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Ezi-SERVO® Plus-R

Closed Loop Stepping System
with Network based Motion Controller

Ezi-SERVO® Plus-R MINI

Closed Loop Stepping System

User Manual

Text

(Rev.08.05.11)

FASTECH

www.fastech.co.kr

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Manual Version ; [ver08.05.11]

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1. Safety Pre-cautions

※ Before getting started ※

- Thank you for purchasing Ezi-SERVO PlusR of FASTECH, which is a full digital position control servo system with a 32bit high performance of DSP.
- This manual describes handling, maintenance, repair, diagnosis, and trouble shooting of Ezi-SERVO.
- Before operating Ezi-SERVO, read this manual through.

1. Safety Precautions

◆ General Precautions

☞ Contents of this manual are subject to change without prior notice for functional improvement, change of specifications, or user's better understanding.

Please read the manual provided with the purchased Ezi-SERVO PlusR carefully.

☞ When the manual is damaged or lost, contact with FASTECH's distributors or the address on the last page of the manual.

☞ FASTECH is not responsible for a product breakdown due to user's dismantling the product, and such a breakdown is not guaranteed by the warranty.

◆ Put the safety first

☞ Please read the manual and understand all contents in this manual, before product's installation, operation and repairing. Prior to product operation, understand the mechanical characteristics of the product and related all safety information and precautions.

☞ After reading the manual, keep the manual near the product so that any user can read the manual whenever needed.

☞ This manual divides safety precautions into 「Warning」 and 「Caution」.

Caution	If the user does improperly handle the product, the user may get seriously or slightly injured and damages may occur in the machine only.

Warning	If the user does improperly handle the product, a dangerous situation like an electric shock may occur resulting in death or serious injuries.

☞ Although the item mentioned is only Caution, a serious result may be caused depending on the situation. Necessarily follow safety precautions.

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◆ The Status of the Product

Caution	☞ Check if the product is damaged or any component is omitted. When an abnormal product is installed and operated, the user may get injured.

◆ Installation

Caution	☞ Carefully handle the product. Dropping the product on the ground or the user's foot may cause an injury. ☞ Use non-flammable materials like metals in the place where the product is to be installed. Otherwise, a fire may occur. ☞ When installing several drives in a sealed place, install a cooling fan to keep the ambient temperature of the drive at 55℃ or lower. Otherwise, a fire or other kinds of accidents may occur due to overheating.

◆ Connecting Cables

Warning	☞ Before connecting cables, input power must be power off status. Otherwise, an electric shock or a fire may occur. ☞ The case of the drive is insulated from the ground of the internal circuit by the condenser. Necessarily ground the driver. Otherwise, an electric shock or a fire may occur.

◆ Change of operation condition and setting parameter

Caution	☞ All parameters of the drive were accordingly set at the factory. To change these parameters, read the manual first. Otherwise, the machine may be damaged or out of order.

◆ Repair and Check

Warning	☞ Stop supplying power to the main circuit, wait for a while, and then check or repair the drive. Electricity remains in the condenser may cause any danger like an electric shock. ☞ Do not change cabling while power is being supplied. Otherwise, the user may get injured or the drive may get damaged. ☞ Do not remodel the drive. Otherwise, the user may receive an electric shock or the drive may get damaged. The damaged product is not guaranteed by the warranty.

Notes on Installation

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

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2. Specifications of the Drive

2.1 Characteristic Table

1) Ezi-SERVO-PR

Motor Model		EzM-20 series	EzM-28 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-42 series	EzS-NDR-56 series	EzS-NDR-60 series	EzS-NDR-86 series
Input Voltage		24VDC ±10%	24VDC ±10%	24VDC ±10%	24VDC ±10%	24VDC ±10%	40~70VDC
Control Method		Closed loop control with 32bit DSP					
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	In Use : 0~55℃ In Storage : -20~70℃					
	Humidity	In Use : 35~85% (Non-condensing) In Storage : 10~90% (Non-condensing)					
	Vib. Resist.	0.5G					
Function	Rotation Speed	0~3000rpm					
	Resolution(P/R)	4000/Rev. Encoder model : 500, 1000, 1600, 2000, 3600, 5000, 6400, 7200, 10000 10000/Rev. Encoder model : 500, 1000, 1600, 2000, 3600, 5000, 6400, 7200, 10000 16000/Rev. Encoder model : 500, 1000, 1600, 2000, 3600, 5000, 6400, 7200, 10000, 16000 20000/Rev. Encoder model : 500, 1000, 1600, 2000, 3600, 5000, 6400, 7200, 10000, 20000 32000/Rev. Encoder model : 500, 1000, 1600, 2000, 3600, 5000, 6400, 7200, 10000, 32000					
	Protection Functions	Over current, Over speed, Position tracking error, Over load, Over temperature, Over regenerated voltage, Motor connect error, Encoder connect error, Motor voltage error, Inposition error, System error, ROM error, Input voltage error, Position overflow error					
	LED Display	Power status, Alarm status, In-Position status, Servo On status					
	In-Position Selection	0~15(Selectable by parameter)					
	Position Gain Selection	0~15(Selectable by parameter)					
	Rotational Direction	CW / CCW (Selectable by parameter)					
I/O Signal	Input Signal	3 dedicated input (LIMIT+, LIMIT-, ORIGIN), 9 programmable input (photocoupler)					
	Output Signal	1 dedicated output (Compare Out), 9 programmable output (photocoupler)					
Communication Interface		The RS-485 serial communication with PC Transmission speed : 9,6ll~921,600[bps]					
Position Control		Incremental mode/Absolute mode Data Range : -134,217,727 to +134,217,727[pulse], Operating speed : Max. 500[kpps]					

