

Ezi-SERVO[®] Plus-R

Closed Loop Stepping System

Ezi-SERVO[®] Plus-R MINI

Closed Loop Stepping System

Ezi-SERVO[®] ALL

Closed Loop Stepping System

- User Manual -

Text (Ver.4)

※ Before operation ※

- Thank you for your purchasing Ezi-SERVO.
- Ezi-SERVO is an all-in-one Unit, for high-speed and high-precision drive of a stepping motor, Ezi-SERVO is an unique drive that adopts a new control scheme owing to an on-board high-performance 32 bit digital signal processor.
- This manual describes handing, maintenance, repair, diagnosis and troubleshooting of Ezi-SERVO.
- Before operating Ezi-SERVO, thoroughly read this manual.
- After reading the manual, keep the manual near the Ezi-SERVO so that any user can read the manual whenever needed.

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1. Safety Pre-caution

1.1 General Precaution

- ◆ Contents of this manual are subject to change without prior notice for functional improvement, change of specifications or user's better understanding.
- ◆ When the manual is damaged or lost, please contact with Fastech's agents or our company at the address on the last page of the manual.
- ◆ Our company is not responsible for a product breakdown due to user's dismantling for the product, and such a breakdown is not guaranteed by the warranty.

1.2 Put the safety First

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

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

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

1.3 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.
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1.4 Installation

 Attention	<ul style="list-style-type: none"> ■ Carefully move the Ezi-SERVO. 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-SERVO is to be installed. Otherwise, a fire may occur. ■ When installing several Ezi-SERVO in a sealed place, install a cooling fan to keep the ambient temperature of the Ezi-SERVO as 50°C or lower. Otherwise, a fire or other kinds of accidents may occur due to overheating.
 Warning	<ul style="list-style-type: none"> ■ The process of installation, connection, operation, checking and repairing should be done with qualified person. Otherwise, a fire or other kinds of accidents may occur.,

1.5. Connect Cables

1.5 Connect Cables

 Attention	<ul style="list-style-type: none"> ■ Keep the rated range of Input Voltage for Ezi-SERVO. Otherwise, a fire or other kinds of accidents may occur. ■ Cable connection should follow the wiring diagram. Otherwise, a fire or other kinds of accidents may occur.
 Warning	<ul style="list-style-type: none"> ■ Before connecting cables check if input power OFF. Otherwise, an electric shock or a fire may occur. ■ The case of Ezi-SERVO is insulated from the ground of the internal circuit by the condenser. Ground the Ezi-SERVO. Otherwise, an electric shock or a fire may occur.

1.6 Operation

 Attention	<ul style="list-style-type: none"> ■ 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 get damaged or the user may get injured. ■ Do not make Motor Free and make input signal to ON during operation. Motor will stop and stop current will become zero. The machine may get damaged or the user may get injured. ■ 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.
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1.7 Check and Repair

 Warning	<ul style="list-style-type: none"> ■ Stop to supply power to the main circuit and wait for a while before checking or repairing the Ezi-SERVO. Electricity remaining in the capacitor may occur danger. ■ Do not change cabling while power is being supplied. Otherwise, the user may get injured or the product may get damaged. ■ Do not reconstruct the Ezi-SERVO. Otherwise, an electric shock may occur or the reconstructed product can not get after service.
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2. Specifications of the Driver

2.1 Driver Specification

2.1.1 Ezi-SERVO Plus-R

Motor Model	EzM-20 series	EzM-28 series	EzM-35 series	EzM-42 series	EzM-56 series	EzM-60 series	EzM-86 series	
Driver Model	EzS-NDR-20 series	EzS-NDR-28 series	EzS-NDR-35 series	EzS-NDR-42 series	EzS-NDR-56 series	EzS-NDR-60 series	EzS-NDR-86 series	
Input Voltage	24VDC ±10%						40~70VDC	
Control Method	Closed loop control with 32bit MCU							
Multi Axes Drive	Maximum 16 axes through Daisy-Chain							
Position Table	256 motion command steps (Continuous, Wait, Loop, Jump and External start etc.)							
Current Consumption	Max 500mA (Except motor current)							
Operating Condition	Ambient Temperature	<ul style="list-style-type: none"> In Use: 0~50°C In Storage: -20~70°C 						
	Humidity	<ul style="list-style-type: none"> In Use: 35~85% RH (Non-Condensing) In Storage: 10~90% RH (Non-Condensing) 						
	Vib. Resist.	0.5g						
Function	Rotation Speed	0~3,000 [rpm] *1						
	Resolution [ppr]	4,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 4,000 10,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 16,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 16,000 20,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 20,000 32,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 32,000 (Selectable by parameter) *2						
	Protection Functions	Over Current Error, Over Speed Error, Position Tracking Error, Over Load Error, Over Temperature Error, Over Regenerated Voltage Error, Motor Connect Error, Encoder Connect Error, In-Position Error, System Error, ROM Error, Position Overflow Error						
	LED Display	Power status, Alarm status, In-Position status, Servo On status						
	In-Position Selection	0~15 (Selectable by parameter)						
	Position Gain Selection	0~15 (Selectable by parameter)						
I/O Signal	Rotational Direction	CW/CCW (Selectable by parameter)						
	Input Signals	3 dedicated inputs (LIMIT+, LIMIT-, ORIGIN), 9 programmable inputs (Photocoupler)						
	Output Signals	1 dedicated output (Compare Out), 9 programmable outputs (Photocoupler), Brake						
	Communication Interface	RS-485 serial communication Communication speed: 9,600~921,600 [bps]						
	Position Control	<ul style="list-style-type: none"> Incremental mode / Absolute mode Data Range: -134,217,728 to +134,217,727 [pulse] Operating speed: Max. 3,000 [rpm] 						
GUI	Return to Origin	Origin Sensor, Z phase, ±Limit sensor, Torque						
	GUI	User Interface Program within Windows						
	Software	Motion Library (DLL) for Windows 7/8/10						

*1 : Up to the resolution of 10,000[ppr], maximum speed can be reached by 3,000[rpm] and with the resolution more than 10,000[ppr], maximum speed shall be reduced accordingly.

*2 : When selected resolution is more than encoder resolution, motor shall be operated by microstep between pulses.

2.1. Driver Specification

2.1.2 Ezi-SERVO Plus-R MINI

Motor Model		EzM-20 series	EzM-28 series	EzM-35 series	EzM-42 series	
Driver Model		EzS-NDR-MI-20 series	EzS-NDR-MI-28 series	EzS-NDR-MI-35 series	EzS-NDR-MI-42 series	
Input Voltage		24VDC ±10%				
Control Method		Closed loop control with 32bit MCU				
Multi Axes Drive		Maximum 16 axes through Daisy-Chain				
Position Table		64 motion command steps (Continuous, Wait, Loop, Jump and External start etc.)				
Current Consumption		Max 500mA (Except motor current)				
Operating Condition	Ambient Temperature	<ul style="list-style-type: none"> · In Use: 0~50°C · In Storage: -20~70°C 				
	Humidity	<ul style="list-style-type: none"> · In Use: 35~85% RH (Non-Condensing) · In Storage: 10~90% RH (Non-Condensing) 				
	Vib. Resist.	0.5g				
Function	Rotation Speed	0~3,000 [rpm] *1				
	Resolution [ppr]	<p>4,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 4,000 10,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 16,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 16,000 20,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 20,000 32,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 32,000 (Selectable by parameter) *2</p>				
	Protection Functions	Over Current Error, Over Speed Error, Position Tracking Error, Over Load Error, Over Temperature Error, Over Regenerated Voltage Error, Motor Connect Error, Encoder Connect Error, In-Position Error, System Error, ROM Error, Position Overflow Error				
	7-Segment	Network ID, Status monitoring				
	In-Position Selection	0~15 (Selectable by parameter)				
	Position Gain Selection	0~15 (Selectable by parameter)				
	Rotational Direction	CW/CCW (Selectable by parameter)				
I/O Signal	Input Signals	3 dedicated inputs (LIMIT+, LIMIT-, ORIGIN), 7 programmable inputs (Photocoupler)				
	Output Signals	1 dedicated output (Compare Out), 1 programmable output (Photocoupler), Brake				
Communication Interface		The RS-485 serial communication Communication speed: 9,600~921,600 [bps]				
Position Control		<ul style="list-style-type: none"> · Incremental mode / Absolute mode Data Range: -134,217,728 to +134,217,727 [pulse] · Operating speed: Max. 3,000 [rpm] 				
Return to Origin		Origin Sensor, Z phase, ±Limit sensor, Torque				
GUI		User Interface Program within Windows				
Software		Motion Library (DLL) for Windows 7/8/10				

*1 : Up to the resolution of 10,000[ppr], maximum speed can be reached by 3,000[rpm] and with the resolution more than 10,000[ppr], maximum speed shall be reduced accordingly.

*2 : When selected resolution is more than encoder resolution, motor shall be operated by microstep between pulses.

2.1.3 Ezi-SERVO ALL-28 series

Model		Ezi-SERVO-ALL-28 series
Input Voltage		24VDC ±10%
Control Method		Closed loop control with 32bit MCU
Multi Axes Drive		Maximum 16 axes through Star Topology
Position Table		Does not support
Current Consumption		Max 500mA (Except motor current)
Operating Condition	Ambient Temperature	<ul style="list-style-type: none"> In Use: 0~40°C In Storage: -20~70°C
	Humidity	<ul style="list-style-type: none"> In Use: 35~85% RH (Non-Condensing) In Storage: 10~90% RH (Non-Condensing)
	Vib. Resist.	0.5g
Function	Rotation Speed	0~3,000 [rpm]
	Resolution [ppr]	500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 16,000 (Selectable by parameter)
	Protection Functions	Over Current Error, Over Speed Error, Position Tracking Error, Over Load Error, Over Temperature Error, Over Regenerated Voltage Error, Motor Connect Error, Encoder Connect Error, In-Position Error, ROM Error, Position Overflow Error
	In-Position Selection	0~63 (Selectable by parameter)
	Position Gain Selection	0~63 (Selectable by parameter)
	Rotational Direction	CW/CCW (Selectable by parameter)
I/O Signal	Input Signals	3 dedicated inputs (LIMIT+, LIMIT-, ORIGIN), 1 programmable input (Photocoupler, NPN/PNP input support)
	Output Signals	Does not support
	Communication Interface	RS-485 serial communication Communication speed: 112,500 [bps]
	Position Control	<ul style="list-style-type: none"> Incremental mode / Absolute mode Data Range: -2,147,483,648 to +2,147,483,647 [pulse] Operating speed: Max. 3,000 [rpm]
	Return to Origin	Origin Sensor, Z phase, ±Limit sensor, Torque
	GUI	User Interface Program within Windows
	Software	Motion Library (DLL) for Windows 7/8/10

2.1. Driver Specification

2.1.4 Ezi-SERVO ALL-42/56 series

Model	Ezi-SERVO-ALL-42 series	Ezi-SERVO-ALL-56 series
Input Voltage	24VDC ±10%	
Control Method	Closed loop control with 32bit MCU	
Multi Axes Drive	Maximum 16 axes through Daisy-Chain	
Position Table	64 motion command steps (Continuous, Wait, Loop, Jump and External start etc.)	
Current Consumption	Max 500mA (Except motor current)	
Operating Condition	Ambient Temperature	<ul style="list-style-type: none"> In Use: 0~55°C In Storage: -20~70°C
	Humidity	<ul style="list-style-type: none"> In Use: 35~85% RH (Non-Condensing) In Storage: 10~90% RH (Non-Condensing)
	Vib. Resist.	0.5g
Function	Rotation Speed	0~3,000 [rpm] *1
	Resolution [ppr]	10,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 20,000/Rev. Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 20,000 (Selectable by parameter)
	Protection Functions	Over Current Error, Over Speed Error, Position Tracking Error, Over Load Error, Over Temperature Error, Over Regenerated Voltage Error, Motor Connect Error, Encoder Connect Error, In-Position Error, ROM Error, Position Overflow Error
	In-Position Selection	0~15 (Selectable by parameter)
	Position Gain Selection	0~15 (Selectable by parameter)
I/O Signal	Rotational Direction	CW/CCW (Selectable by parameter)
	Input Signals	3 dedicated inputs (LIMIT+, LIMIT-, ORIGIN), 7 programmable inputs (Photocoupler)
	Output Signals	1 dedicated output (Compare Out), 1 programmable output (Photocoupler), Brake
	Communication Interface	RS-485 serial communication Communication speed: 9,600~921,600 [bps]
	Position Control	<ul style="list-style-type: none"> Incremental mode / Absolute mode Data Range: -134,217,728 to +134,217,727 [pulse] Operating speed: Max. 3,000 [rpm] *1
	Return to Origin	Origin Sensor, Z phase, ±LIMIT sensor, Torque
	GUI	User Interface Program within Windows
	Software	Motion Library (DLL) for Windows 7/8/10

*1 : Up to the resolution of 10,000[ppr], maximum speed can be reached by 3,000[rpm] and with the resolution more than 10,000[ppr], maximum speed shall be reduced accordingly.

2.1.5 Ezi-SERVO ALL-60/60-ABS series

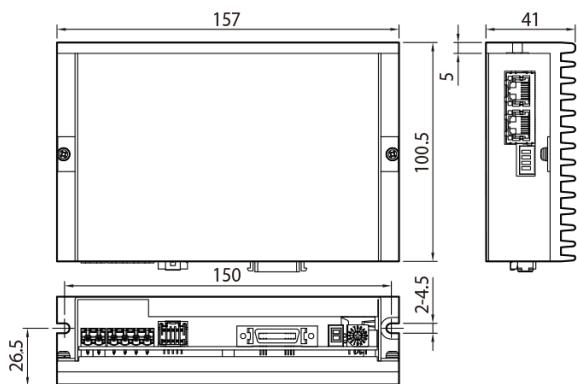
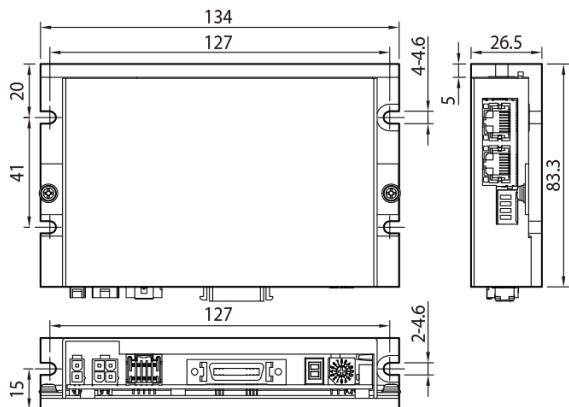
Model	Ezi-SERVO-ALL-60 series	Ezi-SERVO-ALL-60-ABS series
Input Voltage	24VDC ±10%	
Control Method	Closed loop control with 32bit MCU	
Multi Axes Drive	Maximum 16 axes through Daisy-Chain	
Position Table	64 motion command steps (Continuous, Wait, Loop, Jump and External start etc.)	
Current Consumption	Max 500mA (Except motor current)	
Operating Condition	Ambient Temperature	<ul style="list-style-type: none"> · In Use: 0~55°C · In Storage: -20~70°C
	Humidity	<ul style="list-style-type: none"> · In Use: 35~85% RH (Non-Condensing) · In Storage: 10~90% RH (Non-Condensing)
	Vib. Resist.	0.5g
Function	Rotation Speed	0~3,000 [rpm] *1
	Resolution [ppr]	<ul style="list-style-type: none"> · 10,000/Rev, Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 · 20,000/Rev, Encoder model: 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 20,000 (Selectable by parameter) <ul style="list-style-type: none"> · 500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 (Selectable by parameter)
	Protection Functions	Over Current Error, Over Speed Error, Position Tracking Error, Over Load Error, Over Temperature Error, Over Regenerated Voltage Error, Motor Connect Error, Encoder Connect Error, In-Position Error, ROM Error, Position Overflow Error
	In-Position Selection	0~15 (Selectable by parameter)
	Position Gain Selection	0~15 (Selectable by parameter)
	Rotational Direction	CW/CCW (Selectable by parameter)
I/O Signal	Input Signals	3 dedicated inputs (LIMIT+, LIMIT-, ORIGIN), 7 programmable inputs (Photocoupler)
	Output Signals	1 dedicated output (Compare Out), 3 programmable outputs (Photocoupler), Brake
	Communication Interface	RS-485 serial communication Communication speed: 9,600~921,600 [bps]
	Position Control	<ul style="list-style-type: none"> · Incremental mode / Absolute mode Data Range: -134,217,728 to +134,217,727 [pulse] · Operating speed: Max. 3,000 [rpm] *1
Return to Origin	Origin Sensor, Z phase, ±LIMIT sensor, Torque	
GUI	User Interface Program within Windows	
Software	Motion Library (DLL) for Windows 7/8/10	

*1 : Up to the resolution of 10,000[ppr], maximum speed can be reached by 3,000[rpm] and with the resolution more than 10,000[ppr], maximum speed shall be reduced accordingly.

2.2. Dimensions

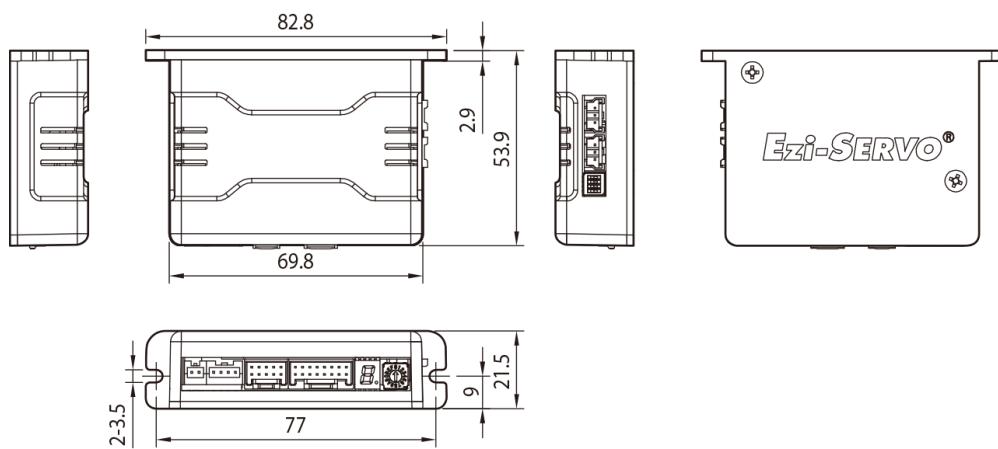
2.2 Dimensions

1) Ezi-SERVO Plus-R

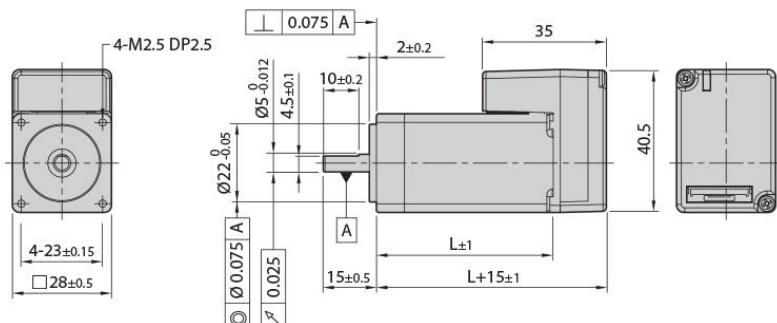


※ 86mm motor drive (EzS-NDR-86 series)

2) Ezi-SERVO Plus-R MINI



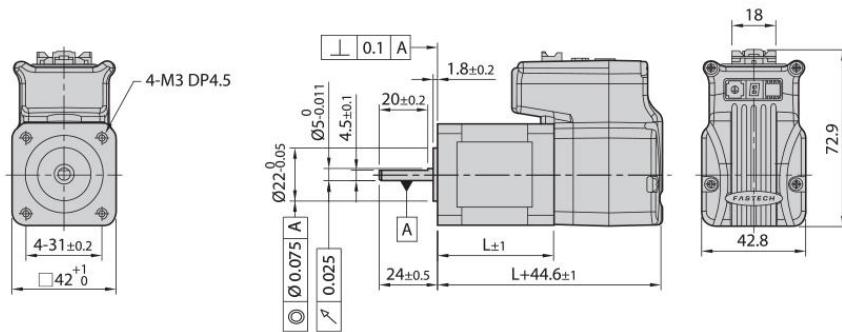
3) Ezi-SERVO ALL-28 series



28mm

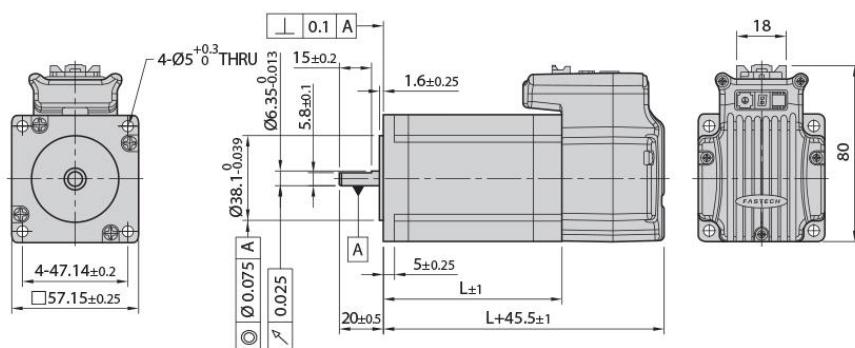
Model name	Length(L)
28S	32
28M	45
28L	50

4) Ezi-SERVO ALL-42 series

**42mm**

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

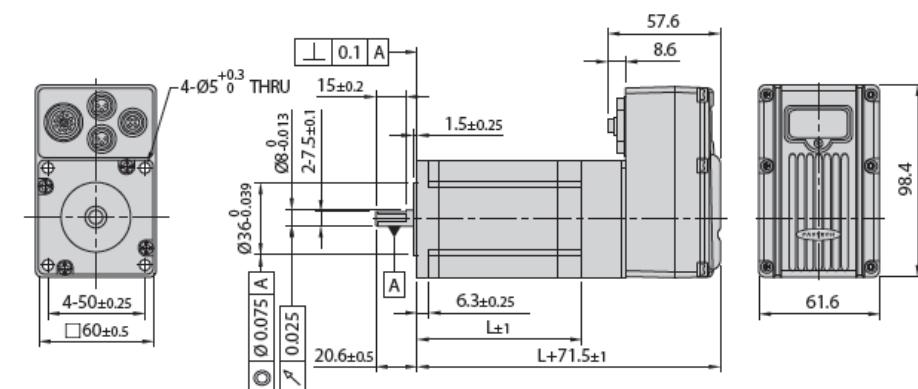
5) Ezi-SERVO ALL-56 series

**56mm**

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

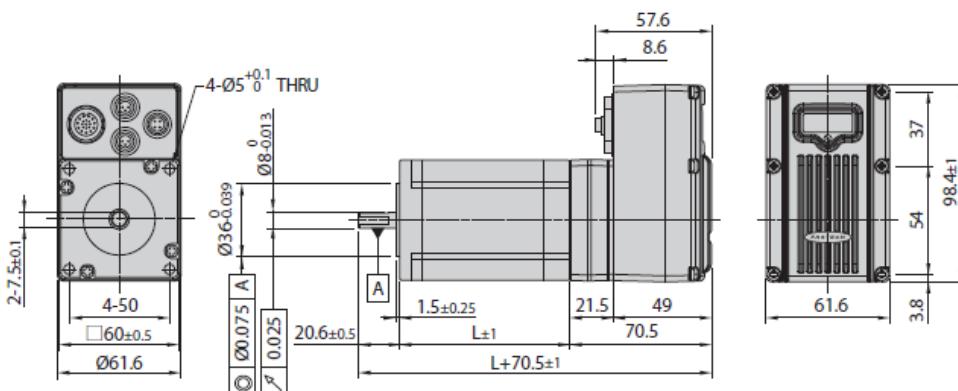
※ There are 2 kinds size of front shaft diameter for Ezi-SERVO-ALL-56 series as Ø6.35 and Ø8.0.

6) Ezi-SERVO ALL-60 series

**60mm**

Model name	Length(L)
60L	85

7) Ezi-SERVO ALL-60-ABS series

**60mm**

Model name	Length(L)
60L-ABS	85

3.1. Motor Specification

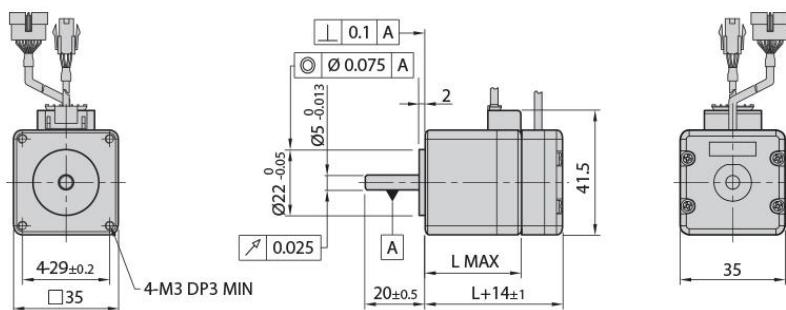
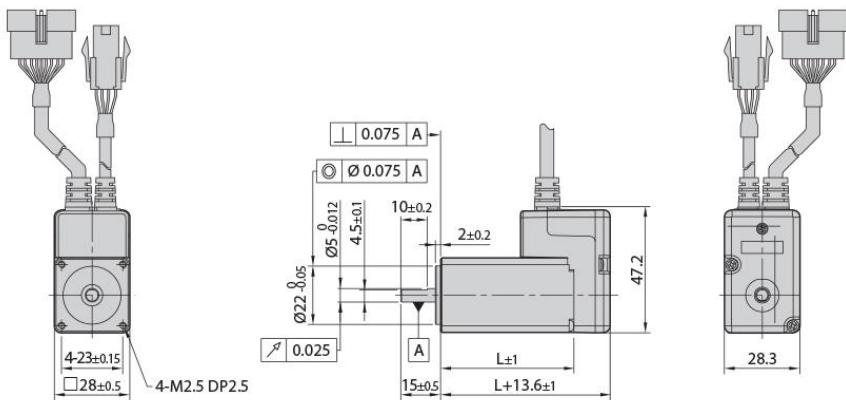
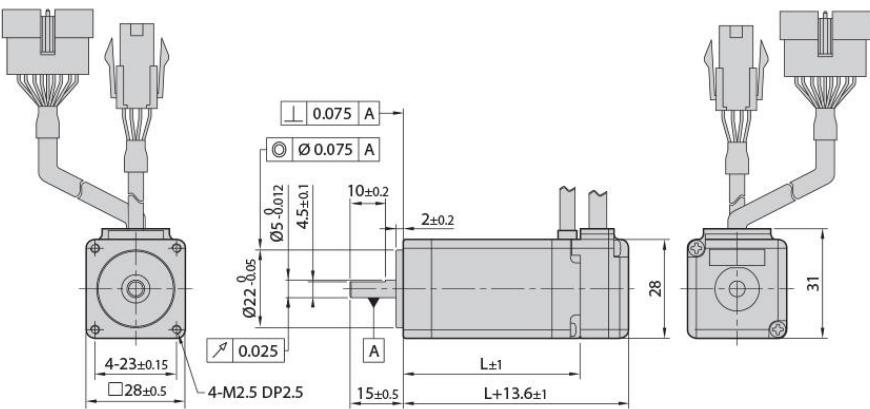
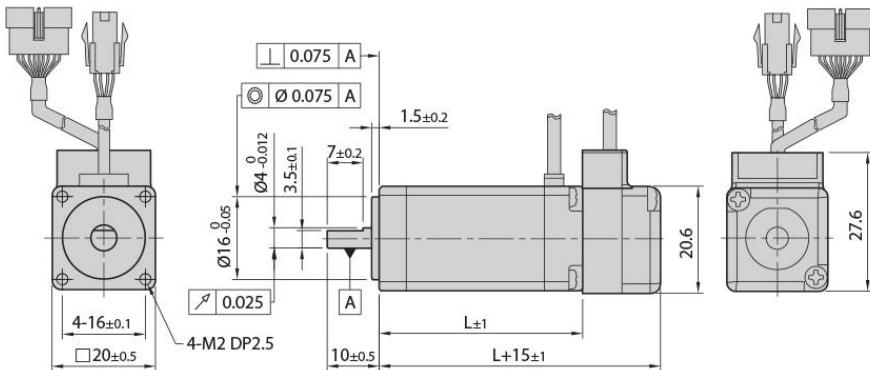
3. Specifications of the Motor

3.1 Motor Specification

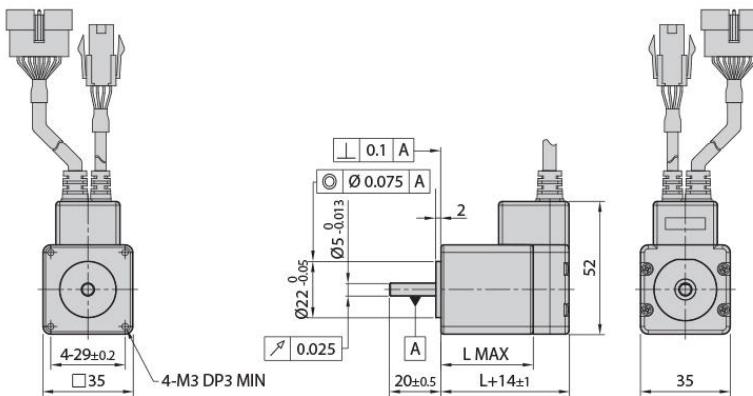
MODEL		UNIT	EzM-20 series		EzM-28 series		EzM-35 series		EzM-42 series				
			20M	20L	28S	28M	28L	35M	35L	42S	42M	42L	42XL
DRIVE METHOD	-		BI-POLAR										
NUMBER OF PHASES	-		2	2	2	2	2	2	2	2	2	2	2
VOLTAGE	VDC		2,75	3,0	3,0	3,0	3,0	1,8	2,7	3,36	4,32	4,56	7,2
CURRENT per PHASE	A		0,5	0,5	0,95	0,95	0,95	1,5	1,5	1,2	1,2	1,2	1,2
RESISTANCE per PHASE	Ohm		5,5	6,0	3,2	3,2	3,2	1,2	1,8	2,8	3,6	3,8	6,0
INDUCTANCE per PHASE	mH		2,0	2,6	2,0	2,7	3,2	1,2	2,6	5,4	7,2	8,0	15,6
HOLDING TORQUE	N·m		0,016	0,025	0,069	0,098	0,118	0,13	0,23	0,32	0,44	0,5	0,65
ROTOR INERTIA	g·cm ²		2,5	3,3	9,0	13	18	15	20	35	54	77	114
WEIGHTS	g		50	80	110	140	200	150	180	250	280	350	500
LENGTH(L)	mm		28	38	32	45	50	32	36	34	40	48	60
PERMISSIBLE OVERHUNG LOAD (DISTANCE FROM END OF SHAFT)	3mm	N	18	18	30	30	30	22	22	22	22	22	22
	8mm		30	30	38	38	38	26	26	26	26	26	26
	13mm		-	-	53	53	53	33	33	33	33	33	33
	18mm		-	-	-	-	-	46	46	46	46	46	46
PERMISSIBLE THRUST LOAD	N		Lower than motor weight										
INSULATION RESISTANCE	Mohm		100 MIN.(at 500VDC)										
INSULATION CLASS	-		CLASS B(130°C)										
OPERATING TEMPERATURE	°C		0 to 55										

MODEL		UNIT	EzM-56 series			EzM-60 series			EzM-86 series				
			56S	56M	56L	60S	60M	60L	86M	86L	86XL		
DRIVE METHOD	-		BI-POLAR										
NUMBER OF PHASES	-		2	2	2	2	2	2	2	2	2		
VOLTAGE	VDC		1,56	1,62	2,64	1,32	1,48	2,2	2,34	3,6	4,8		
CURRENT per PHASE	A		3,0	3,0	3,0	4,0	4,0	4,0	6,0	6,0	6,0		
RESISTANCE per PHASE	Ohm		0,52	0,54	0,88	0,33	0,37	0,55	0,39	0,6	0,8		
INDUCTANCE per PHASE	mH		1,2	2,0	4,0	0,75	1,1	2,7	3,0	6,5	8,68		
HOLDING TORQUE	N·m		0,64	1,0	1,5	0,88	1,28	2,4	4,5	8,5	12		
ROTOR INERTIA	g·cm ²		180	280	520	240	490	690	1800	3600	5400		
WEIGHTS	g		500	720	1150	600	1000	1300	2300	3800	5300		
LENGTH(L)	mm		46	55	80	47	56	85	78	117	155		
PERMISSIBLE OVERHUNG LOAD (DISTANCE FROM END OF SHAFT)	3mm	N	52	52	52	70	70	70	270	270	270		
	8mm		65	65	65	87	87	87	300	300	300		
	13mm		85	85	85	114	114	114	350	350	350		
	18mm		123	123	123	165	165	165	400	400	400		
PERMISSIBLE THRUST LOAD	N		Lower than motor weight										
INSULATION RESISTANCE	Mohm		100 MIN.(at 500VDC)										
INSULATION CLASS	-		CLASS B(130°C)										
OPERATING TEMPERATURE	°C		0 to 55										

