2-86L-■-PN□		3, 5, 8, 10	117
Ezi-SERVO II –PE-86XL-■-PN□	EzM2-86XL-■-PN□		3, 5, 8, 10	155

* The code of encoder resolution will be marked in "■"
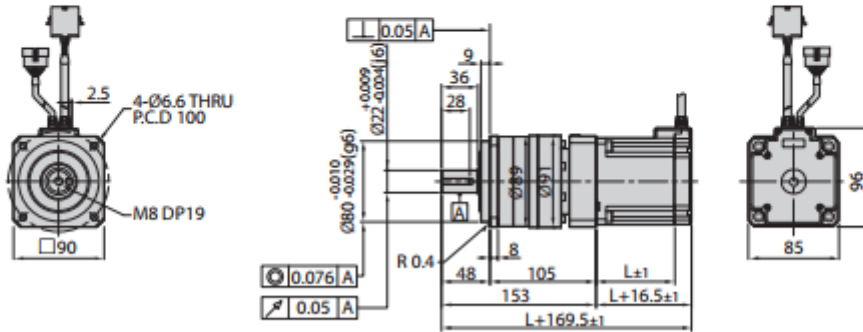
Unit Part Number	Motor	Stage	□Reduction Gear Ratio	L Length [mm]
Ezi-SERVO II –PE-86M-■-PN□	EzM2-86M-■-PN□	Double Stage	15, 25, 40, 50	78
Ezi-SERVO II –PE-86L-■-PN□	EzM2-86L-■-PN□		15, 25, 40, 50	117
Ezi-SERVO II –PE-86XL-■-PN□	EzM2-86XL-■-PN□		15, 25, 40, 50	155

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

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