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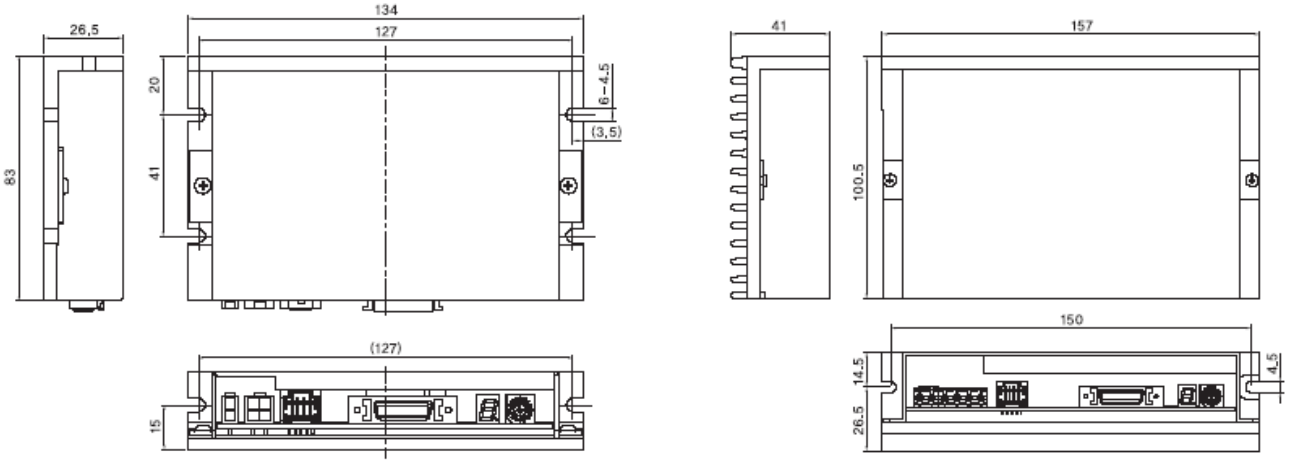
2) Ezi-SERVO-PR-MI

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

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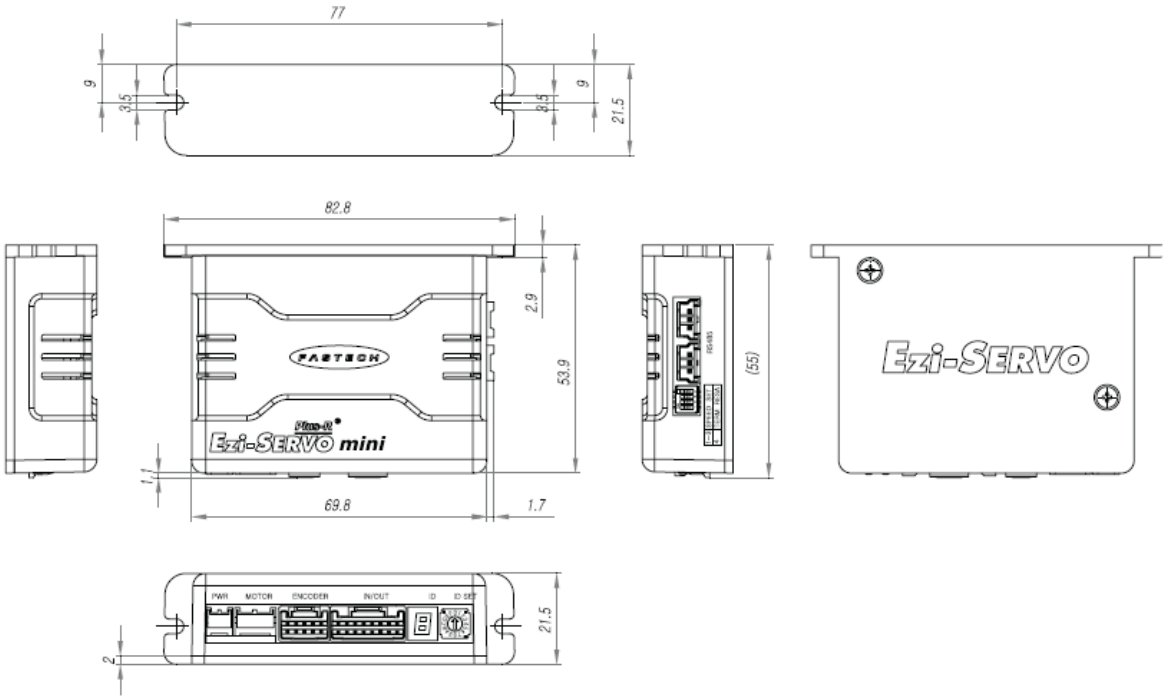
2.2 Dimensions

1) Ezi-SERVO-PR



2) Ezi-SERVO-PR-MI

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



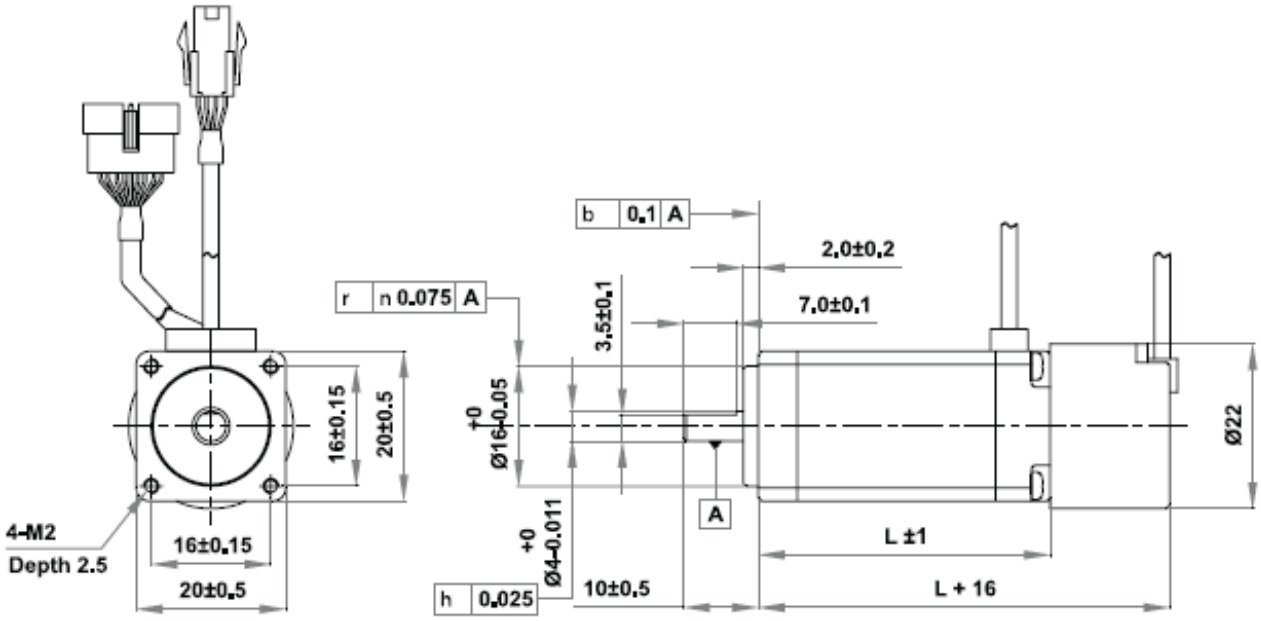
3. Specifications of the Motor

3.1 EzM-20 Series

1) Specifications

M O D E L	UNIT	EzM-20M-F	EzM-20L-F
DRIVE METHOD	----	BI-POLAR	BI-POLAR
NUMBER OF PHASES	----	2	2
VOLTAGE	VDC	2.9	2.25
CURRENT per PHASE	A	0.5	0.5
RESISTANCE per PHASE	Ohm	5.8	5.5
INDUCTANCE per PHASE	mH	2.5	5
HOLDING TORQUE	Nm	0.018	0.03
ROTOR INTERTIA	g·㎠	2.5	3.3
WEIGHTS	g	50	80
LENGTH(L)	mm	28	38
ALLOWABLE THRUST LOAD	N	Lower than motor weight	
INSULATION RESISTANCE	MOhm	100min. (at 500VDC)	
INSULATION CLASS	----	CLASS B (130℃)	
OPERATING TEMPERATURE	℃	0 to 55	