3.2 Motor Dimension

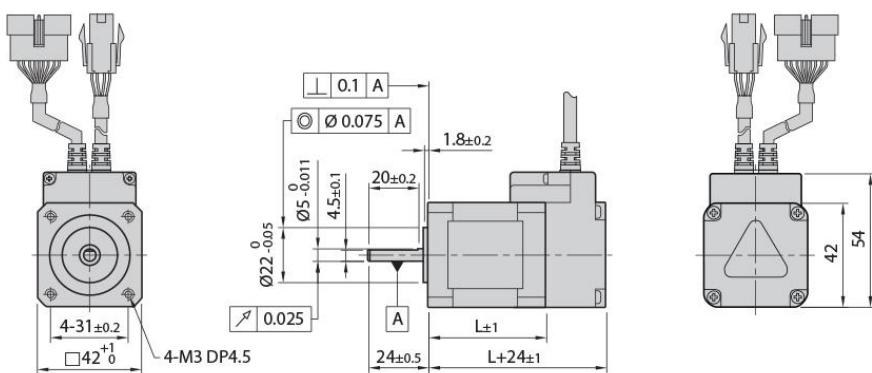


3.2. Motor Dimension



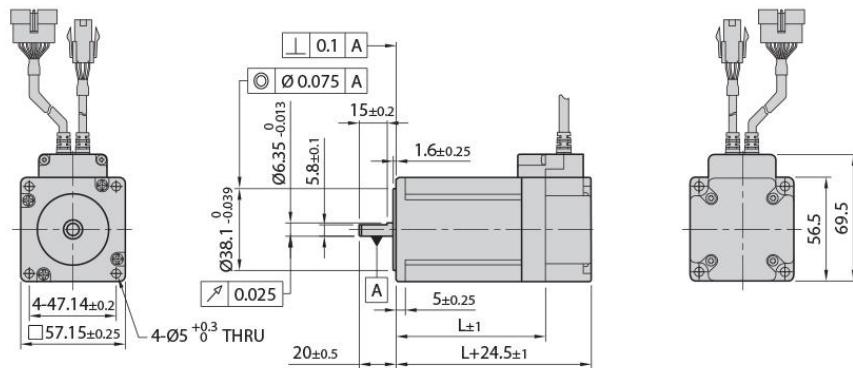
35mm
(Stopper type)

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



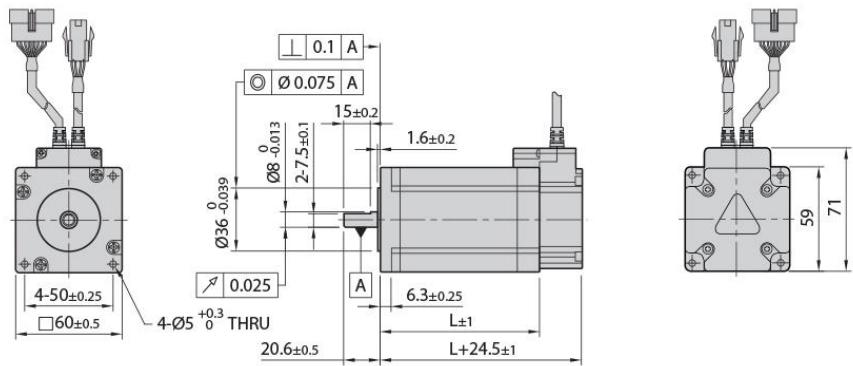
42mm

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



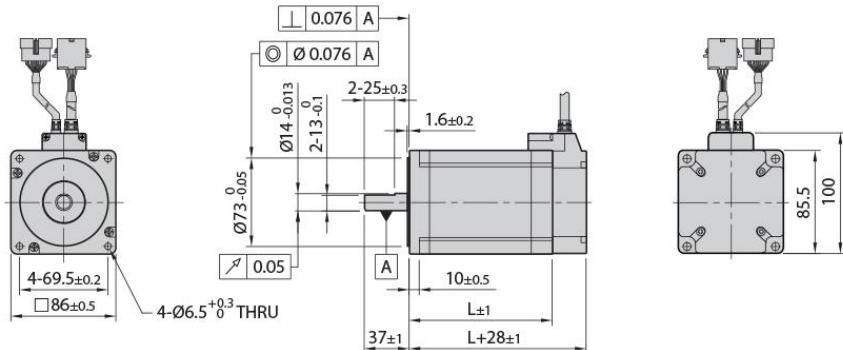
56mm

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



60mm

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



86mm

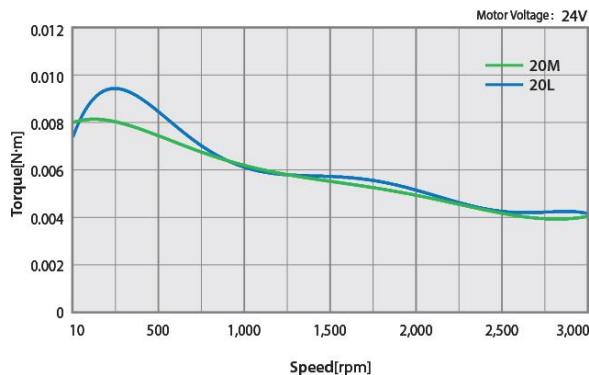
Model name	Length(L)
EzM-86M	78
EzM-86L	117
EzM-86XL	155