2) Dimensions

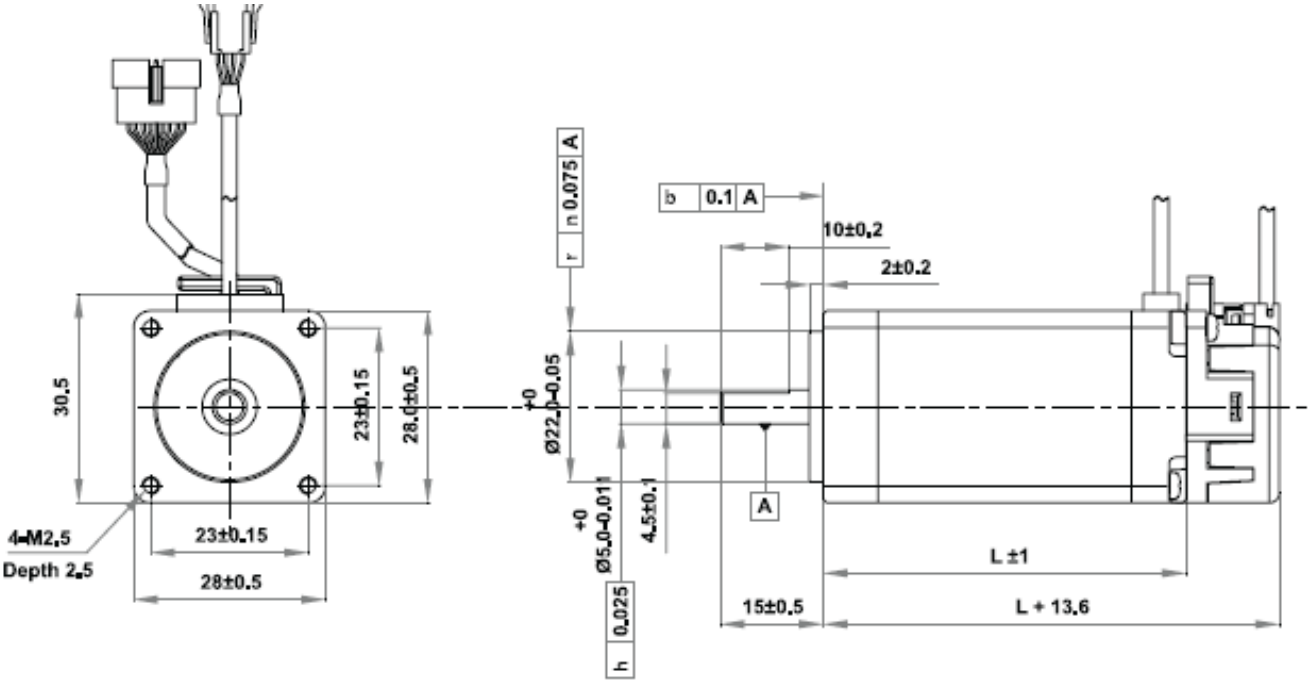


3.2 EzM-28 Series

1) Specifications

M O D E L	UNIT	EzM-28S-D	EzM-28M-D	EzM-28L-D
DRIVE METHOD	----	BI-POLAR	BI-POLAR	BI-POLAR
NUMBER OF PHASES	----	2	2	2
VOLTAGE	VDC	3.04	3.04	3.04
CURRENT per PHASE	A	0.95	0.95	0.95
RESISTANCE per PHASE	Ohm	3.2	3.2	3.2
INDUCTANCE per PHASE	mH	2	5	5.8
HOLDING TORQUE	Nm	0.07	0.12	0.14
ROTOR INTERTIA	g·㎠	9	13	18
WEIGHTS	g	110	140	200
LENGTH(L)	mm	32	45	52
ALLOWABLE THRUST LOAD	N	Lower than motor weight		
INSULATION RESISTANCE	MOhm	100min. (at 500VDC)		
INSULATION CLASS	----	CLASS B (130℃)		
OPERATING TEMPERATURE	℃	0 to 55		