3.3. Motor Torque

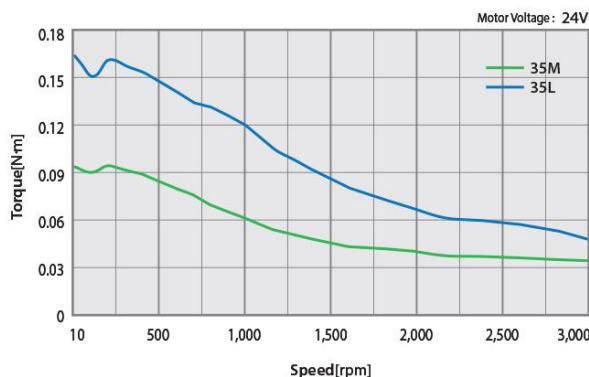
3.3 Motor Torque

3.3.1 Ezi-SERVO Plus-R

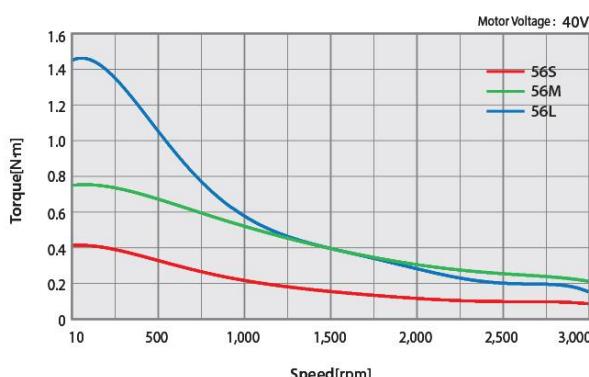
Ezi-SERVO-PR-20 series



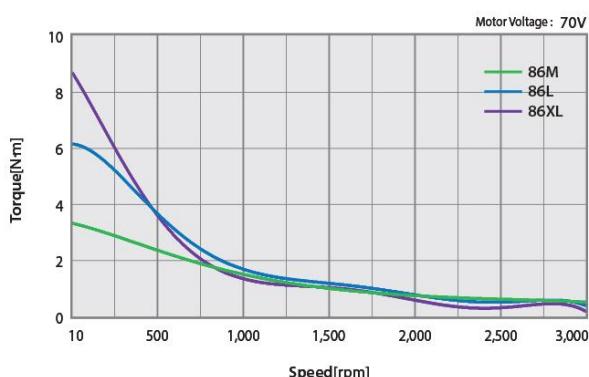
Ezi-SERVO-PR-35 series



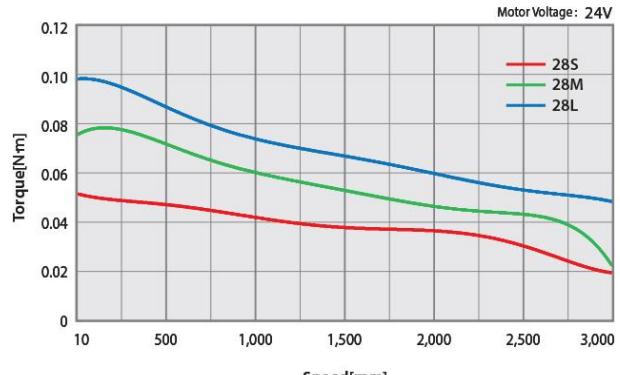
Ezi-SERVO-PR-56 series



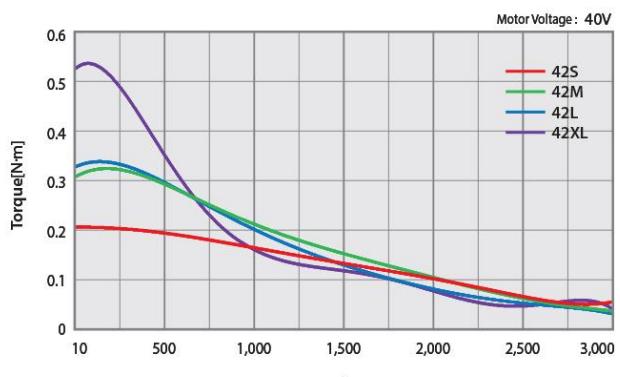
Ezi-SERVO-PR-86 series



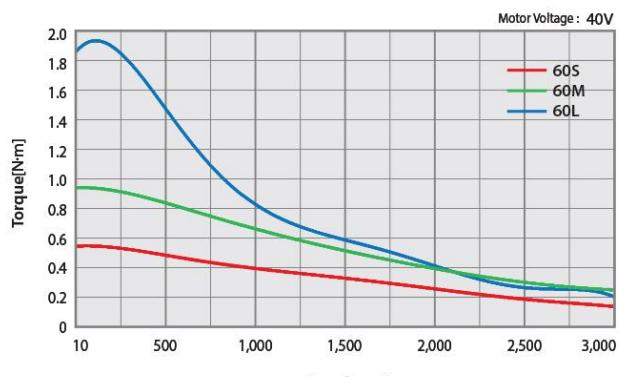
Ezi-SERVO-PR-28 series



Ezi-SERVO-PR-42 series



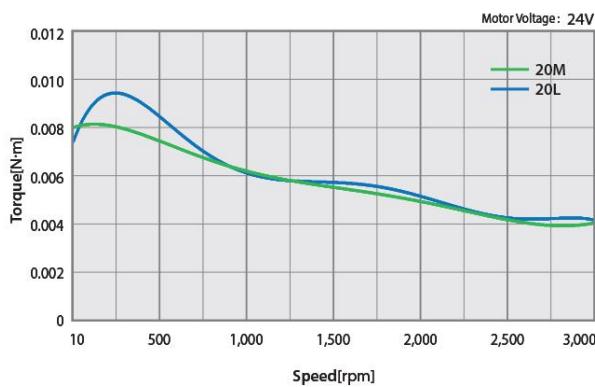
Ezi-SERVO-PR-60 series



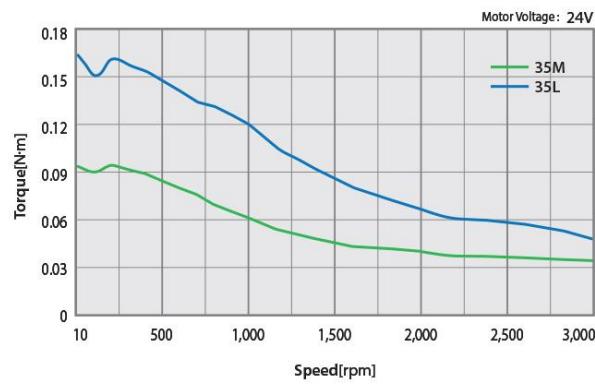
3.3. Motor Torque

3.3.2 Ezi-SERVO Plus-R MINI

Ezi-SERVO-PR-MI-20 series

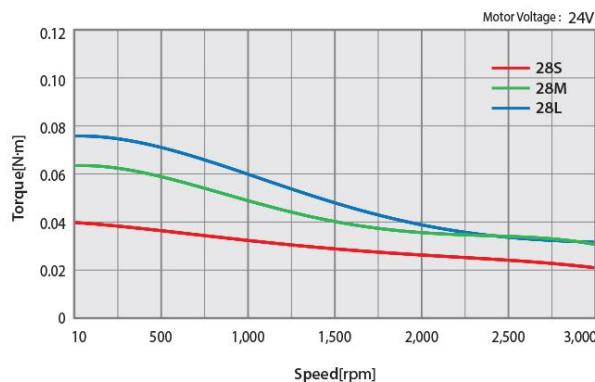


Ezi-SERVO-PR-MI-35 series

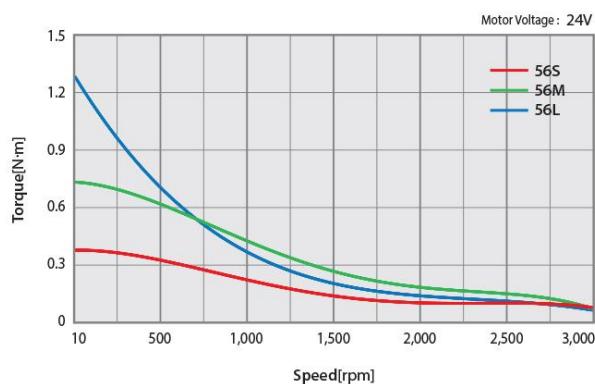


3.3.3 Ezi-SERVO Plus-R ALL series

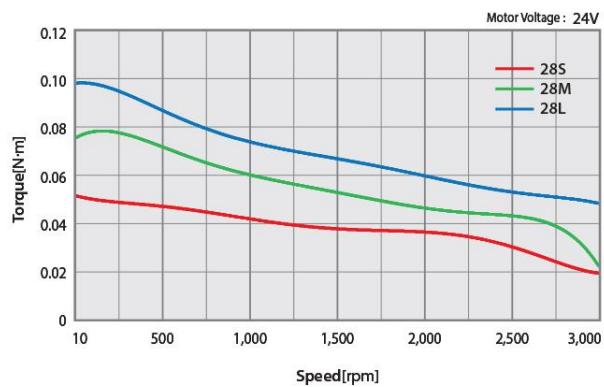
Ezi-SERVO-ALL-28 series



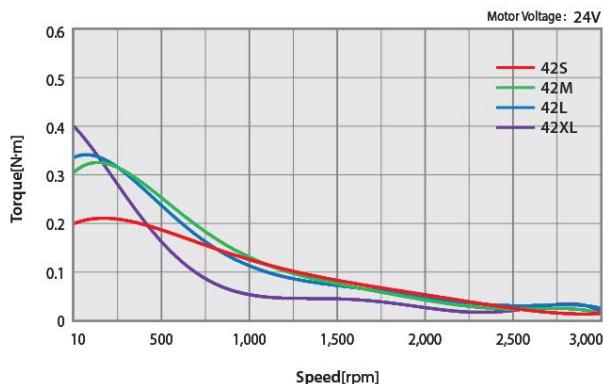
Ezi-SERVO-ALL-56 series



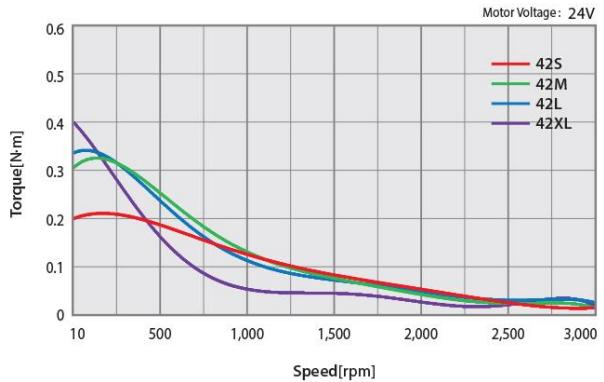
Ezi-SERVO-PR-MI-28 series



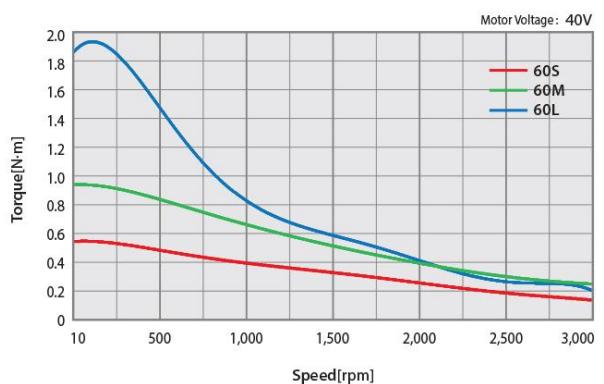
Ezi-SERVO-PR-MI-42 series



Ezi-SERVO-ALL-42 series



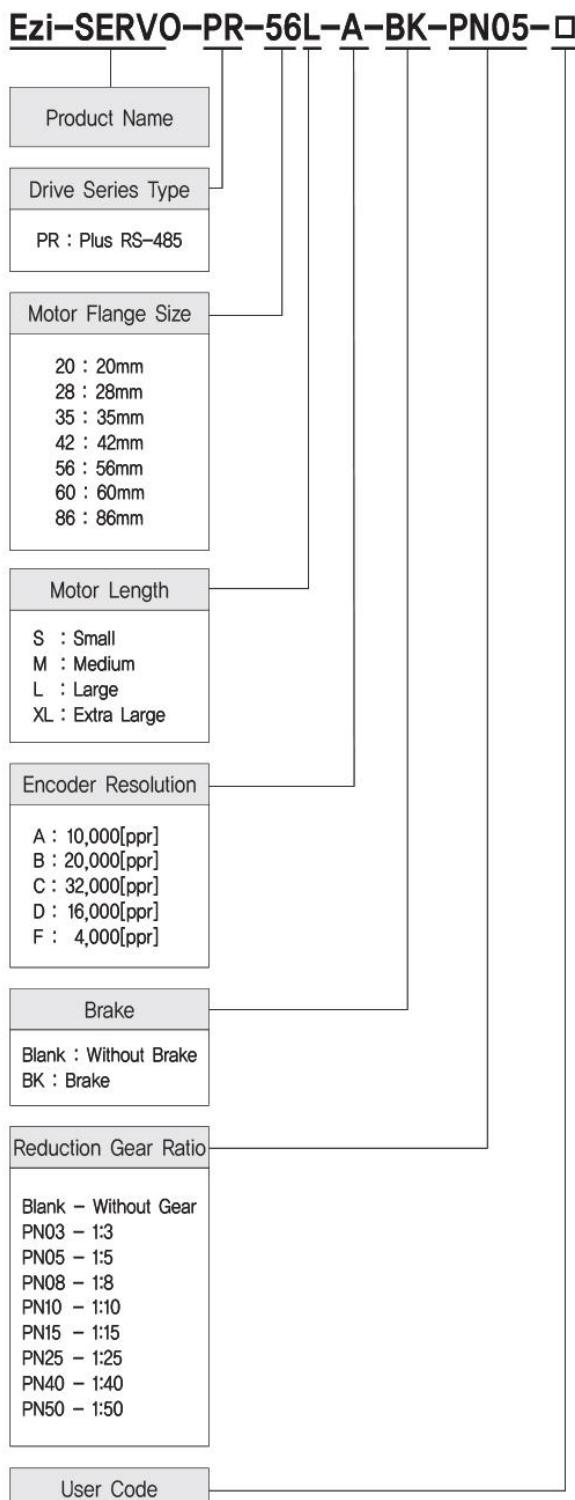
Ezi-SERVO-ALL-60 series



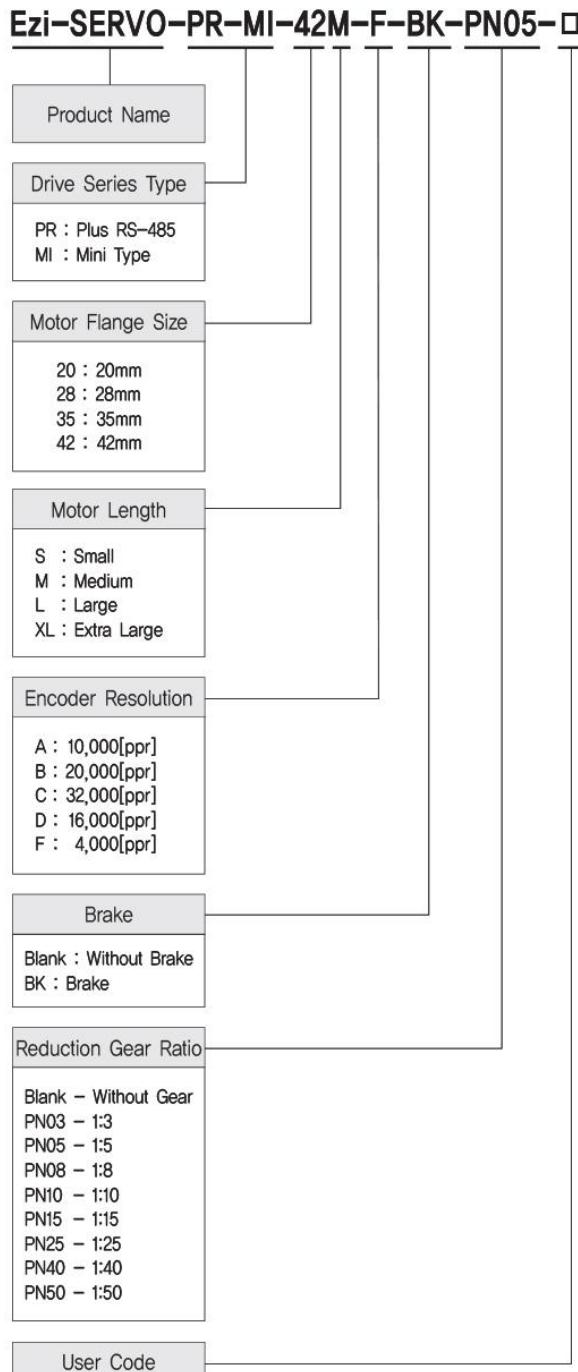
4. Configuration of the System

4.1 Part Numbering

1) Ezi-SERVO Plus-R

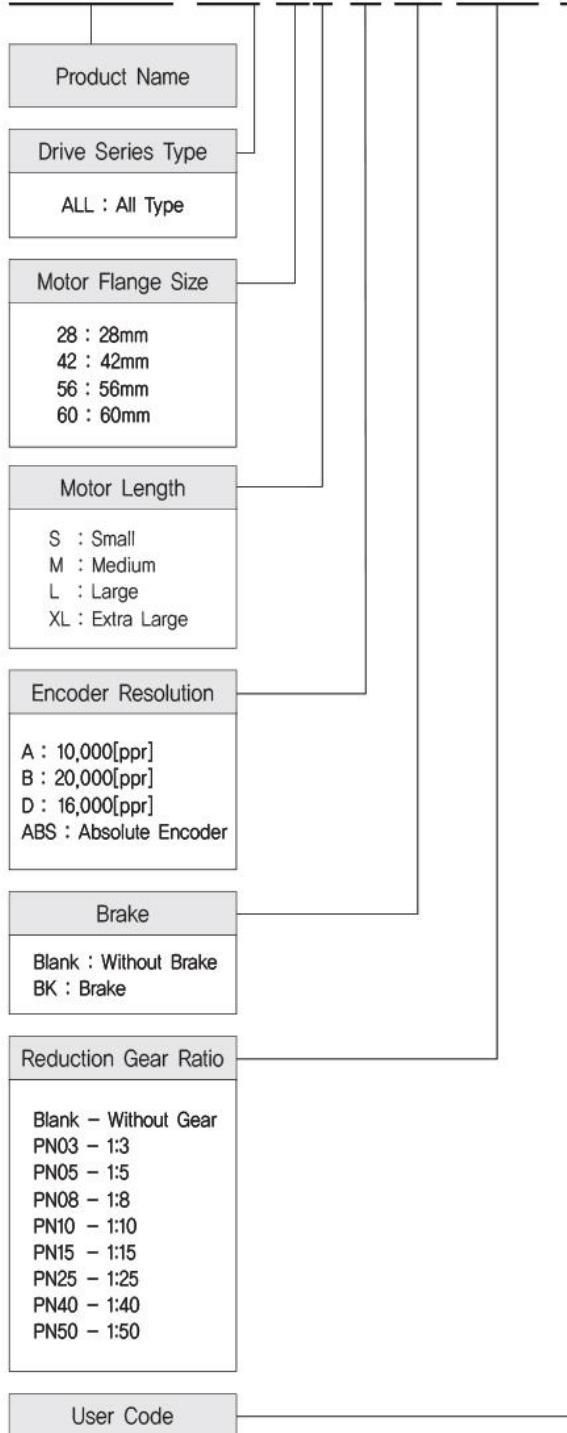


2) Ezi-SERVO Plus-R MINI



3) Ezi-SERVO ALL series

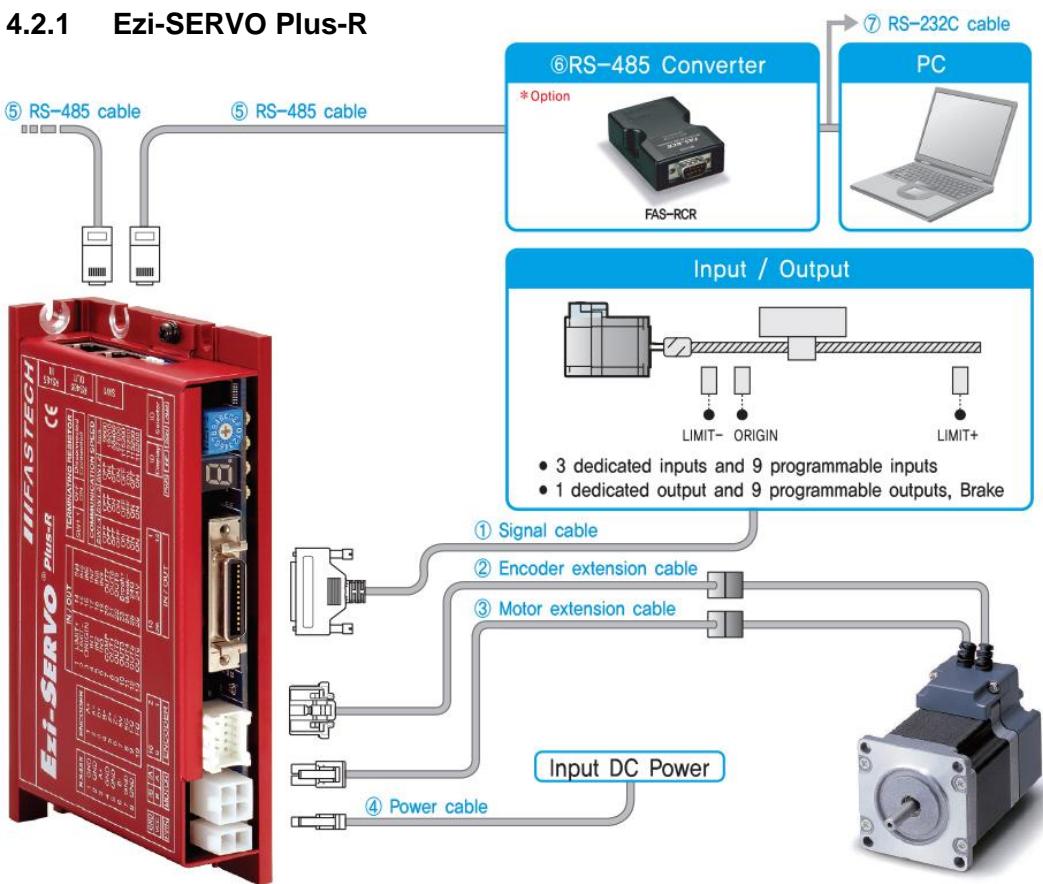
Ezi-SERVO-ALL-42S-A-BK-PN05-□



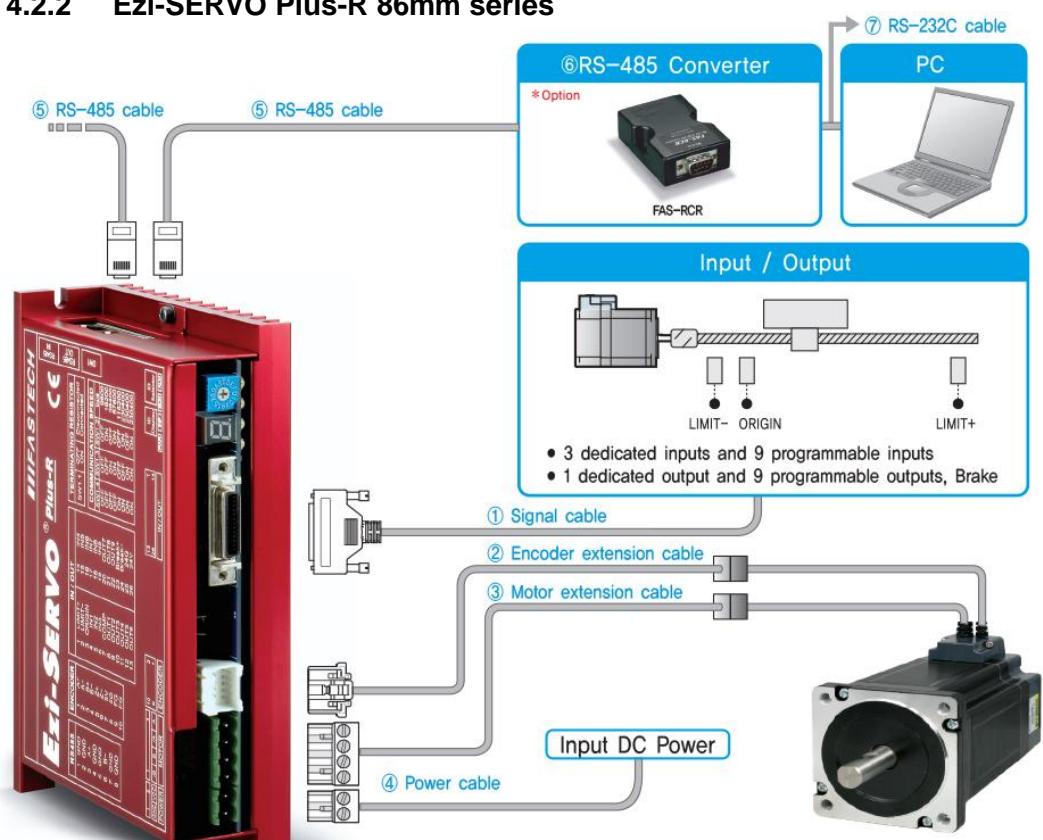
4.2. System Configuration

4.2 System Configuration

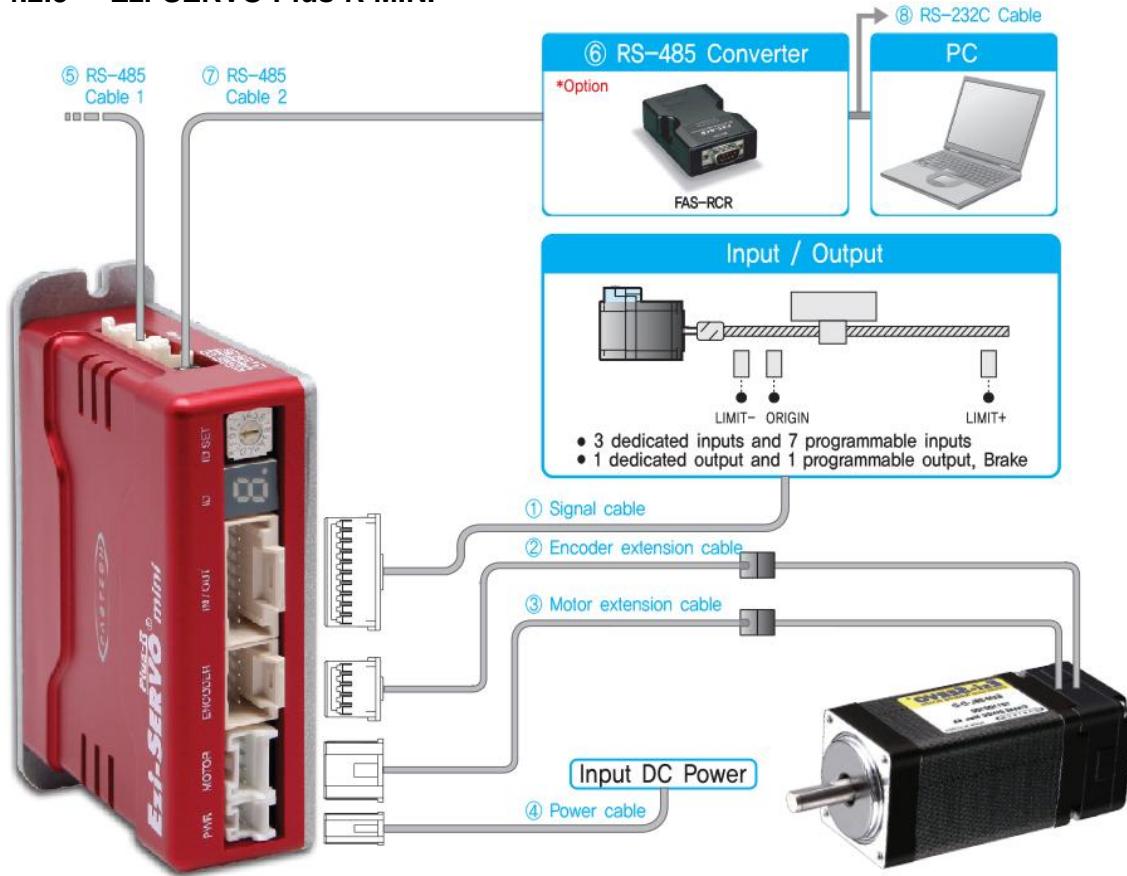
4.2.1 Ezi-SERVO Plus-R



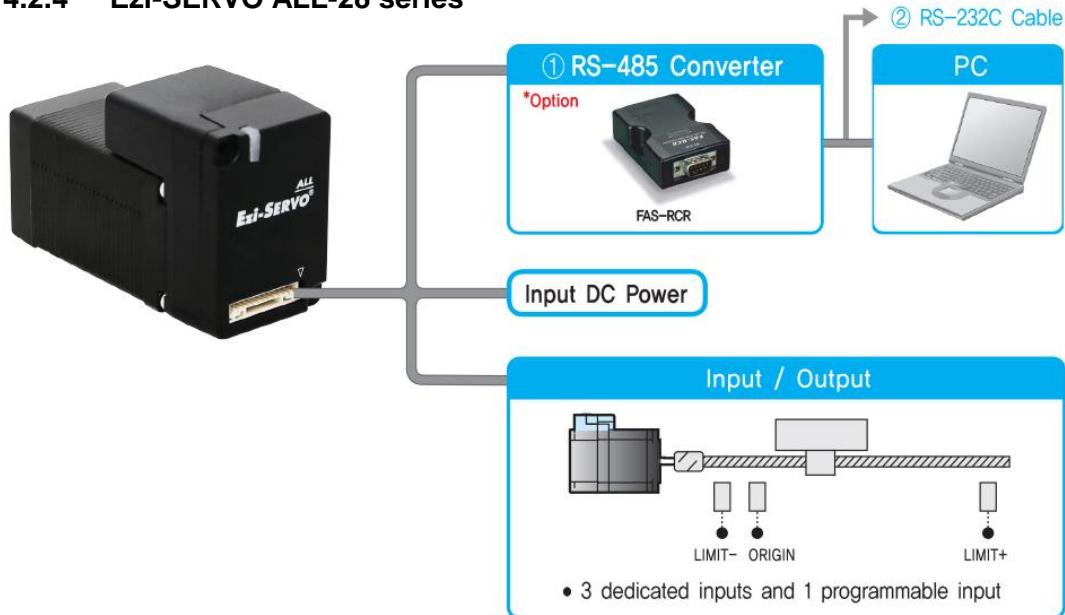
4.2.2 Ezi-SERVO Plus-R 86mm series



4.2.3 Ezi-SERVO Plus-R MINI

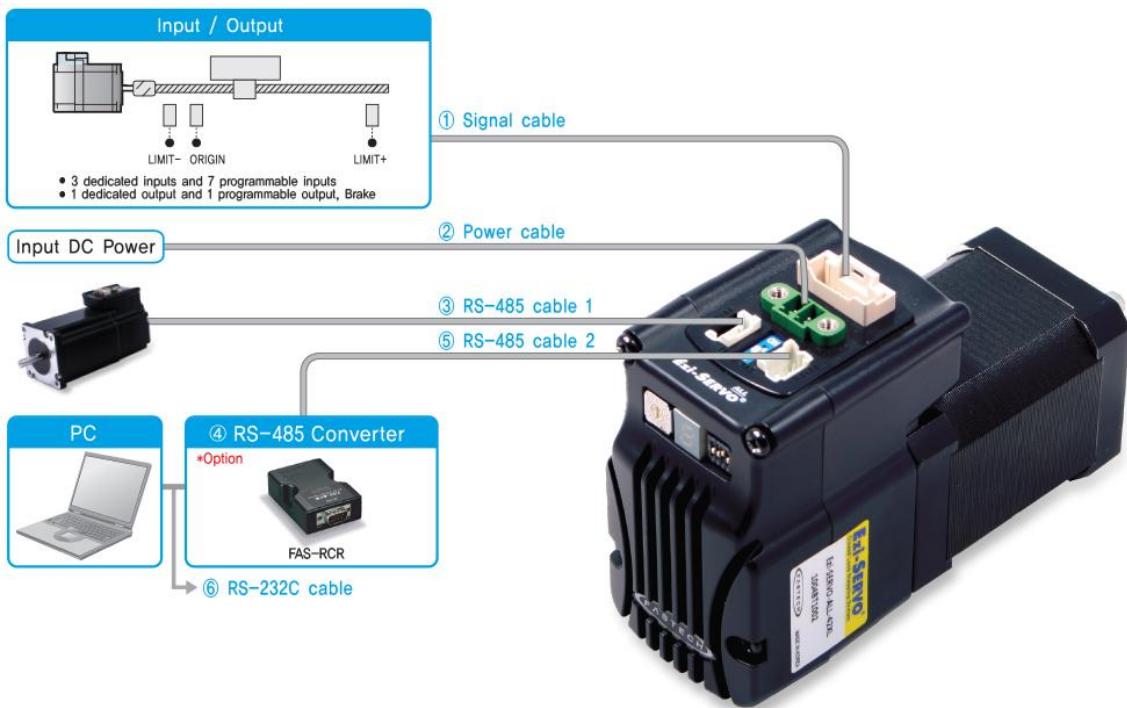


4.2.4 Ezi-SERVO ALL-28 series



4.2. System Configuration

4.2.5 Ezi-SERVO ALL-42/56 series

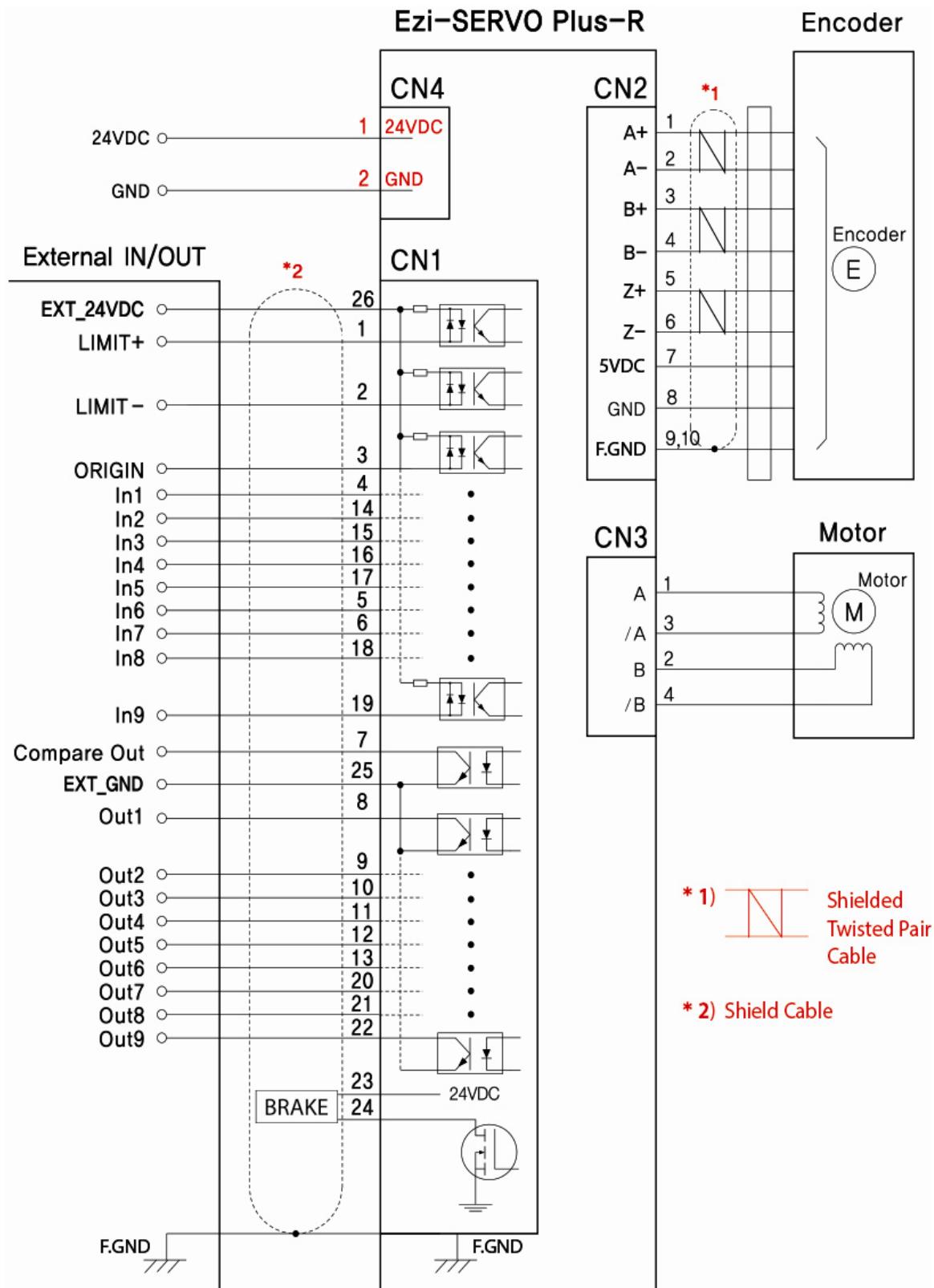


4.2.6 Ezi-SERVO ALL-60/60-ABS series



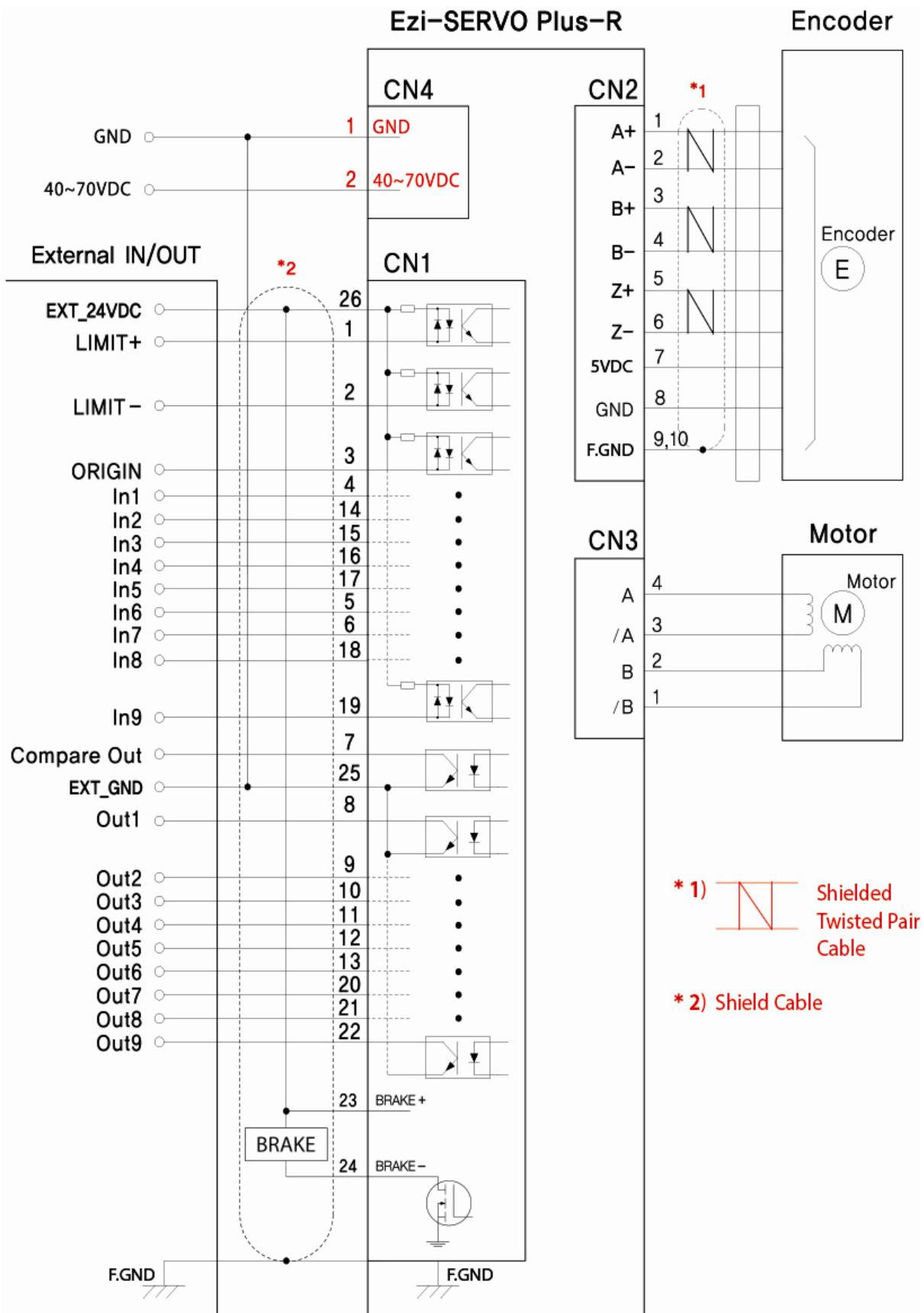
4.3 External Wiring Diagram

4.3.1 Ezi-SERVO Plus-R

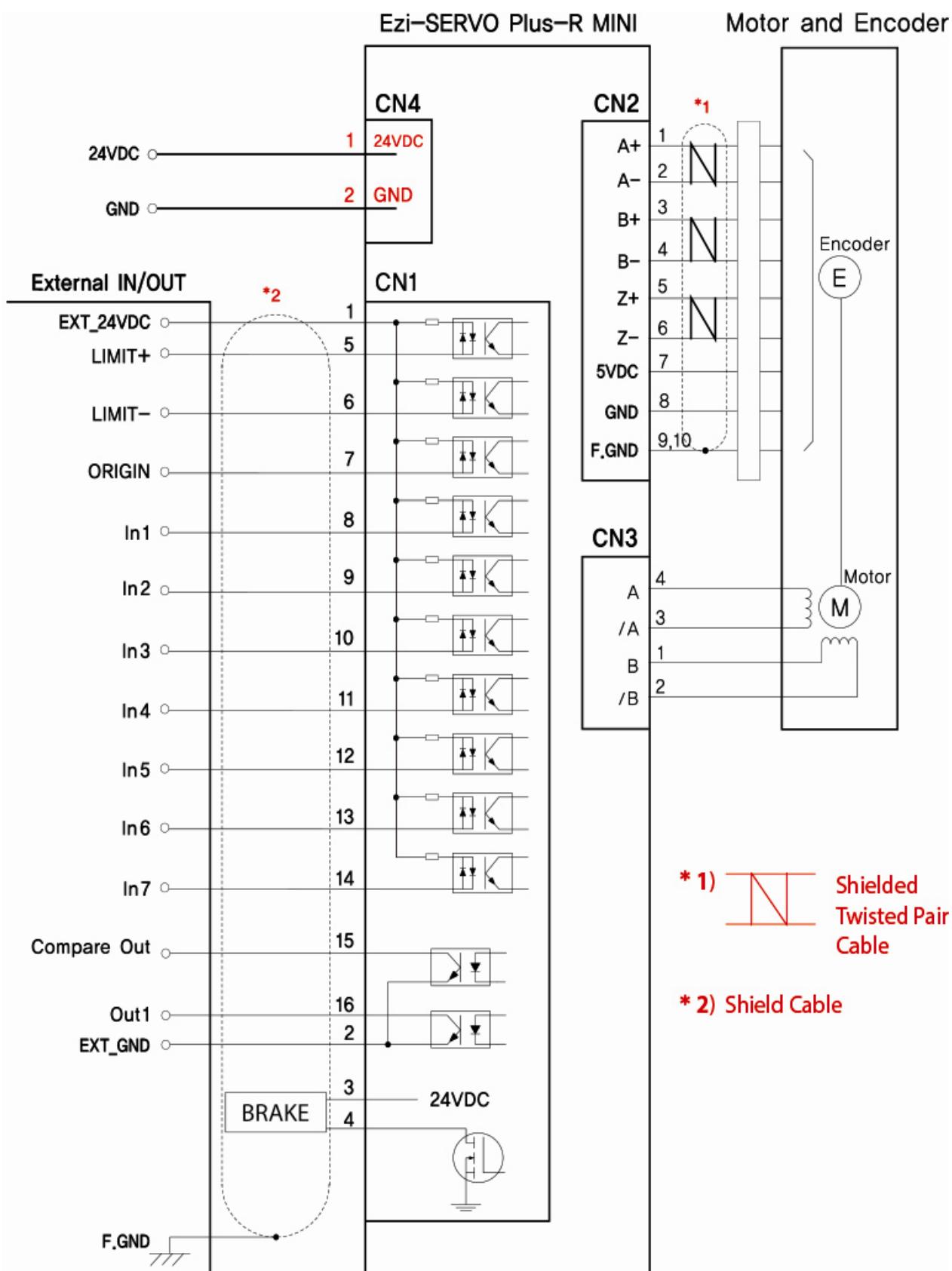


4.3. External Wiring Diagram

4.3.2 Ezi-SERVO Plus-R 86mm

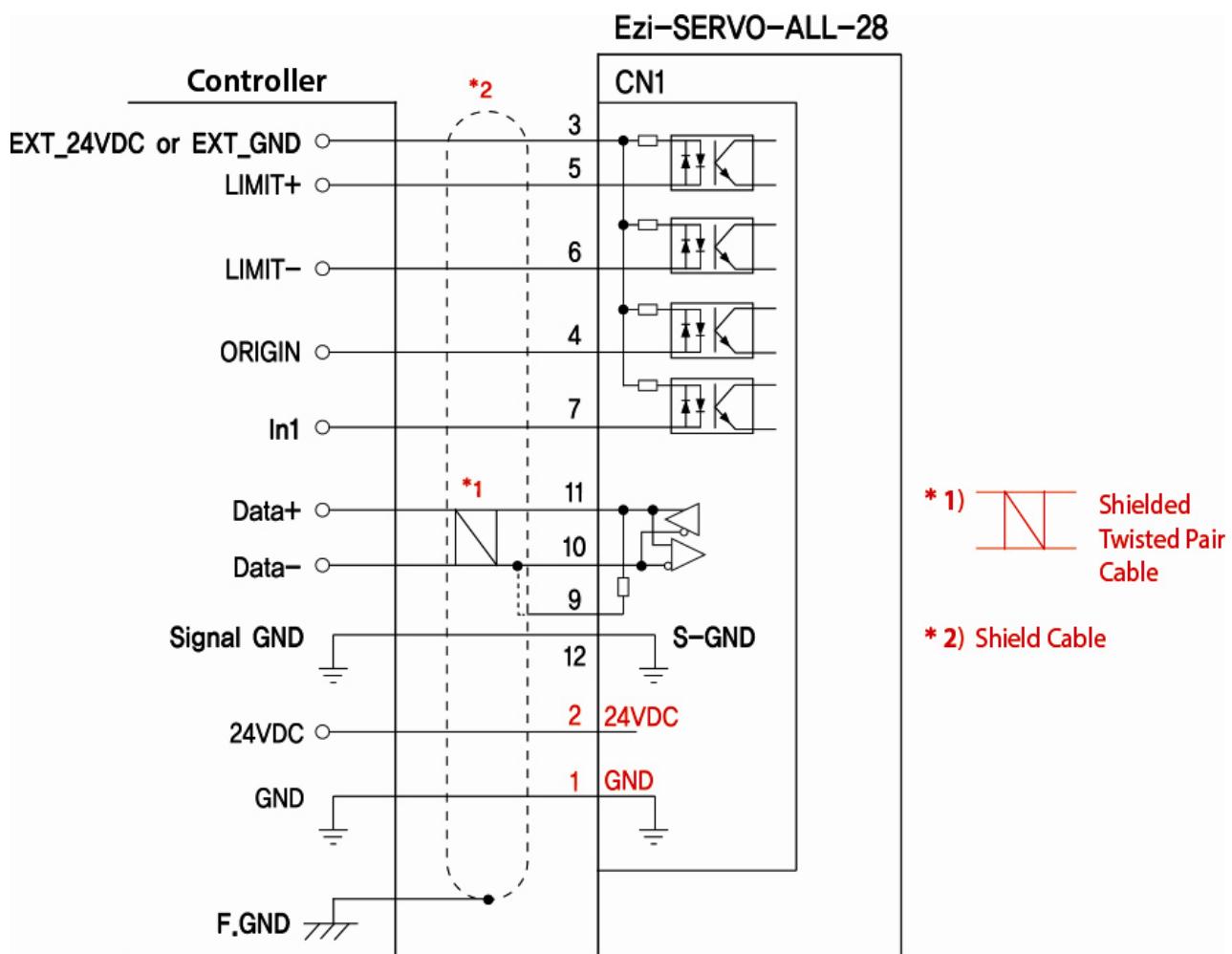


4.3.3 Ezi-SERVO Plus-R MINI

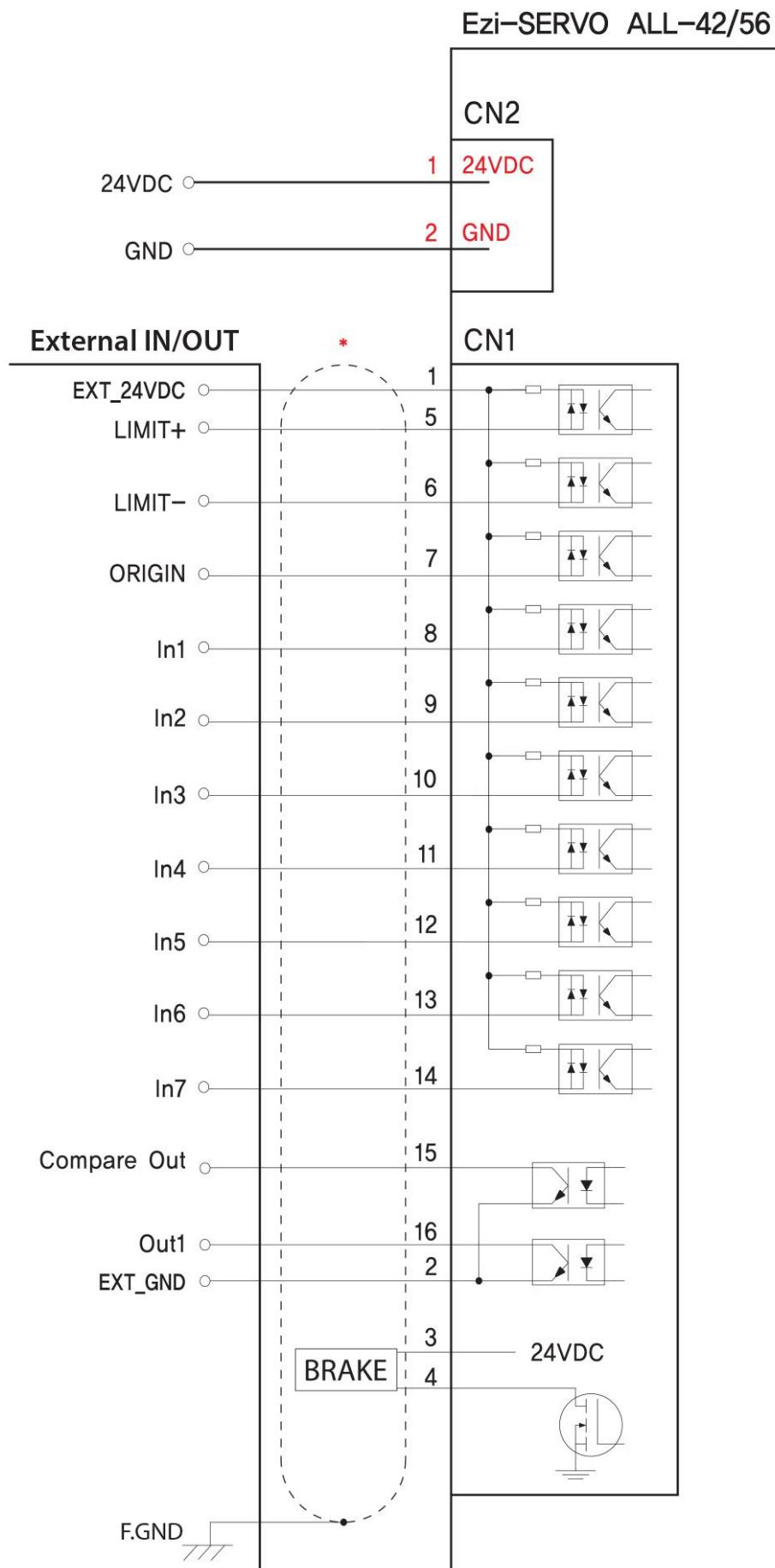


4.3. External Wiring Diagram

4.3.4 Ezi-SERVO ALL-28 series

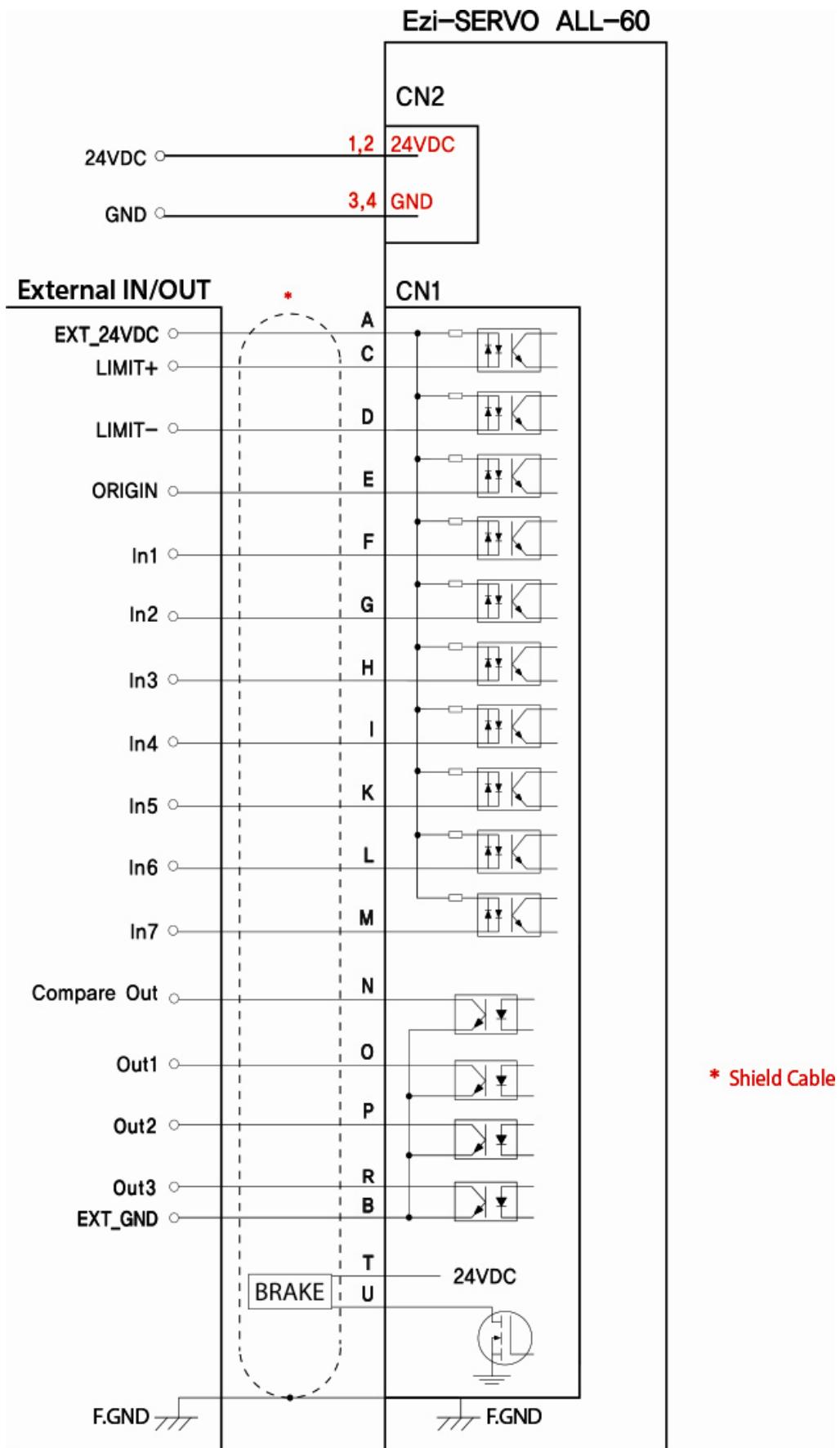


4.3.5 Ezi-SERVO ALL-42/56 series

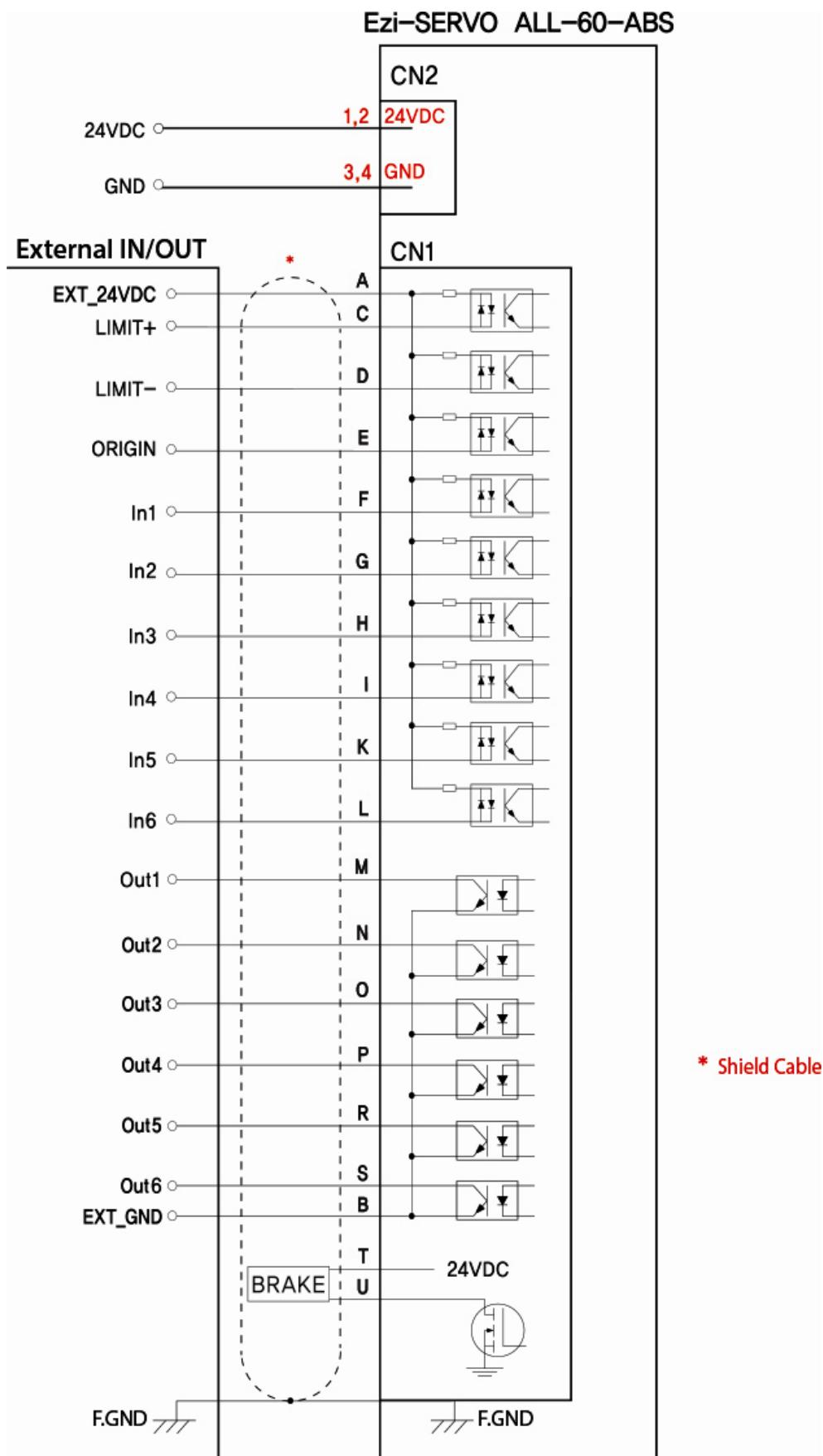


4.3. External Wiring Diagram

4.3.6 Ezi-SERVO ALL-60 series



4.3.7 Ezi-SERVO ALL-60-ABS

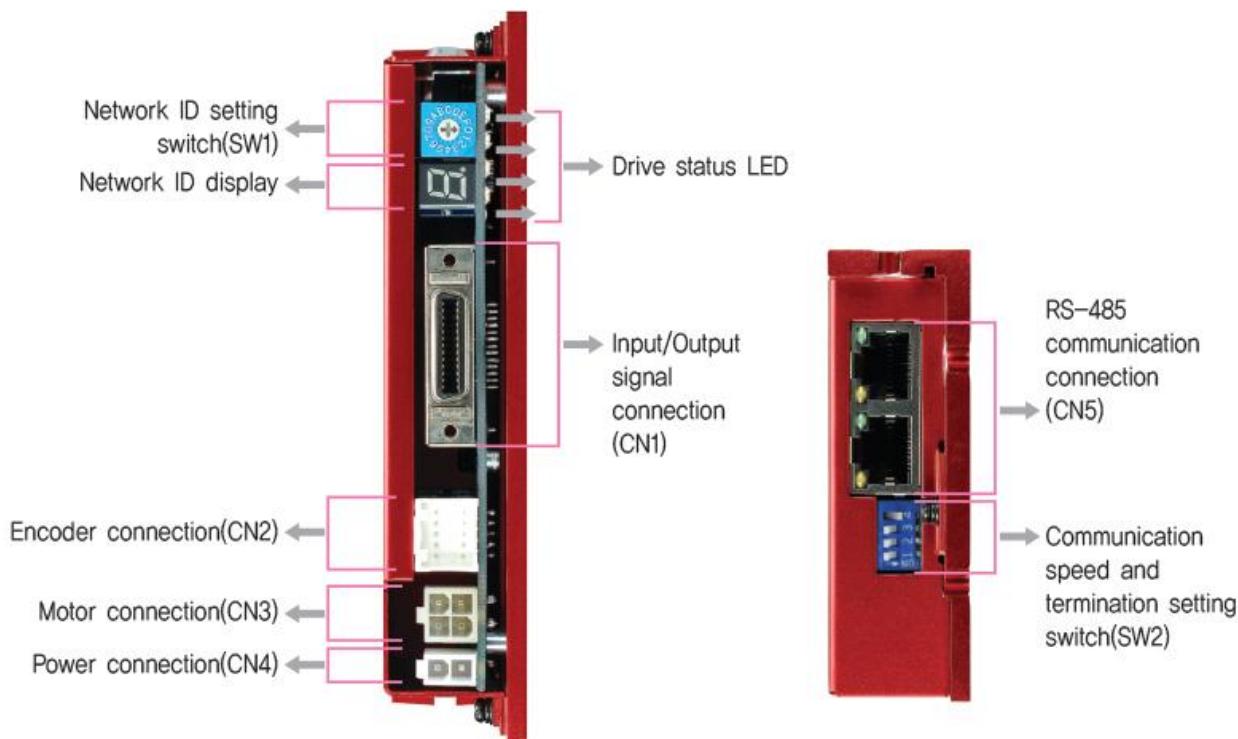


5. Setting and Operation

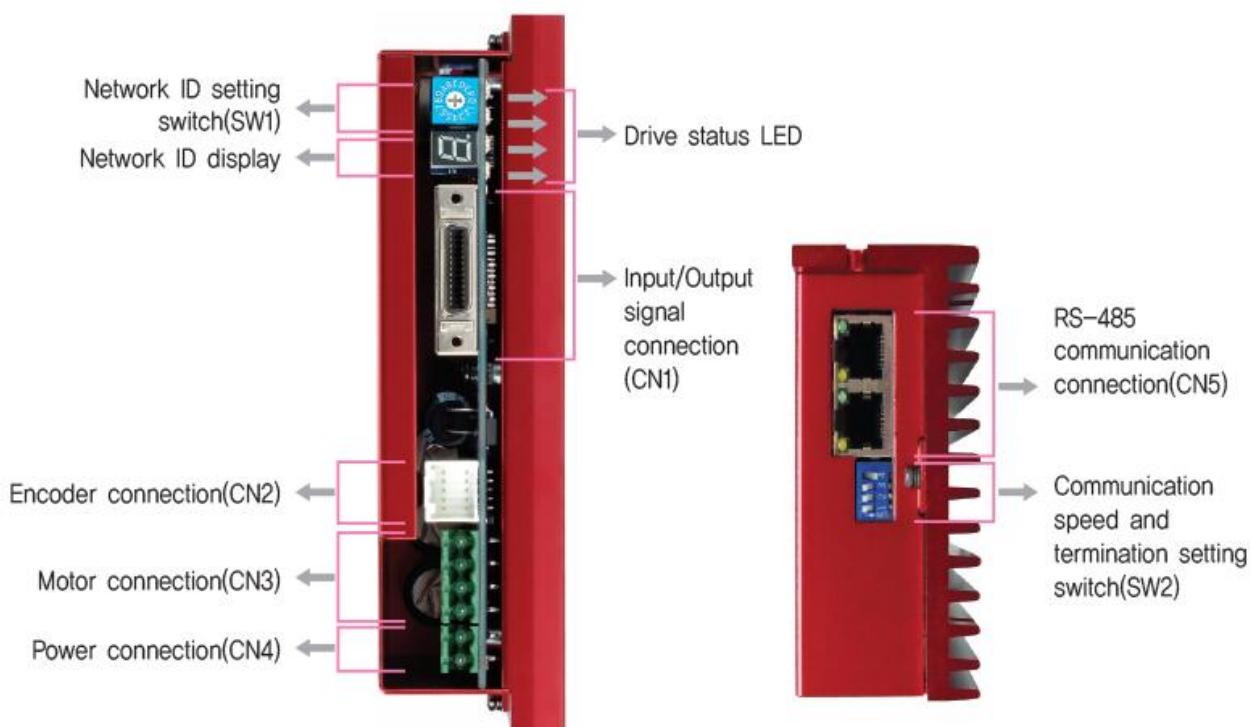
5.1 Ezi-SERVO Plus-R

1) Appearance and Part Name

◆ Ezi-SERVO Plus-R-20/28/35/42/56/60



◆ Ezi-SERVO Plus-R-86



2) Drive status LED

Indication	Color	Function	ON/OFF Condition
PWR	Green	Power input indication	LED is turned ON when power is applied
INP	Yellow	Complete Positioning Motion	Lights On when Positioning error reaches within the preset pulse selected by parameter
SON	Orange	Servo On/Off Indication	Servo On: Lights On, Servo Off: Lights Off
ALM	Red	Alarm indication	Flash when protection function is activated (Identifiable which protection mode is activated by counting the blinking times)

◆ Protection functions and LED flash times

Times	Protection	Conditions
1	Over Current Error	The current through power devices in drive exceeds the limit value ^{*1}
2	Over Speed Error	Motor speed exceeds 3,000 [rpm]
3	Position Tracking Error	Position error value is higher than 90° in motor run state ^{*2}
4	Over Load Error	The motor is continuously operated more than 5 seconds under a load exceeding the max. torque
5	Over Temperature Error	Inside temperature of drive exceeds 85°C
6	Over Regeneratived Voltage Error	Back-EMF is higher than limit value ^{*3}
7	Motor Connect Error	The power is ON without connection of the motor cable to drive
8	Encoder Connect Error	Cable connection error in Encoder connection of drive
10	In-Position Error	After operation is finished, position error more than 1 pulse is continued for more than 3 seconds
11	System Error	Error occurs in drive system
12	ROM Error	Error occurs in parameter storage device(ROM)
15	Position Overflow Error	Position error value is higher than 90° in motor stop state ^{*2}



Alarm LED flash
(Ex, Position Tracking Error)

*1 : Limit value depends on motor model
(Refer to the Manual)

*2 : Limit value can be change by parameter

*3 : Voltage limit of Back-EMF depends on motor model (Refer to the Manual)

※ For the details, please refer to the Manual.

3) Network ID Setting Switch(SW1)

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



※ Maximum 16 axis can be connected in one network.

4) Communication Speed and Termination Setting Switch(SW2)

Termination Setting Switch(SW2.1)

The drive installed at the end of the network must be terminated for reliable operation. Please termination setting switch is ON if drive installed at the end of the network.

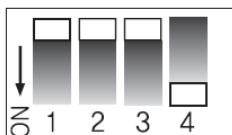
Speed Setting Switch(SW2.2~SW2.4)

SW2.2~SW2.4 used for setting speed as follows

5.1. Ezi-SERVO Plus-R

SW2.1	SW2.2	SW2.3	SW2.4	Baud Rate[bps]
-	OFF	OFF	OFF	9,600
-	ON	OFF	OFF	19,200
-	OFF	ON	OFF	38,400
-	ON	ON	OFF	57,600
-	OFF	OFF	ON	115,200*1
-	ON	OFF	ON	230,400
-	OFF	ON	ON	460,800
-	ON	ON	ON	921,600

*1 : Default setting value



Speed setting switch
Termination setting switch



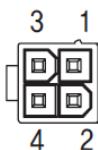
■ The communication speed of drive modules connected to one network must be set with same value.



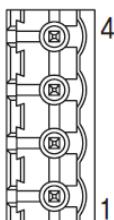
■ Support max. 115200[bps] when using RS-232 to RS-485 converter.

5) Motor Connector(CN3)

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



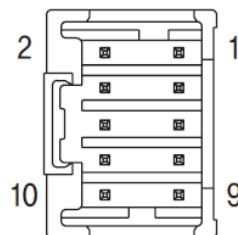
NO.	Function	I/O
1	/B Phase	Output
2	B Phase	Output
3	/A Phase	Output
4	A Phase	Output



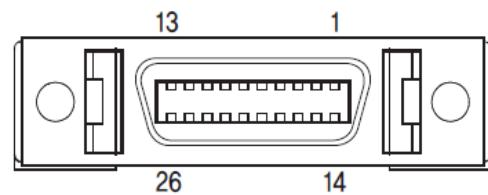
※Only for 86mm motor drive.

6) Encoder Connector(CN2)

NO.	Function	I/O
1	A+	Input
2	A-	Input
3	B+	Input
4	B-	Input
5	Z+	Input
6	Z-	Input
7	5VDC	Output
8	GND	Output
9	F.GND	-----
10	F.GND	-----

**7) Input/Output Signal Connector(CN1)**

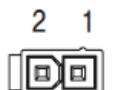
NO.	Function	I/O
1	LIMIT+	Input
2	LIMIT-	Input
3	ORIGIN	Input
4	Digital In1	Input
5	Digital In6	Input
6	Digital In7	Input
7	Compare Out	Output
8	Digital Out1	Output
9	Digital Out2	Output
10	Digital Out3	Output
11	Digital Out4	Output
12	Digital Out5	Output
13	Digital Out6	Output
14	Digital In2	Input
15	Digital In3	Input
16	Digital In4	Input
17	Digital In5	Input
18	Digital In8	Input
19	Digital In9	Input
20	Digital Out7	Output
21	Digital Out8	Output
22	Digital Out9	Output
23	BRAKE+	Output
24	BRAKE-	Output
25	EXT_GND	Input
26	EXT_24VDC	Input



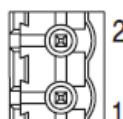
5.1. Ezi-SERVO Plus-R

8) Power Connector(CN4)

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



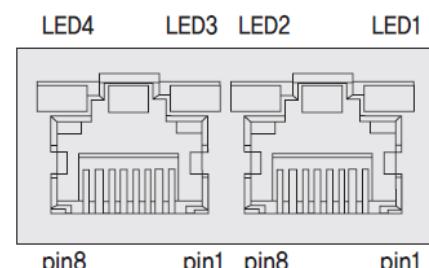
NO.	Function	I/O
1	GND	Input
2	40~70VDC	Input



※Only for 86mm motor drive.

9) RS-485 Communication Connector(CN5)

NO.	Function	NO.	Function
1	GND	6	Data-
2	GND	7	GND
3	Data+	8	GND
4	GND	LED 1, 3	Drive status
5	GND	LED 2, 4	Communication status



10) Connector Specifications

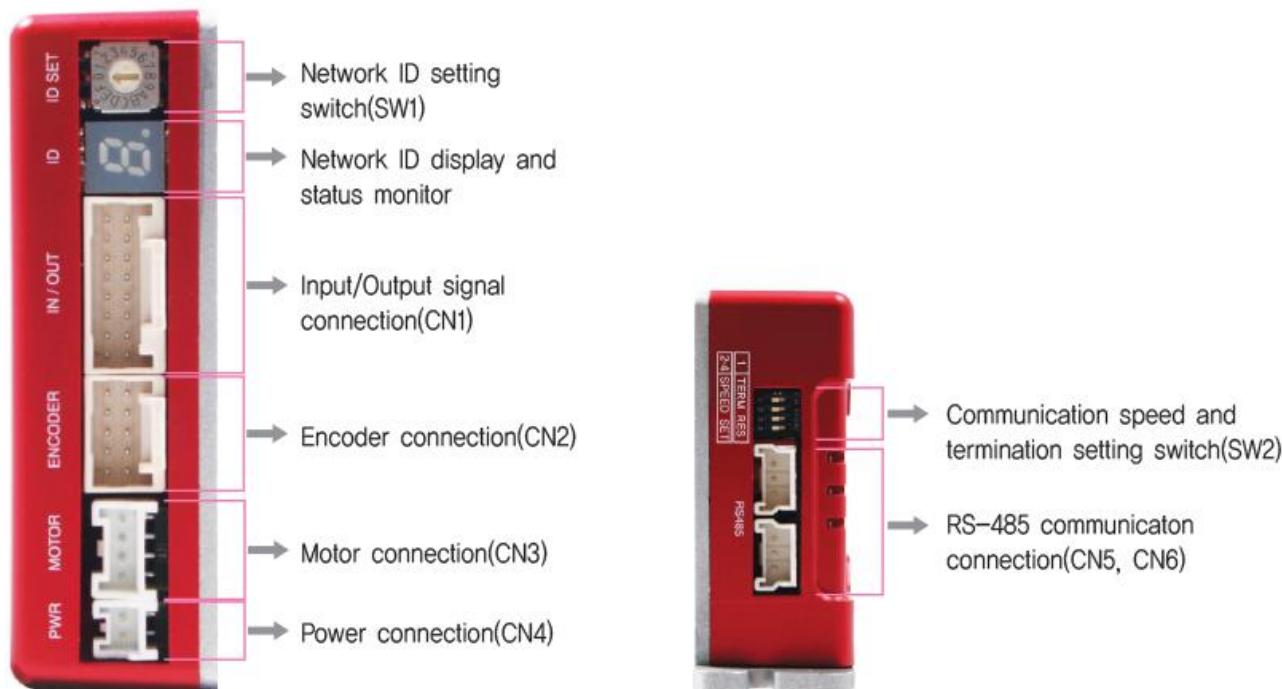
Connector specifications for cabling to drive.

Purpose		Item	Part Number	Manufacturer
Power (CN4)		Housing Terminal	5557-02R 5556T	MOLEX
Motor	Drive Side (CN3)	Housing Terminal	5557-04R 5556T	MOLEX
	Motor Side	Housing Terminal	5557-04R 5556T	MOLEX
Encoder	Drive Side (CN2)	Housing Terminal	51353-1000 56134-9000	MOLEX
	Encoder Side	Housing Terminal	SMP-09V-NC SHF-001T-0.8BS	JST
Signal (CN1)		Connector Backshell	10126-3000PE 10326-52F0-008	3M

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

5.2 Ezi-SERVO Plus-R MINI

1) Appearance and Part Name



2) Protection Functions and 7-Segment Flash Times

Times	Protection	Conditions
1	Over Current Error	The current through power devices in drive exceeds 4,8A
2	Over Speed Error	Motor speed exceeds 3,000 [rpm]
3	Position Tracking Error	Position error value is higher than 90° in motor run state ^{*1}
4	Over Load Error	The motor is continuously operated more than 5 seconds under a load exceeding the max. torque
5	Over Temperature Error	Inside temperature of drive exceeds 85°C
6	Over Regenerational Voltage Error	Back-EMF is higher than 48V
7	Motor Connect Error	The power is ON without connection of the motor cable to drive
8	Encoder Connect Error	Cable connection error in Encoder connection of drive
10	In-Position Error	After operation is finished, a position error occurs
11	System Error	Error occurs in drive system
12	ROM Error	Error occurs in parameter storage device(ROM)
15	Position Overflow Error	Position error value is higher than 90° in motor stop state ^{*1}



7-Segment flash
(Ex, Position tracking error)

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

※ For the details, please refer to the Manual.

3) Network ID Setting Swirch(SW1)

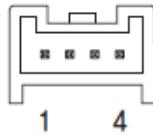
Position	ID Number	Position	ID Number
0	0	8	8
1	1	9	9
2	2	A	10
3	3	B	11
4	4	C	12
5	5	D	13
6	6	E	14
7	7	F	15



※ Maximum 16 axis can be connected in one network.

4) Motor Connector(CN3)

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



5) Communication Speed and Termination Setting Switch(SW2)

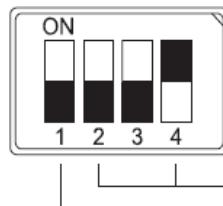
Termination Setting Switch(SW2.1)

The drive installed at the end of the network must be terminated for reliable operation. Please termination setting switch is ON if drive installed at the end of the network.

Speed Setting Switch(SW2.2~SW2.4)

SW2.2~SW2.4 used for setting speed as follows

SW2.1	SW2.2	SW2.3	SW2.4	Baud Rate[bps]
-	OFF	OFF	OFF	9,600
-	ON	OFF	OFF	19,200
-	OFF	ON	OFF	38,400
-	ON	ON	OFF	57,600
-	OFF	OFF	ON	115,200*1
-	ON	OFF	ON	230,400
-	OFF	ON	ON	460,800
-	ON	ON	ON	921,600

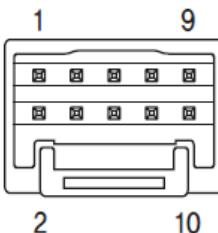


Speed setting switch
Termination setting switch

*1 : Default setting value

6) Encoder Connector(CN2)

NO.	Function	I/O
1	A+	Input
2	A-	Input
3	B+	Input
4	B-	Input
5	Z+	Input
6	Z-	Input
7	5VDC	Output
8	GND	Output
9	F.GND	-----
10	F.GND	-----

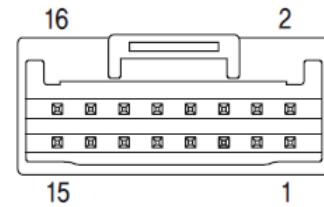


7) Power Connector(CN4)

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

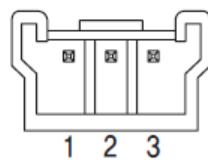
**8) Input/Output Signal Connector(CN1)**

NO.	Function	I/O
1	EXT_24VDC	Input
2	EXT_GND	Input
3	BRAKE+	Output
4	BRAKE-	Output
5	LIMIT+	Input
6	LIMIT-	Input
7	ORIGIN	Input
8	Digital In1	Input
9	Digital In2	Input
10	Digital In3	Input
11	Digital In4	Input
12	Digital In5	Input
13	Digital In6	Input
14	Digital In7	Input
15	Compare Out	Output
16	Digital Out1	Output

**9) RS-485 Communication Connector(CN6)**

RS-485 Communication Port to connect with Host Controller.

NO.	Function
1	Data+
2	Data-
3	GND



10) Connector Specifications

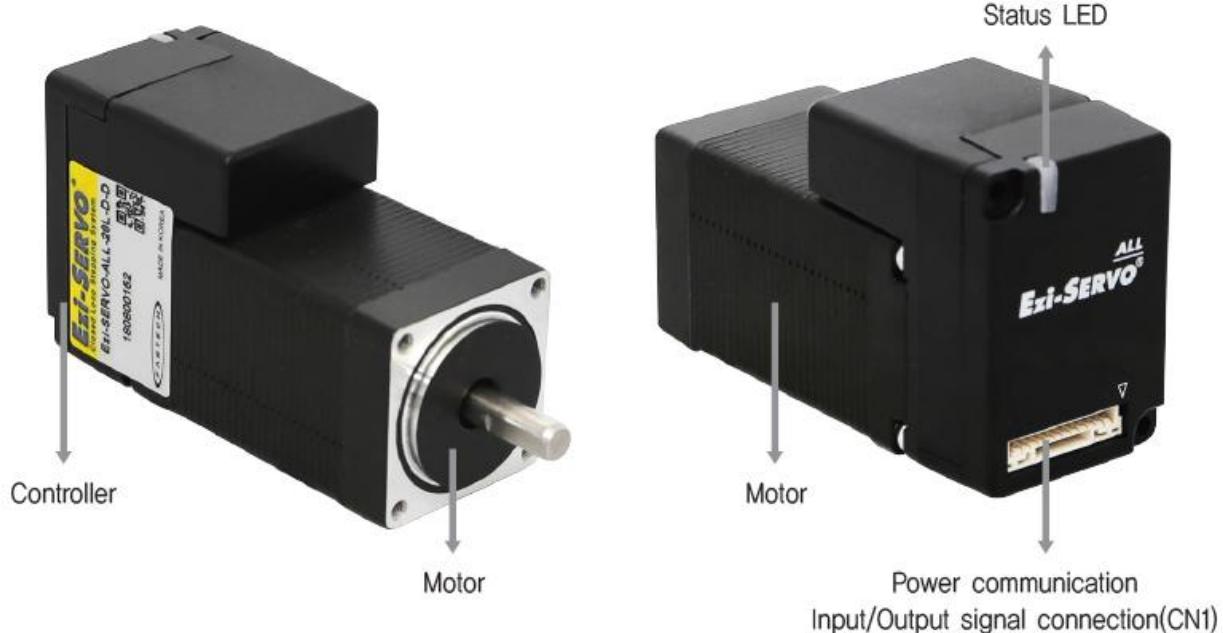
Connector specifications for cabling to drive.

Purpose	Item	Part Number	Manufacturer	
RS-485 Communication (CN5, CN6)	Housing Terminal	35507-0300 50212-8100	MOLEX	
Power (CN4)	Housing Terminal	PAP-02V-S SPHD-001T-P0,5	JST	
Motor	Drive Side (CN3)	Housing Terminal	PAP-04V-S SPHD-001T-P0,5	JST
	Motor Side	Housing Terminal	5557-04R 5556T	MOLEX
Encoder	Drive Side (CN2)	Housing Terminal	501646-1000 501648-1000(AWG 26~28)	MOLEX
	Encoder Side	Housing Terminal	SMP-09V-NC SHF-001T-0,8BS	JST
Signal (CN1)	Housing Terminal	501646-1600 501648-1000(AWG 26~28)	MOLEX	

* Above connector is the most suitable product for the drive applied. Another equivalent connector can be used.

5.3 Ezi-SERVO ALL-28

1) Appearance and Part Name



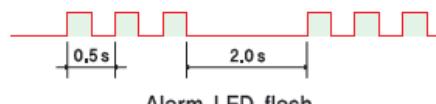
2) Drive status LED

In the case of Ezi-SERVO-ALL-28 series products, LED can be checked by LED color, lighting, On/Off and blinking.

Status	LED	Description
Disable	Green : Red :	Green light flashing, Red light off
Enable	Green : Red :	Green light on, Red light off
Enable & Communication	Green : Red :	Green light on, Red light flashing
In motion	Green : Red :	Green light on, Red light on
In-position deviation	Green : Red :	Green and Red light alternately flashing
Alarm	Green : Red :	Red light flashing repeatedly as many as alarm number

◆ Protection functions and LED flash times

Times	Protection	Conditions
1	Over Current Error	The current through power devices in inverter exceeds the 4.8A
2	Over Speed Error	Motor speed exceeds 3,000 [rpm]
3	Position Tracking Error	Position error value is higher than 90° in motor run status *1
4	Over Load Error	The motor is continuously operated more than 5 seconds under a load exceeding the max. torque
5	Over Temperature Error	Inside temperature of drive is abnormally high
6	Over Regenerativd Voltage Error	Back-EMF is higher than 48V
7	Motor Connect Error	The power is ON without connection of the motor cable to drive
8	Encoder Connect Error	Cable connection error with Encoder connection in drive
10	In-Position Error	After operation is finished, a position error occurs
12	ROM Error	Error occurs during tuning execution
15	Position Overflow Error	Position error value is higher than 90° in motor stop state *1



Alarm LED flash
(Ex, Position tracking error)

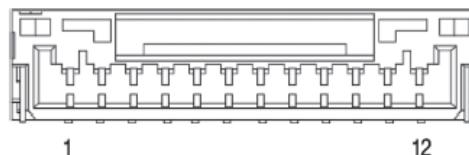
*1 : Default value can be changed by parameter(Refer of the Manual)

3) Termination Setting

When pin 9 and pin 10 of the connector(CN1) are connected externally, the drive is set to the end of the network. If the drive is connected to the end of the communication network, set it to the termination.

4) Power Communication Input/Output Signal Connector(CN1)

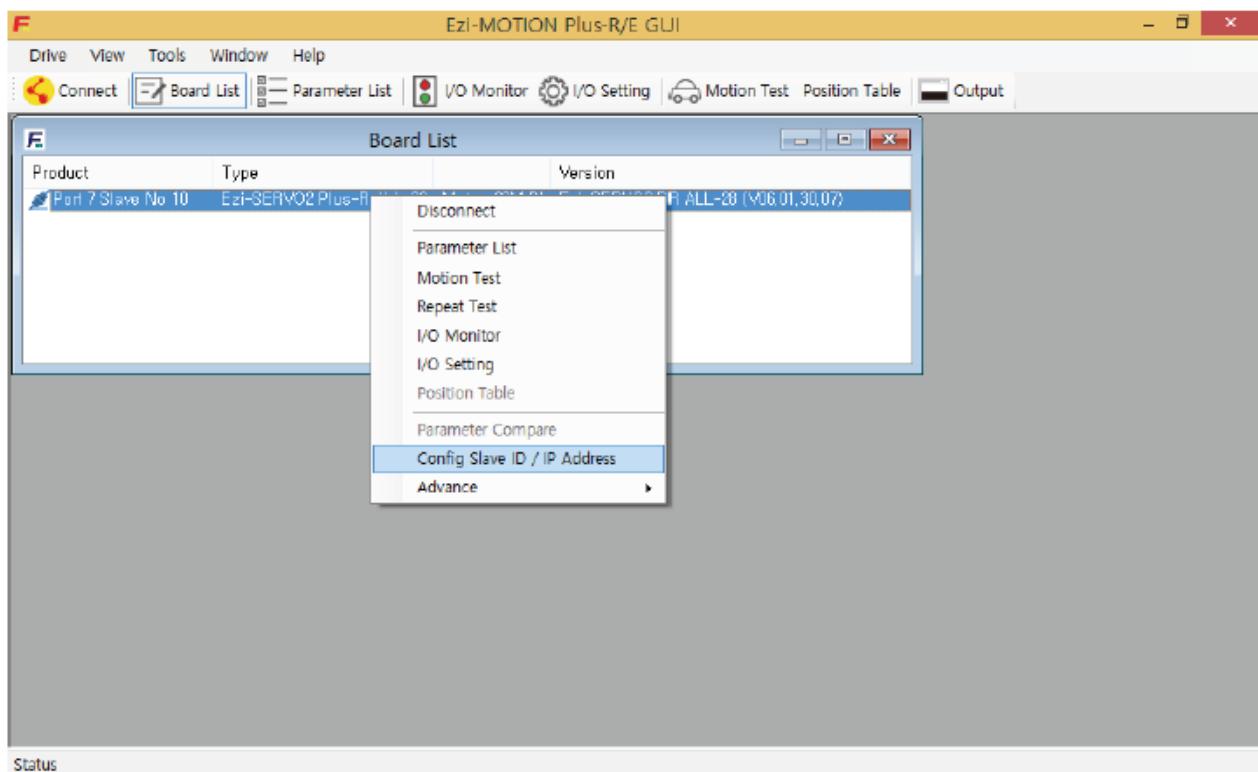
NO.	Function	I/O
1	GND	Input
2	24VDC	Input
3	IO COMMON	Input
4	ORIGIN	Input
5	LIMIT+	Input
6	LIMIT-	Input
7	IN1	Input
9	Termination	Input
10	Data-	Communication
11	Data+	Communication
12	S-GND	Input



5.3. Ezi-SERVO ALL-28

5) Network ID Setting

The network ID of Ezi-SERVO-ALL-28 series can be set using Ezi-MOTION Plus-R GUI (Version 6.40.7.12 or later). After connecting the communication, the setting window appears by selecting the product and press the right button of the mouse.



6) Connector Specifications

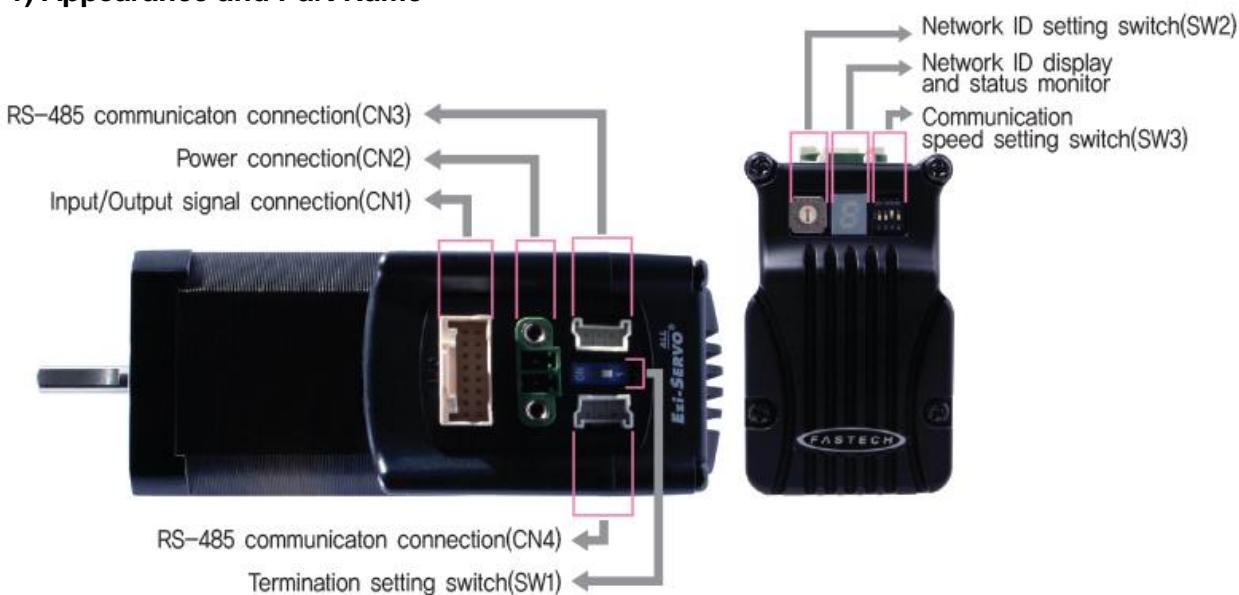
Connector specifications for cabling to drive.

Purpose	Item	Part Number	Manufacturer
Signal	Housing Terminal	GHR-12V-S SSH-002T-P0,2	JST

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

5.4 Ezi-SERVO ALL-42/56

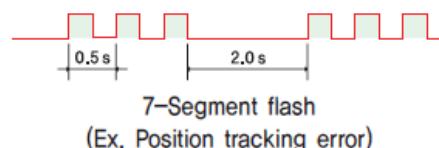
1) Appearance and Part Name



2) Protection Functions and 7-Segment Flash Times

When Alarm occurs, can recognize main reason of alarming thru by 7-Segment flash times which indicates Network ID.

Times	Protection	Conditions
1	Over Current Error	The current through power devices in inverter exceeds the 4.8A
2	Over Speed Error	Motor speed exceed 3,000rpm
3	Position Tracking Error	Position error value is higher than 90° in motor run state *1
4	Over Load Error	The motor is continuously operated more than 5 seconds under a load exceeding the max. torque
5	Over Temperature Error	Inside temperature of drive exceeds 85°C
6	Over Regeneratived Voltage Error	Back-EMF is more than 48V value
7	Motor Connect Error	The power is ON without connection of the motor cable to drive
8	Encoder Connect Error	Cable connection error with Encoder connection in drive
10	In-Position Error	After operation is finished, a position error occurs
12	ROM Error	Error occurs during tuning execution
15	Position Overflow Error	Position error value is higher than 90° in motor stop state *1



7-Segment flash
(Ex, Position tracking error)

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

3) Termination Setting Switch(SW1)

The drive installed at the end of the network must be terminated for reliable operation. Please termination setting switch is ON if drive installed at the end of the network,

4) Network ID Setting Switch(SW2)

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



※ Maximum 16 axis can be connected in one network.