2) Dimensions

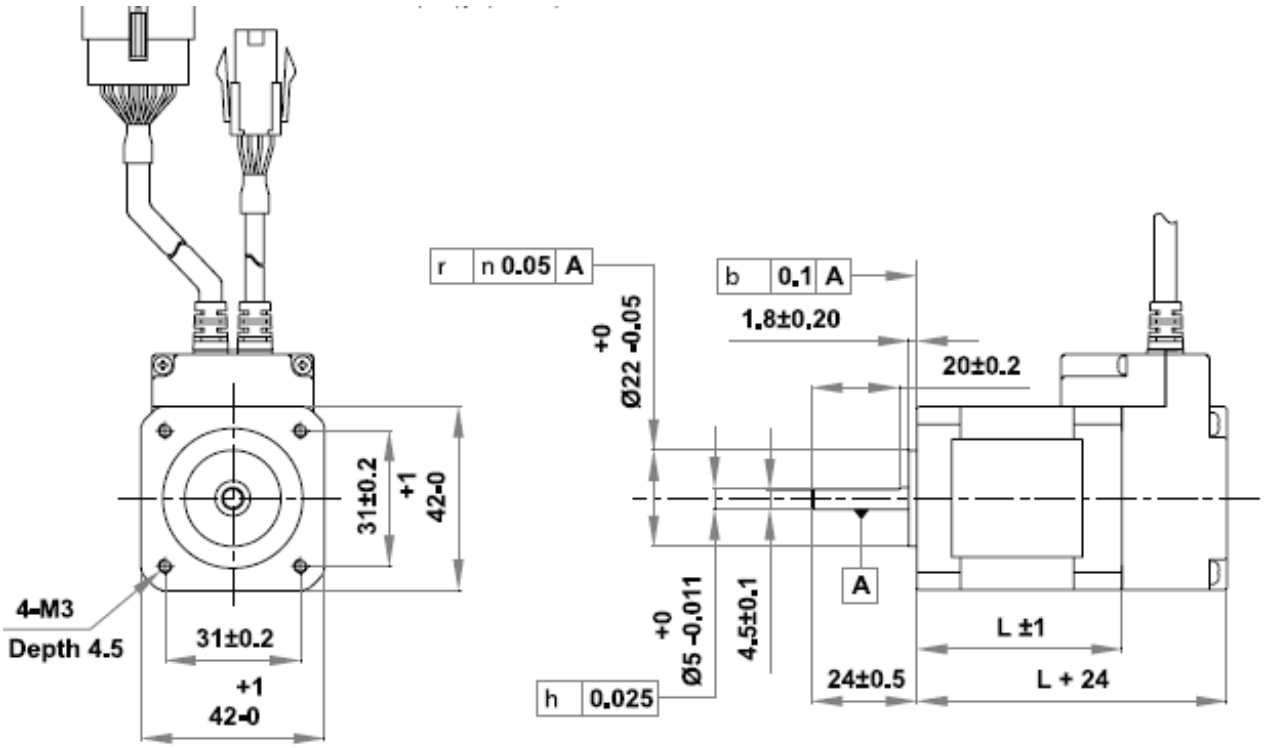


3.3 EzM-42 Series

1) Specifications

M O D E L	UNIT	EzM-42S-A EzM-42S-B EzM-42S-C	EzM-42M-A EzM-42M-B EzM-42M-C	EzM-42L-A EzM-42L-B EzM-42L-C	EzM-42XL-A EzM-42XL-B EzM-42XL-C
DRIVE METHOD	-----	BI-POLAR	BI-POLAR	BI-POLAR	BI-POLAR
NUMBER OF PHASES	-----	2	2	2	2
VOLTAGE	VDC	3.36	4.32	4.56	7.2
CURRENT per PHASE	A	1.2	1.2	1.2	1.2
RESISTANCE per PHASE	Ohm	2.8	3.6	3.8	6
INDUCTANCE per PHASE	mH	2.5	7.2	8	15.6
HOLDING TORQUE	Nm	0.32	0.44	0.54	0.8
ROTOR INTERTIA	g·㎠	35	54	77	114
WEIGHTS	g	220	280	350	500
LENGTH(L)	mm	33	39	47	59
ALLOWABLE THRUST LOAD	N	Lower than motor weight			
INSULATION RESISTANCE	Mohm	100min. (at 500VDC)			
INSULATION CLASS	-----	CLASS B (130℃)			
OPERATING TEMPERATURE	℃	0 to 55			

2) Dimensions



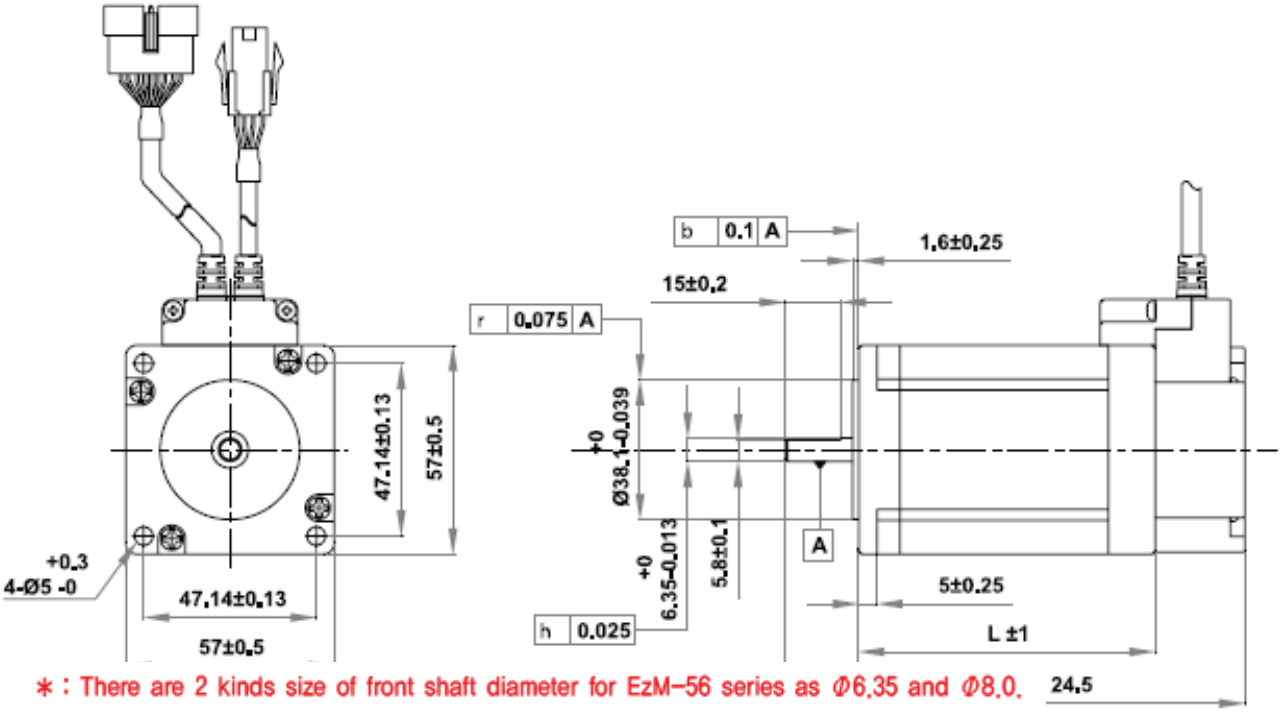
3.4 EzM-56 Series

Ezi-SERVO-PR drive only.

1) Specifications

M O D E L	UNIT	EzM-56S-A EzM-56S-B EzM-56S-C	EzM-56M-A EzM-56M-B EzM-56M-C	EzM-56L-A EzM-56L-B EzM-56L-C	EzM-56XL-A EzM-56XL-B EzM-56XL-C
DRIVE METHOD	----	BI-POLAR	BI-POLAR	BI-POLAR	BI-POLAR
NUMBER OF PHASES	----	2	2	2	2
VOLTAGE	VDC	1.56	2.1	2.7	3.57
CURRENT per PHASE	A	3	3	3	3
RESISTANCE per PHASE	Ohm	0.52	0.7	0.9	1.19
INDUCTANCE per PHASE	mH	1	2	3.8	7.97
HOLDING TORQUE	Nm	0.64	1	2	3.5
ROTOR INTERTIA	g·㎠	120	200	480	737
WEIGHTS	g	500	700	1150	1580
LENGTH(L)	mm	46	54	80	138.5
ALLOWABLE THRUST LOAD	N	Lower than motor weight			
INSULATION RESISTANCE	MOhm	100min. (at 500VDC)			
INSULATION CLASS	----	CLASS B (130℃)			

2) Dimensions



* : There are 2 kinds size of front shaft diameter for EzM-56 series as Ø6.35 and Ø8.0.