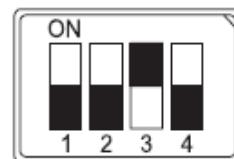
5) Communication Speed Setting Switch(SW3)

The purpose of this is to setting the communication speed

SW3.1	SW3.2	SW3.3	Baud Rate [bps]
OFF	OFF	OFF	9,600
ON	OFF	OFF	19,200
OFF	ON	OFF	38,400
ON	ON	OFF	57,600
OFF	OFF	ON	115,200*1
ON	OFF	ON	230,400
OFF	ON	ON	460,800
ON	ON	ON	921,600

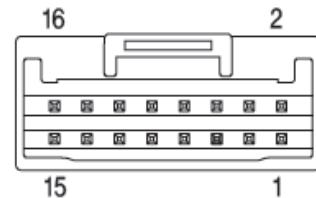
*1 : Default setting value

*2 : SW3.4 is not available to use



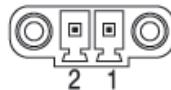
6) Input/Output Signal Connector(CN1)

NO.	Function	I/O
1	EXT_24VDC	Input
2	EXT_GND	Input
3	BRAKE+	Output
4	BRAKE-	Output
5	LIMIT+	Input
6	LIMIT-	Input
7	ORIGIN	Input
8	Digital In1	Input
9	Digital In2	Input
10	Digital In3	Input
11	Digital In4	Input
12	Digital In5	Input
13	Digital In6	Input
14	Digital In7	Input
15	Compare Out	Output
16	Digital Out1	Output



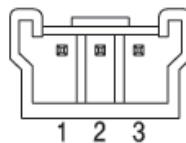
7) Power Connector(CN2)

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



8) RS-485 Communication Connector(CN3,CN4)

NO.	Function
1	Data+
2	Data-
3	GND



9) Connector Specifications

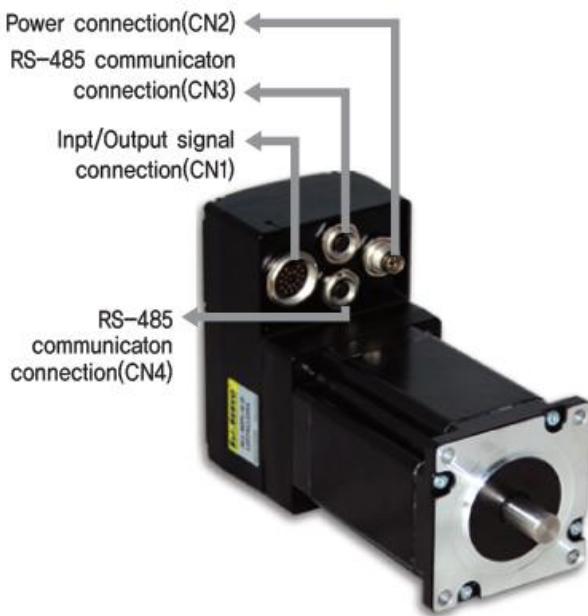
Connector specifications for cabling to drive.

Purpose	Item	Part Number	Manufacturer
Power (CN2)	Terminal Block	MC421-38102	DECA
Signal (CN1)	Housing Terminal	501646-1600 501648-1000(AWG 26~28)	MOLEX
RS-485 Communication (CN3, CN4)	Housing Terminal	35507-0300 50212-8100	MOLEX

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

5.5 Ezi-SERVO ALL-60/60-ABS series

1) Appearance and Part Name



◆ Ezi-SERVO-ALL-60-ABS series



This part has separate
detachable cover for
waterproof function when
product sold.

◆ Ezi-SERVO-ALL-60 series



This part has separate
detachable cover for
waterproof function when
product sold.

2) Protection Functions and 7-Segment Flash Times

When Alarm occurs, can recognize main reason of alarming thru by LED or 7-Segment flash times.

Times	Protection	Conditions
1	Over Current Error	The current through power devices in inverter exceeds the 4.8A
2	Over Speed Error	Motor speed exceed 3,000 [rpm]
3	Position Tracking Error	Position error value is higher than 90° in motor run state *1
4	Over Load Error	The motor is continuously operated more than 5 seconds under a load exceeding the max. torque
5	Over Temperature Error	Inside temperature of drive exceeds 85°C
6	Over Regeneratived Voltage Error	Back-EMF is more than 48V value
7	Motor Connect Error	The power is ON without connection of the motor cable to drive
8	Encoder Connect Error	Cable connection error with Encoder connection in drive
10	In-Position Error	After operation is finished, a position error occurs
12	ROM Error	Error occurs during tuning execution
15	Position Overflow Error	Position error value is higher than 90° in motor stop state *1



Alarm LED or 7-Segment flash
(Ex, Position tracking error)

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

3) Network ID Setting Switch(SW2)

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

- ※ Maximum 16 axis can be connected in one network.
- ※ Ezi-SERVO-ALL-60 series only.
- ※ The network ID of Ezi-SERVO-ALL-60-ABS can be set under RS-485 communication



4) Communication Speed and Termination Setting Switch(SW2)

◆ Ezi-SERVO-ALL-60 series

Termination Setting Switch(SW1.4)

The drive installed at the end of the network must be terminated for reliable operation. Please termination setting switch is On if drive installed at the end of the network.

Speed Setting Switch(SW1.1~SW1.3)

SW1.1~ SW1.3 used for setting speed as follows

SW1.1	SW1.2	SW1.3	SW1.4	Baud Rate [bps]
OFF	OFF	OFF	—	9,600
ON	OFF	OFF	—	19,200
OFF	ON	OFF	—	38,400
ON	ON	OFF	—	57,600
OFF	OFF	ON	—	115,200*1
ON	OFF	ON	—	230,400
OFF	ON	ON	—	460,800
ON	ON	ON	—	921,600

*1 : Default setting value



Speed setting switch
Termination setting switch

◆ Ezi-SERVO-ALL-60-ABS series

Termination Setting Switch(SW1)

The drive installed at the end of the network must be terminated for reliable operation. Please termination setting switch is On if drive installed at the end of the network.



Ezi-SERVO-ALL-60-ABS series
Termination Setting Switch(SW1)

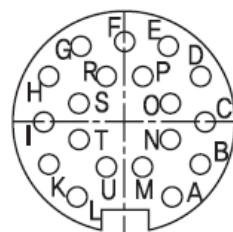
5) Input/Output Signal Connector(CN1)

◆ Ezi-SERVO-ALL-60 series

NO.	Function	I/O
A	EXT_24VDC	Input
B	EXT_GND	Input
C	LIMIT+	Input
D	LIMIT-	Input
E	ORIGIN	Input
F	Digital In1	Input
G	Digital In2	Input
H	Digital In3	Input
I	Digital In4	Input
K	Digital In5	Input
L	Digital In6	Input
M	Digital In7	Input
N	Compare Out	Output
O	Digital Out1	Output
P	Digital Out2	Output
R	Digital Out3	Output
S	NC	-----
T	BRAKE+	Output
U	BRAKE-	Output

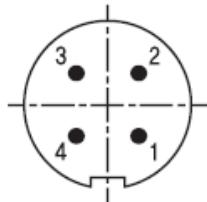
◆ Ezi-SERVO-ALL-60-ABS series

NO.	Function	I/O
A	EXT_24VDC	Input
B	EXT_GND	Input
C	LIMIT+	Input
D	LIMIT-	Input
E	ORIGIN	Input
F	Digital In1	Input
G	Digital In2	Input
H	Digital In3	Input
I	Digital In4	Input
K	Digital In5	Input
L	Digital In6	Input
M	Digital Out1	Output
N	Digital Out2	Output
O	Digital Out3	Output
P	Digital Out4	Output
R	Digital Out5	Output
S	Digital Out6	Output
T	BRAKE+	Output
U	BRAKE-	Output



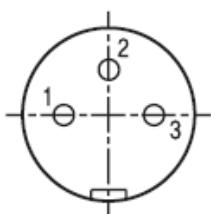
6) Power Connector(CN2)

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



7) RS-485 Communication Connector(CN5,CN6)

NO.	Function
1	Data+
2	Data-
3	GND



8) Connector Specifications

Connector specifications for cabling to drive.

Purpose	Item	Part Number	Manufacturer
Power (CN2)	Connector	99-0410-00-04	BINDER
Signal (CN1)	Connector	99-5461-40-19	BINDER
RS-485 Communication (CN3, CN4)	Connector	99-0405-00-03	BINDER

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

6. Control Input/Output Signal

6.1 Ezi-SERVO Plus-R series

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

6.1.1 Input

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

Other signals as like 'Clear Pos' are assigned to IN1~IN9 terminal blocks.

(3 dedicated input + 9 programmable input = total 12 input pins.)

Ezi-SRERVO Plus-R : 3 dedicated In + 9 programmable In = 12 Inputs

Ezi-SRERVO Plus-R-MINI : 3 dedicated In + 7 programmable In = 10 Inputs

Signal Name	Plus-R CN1 pin	Plus-R MINI CN1 pin	Function
Limit+	1	5	Positive Limit sensor
Limit-	2	6	Negative Limit sensor
Origin	3	7	Origin sensor
IN1	4	8	Position Table A0 ~ Position Table A7 (PT A0~PT A7) / Position Table start execution (PT Start) /
IN2	14	9	Soft Stop(Stop) / Emergency Stop(E-Stop) /
IN3	15	10	Jog+ / Jog- / Clear Pos / Teaching /
IN4	16	11	Alarm Reset / Servo ON / Pause / Origin Search /
IN5	17	12	Jump Position Table start (JPT Start) /
IN6	5	13	User input 0 ~ User input 8 (User IN 0 ~ User IN 8) /
IN7	6	14	Jump Position Table input 0 ~ Jump Position Table input 2 (JPT IN 0~ JPT IN 2) /
IN8	18	None	
IN9	19	None	

6.1.2 Output

「COMP」 signal is dedicated to CN1 No.7. Other signals like inposition are assigned to OUT1~OUT9 terminal blocks.

Ezi-SRERVO Plus-R : 1 dedicated Out + 9 programmable Out = 10 Outputs

Ezi-SRERVO Plus-R-MINI : 1 dedicated Out + 1 programmable Out = 2 Outputs

Signal Name	Plus-R CN1 pin	Plus-R MINI CN1 pin	Function
COMP	7	15	Compare Out
OUT1	8	16	
OUT2	9	None	InPosition / Alarm / Moving
OUT3	10	None	Acc&Dec / ACK / END
OUT4	11	None	AlarmBlink / OriginSearchOK
OUT5	12	None	ServoReady / Brake
OUT6	13	None	Position Table output 0 ~ Position Table output 2
OUT7	20	None	(PT OUT 0 ~ PT OUT 2) /
OUT8	21	None	User Output 0 ~ User Output 8
OUT9	22	None	

6.2 Ezi-SERVO ALL-28/42/56 series

6.2.1 Input

Ezi-SERVO ALL-28 : 3 dedicated In + 1 programmable In = 4 Inputs

Signal Name	ALL-28 CN1 pin	Function
Limit+	5	Positive Limit sensor
Limit-	6	Negative Limit sensor
Origin	4	Origin sensor
IN1	7	Soft Stop(Stop) / Emergency Stop(E-Stop) / Jog+ / Jog- / Clear Pos / AlarmReset / ServoON / Origin Search / Jump Position Table start (JPT Start) / User input 0 ~ User input 5 (User IN 0 ~ User IN 5)
IO COMMON	3	IO Input Common
Termination	9	Terminator Resistance Connection

6.2. Ezi-SERVO ALL-28/42/56 series

Ezi-SRERVO ALL-42/56 : 3 dedicated In + 7 programmable In = 10 Inputs

Signal Name	ALL-42/56 CN1 pin	Function
Limit+	5	Positive Limit sensor
Limit-	6	Negative Limit sensor
Origin	7	Origin sensor
IN1	8	Position Table start execution (PT Start) /
IN2	9	Soft Stop(Stop) / Emergency Stop(E-Stop) /
IN3	10	Jog+ / Jog- / Clear Pos / Teaching /
IN4	11	AlarmReset / ServoON / Pause / Origin Search /
IN5	12	Jump Position Table start (JPT Start) /
IN6	13	User input 0 ~ User input 8 (User IN 0 ~ User IN 8)
IN7	14	

6.2.2 Output

Ezi-SRERVO ALL-28 : None

Ezi-SRERVO ALL-42/56 : 1 dedicated Out + 1 programmable Out = 2 Outputs

Signal Name	ALL-28 CN1 pin	ALL-42/56 CN1 pin	Function
COMP	None	15	Specified output signal (Compare Out)
OUT1	None	16	InPosition / Moving / Alarm / Acc&Dec / ACK / END / AlarmBlink / OriginSearchOK / ServoReady / Brake / Position Table output 0 ~ Position Table output 2 (PT OUT 0 ~ PT OUT 2) / User Output 0 ~ User Output 8

6.3 Ezi-SERVO ALL-60/60-ABS series

6.3.1 Input

Ezi-SRERVO ALL-60 : 3 dedicated In + 7 programmable In = 10 Inputs

Ezi-SRERVO ALL-60-ABS : 3 dedicated In + 6 programmable In = 9 Inputs

Signal Name	ALL-60 CN1 pin	ALL-60-ABS CN1 pin	Function
Limit+	C	C	Positive Limit sensor
Limit-	D	D	Negative Limit sensor
Origin	E	E	Origin sensor
IN1	F	F	
IN2	G	G	
IN3	H	H	
IN4	I	I	
IN5	K	K	
IN6	L	L	
IN7	M	None	

6.3.2 Output

Ezi-SRERVO ALL-60 : 1 dedicated Out + 3 programmable Out = 4 Outputs

Ezi-SRERVO ALL-60-ABS : 0 dedicated Out + 6 programmable Out = 6 Outputs

Signal Name	ALL-60 CN1 pin	ALL-60-ABS CN1 pin	Function
COMP	N	None	Specified output signal (Compare Out)
OUT1	O	M	InPosition / Moving / Alarm / Acc&Dec /
OUT2	P	N	ACK / END / AlarmBlink / OriginSearchOK /
OUT3	R	O	ServoReady / Brake /
OUT4	None	P	Position Table output 0 ~ Position Table output 2 (PT OUT 0 ~ PT OUT 2) /
OUT5	None	R	User Output 0 ~ User Output 8
OUT6	None	S	

6.4. External Brake Connection

6.4 External Brake Connection

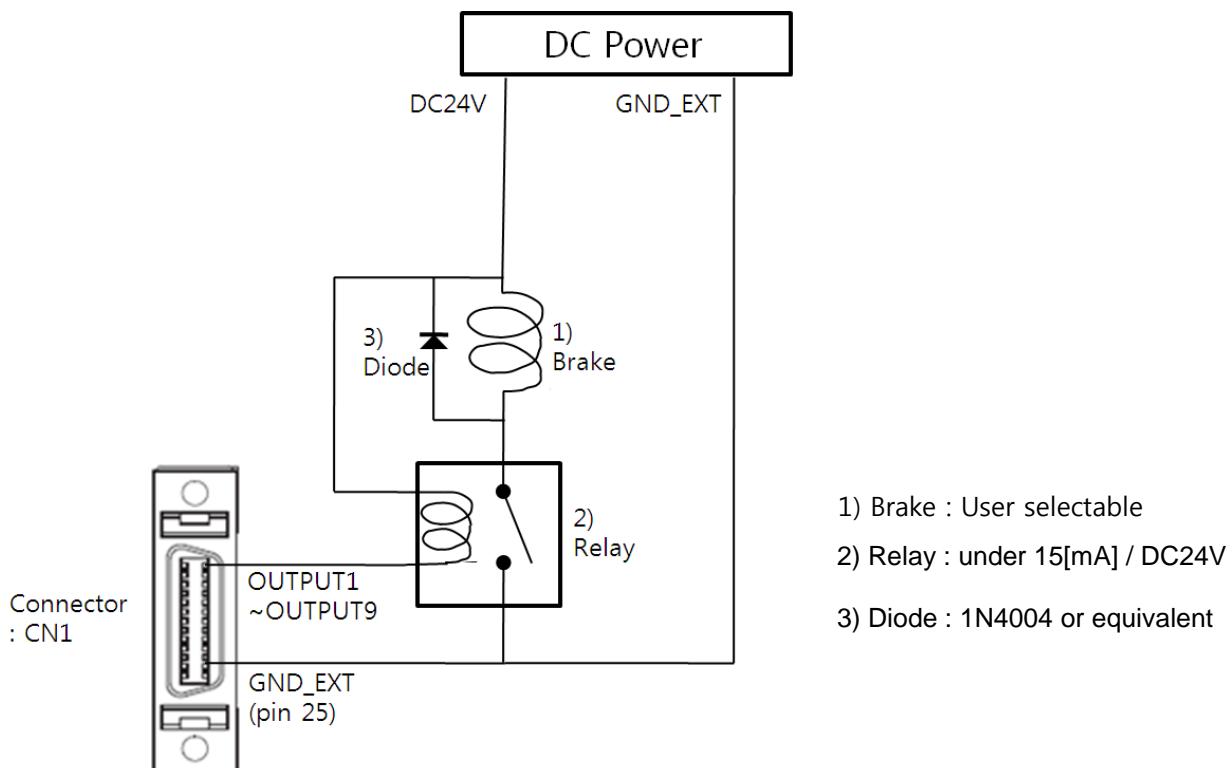
Driver type	Normal pin									Exclusive pin	
	Out1	Out2	Out3	Out4	Out5	Out6	Out7	Out8	Out9	Brake	Rated Current [mA] *1
Ezi-SERVO Plus-R	O	O	O	O	O	O	O	O	O	O	400
Ezi-SERVO Plus-R (86mm)	O	O	O	O	O	O	O	O	O	O	600
Ezi-SERVO Plus-R MINI	O	X	X	X	X	X	X	X	O	O	400
Ezi-SERVO ALL-42/56 *2	O	X	X	X	X	X	X	X	O	O	400
Ezi-SERVO ALL-60	O	O	O	X	X	X	X	X	O	O	400
Ezi-SERVO ALL-60-ABS	O	O	O	O	O	O	X	X	X	O	400

Above diagram represents the possible pin assignments for brake of each driver type. (marked 'O')

*1. If the current consumption of brake do not exceed this value, use 'Exclusive pin'.

*2. For **Ezi-SERVO ALL-28** driver, the function of brake control is not supported.

If the current comsumption of brake exceed this value, use 'Normal pin' and install the external circuit diagram like below diagram (ex: Ezi-SERVO Plus-R)



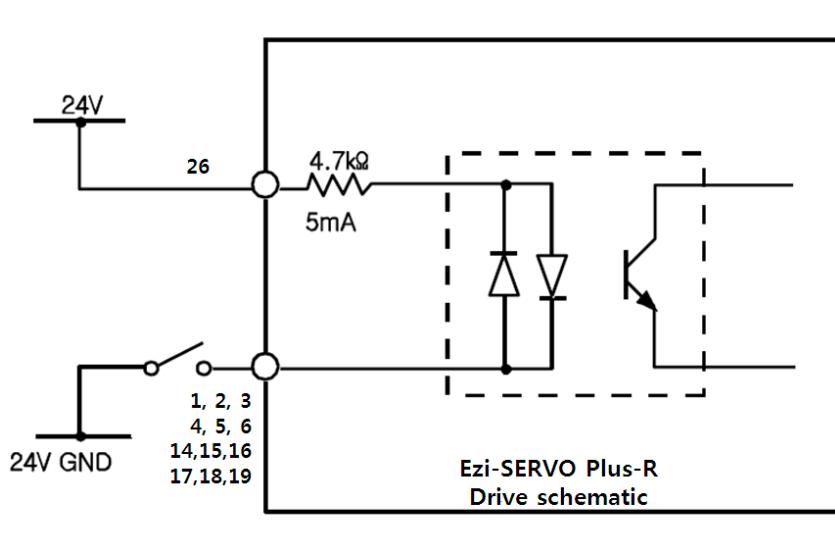
6.5 Connection Circuit

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

The pin number of Input and Output circuit is for Ezi-SERVO Plus-R standard.

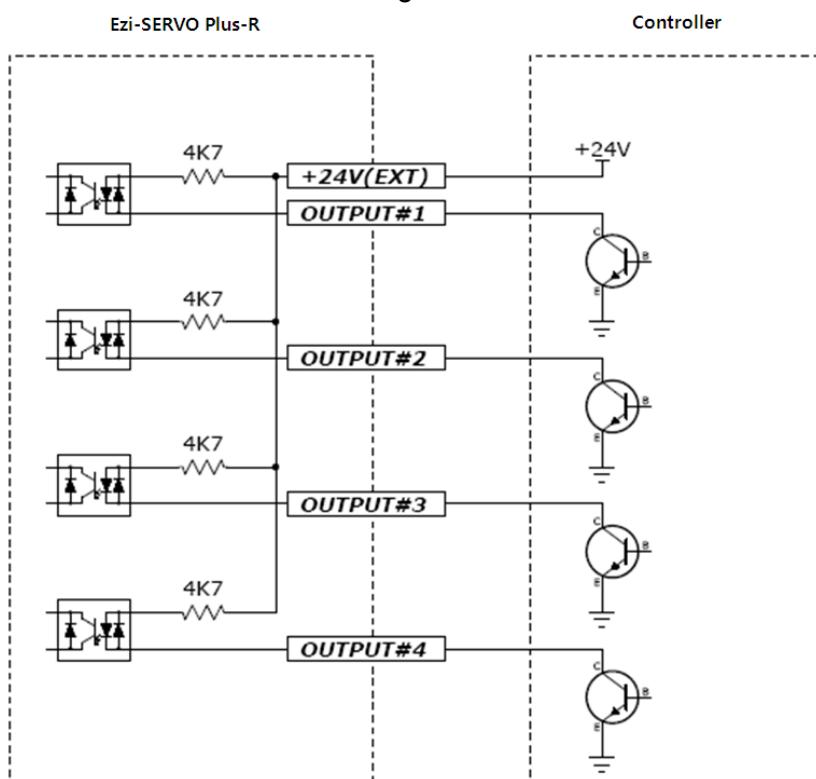
1) Input Circuit

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



◆ Connect NPN type Input signal

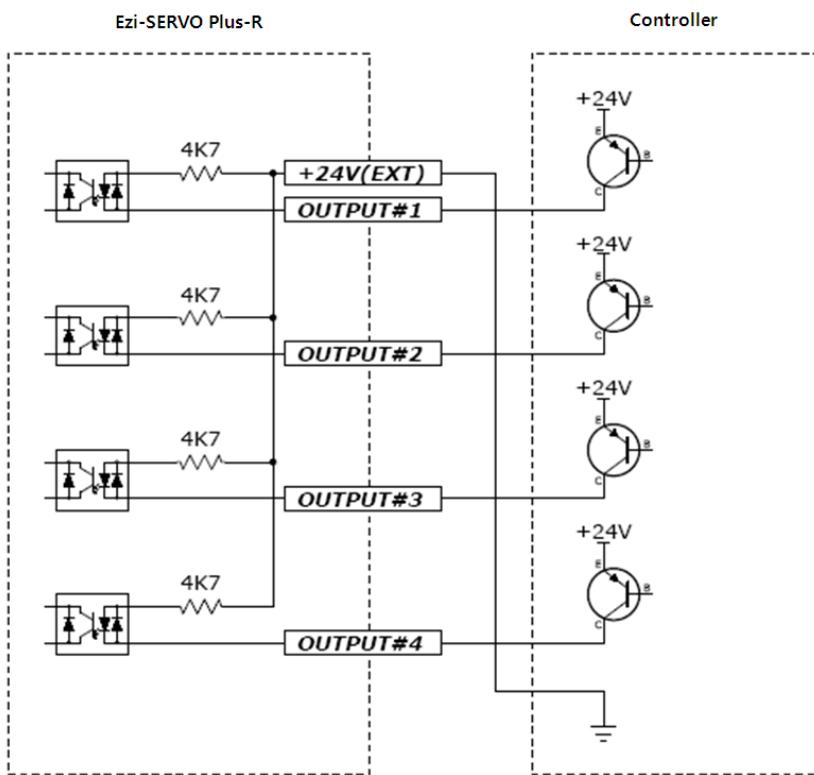
Connect the '+24V external' signal of drive to '+24V' of Controller .



6.5. Connection Circuit

◆ Connect PNP type Input signal

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

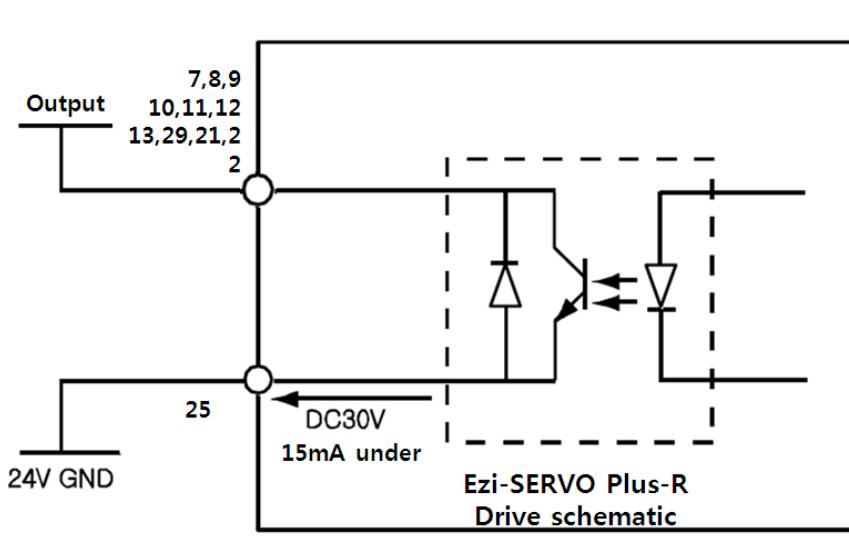


2) Output Circuit

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

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

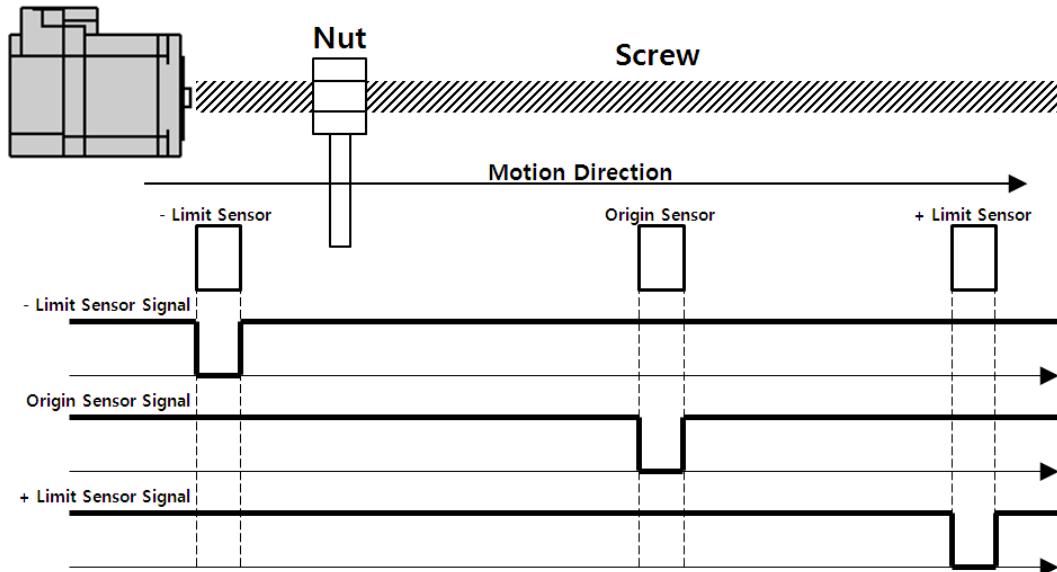
- Applied voltage \leq 30V
- Electrified current \leq 15mA



6.6 Input Signal

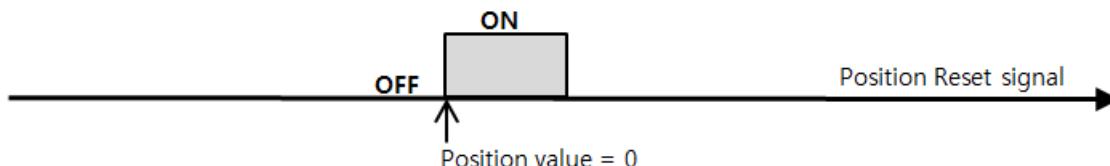
6.6.1 ‘Limit’ Sensor and ‘Origin’ Sensor input

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 clockwise and counterclockwise to prevent mechanical collision. Origin sensor is to set the origin of equipment.



6.6.2 Clear Pos(Position Reset) input

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



6.6.3 Position Table A0~A7 (PT A0~A7) input

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

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

* Ezi-SRERVO PlusR-MINI/ Ezi-SERVO ALL : maximum **64** position table numbers can be set.

(but this function is not supported for Ezi-SERVO ALL-28)

6.6. Input Signal

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

A7	A6	A5	~	A2	A1	A0	PT number
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

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

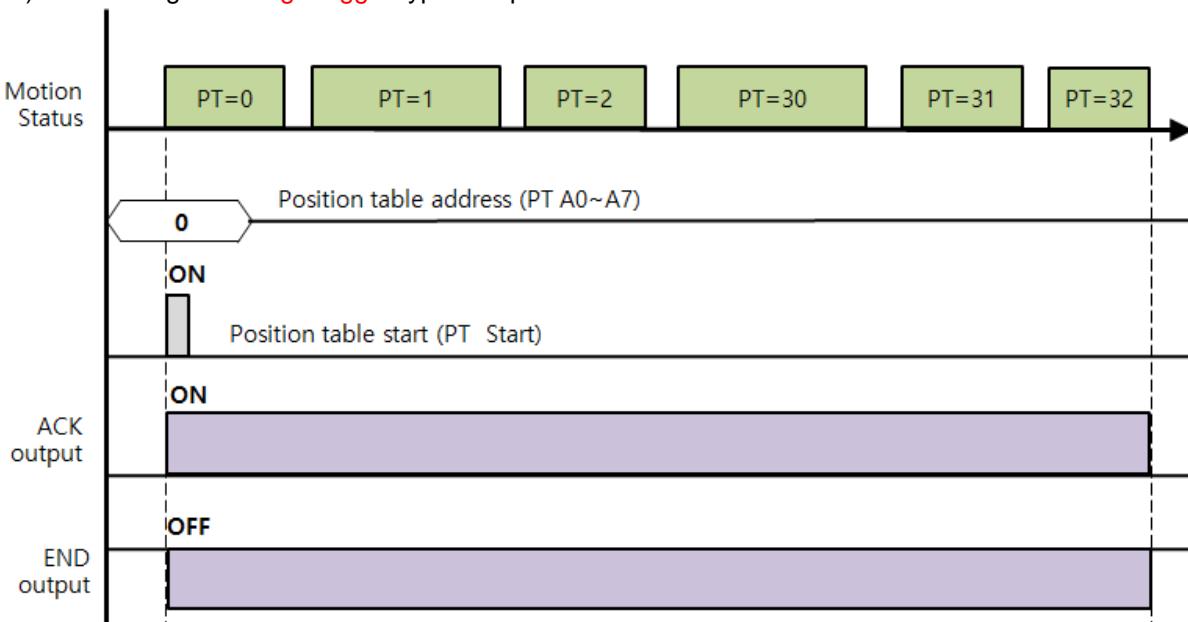
*2. 'PT A5/UserIN 6' 'PT A6/UserIN 7' 'PT A7/UserIN 8' signal setting : This signal can be used as 'PT A5~A7', and also can be used as 'User IN6~IN8' signal when the input signal 'User IN0~IN5' is not enough.

### 6.6.4 Position Table Start (PT Start) input

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

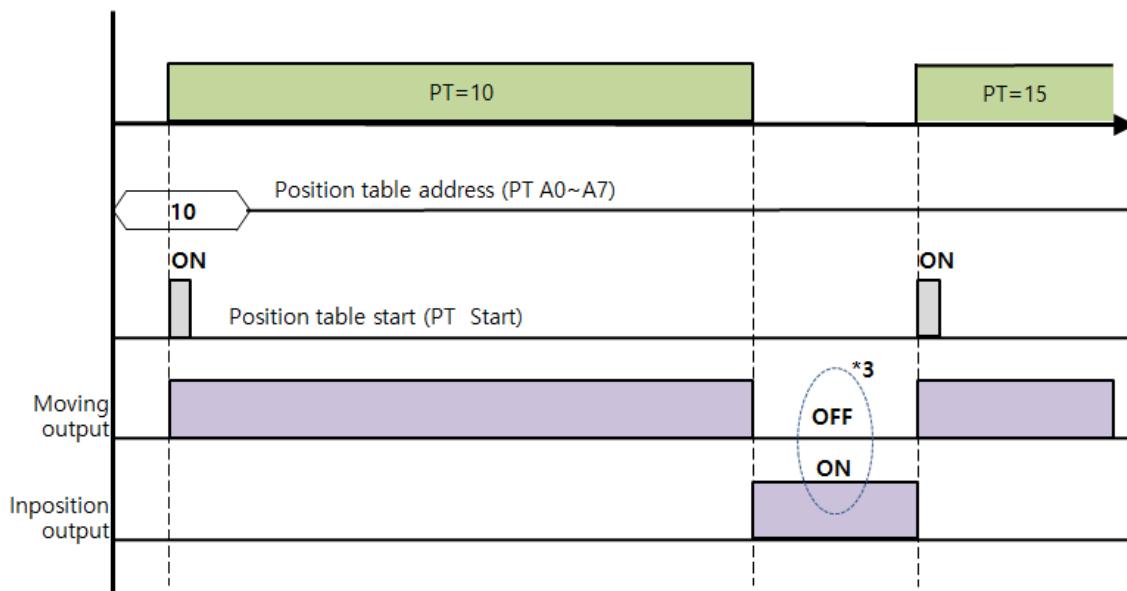
Following example shows that total 6 motion patterns are in order executed from No.0 to No.32 and then stopped.

- 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.



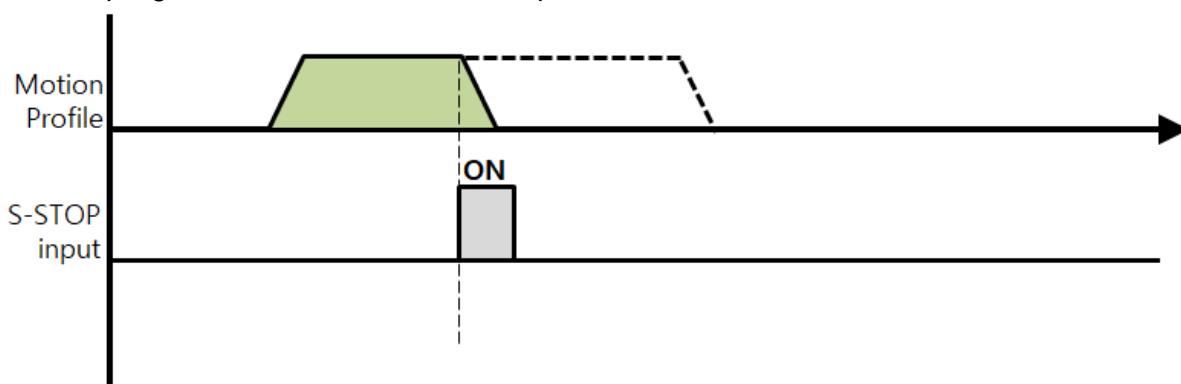
## 6.6. Input Signal

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



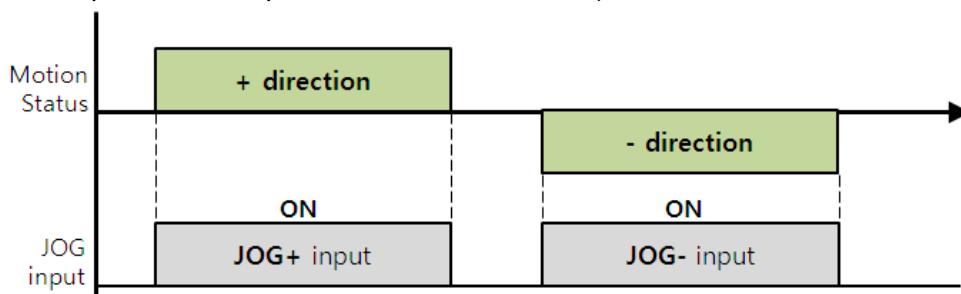
### 6.6.5 Stop input

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



### 6.6.6 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).



## 6.6. Input Signal

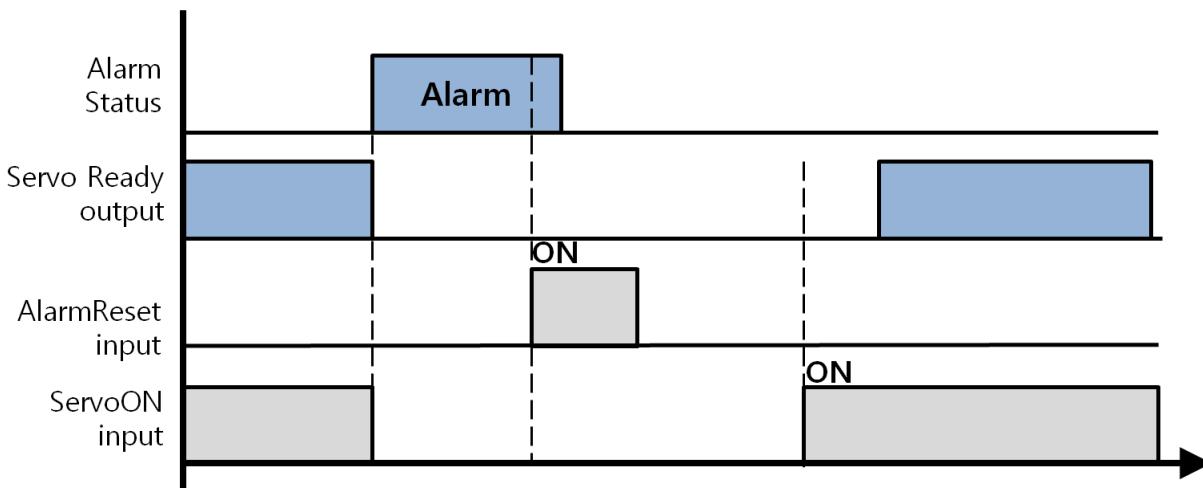
### 6.6.7 Servo ON and AlarmReset input

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

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

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

 <b>Attention</b>	■ If the 'Servo ON' signal is assigned to input pin, ServoON command from GUI or DLL library will not executed.
----------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------



*1. If 'No.0: Pulse per Revolution' in the parameter list is changed, the motor is set to Servo OFF.

*2. After 'ServoON' signal is assigned to input pin, it is impossible to use 'SERVO ON' button in UserProgram(GUI).

*3. After 'ServoON' is executed, the 'Command Position' value will change as same as 'Actual Position' value to remove 'Position Error'.

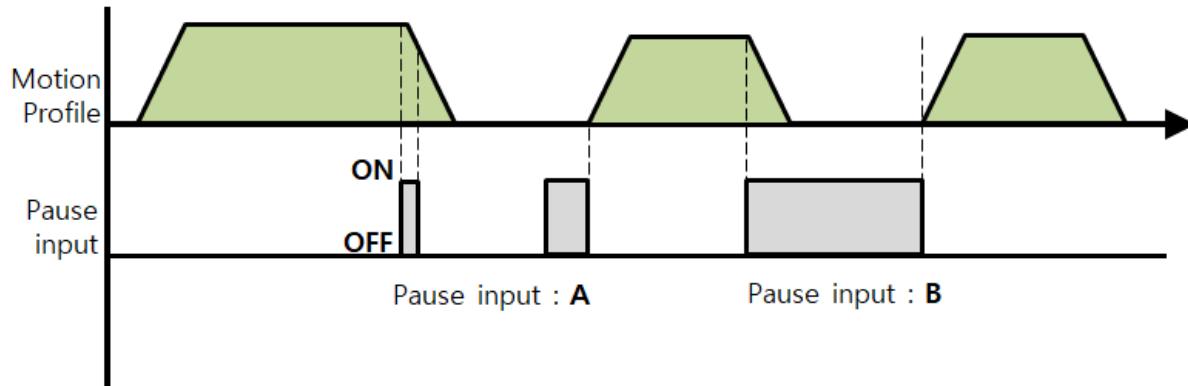
### 6.6.8 Pause input

When Pause signal is set to ON, the motion in service is stopped. There are two pause signal operation modes as follows.

① Case A : When Pause signal is set to ON, the motor starts to decelerate. Pause signal becomes OFF before the motor is completely stopped. To start motion, Pause signal should be set to ON.

② Case B : When Pause signal is set to ON, the motor starts to decelerate. The signal is continuously maintained since the motor is completely stopped. To start motion, Pause signal should be set to OFF.

Pause signal pulse scale is 10ms or more.

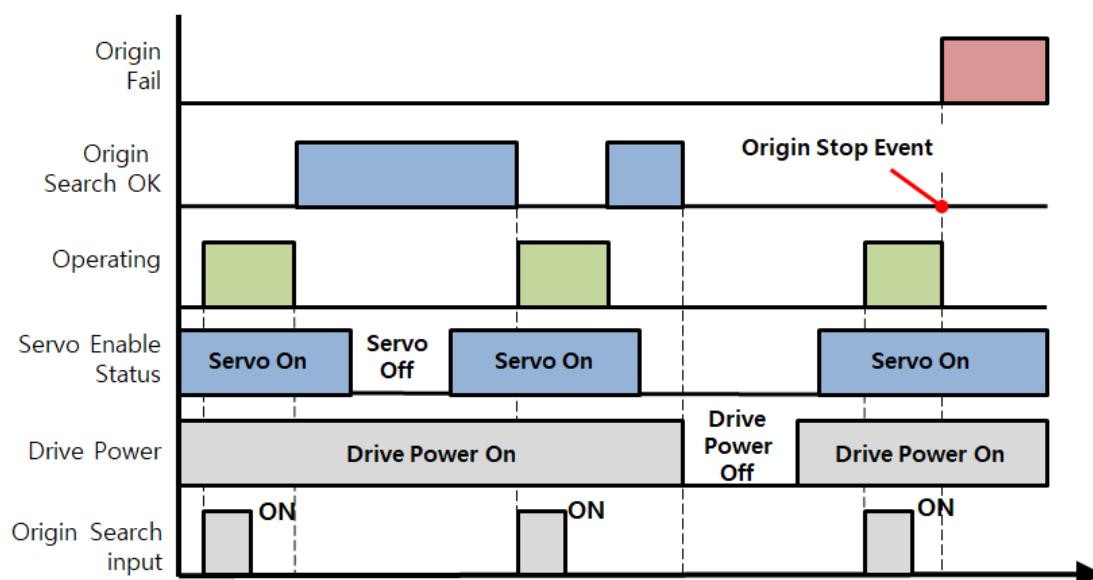


*1. This function is not applied while 'Repeat Test' of the User Program(GUI) is executing.

*2. This function is not applied while 'Push Motion' positioning and Ezi-SERVO ALL-28 driver.

### 6.6.9 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. When the origin search command is completed, 'Origin Search OK' signal is set to ON to CN1 connector's output port.



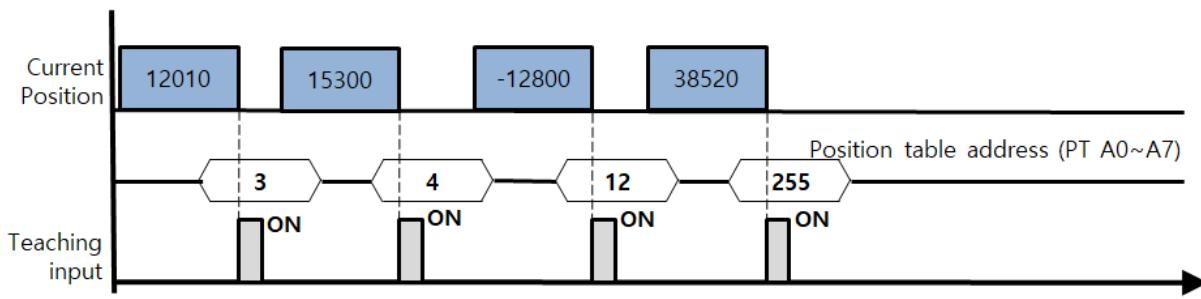
### 6.6.10 Teaching input

Teaching signal functions that the position value[pulse] being working can be automatically inputted into a 'position' value of a specific position table. If it is hard to calculate the exact moving

## 6.6. Input Signal

distance(position value) of specific motion mechanically, the user can measure and set the distance(position value) easily by using this signal.

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



PT number	Position value [pulse]
3	12010
4	15300
12	-12800
255	38520

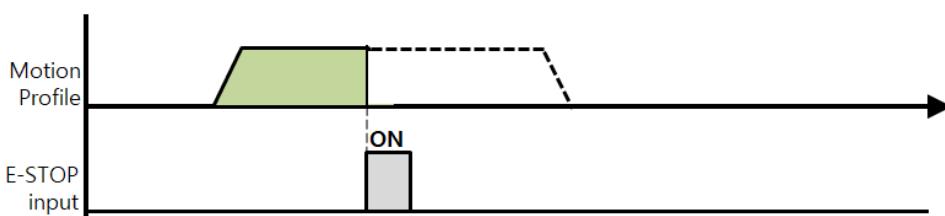
*1. After executing Teaching, click 'Refresh' icon, and the position value will be displayed to the position table.

*2. Click 'Save to ROM' icon, and the position value will be saved to the ROM area.

*3. Teaching signal can be used by two methods; the user assigns actual signal to the motor, or he clicks 'Teaching' icon at the 'I/O Monitoring' window of User Program(GUI).

### 6.6.11 E-Stop input

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



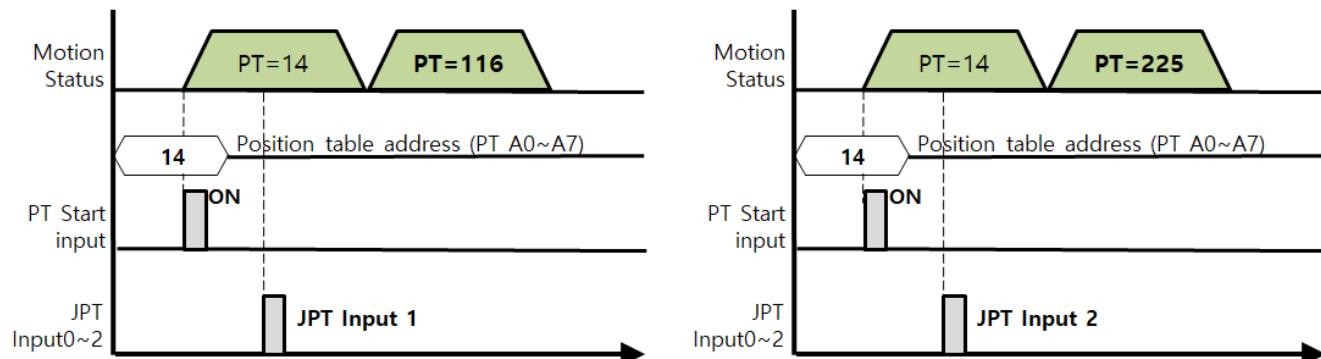
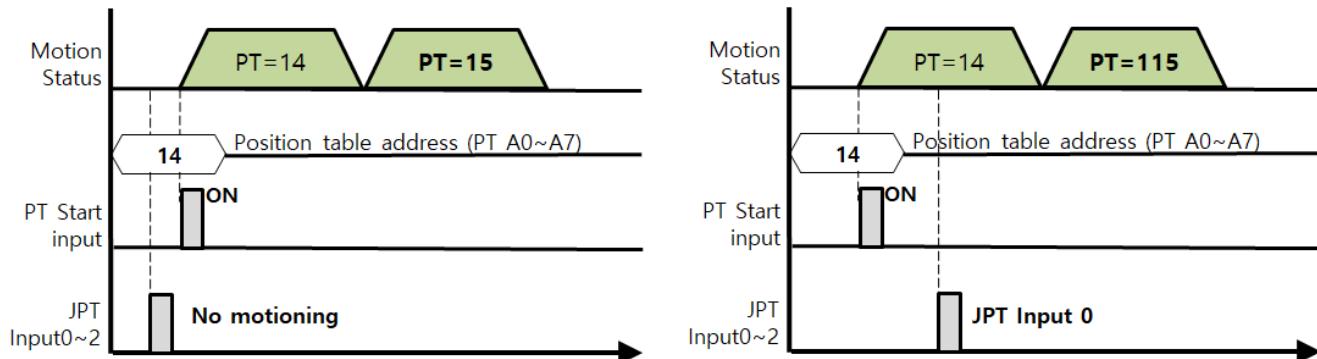
### 6.6.12 JPT Input0~Input2 (Jump Position Table Input) input

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

**【Example】** If PT 14 motion operates, when there is no other input signal, next motion becomes PT 15 as shown in first diagram. However, if 'JPT Input0~Input2' input signal is set to ON while PT 14 is executing, each corresponding position number is executed as shown in second, third and fourth diagram.

Data of PT 14

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



* Ezi-SERVO ALL-28 is not support this function.

## 6.6. Input Signal

### 6.6.13 JPT(Jump Position Table) Start input

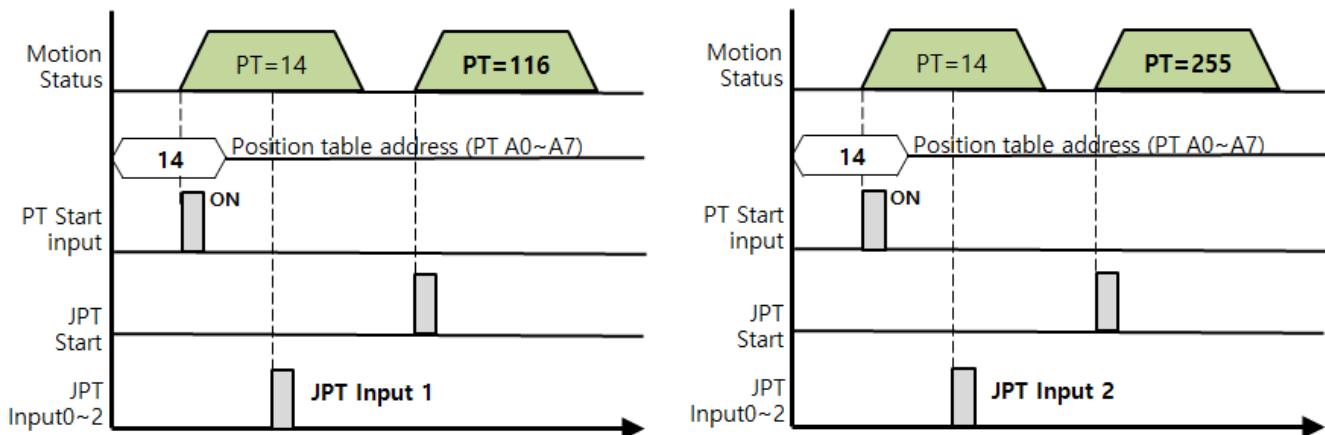
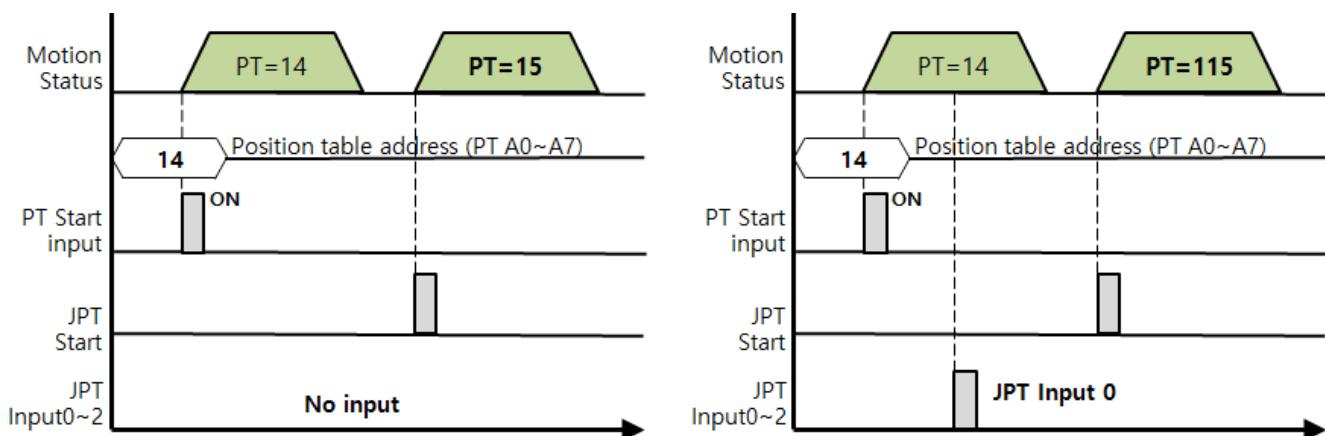
To select motion pattern(position table number) to be subsequently executed according to input signal conditions. The difference from Paragraph 「6.6.12 ‘JPT Input0~Input2 Input」 is:

- 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]**

Data of PT 14

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



* Ezi-SERVO ALL-28 is not support this function.

## 6.7 Output Signal

### 6.7.1 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. Refer to [「7.5 Trigger Pulse Output」](#).

* Ezi-SERVO ALL-28 is not support this function.

### 6.7.2 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	Function
0~7	Fast mode	Output the signal in 1[msec] after the motor stop in target position .
8~15	Accurate mode	Output the signal in maximum 100[msec] after the motor stop in target position. (Time is needed to check find exact positioning)

### 6.7.3 Alarm and AlarmBlink output

When the motor operates normally, alarm output becomes OFF. When the protective function operates, alarm output becomes ON. The upper controller being used by the user detects this alarm and then stops motor operation command. If overload or overcurrent occurs while the motor is operating, the drive detects it and cuts off the motor's current. And alarm output is set to ON and also 'AlarmBlink' flash so that the user can check abnormality type.

The following table shows alarm type according to LED flash count.

## 6.7. Output Signal

Flash count	Alarm Name	Description
1	Overcurrent	The current through power devices in inverter exceeds the limit value
2	Overspeed	Command speed for motor exceeds 3300[rpm].
3	Position Tracking	Position error value is higher than specified value*1 in position command status. *1
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°C.
6	Over regeneratived voltage	Back-EMF more than limit value. *2
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.*3
10	Inposition error	After operation is finished, a position error occurs.
11	System error	Drive system is halted(Watch Dog Timer).
12	ROM error	Read/Write error on ROM device in drive system.
15	Pos. Error Overflow	Position error value is higher than specified value*1 in motor stop status. *4

*1 Parameter value in 'Pos Tracking Limit[No.27]' [pulse]

*2 50V : EzS-NDR-MI-20, EzS-NDR-MI-28, EzS-NDR-MI-42, Ezi-SERVO ALL series model

70V : EzS-NDR-20, EzS-NDR-28, EzS-NDR-42, EzS-NDR-56, EzS-NDR-60 model

90V : EzS-NDR-86 model

*3 20V : EzS-NDR-20, EzS-NDR-28, EzS-NDR-42, EzS-NDR-56, EzS-NDR-60 model

EzS-NDR-MI-20, EzS-NDR-MI-28, EzS-NDR-MI-42 model

Ezi-SERVO ALL series model

40V : EzS-NDR-86 model

*4 Parameter value in 'Pos Error Overflow Limit[No.33]' [pulse]

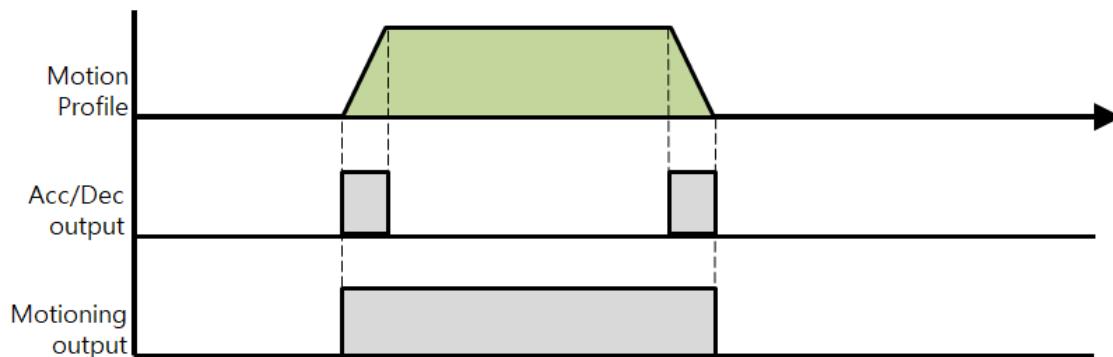
### 6.7.4 ACK and End output

'PT ACK' and 'PT End' signals are available only when the motion is executed by position table. When PT ACK signal is set to ON and PT End signal is set to OFF, all motion loops are finished. Then PT ACK signal becomes OFF and PT End signal becomes ON. If the 'Wait time' value in PT item is not 0, the defined time is needed to PT End signal becomes ON.

Refer to 「Ezi-SERVO Plus-R User Manual – 'Position Table Function'」

### 6.7.5 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.

### 6.7.6 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. When the alarm happens, this signal is set to OFF.

### 6.7.7 Servo Ready output

When the drive supplies power to the motor by Servo ON signal or command and is ready to perform motion command, 'ServoReady' signal displays ON signal.

### 6.7.8 PT(Position Table) Output 0~2 output

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

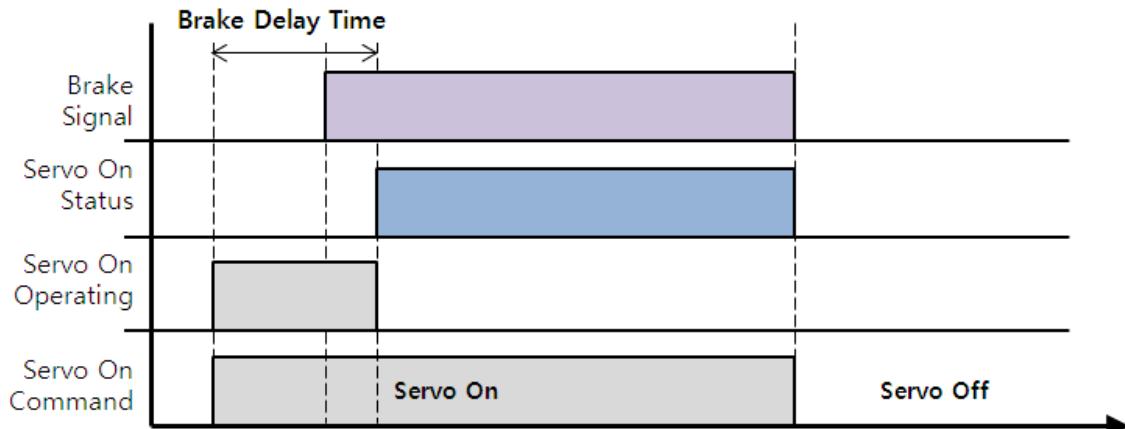
* If PT set items are set to '1~7', when the position starts to move, PT Output HEX value is displayed to 'PT Output O ~ PT Output 2'.

* If PT set items are set to '9~15', the position motion is finished and then PT Output HEX value is displayed to 'PT Output O ~ PT Output 2'.

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

### 6.7.9 BRAKE+ and BRAKE- output

This function is used to protect motor rotation in Servo ON status by pin23 and pin24 of CN1 connector(Ezi-SERVO Plus-R). DC +24V is connect to 'BRAKE+' for brake logic and brake control signal is connect to 'BRAKE-'. This output function must be used to the Brake that is under 400[mA]/DC24V(for 86mm, 600[mA]) of current consumption.



* The delay time of 'Brake OFF' process after Servo ON command is define in '['Brake Delay Time \[No.34\]' parameter](#).

## 7. Operation

### 7.1 Basic subject of Operation

#### 1) Power Supply Timing

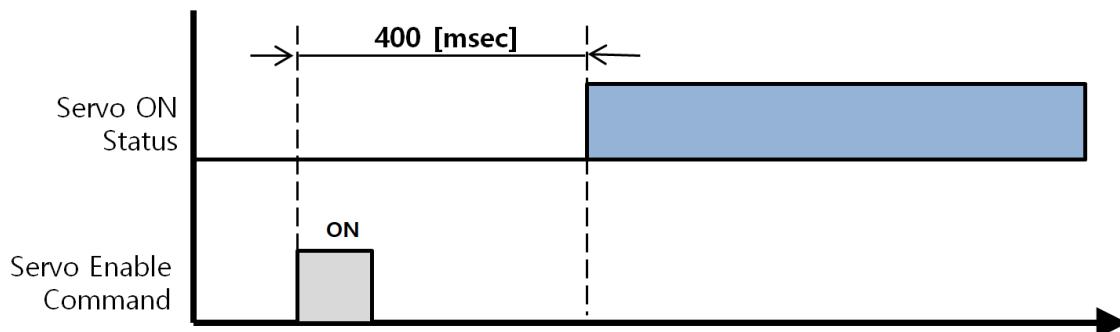
Ezi-SERVO Plus-R is supplied power through drive module to motor. Therefore, connect the drive and the motor with a cable and then supply power to the drive module. After power is supplied, the motor is basically set to Servo OFF.

#### 2) Servo ON Operation

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

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

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



The necessary time until Servo ON command is given and then the position is decided. It is about 400 [msec] with factory default value and it can be change with ‘Servo ON Method [No.33]’ parameter. It is subject to the rising time of supplying power and the motor status.

#### 3) Operation Mode

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

##### ◆ 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.

## 7.1. Basic subject of Operation

### ◆ Communication Command Mode

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

### ◆ Position Table Mode

In case of Ezi-SERVO Plus-R, the system can execute continuous operation by position table at the I/O command mode.

- ① By using PT A0 ~ PT A7 input signal or DLL program, set PT number to be operated.
- ② In case of Servo OFF, set the controller to Servo ON by communication program or Servo ON control input.
- ③ Start to operate by rising edge of PT Start input signal or communication program.

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

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

### ◆ Position Control Operation

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

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

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

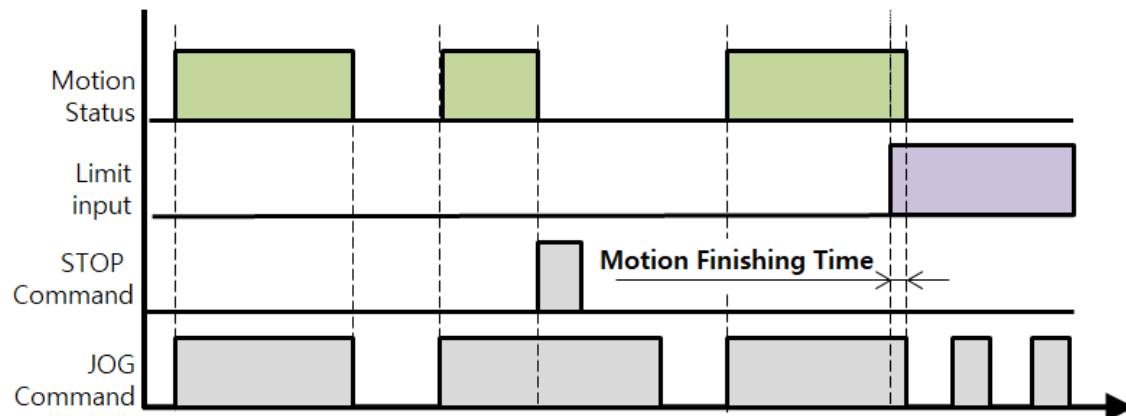
Parameter Name	Setting Content	Range
Axis Max Speed	Operation speed after acceleration is finished	1~2500000[pps]
Axis Start Speed	Operation start speed before acceleration starts	1~35000[pps]
Axis Acc Time	Required time until the motor reaches the axis max speed from stop status	1~9999[ms]
Axis Dec Time	Required time until the motor reaches from the axis max speed to the stop status	1~9999[ms]
Motion Dir	To select motion direction (CW or CCW)	0~1
Pulse per Revolution	Number of pulses per revolution. The range of 'Axis Max Speed' parameter is depend on this value.	0~9

◆ Teaching Function

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

## 7.2 JOG Operation

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



## 7.3 Position Operation

The position move command is a command to move to the target position even if the command is released at the time when the position movement is started. When the stop command is executed and the limit is reached during the position movement, the position movement is stopped.

1) Command execution: Normal command

The motion starts at ①, which is the point at which the position move command is executed, and reaches the target position even if the command is released before reaching the target position ②.

2) Repeated command execution while moving: Ignore command

Move to the target position started in ③ even if the position move command is executed and the position move command is executed at the time when the position move is not completed as in ④.

3) Command maintenance: Move to normal position

Even if the position move command is kept longer than the position ⑥ at which the position move command is completed, the target position executed at the point of ⑤ is maintained.

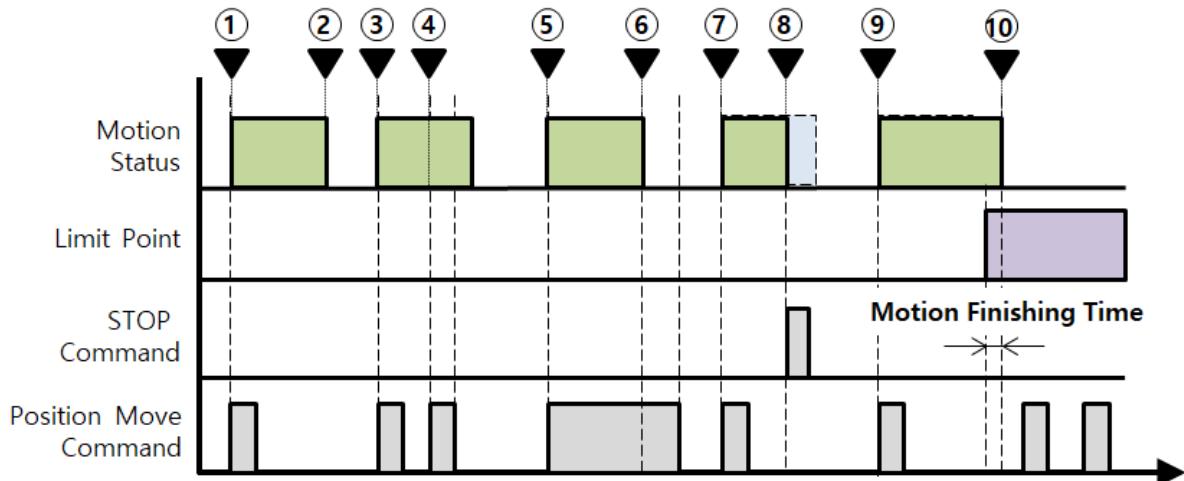
4) Stop command while moving: Command cancel

S-STOP or E-STOP is executed at ⑧ when the stop command is input. At this time, motion profile input from ⑦ point is canceled

5) Limit reached during movement: Can not move

### 7.3. Position Operation

When the motion at the point ⑨ at which the command is executed reaches the limit in progress, the motion stops at the point ⑩ because it stops according to the stopping method for the limit point.