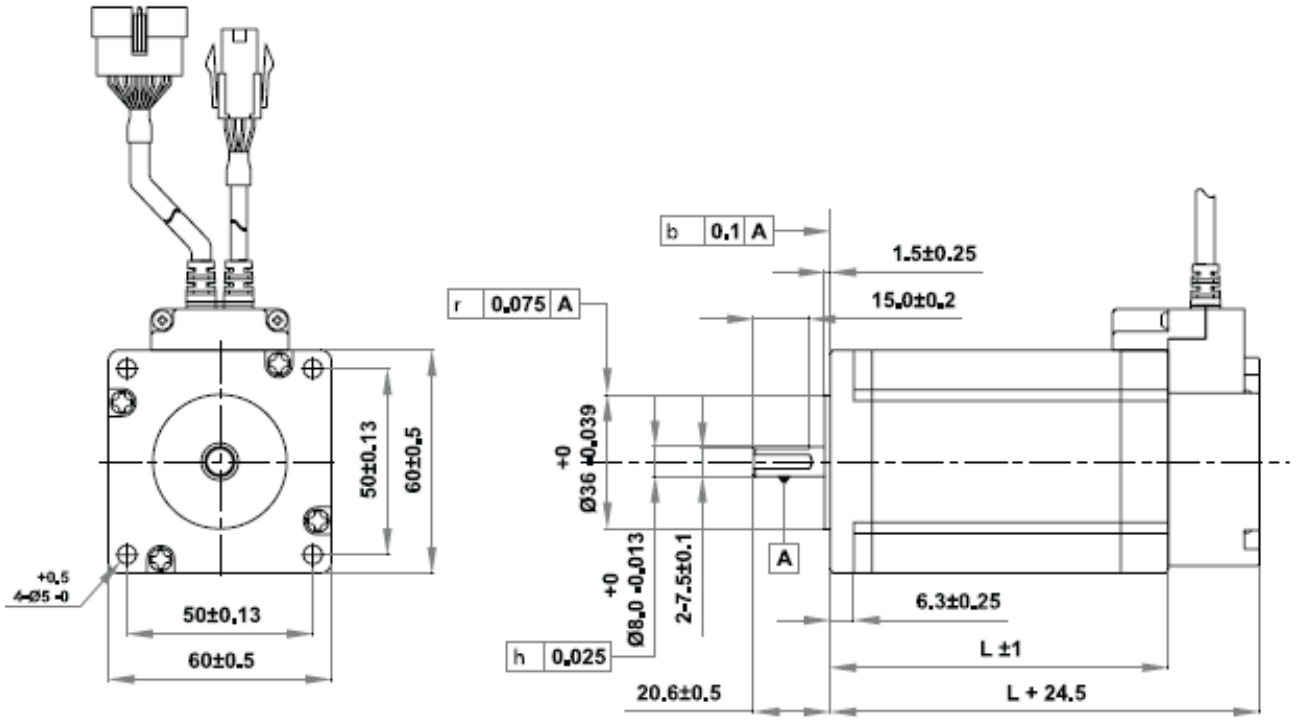
3.5 EzM-60 Series

Ezi-SERVO-PR drive only.

1) Specifications

M O D E L	UNIT	EzM-60S-A EzM-60S-B EzM-60S-C	EzM-60M-A EzM-60M-B EzM-60M-C	EzM-60L-A EzM-60L-B EzM-60L-C
DRIVE METHOD	----	BI-POLAR	BI-POLAR	BI-POLAR
NUMBER OF PHASES	----	2	2	2
VOLTAGE	VDC	1.52	1.56	2.6
CURRENT per PHASE	A	4	4	4
RESISTANCE per PHASE	Ohm	0.38	0.39	0.65
INDUCTANCE per PHASE	mH	0.64	1.2	2.4
HOLDING TORQUE	Nm	0.88	1.28	2.4
ROTOR INTERTIA	g·㎠	140	320	800
WEIGHTS	g	600	900	1600
LENGTH(L)	mm	46	56	90
ALLOWABLE THRUST LOAD	N	Lower than motor weight		
INSULATION RESISTANCE	MOhm	100min. (at 500VDC)		
INSULATION CLASS	----	CLASS B (130℃)		
OPERATING TEMPERATURE	℃	0 to 55		