## 7.4 Origin Return

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

Parameter Name	Description	Range
Org Speed	Operation speed when origin return starts	1~500,000[pps]
Org Search Speed	Low-speed operation speed after origin sensor is sensed and operation start speed when origin start.	1~50,000[pps]
Org Acc Dec Time	The time assigned to the acceleration and deceleration section when origin return starts and stops.	1~9,999[ms]
Org Method	To select how to return the origin	0~6
Org Dir	To select operation direction(CW or CCW)	0~1
Org Offset	After origin return is finished, the motor moves additionally as this setting value and then stops.	-134,217,727 ~ 134,217,727
Org Position Set	After origin return is finished, 'Command Pos' value is set to this setting value.	-134,217,727 ~ 134,217,727
Org Sensor Logic	To set the origin sensor signal level.	0~1
Org Torque Ratio	To set the torque ratio during Torque origin method	20~100[%]

### 1) Origin Return Method Setting

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

### 2) Sequence of Origin Return

Origin return motioning sequence is done with next step.

- ① Set needed parameter for origin return motioning.
- ② If the drive is Servo OFF status, change to Servo ON status by input signal or DLL program.
- ③ Origin return start by input signal 「Origin Search」 or DLL communication program.

### 3) Cancel of Origin Return

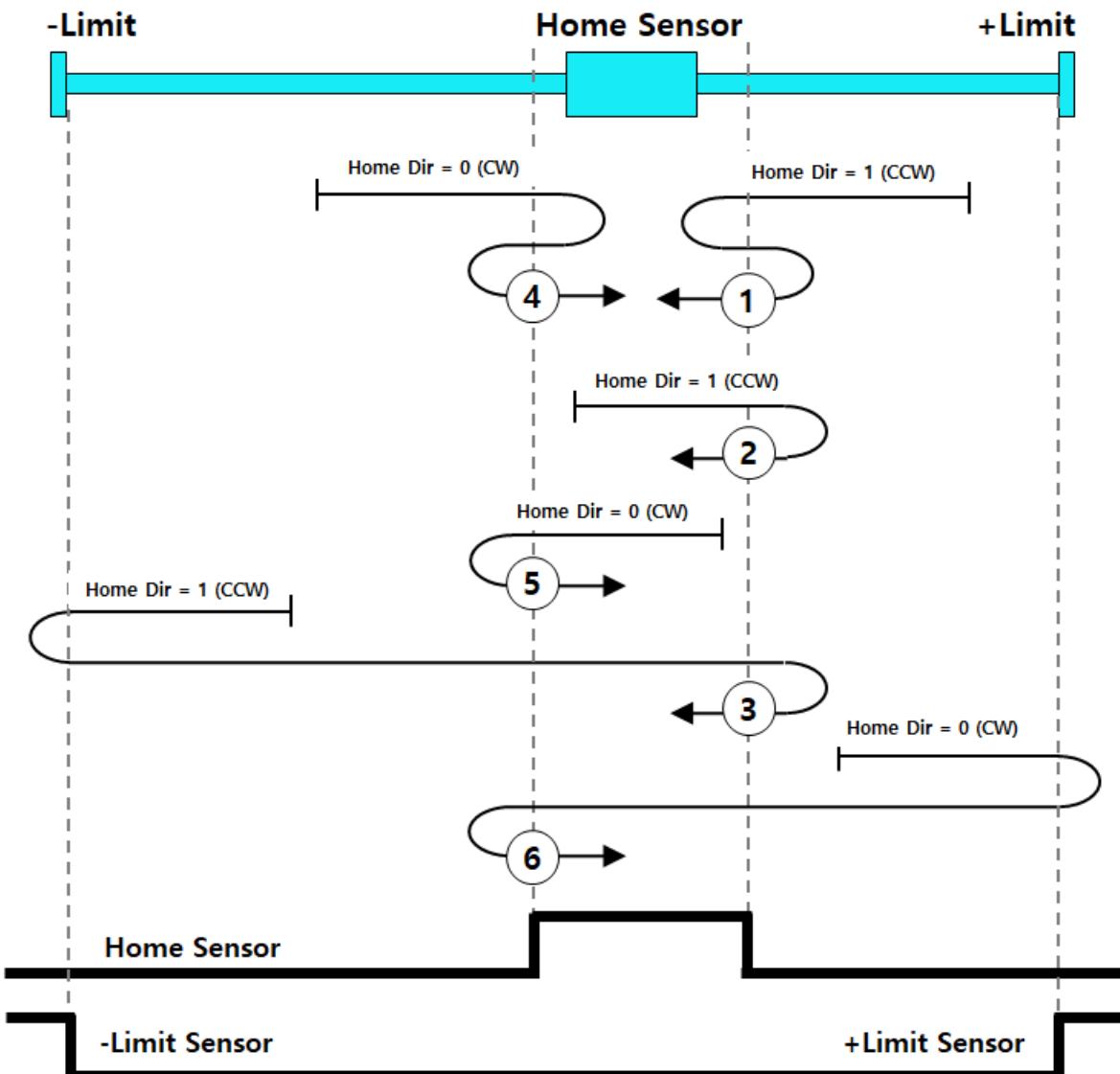
During Origin motioning the 'Stop' or 'E-Stop' command make motor stop. In this case, new origin motioning process is canceled.

### 7.4.1 Common Origin Operation

The origin return method by the origin sensor is the method in which the origin detected when the sensor dog is approached to the home sensor.

Homing operation ①, ③, ④, ⑥ is when sensor dog is between Origin and Limit sensor. At this time, if the Limit sensor is detected earlier than the origin sensor as in the home return operation ③ and ⑥, it moves in the direction opposite to the limit and detects the origin sensor and is designated as origin. If the opposite limit sensor is detected by moving in the direction opposite to the limit, Homing will fail, so check whether the home sensor is operating.

Homing operation ②, ⑤, is when the sensor dog exists in the origin sensor, moves in the direction opposite to the homing direction and designates the proximity position of the sensor as origin.

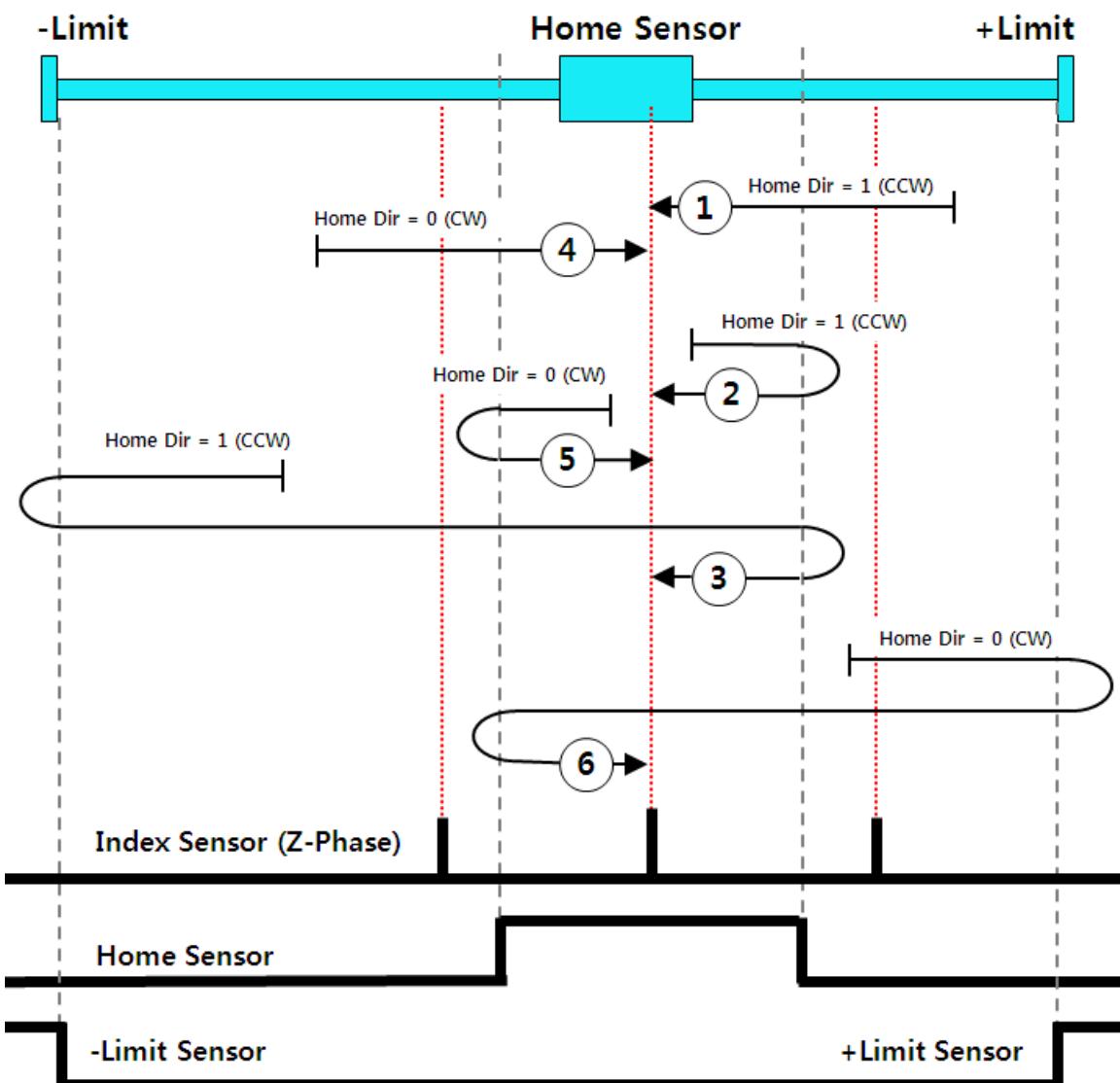


### 7.4.2 Z-pulse Origin Operation

The homing method by Z phase input signal after home sensor detection is to designate the home position where the Z phase input signal of encoder detected after execution of home sensor return method is detected

The homing operation ①, ③, ④, ⑥ is when the sensor dog is between the origin and limit sensor. It operates as same as homing method by home sensor until home sensor is detected. At this time, all Z-phase input signals before the home sensor is detected are ignored and the first Z-phase input signal after the home sensor is detected is designated as origin

Homing operation ②, ⑤, is the case where the sensor dog exists in the origin sensor, moves in the direction opposite to homing direction, and the first Z-phase input signal after completely deviating from the input range of the origin sensor is set as origin specified

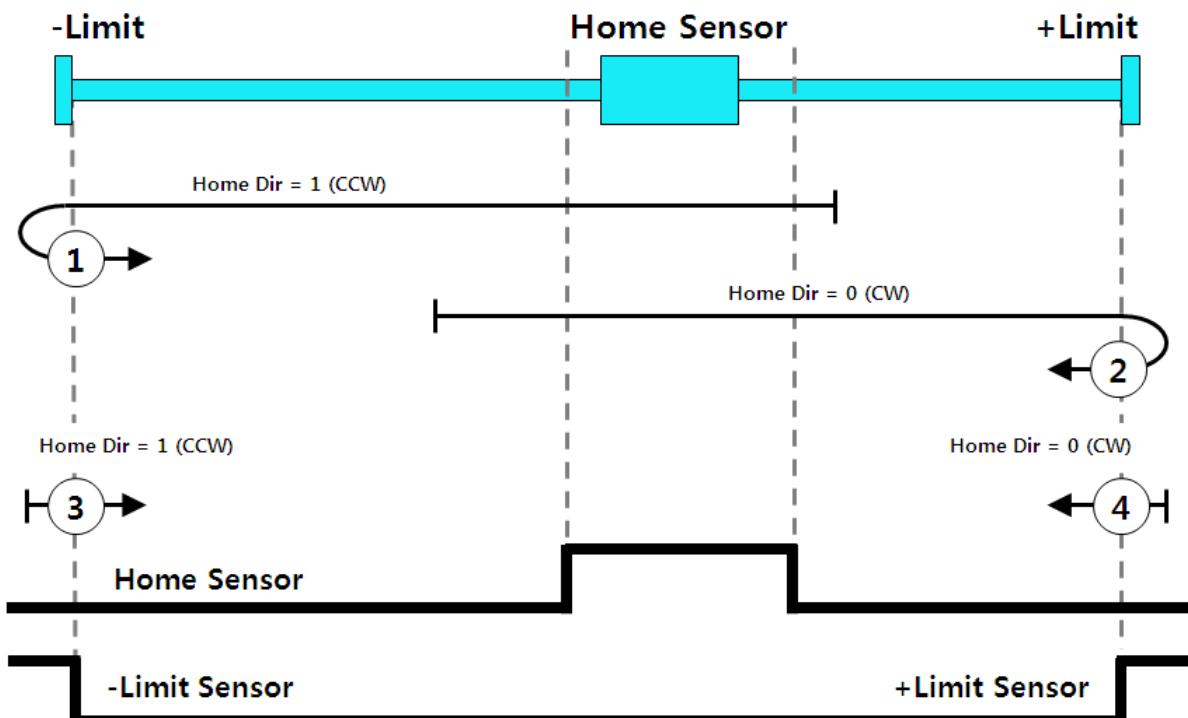


### 7.4.3 Limit Origin Operation

The homing method based on the limit input signal specifies the position where the limit sensor is detected as the home position.

Homing operation ① and ② are within the operating range, and specify the origin where the Limit input signal in origin direction is detected. Even if the input signal of the origin sensor or the limit input signal in the opposite direction is detected before the Limit input signal in the direction of origin is detected, it is ignored and the origin where the Limit input signal in the origin direction is detected is the origin.

The homing operation ③ and ④ are the origin when the Limit input signal in origin direction is detected and the limit input section is completely deviated from the origin.

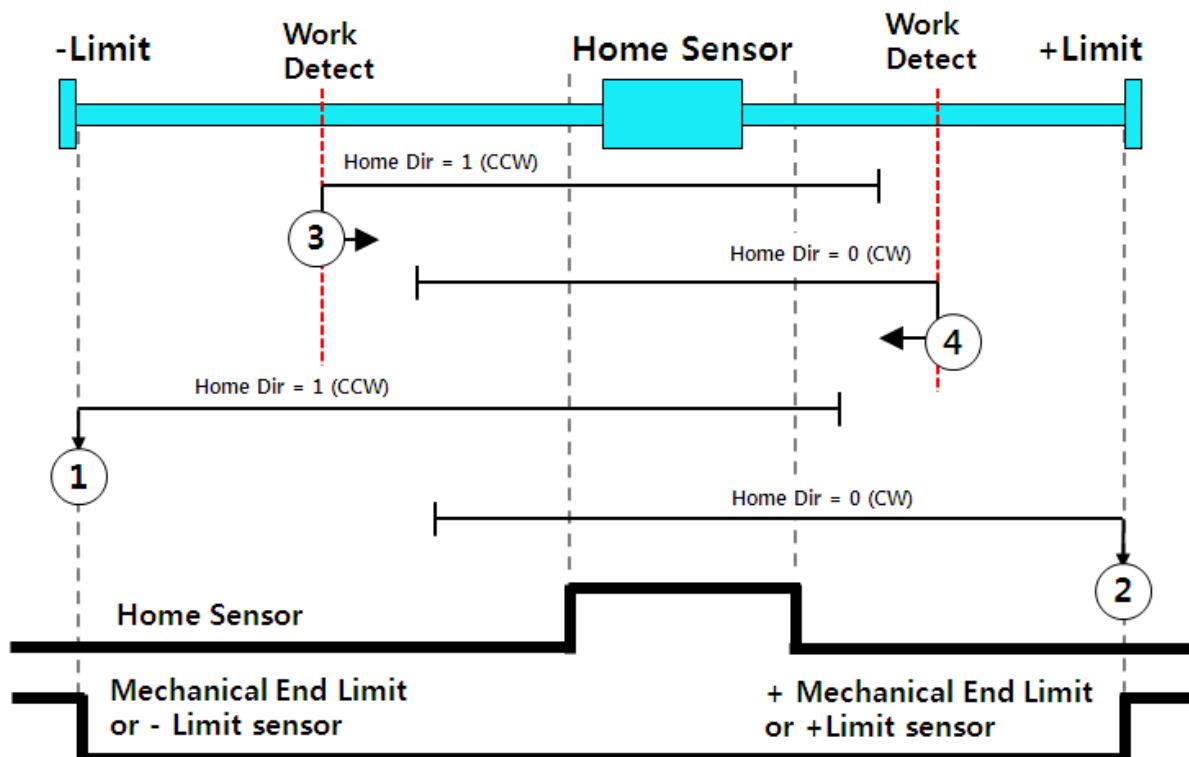


- When the limit sensor is detected during motioning, the stop method is fixed to 'Soft Stop', not depends on parameter value..

#### 7.4.4 Torque Origin Operation

The torque origin command is a command that originates at the point where a physical load is detected at the mechanical end point or the load(work) is exist in a system without the H / W Limit signal(③ and ④). The operation at this time is to detect the load amount of the motor and detect the mechanical end point when the abnormality occurs in the setting value of 'Org Torque Ratio' parameter value. Therefore, before executing the torque origin command, it should be set to a value that is more than the basic load condition of the mechanical equipment.

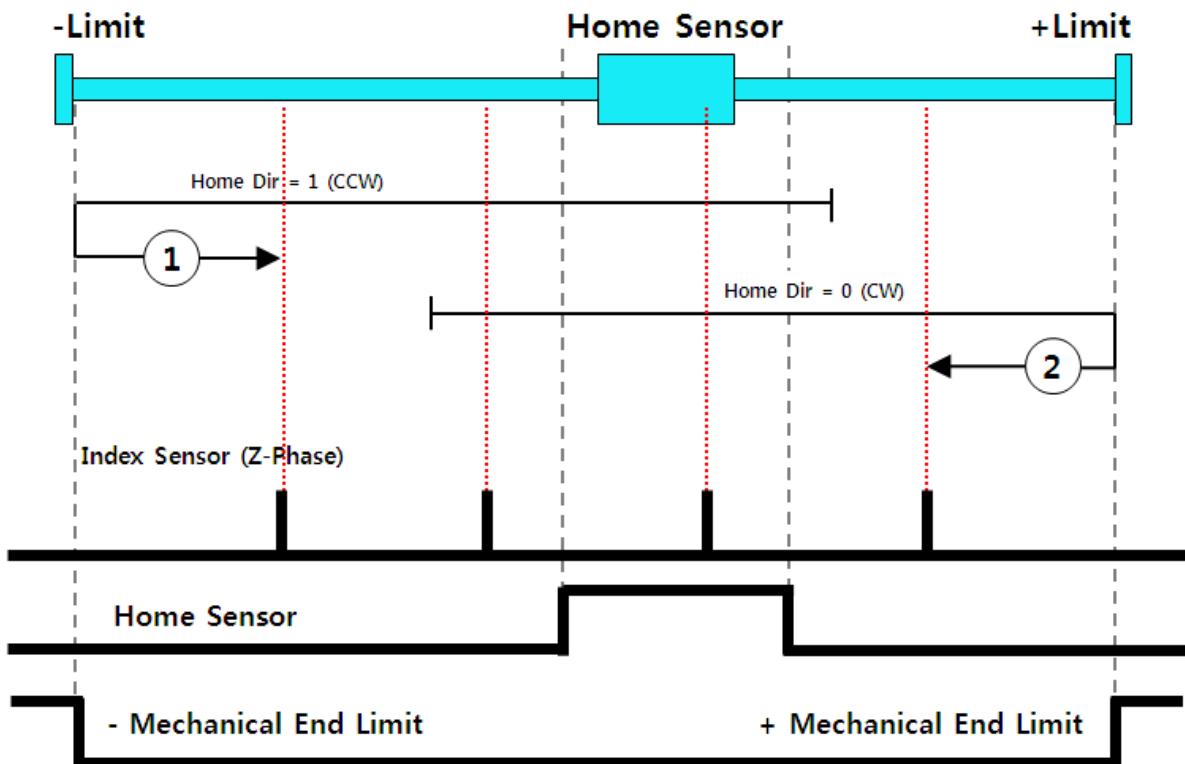
Homing operation ① and ② are motions in which the motor moves in the origin direction and stop. The homing operation is finished in that position.



- When the limit sensor is detected during motioning, the origin command is canceled and motion is stopped..

### 7.4.5 Torque-Z Origin Operation

Homing method based on Z phase input signal after torque origin is a command executed by concurrent execution of home return and Z-phase home return method by detecting the point where physical load is detected at mechanical end point. Homing operation ① and ② are movement in the direction of origin and detect the mechanical end point and are performed in the opposite direction by Z-phase homing method.



- When the limit sensor is detected during motioning, the origin command is canceled and motion is stopped..

### 7.4.6 Set Origin Operation

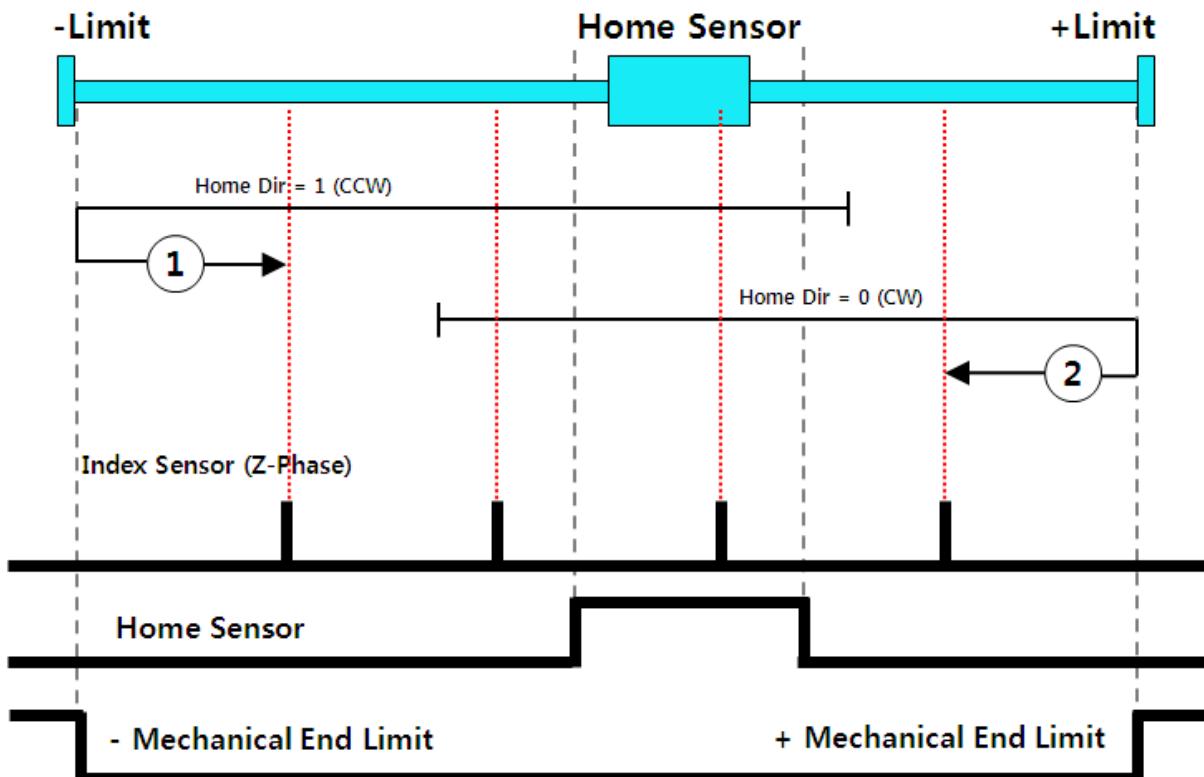
Set to origin in current mechanical position without origin sensor.

HW Limit sensor and Z-phase signal is neglected during origin motioning. And this command can be done only in Servo ON status.

#### 7.4.7 Limit Z Origin Operation

This method is executed in 2 steps. The first one is detecting the limit sensor position and the second is detecting the Z phase input signal.

Homing operation ① and ② are motions in which the motor moves in the origin direction and detect the limit input signal. After change direction, the motor moves until the Z phase input signal detect and that position is the origin position.



- When the limit sensor is detected during motioning, the stop method is fixed to 'Soft Stop', not depends on parameter value..

## 7.5 Trigger Pulse Output

This function is used when the output signal becomes ON periodically in specific condition. This function can be used in absolute coordinate system.

* Ezi-SERVO ALL-28 is not support this function.

### 1) Setting

This function is working with RS-485 communication (DLL library) method only. This command can be executed during the positioning command or before the positioning command also. The following table shows the setting conditions and refer to [「User Manual – Communication Function」](#).

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

### 2) Formular for Setting Items

To calculate the minimum ‘Pulse Period’ value, the next formular is used.

$$\text{The minimum ‘Pulse Period[pulse]’} = (\text{speed / 1000}) * \text{pulse_width} * 10$$

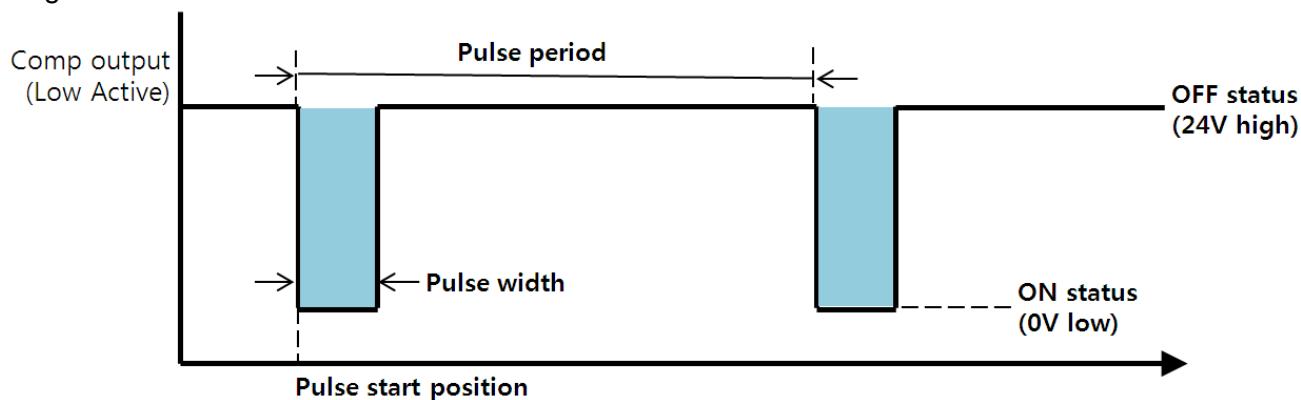
(where  
 - Motioning speed = speed[pps]  
 - Pulse width = pulse_width[msec] )

For example, the motioning speed is 100,000[pps], pulse width is 5[msec] , The minimum ‘pulse period’ must set to more than ‘5000[pulse] value.

 Attention	■ The pulse is output only in bigger position area than ‘pulse start position’ and is output in incremental motion direction.
 Attention	■ The sign of current position value and the sign of ‘pulse start position’ must be same to pulse output.

### 3) Output Signal

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



### 4) Status Check

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

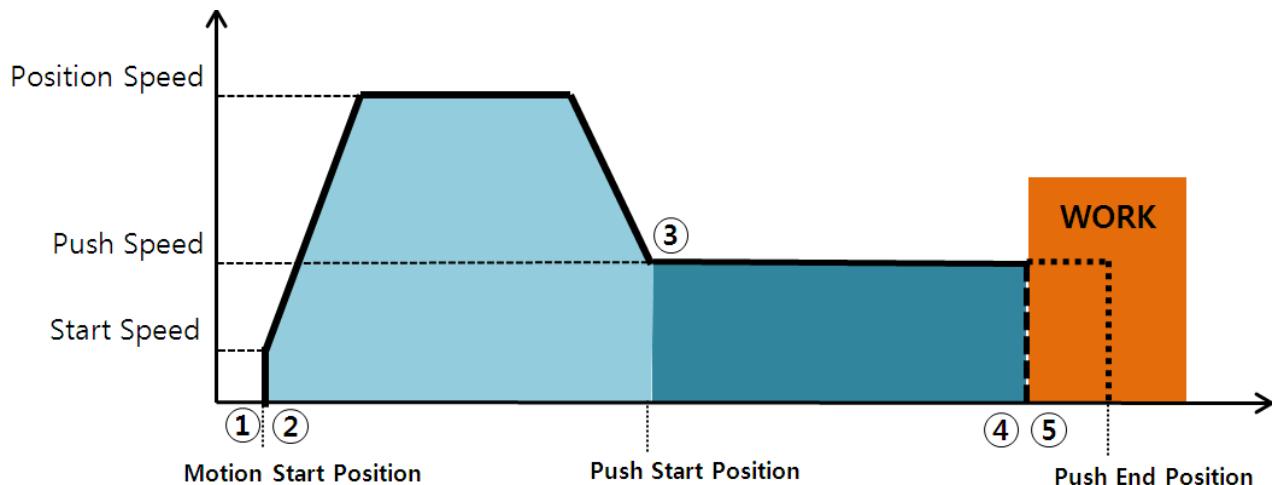
## 7.6 Push Motion

This function is used when the specified motor torque is needed during motioning and stop(only in Stop-mode) status.

This function is **working only in absolute position value**.

* Ezi-SERVO ALL-28 is not support this function.

### 1) Function



① Start Push Motion command

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

## 7.6. Push Motion

③ Decelerate the speed from position motion to push motion.

(push motion speed must be lower than 400[rpm].)

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

⑤ When Push mode is ‘Stop’:

After the work detected, the motor will stop but the motor torque will be maintained and the ‘inposition’/ ‘END’ signal is effective. The maintained motor torque will be return to normal(Servo ON) status by ‘stop’ command.

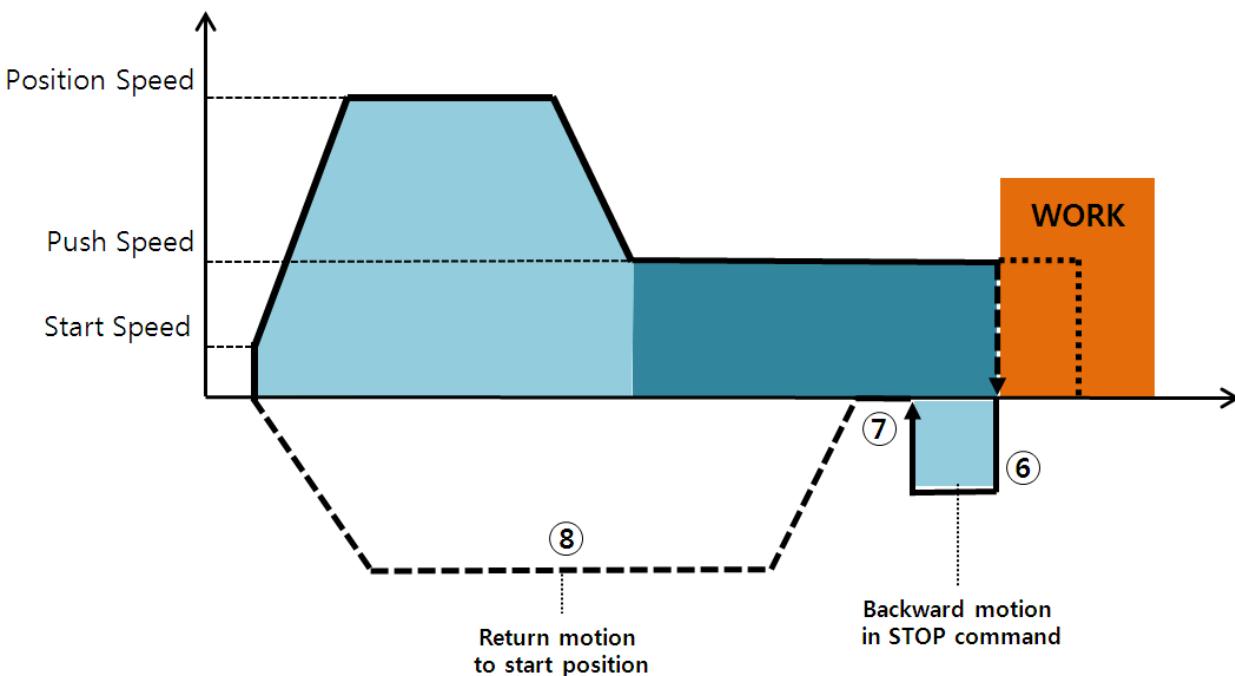
(status : release push mode and return to position mode)

When Push mode is ‘Non-stop’:

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

⑥ Additional the next step is needed as below diagram.

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



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

⑧ Return to start position.



■ Non-stop mode : must be execute the **‘Stop’ command before next motion command** in the work detect situation.



- If there is shock in mechanism, the time delay is needed after 'Stop' operation.
- If alarm happens with 'stop' command after push motion executed, change the 'Push mode' value to bigger or smaller.
- If the work can not be detect during Push position, the push mode is automatically finished.

## 2) Specification

The push torque is different for each motor size. Refer to 「3.3 Motor Torque」 .

Push ratio (from 20~90[%] ) value is referenced to stop status torque on 'Torque Graph'. And the accuracy is -10 ~ +10[%].

When this function is working specially in Ezi-Actuator that is combined Ezi-SERVO Plus-R-MINI and MC-28VA cylinder, the push motion characteristic is as follows.

Item	MC-28VA with Ezi-SERVO Plus-R MINI
Pushing force [N] *1	20 ~ 83 (push ratio : 20~90 [%])
Pushing speed [mm/sec]	6.6 or less
Positioning repeatability [mm]	0.01
Driven method	Lead screw
Max velocity [mm/s]	24
Lead [mm]	2

When this function is working specially in Captive Linear Step that is combined Ezi-SERVO Plus-R-MINI and 17C2035S4 motor, the push motion characteristic is as follows.

Item	17C2035S4 with Ezi-SERVO Plus-R MINI
Pushing force [N] *1	22 ~ 106 (push ratio : 20~90 [%])
Pushing speed [mm/sec]	19.05 or less
Driven method	Lead screw
Lead [mm]	6.35

### 3) Setting Method

This function is **working only in absolute position value**. The position error can happen 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.

- ◆ DLL library method

The following table shows the setting conditions and refer to [「User Manual – Communication Function」](#). There is another library for status checking of push motioning. The position value that is used in push motion must be ‘absolute coordinate’ value.

Setting Item	Description	Range *1
Position command Start speed	Start speed value of position motion	1~35000[pps]
Position command Moving speed	Moving speed of position motion	1~500000[pps]
Position command Target position	Absolute target position value of position command	134,217,727 ~ 134,217,727
Acceleration time	Acceleration time of position motion	1~9,999[ms]
Deceleration time	Decelerate time of position motion	1~9,999[ms]
Push ratio	Motor torque value in push mode	20~80[%]
Push command Moving speed	Moving speed of Push motion (max 400[rpm])	1~66000[pps]
Push command Target position	Absolute targett position value of push command.  *Non-stop mode : the value must be set more than ‘Position command Target position’ value.  *The motor will stop if the position is exceed this value even if the work is not detected.	134,217,727 ~ 134,217,727
Push mode	Set Stop mode(0) or Non-stop mode(1~10000) after the work detect. In case of Non-stop mode, the motor move backward as much as this value[pulse] distances.	0~10,000

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

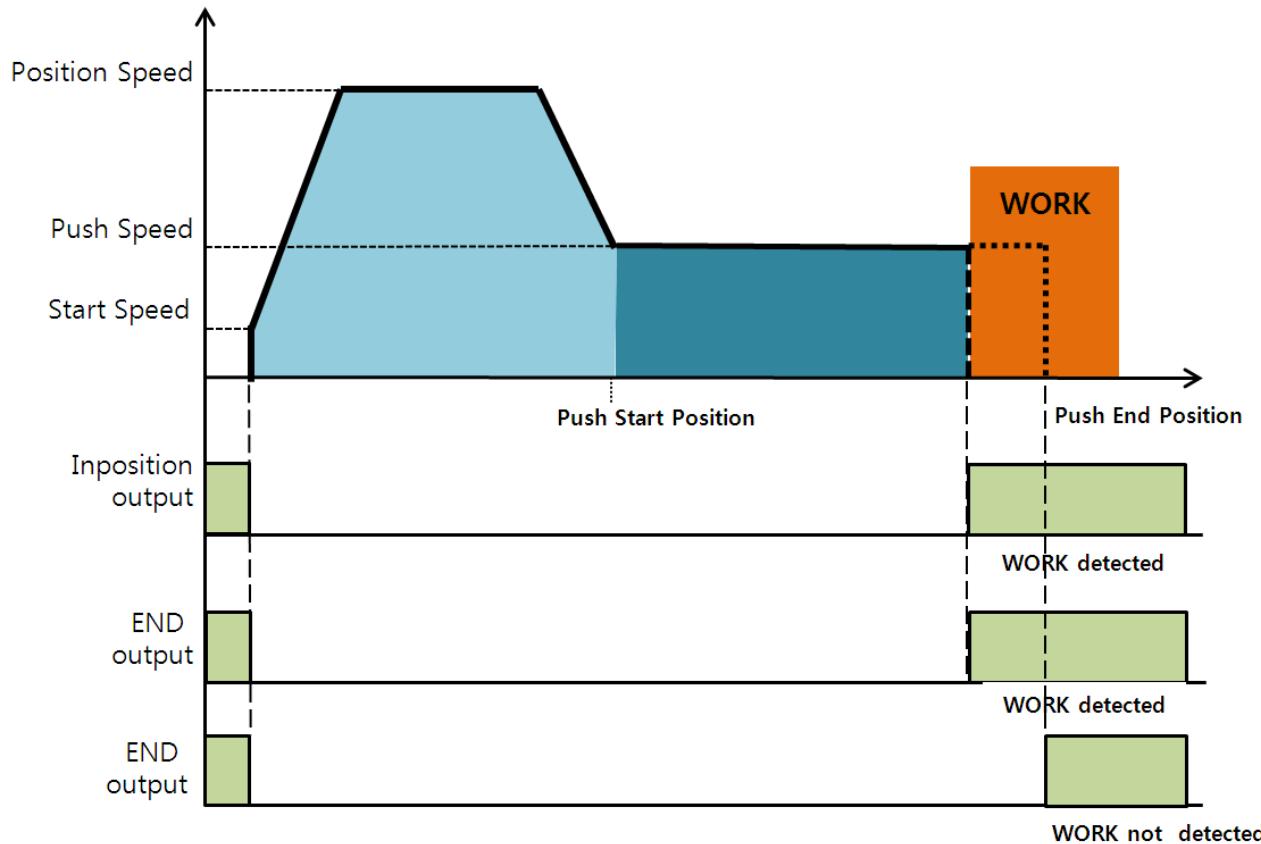
- ◆ Input signal(PT Start) Method

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

#### 4) Status Check

Basically the current push motion status can be checked by DLL library and additionally can be checked by Flag(Inposition signal) and Output(END signal) as follows.

- ◆ Work detected



- ◆ Work not detected

The 'Inposition' and other signals are still OFF when the work is not detected. By 'stop' command these signals change to ON status. If the work is overdue after work detect('Inposition' signal is ON), the 'Inposition' signal change to OFF status. But the 'END' signal is still ON after the first work detect.

The push command is stopped at 'Push End Position'.

#### 5) Alarm

Basically the alarm (#3 and #4) function is not working during push motion moving. This is because of the position error and overload alarm can be happen in push mode.

If the alarm happens during return to start position after finishing push motioning, increase the parameter '27. Position Tracking Limit' value.

## 8. Communication Function

In case of RS-485, up to 16 axes can be controlled by the multi-drop link (daisy chain).



- If Windows goes to the stand-by mode, serial communication is basically disconnected. So, after recovering from the stand-by mode, the user should connect communication again. This content is equally applied to the library provided with the product.

### 8.1 Connection with the PC

There are one method of connecting between the drive and the PC by RS-485(serial communication). PC's RS-232C port can be used. By using following communication converters according to each communication type, the user can connect the PC and the drive module. The maximum communication speed is 115200[bps] with RS-232 to RS-485 converter.



RS-485 Converter (to RS-232)

For connection with the PC, refer to [「4.2 System Configuration」](#)

#### ◆ Cable of Connecting RS232 Port (to PC) and Converter (RS232 ↔ RS-485)

Normally Power does not need to be supplied to the converter module. But when the communication have problems without power, DC 5~24V external power can be connected. The signal is wired as follows.

PC's Connector (DB-9 female)		Cabling	Converter's Connector (DB-9 male)	
Connector	Pin number		Connector	Pin number
	1 2 3 4 5 6 7 8 9	1-----1 2-----2 3-----3 4-----4 5-----5 6-----6 7-----7 9-----9 FrameGND-----FrameGND		1 2 3 4 5 6 7 8 9

◆ **Cable of connecting RS-485 Converter and Drive Module : Ezi-SERVO Plus-R**

Connector Type : RJ45

Cable Type : LAN cable, CAT5E or better (UTP or STP)

Signal Wiring : Standard Straight Wiring (1↔1, 2↔2, 3↔3,..., 8↔8)

If multi-axis connection is required at one segment, up to 16 drive modules can be connected by the daisy-chain method. The pin signal content is as follows.

RJ45 pin No.	UTP CAT5 cable	Function
1	White/orange	GND
2	Orange	GND
3	White/green	Data+
4	Blue	GND
5	White/blue	GND
6	Green	Data-
7	White/green	GND
8	Brown	GND
case		Frame GND

◆ **Cable of connecting RS-485 Converter and Drive Module : Ezi-SERVO Plus-R-MINI and Ezi-SERVO ALL series**

Signal Wiring : Standard Straight Wiring (1↔1, 2↔2, 3↔3)

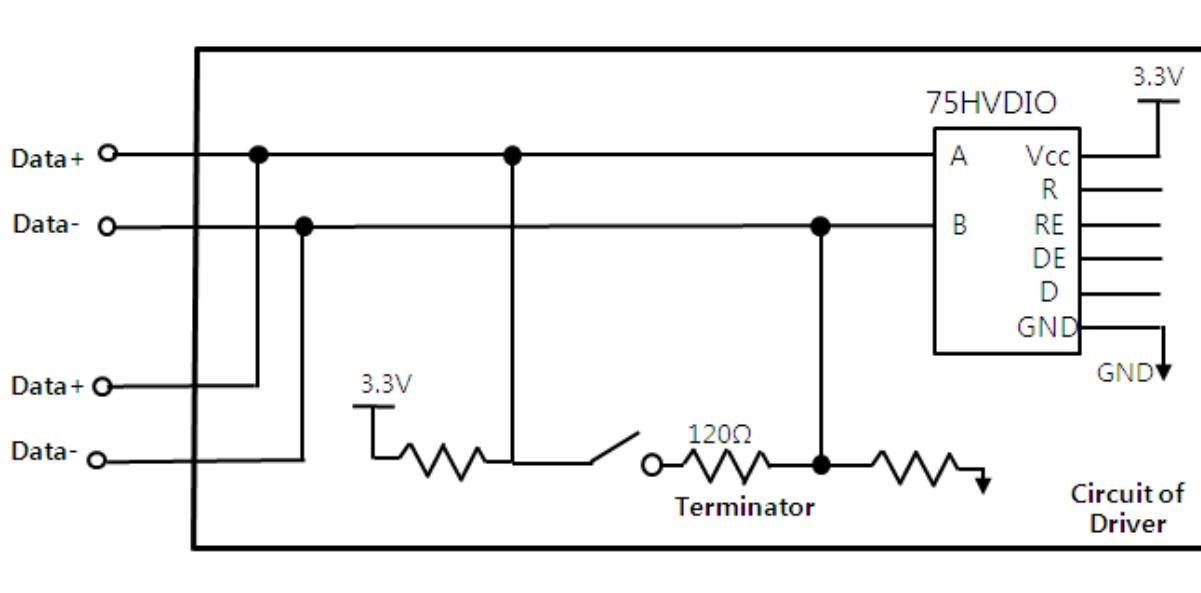
If multi-axis connection is required at one segment, up to 16 drive modules can be connected by the daisy-chain method. The pin signal content is as follows.

pin No	Function
1	Data+
2	Data-
3	GND



■ Signal cable ‘Data+’ and ‘Data-’ are differential type signals. These two signal cables must be **twisted**.

## 8.2 Communication Interface Circuit



The above figure shows an I/O circuit of RS-485 communication interface signal. When communication is connected, Ezi-SERVO Plus-R maintains to receive stand-by status. It performs sending only when it receives the signal from upper communication and then replies. For more information about communication function, refer to [「User Manual – Communication Function」](#) in a separate volume.

## 9. Protective Function

### 9.1 Alarm Type

When an alarm occurs while the controller is operating, a red LED among status display LEDs flash and the following protective function will be displayed according to the number of LED flash counting.(for Ezi-SERVO Plus-R)

Flash count	Alarm Name	Description
1	Overcurrent	The current through power devices in inverter exceeds the limit value *1
2	Overspeed	Command speed for motor exceeds 3300[rpm].
3	Position Tracking	Position error value is higher than specified value in position command status . *2
4	Overload	The motor is continuously operated more than 5 second under a load exceeding the max. torque.
5	Overheat	The internal temperature of the drive exceeds 85 °C.
6	Over regeneratived 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	Inposition error	After operation is finished, a position error occurs.
11	System error	Drive system is halted(Watch Dog Timer).
12	ROM error	Read/Write error on ROM device in drive system.
15	Pos. Error Overflow	Position error value is higher than specified value*1 in motor stop status. *5

*1 4.5A : EzS-NDR-20, EzS-NDR-28, EzS-NDR-42, EzS-NDR-56, EzS-NDR-60, Ezi-SERVO ALL series

9A : EzS-NDR-86 series

*2 Value of 'Pos Tracking Limit[No.27]' parameter[pulse]

*3 50V : EzS-NDR-MI-20, EzS-NDR-MI-28, EzS-NDR-MI-42, Ezi-SERVO ALL series

70V : EzS-NDR-20, EzS-NDR-28, EzS-NDR-42, EzS-NDR-56, EzS-NDR-60 series

90V : EzS-NDR-86 series

*4 20V : EzS-NDR-20, EzS-NDR-28, EzS-NDR-42, EzS-NDR-56, EzS-NDR-60, Ezi-SERVO ALL series

40V : EzS-NDR-86 series

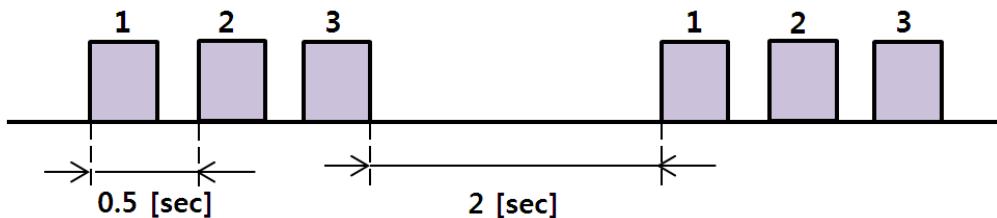
*5 Value of 'Pos Error Overflow Limit[No.33]' parameter[pulse]

## 9.2 Acquiring Alarm Information

When an alarm occurs, the motor become Servo OFF and then stops by free run and at the same time displays alarm message.

Also, 'AlarmBlink' signal repeats On/Off according to the timing as illustrated below. The red LED flash every 0.5 second in accordance with alarm number and wait for 2 seconds. And then red LED flash repeatedly until inputting 'AlarmReset' signal.

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



If the alarm condition happens, the history of alarm happened is saved to ROM area and can be check afterwards.

- ① Maximum 30 history can be save.
  - ② Checking alarm history can be support in Servo OFF status only.
  - ③ To remove alarm history, use 'Reset Alarm Logs' function.
- * Ezi-SERVO ALL-28 is not support this function.



### 9.3 Alarm Check and Release

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

Flash count	Alarm Name	Description	Reset
1	Overcurrent	1)Check the motor's short-circuit (A, /A, B, /B) 2)Check the mechanical status such as parameter setting.	Valid
2	Overspeed	1)Check parameter setting, and abnormal operation of the motor. 2)Check the speed command of upper controller(ex:PLC).	Valid
3	Position Tracking	1)Get down the load or increase the acceleration or deceleration speed. 2)Check assemble status of mechanism. 3)Check the brake signal cable. 4)Check the motor's short-circuit (A, /A, B, /B) 5)Check the encoder cable connection status. 6)Check the parameter(27:Position Tracking Limit) 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 regeneratived 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
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

# 10. Parameter

## 10.1 Parameter List

No	Name	Unit	Lower limit	Upper limit	Default
0	Pulse per Revolution		0	9	9
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 *5	[%]	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	Servo Alarm Logic *5		0	1	0
10	Servo On Logic *5		0	1	0
11	Servo Alarm Reset Logic *5		0	1	0
12	S/W Limit Plus Value *6	[pulse]	-134,217,727	+134,217,727	+134,217,727
13	S/W Limit Minus Value *6	[pulse]	-134,217,727	+134,217,727	-134,217,727
14	S/W Limit Stop Method		0	1	1
15	H/W Limit Stop Method		0	1	1
16	Limit Sensor Logic		0	1	0
17	Org Speed	[pps]	1	500,000	5,000
18	Org Search Speed	[pps]	1	500,000	1,000
19	Org Acc Dec Time	[msec]	1	9,999	50
20	Org Method		0	6	0
21	Org Dir		0	1	0
22	Org Offset *6	[pulse]	-134,217,727	+134,217,727	0
23	Org Position Set *6	[pulse]	-134,217,727	+134,217,727	0
24	Org Sensor Logic		0	1	0

25	Position Loop Gain		0	15	4
26	Inpos Value		0	15	0
27	Pos Tracking Limit *6	[pulse]	0	+134,217,727	5,000
28	Motion Dir		0	1	0
29	Limit Sensor Dir		0	1	1
30	Org Torque Ratio	[%]	20	90	50
31	Pos. Error Overflow Limit *2, *6	[pulse]	0	+134,217,727	5,000
32	Pos. Value Counting Method *2, 5	[pulse]	0	1	0
33	Servo ON Method *3, 5		0	1	1
34	Brake Delay Time *3, 5	[msec]	10	5000	400
35	Reserved				
36	Run Current *4	*10 [%]	5	15	10
37	Stop Current *4	*10 [%]	2	10	5
38	Boost Current *4	*50 [%]	0	7	0

*1 Firmware version number of 08.13.045.1 and later only supported.

*2 Firmware version number of 06.03.043.10 and later only supported.

*3 Firmware version number of 06.0x.063.51 and later only supported.

*4 Firmware version number of 06.0x.063.61 and later only supported.

*5 Ezi-SERVO ALL-28 is not supported.

*6 Next value is used for bigger '06.0x.1xx.xx' Firmware version number.

(plus value is 2147483647 and minus value is -2147483647)

## 10.2 Encoder Setup

The setup of encoder can do in 'No.0 (Pulse per Revolution)' item on next table. Normally the resolution of encoder is 10000. If the resolution is 20000, 32000 or other value, you have to set '0' in parameter setup.

If you don't use default value for 'No.0 (Pulse per Revolution)', 'Position Error' can happen because of the function of Electronic Gear Ratio.

### 10.3. Parameter Description

#### 10.3 Parameter Description

No	Description	Unit	Default																								
0	<p><b>Pulse per Revolution :</b> Number of pulses per revolution. If this value is changed, the motor is set to Servo OFF.</p> <table border="1"> <thead> <tr> <th>Value</th><th>Pulse/Revolution</th><th>Value</th><th>Pulse/Revolution</th></tr> </thead> <tbody> <tr> <td>0</td><td>500 *1</td><td>5</td><td>3600</td></tr> <tr> <td>1</td><td>500</td><td>6</td><td>5000</td></tr> <tr> <td>2</td><td>1000</td><td>7</td><td>6400</td></tr> <tr> <td>3</td><td>1600</td><td>8</td><td>7200</td></tr> <tr> <td>4</td><td>2000</td><td>9</td><td>10000</td></tr> </tbody> </table> <p>*1 : In case of encoder resolution is 2000,4000, 16000, 20000 32000</p>	Value	Pulse/Revolution	Value	Pulse/Revolution	0	500 *1	5	3600	1	500	6	5000	2	1000	7	6400	3	1600	8	7200	4	2000	9	10000		9
Value	Pulse/Revolution	Value	Pulse/Revolution																								
0	500 *1	5	3600																								
1	500	6	5000																								
2	1000	7	6400																								
3	1600	8	7200																								
4	2000	9	10000																								
1	<p><b>Axis Max Speed :</b> 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 limit by encoder resolution value.</p> <p>◆ In case of 1000 : 500,000 ◆ In case of 32000 : 1,600,000</p>	[pps]	500,000																								
2	<p><b>Axis Start Speed :</b> When position moving commands(absolute move, incremental move) are given, this mode sets the operation start speed to [pps] unit.</p>	[pps]	1																								
3	<p><b>Axis Acc Time :</b> 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 <b>Axis Speed</b>.</p> <p>(Ex.1) Axis Start Speed=1, Move Speed=400000 : 1~14316 [msec] (Ex.2) Axis Start Speed=1, Move Speed=10000 : 1~356 [msec]</p>	[msec]	100																								
4	<p><b>Axis Dec Time :</b> When position moving commands(absolute move, incremental move) are given, this mode sets the deceleration section of operation stop segment to [msec] unit. Possible range is different from <b>Axis Speed</b> same as 'Axis Acc Time' paramete.</p>	[msec]	100																								
5	<p><b>Speed Override : *3</b> When position moving commands(absolute move, incremental move) are given, the operation speed is subject to the ratio set to 'Move Speed'. (Ex) If current move speed is 10,000 and speed override is 200, actual motion speed is set to 20,000..</p>	[%]	100																								
6	<p><b>Jog Speed :</b> When jog position moving command is given, this mode sets the motor revolution value to [pps] unit.</p>	[pps]	5,000																								

### 10.3. Parameter Description

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7	<b>Jog Start Speed :</b> When jog position moving command is given, this mode sets the operation start speed to [pps] unit.	[pps]	1
8	<b>Jog Acc Dec Time :</b> In case of jog operation, this mode sets the time of acceleration and deceleration sections to [msec] unit. Possible range is different from <b>Axis Speed</b> . (Ex.1) Axis Start Speed=1, Move Speed=400000 : 1~14316 [msec] (Ex.2) Axis Start Speed=1, Move Speed=10000 : 1~356 [msec]	[msec]	100
9	<b>Servo Alarm Logic : *3</b> When the motor or the drive is defective and so alarm signal output is ON through CN1 connector, this mode sets the output signal level. ◆ 0 : 0 V (Active low)   ◆ 1 : 24V (Active high)		0
10	<b>Servo On Logic : *3</b> By using the input pin of CN1 connector, the drive may be converted into Servo ON. In this case, this mode sets the input signal condition so that the drive can be Servo ON. ◆ 0 : When 0 V (low level) is inputted, servo is set to ON. ◆ 1 : When 24V(high level) is inputted, servo is set to ON.		0
11	<b>Servo Alarm Reset Logic : *3</b> When the motor or the drive is detected to generate alarm, this mode sets the input signal level to release the alarm signal. Before releasing the alarm signal, the user must release its cause. ◆ 0 : 0 V (Active low)   ◆ 1 : 24V (Active high)		0
12	<b>S/W Limit Plus Value : *4</b> When position moving commands(absolute move, incremental move, jog) are given, this move set the maximum input limit that the motor can move to the plus(+) direction with 28 bits. When position reach to this value during 'Limit Origin', it will be recognized to the Origin.  <i>* When this value set to '0', S/W Limit function is canceled</i>	[pulse]	+134,217,727
13	<b>S/W Limit Minus Value : *4</b> 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. When position reach to this value during 'Limit Origin', it will be recognized to Origin.  <i>* When this value set to '0', S/W Limit function is canceled</i>	[pulse]	-134,217,727
14	<b>S/W Limit Stop Method :</b> 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.		1
15	<b>H/W Limit Stop Method:</b> 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.		1

### 10.3. Parameter Description

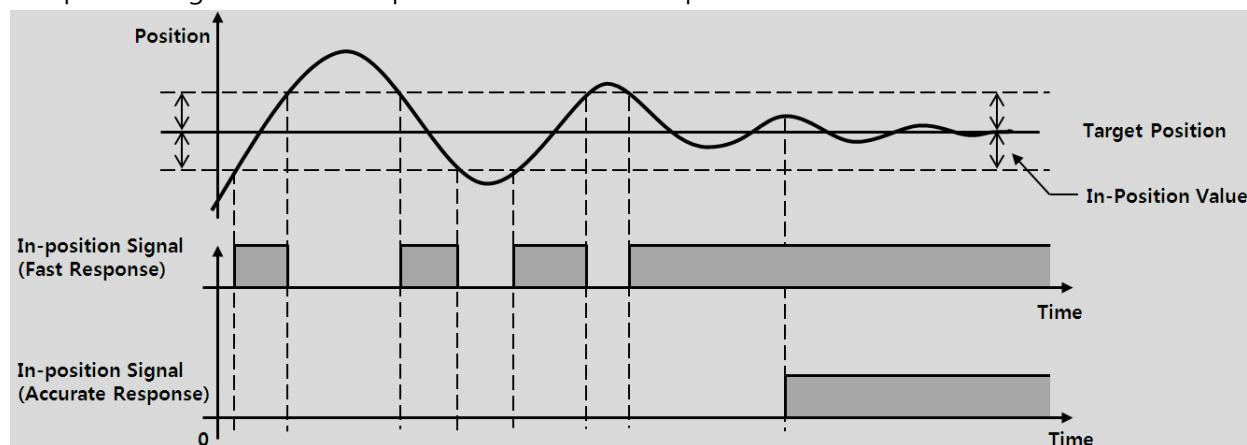
16	<b>Limit Sensor Logic :</b> Sets the signal level so that the motor can recognize limit sensor's input to ON. ◆ 0 : 0 V (Active low)   ◆ 1 : 24V (Active high)		0
17	<b>Org Speed :</b> In case of origin return command, this mode sets the operation speed until the motor senses the origin sensor to [pps] unit.	[pps]	5,000
18	<b>Org Search Speed :</b> 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]	1,000
19	<b>Org Acc Dec Time :</b> 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]	50
20	<b>Org Method :</b> 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 wall by 'Org Torque Ratio' and then immediately stops. ◆ 4 : 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'. ◆ 5 : To set origin in current mechanical position.. For more information, refer to ' <a href="#">7.4 Origin Return</a> '. ◆ 6 : The motor moves up to the limit sensor spot by 'Org Speed' and then execute Z-pulse origin return at the low value of 'Org Search Speed'.		0
21	<b>Org Dir :</b> In case of origin return, this mode sets the revolution direction of the motor. ◆ 0 : moves the motor clockwise. ◆ 1 : moves the motor counterclockwise.		0
22	<b>Org Offset :</b> 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]	0
23	<b>Org Position Set :</b> After origin return is completed, 'Command Pos/Actual Pos' value is set to this setting value.	[pulse]	0
24	<b>Org Sensor Logic :</b> Sets the origin sensor signal level so that the motor can recognize origin sensor's input to ON. ◆ 0 : 0 V (low)   ◆ 1 : 24V (high)		0
25	<b>Position Loop Gain :</b> After the motor stops, this mode controls the motor's response by a load attached to the motor. The user can control this value by the motor's load and so get the motor's		4

	<p>performance that responds fast and stably. Set this mode as follows.</p> <ol style="list-style-type: none"> <li>1) Set the value to '0'.</li> <li>2) Increase the value until the motor's response is stabilized.</li> <li>3) Previously adjust the setting status by increasing/decreasing one or two steps of the current setting value.</li> </ol> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Value</th><th>Integral Part's Time Constant</th><th>Proportional Gain</th><th>Value</th><th>Integral Part's Time Constant</th><th>Proportional Gain</th></tr> </thead> <tbody> <tr><td>0</td><td>1</td><td>1</td><td>8</td><td>2</td><td>4</td></tr> <tr><td>1</td><td>1</td><td>2</td><td>9</td><td>2</td><td>5</td></tr> <tr><td>2</td><td>1</td><td>3</td><td>10</td><td>3</td><td>1</td></tr> <tr><td>3</td><td>1</td><td>4</td><td>11</td><td>3</td><td>2</td></tr> <tr><td>4</td><td>1</td><td>5</td><td>12</td><td>3</td><td>3</td></tr> <tr><td>5</td><td>2</td><td>1</td><td>13</td><td>3</td><td>4</td></tr> <tr><td>6</td><td>2</td><td>2</td><td>14</td><td>3</td><td>5</td></tr> <tr><td>7</td><td>2</td><td>3</td><td>15</td><td>3</td><td>6</td></tr> </tbody> </table> <p>* The above value is not the actual value used inside the drive but the relative value.</p>	Value	Integral Part's Time Constant	Proportional Gain	Value	Integral Part's Time Constant	Proportional Gain	0	1	1	8	2	4	1	1	2	9	2	5	2	1	3	10	3	1	3	1	4	11	3	2	4	1	5	12	3	3	5	2	1	13	3	4	6	2	2	14	3	5	7	2	3	15	3	6							
Value	Integral Part's Time Constant	Proportional Gain	Value	Integral Part's Time Constant	Proportional Gain																																																									
0	1	1	8	2	4																																																									
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5	2	1	13	3	4																																																									
6	2	2	14	3	5																																																									
7	2	3	15	3	6																																																									
26	<p><b>Inpos Value :</b></p> <p>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.</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">Value</th><th colspan="2">Inposition Value [pulse]</th><th rowspan="2">Value</th><th colspan="2">Inposition Value [pulse]</th></tr> <tr> <th>Fast Response</th><th>Accurate Response</th><th></th><th></th><th></th></tr> </thead> <tbody> <tr><td>0</td><td>0</td><td>8</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>1</td><td>9</td><td>1</td><td>1</td><td>1</td></tr> <tr><td>2</td><td>2</td><td>10</td><td>2</td><td>2</td><td>2</td></tr> <tr><td>3</td><td>3</td><td>11</td><td>3</td><td>3</td><td>3</td></tr> <tr><td>4</td><td>4</td><td>12</td><td>4</td><td>4</td><td>4</td></tr> <tr><td>5</td><td>5</td><td>13</td><td>5</td><td>5</td><td>5</td></tr> <tr><td>6</td><td>6</td><td>14</td><td>6</td><td>6</td><td>6</td></tr> <tr><td>7</td><td>7</td><td>15</td><td>7</td><td>7</td><td>7</td></tr> </tbody> </table> <p>Fast response and accurate response can be controlled as illustrated below *2</p>	Value	Inposition Value [pulse]		Value	Inposition Value [pulse]		Fast Response	Accurate Response				0	0	8	0	0	0	1	1	9	1	1	1	2	2	10	2	2	2	3	3	11	3	3	3	4	4	12	4	4	4	5	5	13	5	5	5	6	6	14	6	6	6	7	7	15	7	7	7		0
Value	Inposition Value [pulse]		Value	Inposition Value [pulse]																																																										
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0	0	8	0	0	0																																																									
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3	3	11	3	3	3																																																									
4	4	12	4	4	4																																																									
5	5	13	5	5	5																																																									
6	6	14	6	6	6																																																									
7	7	15	7	7	7																																																									
27	<p><b>Pos Tracking Limit :</b></p> <p>Acts to protect the motor and the drive. While the motor is run, when 'Position Error' is greater than this setting value, this mode generates an alarm to stop a flow of electricity to the motor and then set it to Servo OFF.</p>	[pulse]	5000																																																											
28	<p><b>Motion Dir :</b></p> <p>When the motor operates by position command, this mode sets the revolution direction of the motor.</p> <p>◆ 0 : moves the motor clockwise. ◆ 1 : moves the motor counterclockwise.</p> <p>If this parameter is changed, normally 'Limit Sensor Dir' is also changed.</p>		0																																																											

### 10.3. Parameter Description

	<b>Limit Sensor Dir :</b> Sets the limit sensor direction to stop the motor to the limit spot under operation.  ◆ 0 : When operation direction is 'CW', input the sensor signal to the Limit+ direction, and the motor will stop. ◆ 1 : When operation direction is 'CW', input the sensor signal to the Limit- direction, and the motor will stop.  If this parameter is changed, normally 'Motion Sensor Dir' is also changed.		0
29	<b>Org Torque Ratio :</b> This parameter can be used only when 'Origin Method' is '3'. To set the maximum torque value to stop the motor with some material(wall)	%	50
31	<b>Pos. Error Overflow Limit :</b> 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]	5000
32	<b>Pos. Value Counting Method : *3</b> To select the display type of 'position' value.  ◆ 0 : When the position value is display in positive and negative value together. ◆ 1 : When the position value is display only in positive value. This type can be used in one direction motioning..		0
33	<b>Servo ON Method : *3</b> To select the Servo ON processing depends on mechanical characteristics.  ◆ 1 : When the normal process is enough and it takes about 400[msec]. ◆ 0 : For the safe Servo ON process on big friction mechanism and it takes about 2~3 [sec].		1
34	<b>Brake Delay Time : *3</b> To set the delay time of brake control signal depends on Servo ON process.	[msec]	400
35	<b>Run Current :</b> To set the maximum value of the current of motor during operates by position command.	*10[%]	10
36	<b>Stop Current :</b> To set the maximum value of the current of motor while the motor stop.	*10[%]	5
37	<b>Boost Current :</b> To set the maximum value of the current of motor during accelerate or decelerate operation.	*50[%]	0

*2 Inposition signals of Fast Response and Accurate Response mode.



***3** Ezi-SERVO ALL-28 is not supported function.

***4** Next value is used for bigger '06.0x.1xx.xx' Firmware version number.

(plus value is 2147483647 and minus value is -2147483647)



*Fast, Accurate, Smooth Motion*

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