2) Dimensions



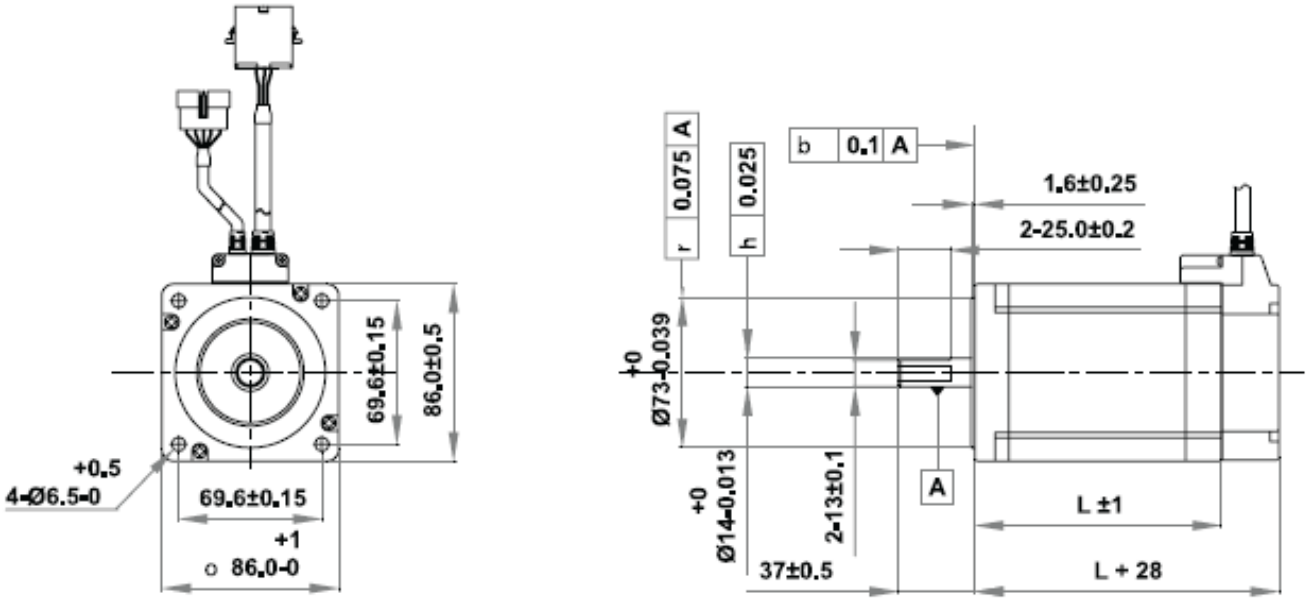
3.6 EzM-86 Series

Ezi-SERVO-PR drive only.

1) Specifications

M O D E L	UNIT	EzM-86M-A	EzM-86L-A	EzM-86XL-A
DRIVE METHOD	----	BI-POLAR	BI-POLAR	BI-POLAR
NUMBER OF PHASES	----	2	2	2
VOLTAGE	VDC	2.4	3.6	4.38
CURRENT per PHASE	A	6.0	6.0	6.0
RESISTANCE per PHASE	Ohm	0.4	0.6	0.73
INDUCTANCE per PHASE	mH	3.5	6.5	8.68
HOLDING TORQUE	mN·m	4500	8500	12000
ROTOR INTERTIA	g·㎠	1400	2700	4000
WEIGHTS	kg	2.4	3.9	5.4
LENGTH(L)	mm	79	119	159
ALLOWABLE THRUST LOAD	N	Lower than motor weight		
INSULATION RESISTANCE	MOhm	100min. (at 500VDC)		
INSULATION CLASS	----	CLASS B (130℃)		

2) Dimensions

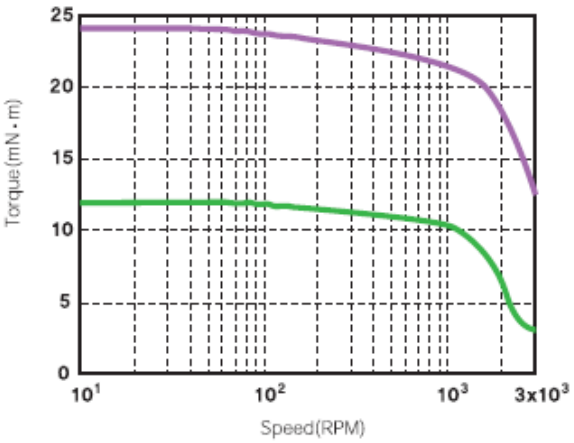


4. Characteristics of Motor Torque

※Measured Condition
Motor Voltage = 24VDC
Motor Current = Rated Current (Refer to Motor Specification)
Drive = Ezi-SERVO-MI-PR

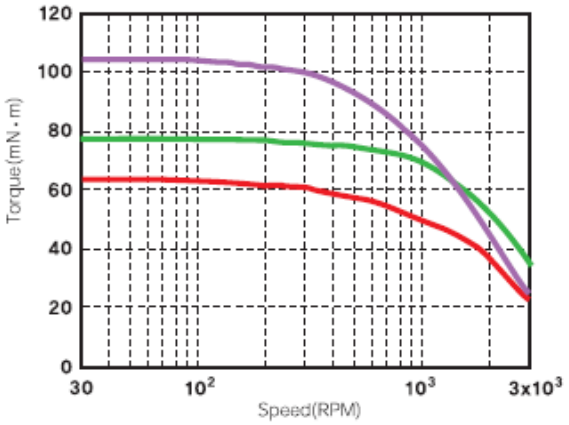
EzM-20 series

EzM-20M-F
EzM-20L-F



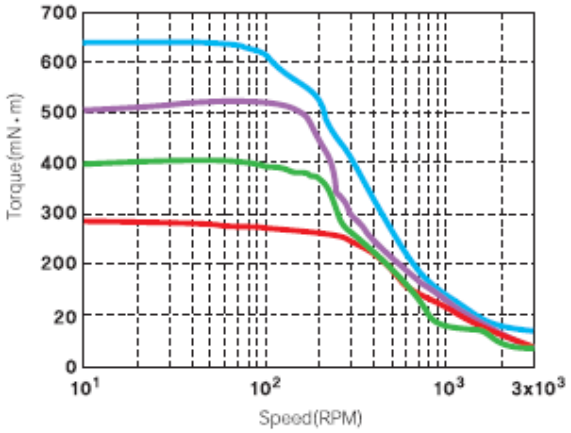
EzM-28 series

EzM-28S-D
EzM-28M-D
EzM-28L-D



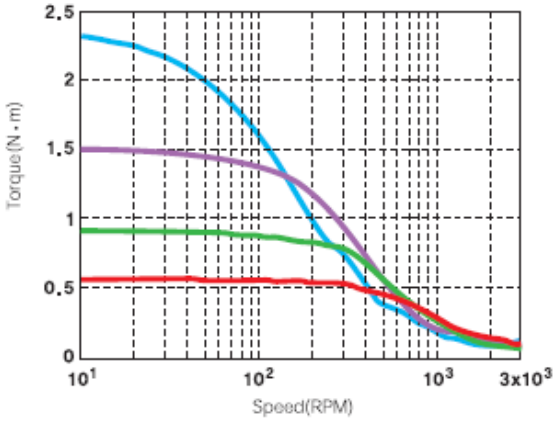
EzM-42 series

EzM-42S
EzM-42M
EzM-42L
EzM-42XL



EzM-56 series

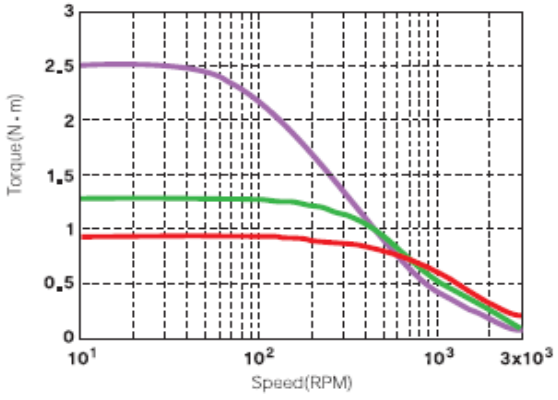
EzM-56S
EzM-56M
EzM-56L
EzM-56XL



EzM-56 series :Ezi-SERVO-PR drive only.
EzM-60 series :Ezi-SERVO-PR drive only.

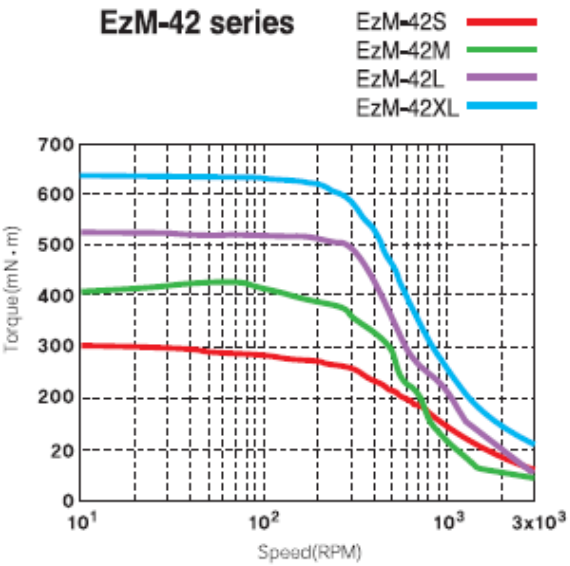
EzM-60 series

EzM-60S
EzM-60M
EzM-60L

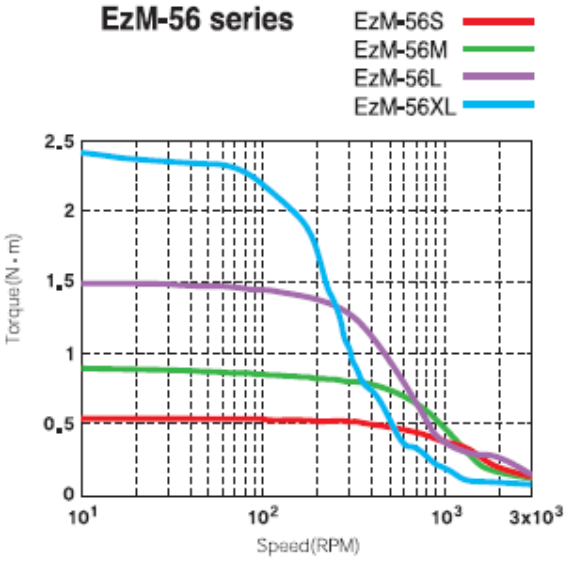


※Measured Condition
Motor Voltage = 40VDC
Motor Current = Rated Current (Refer to Motor Specification)
Drive = Ezi-SERVO-Plus R

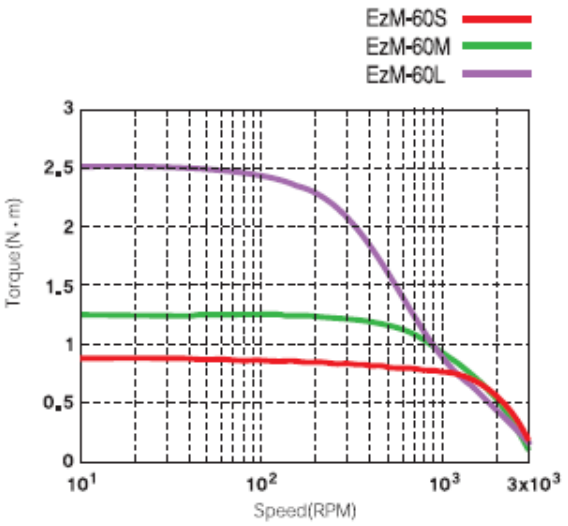
EzM-42 series



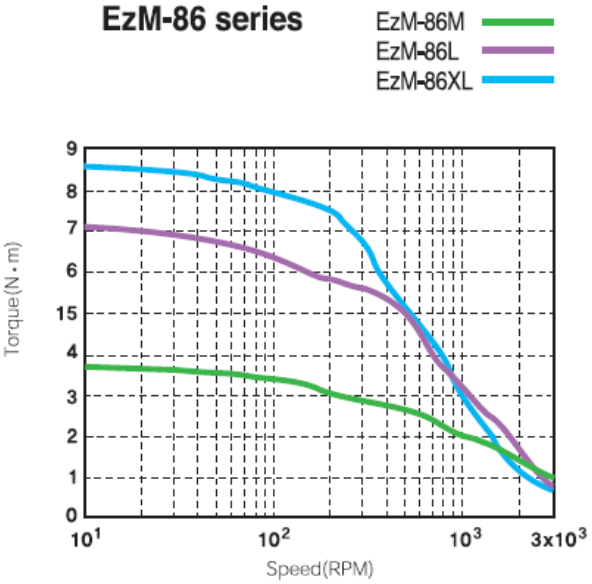
EzM-56 series



EzM-60 series



EzM-86 series



※Measured Condition

Motor Voltage = 70VDC

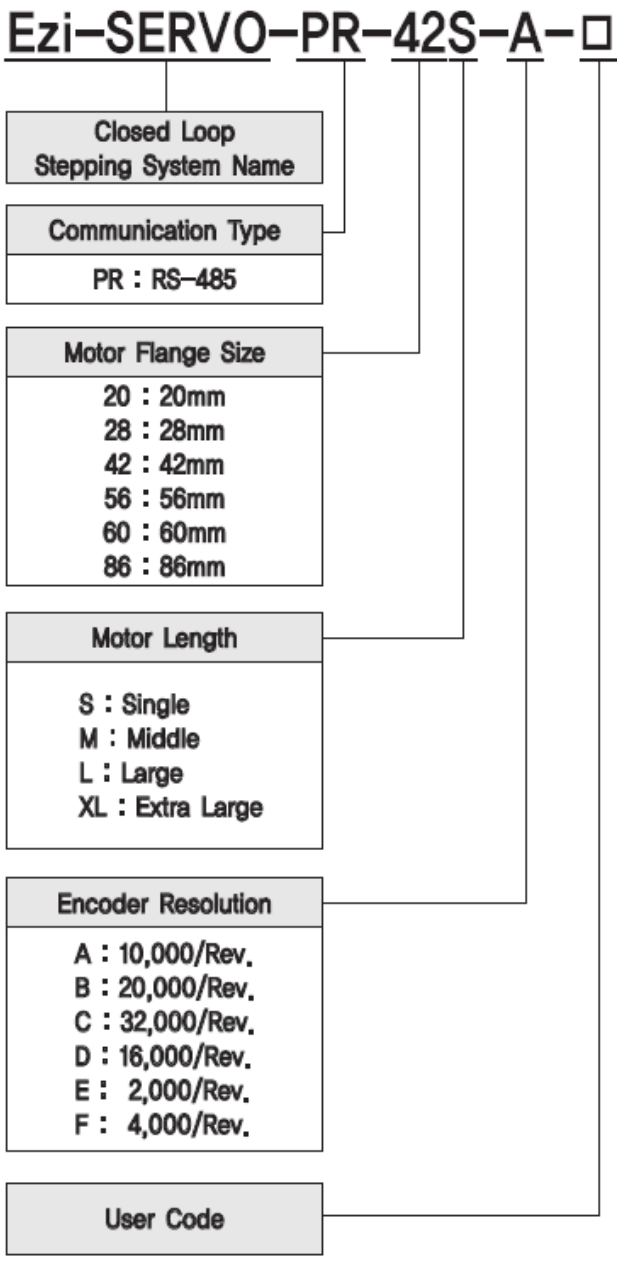
Motor Current = Rated Current(Refer to Motor Specification)

Drive = Ezi-SERVO-Plus R

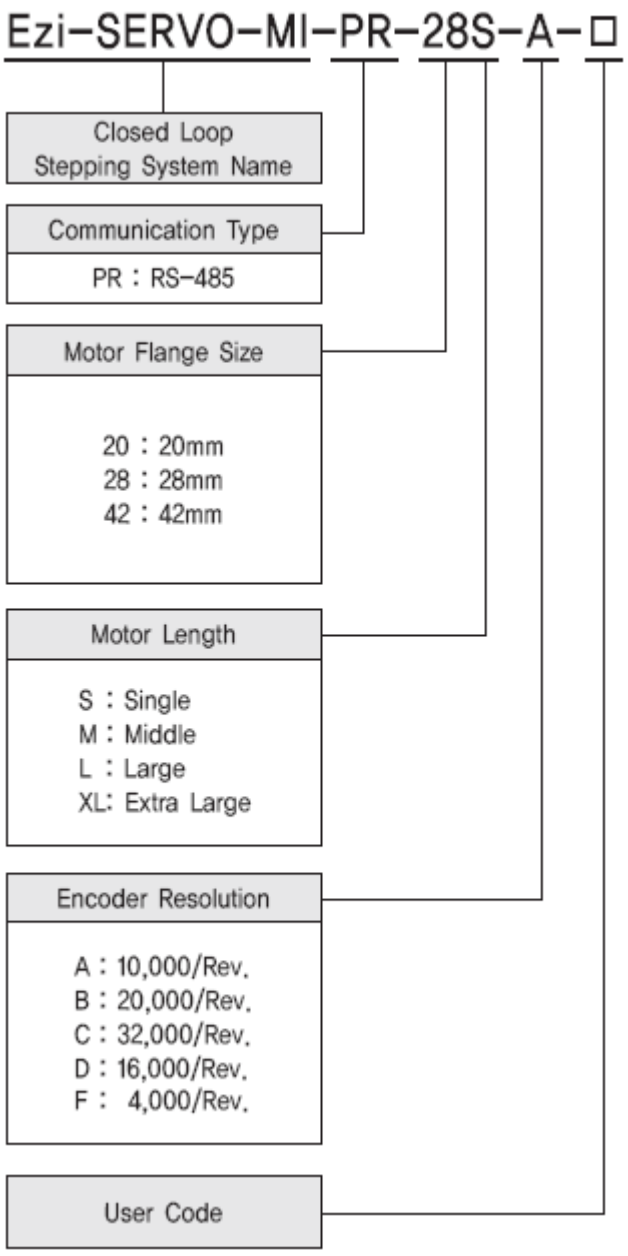
5. Configuration of the Controller

5.1 Combination of Motor and Drive

1) Ezi-SERVO-PR



2) Ezi-SERVO-PR-MI



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3) Combination of Ezi-SERVO-PR

Unit Part Number	Motor Model Number	Drive Model Number
Ezi-SERVO-PR-20M-F	EzM-20M-F	EzS-NDR-20M-F
Ezi-SERVO-PR-20L-F	EzM-20L-F	EzS-NDR-20L-F
Ezi-SERVO-PR-28S-D	EzM-28S-D	EzS-NDR-28S-D
Ezi-SERVO-PR-28M-D	EzM-28M-D	EzS-NDR-28M-D
Ezi-SERVO-PR-28M-E*1	EzM-28M-E	EzS-NDR-28M-E
Ezi-SERVO-PR-28L-D	EzM-28L-D	EzS-NDR-28L-D
Ezi-SERVO-PR-28L-E*1	EzM-28L-E	EzS-NDR-28L-E
Ezi-SERVO-PR-42S-A	EzM-42S-A	EzS-NDR-42S-A
Ezi-SERVO-PR-42S-B	EzM-42S-B	EzS-NDR-42S-B
Ezi-SERVO-PR-42S-C	EzM-42S-C	EzS-NDR-42S-C
Ezi-SERVO-PR-42M-A	EzM-42M-A	EzS-NDR-42M-A
Ezi-SERVO-PR-42M-B	EzM-42M-B	EzS-NDR-42M-B
Ezi-SERVO-PR-42M-C	EzM-42M-C	EzS-NDR-42M-C
Ezi-SERVO-PR-42L-A	EzM-42L-A	EzS-NDR-42L-A
Ezi-SERVO-PR-42L-B	EzM-42L-B	EzS-NDR-42L-B
Ezi-SERVO-PR-42L-C	EzM-42L-C	EzS-NDR-42L-C
Ezi-SERVO-PR-42XL-A	EzM-42XL-A	EzS-NDR-42XL-A
Ezi-SERVO-PR-42XL-B	EzM-42XL-B	EzS-NDR-42XL-B
Ezi-SERVO-PR-42XL-C	EzM-42XL-C	EzS-NDR-42XL-C
Ezi-SERVO-PR-56S-A	EzM-56S-A	EzS-NDR-56S-A
Ezi-SERVO-PR-56S-B	EzM-56S-B	EzS-NDR-56S-B
Ezi-SERVO-PR-56S-C	EzM-56S-C	EzS-NDR-56S-C
Ezi-SERVO-PR-56M-A	EzM-56M-A	EzS-NDR-56M-A
Ezi-SERVO-PR-56M-B	EzM-56M-B	EzS-NDR-56M-B
Ezi-SERVO-PR-56M-C	EzM-56M-C	EzS-NDR-56M-C
Ezi-SERVO-PR-56L-A	EzM-56L-A	EzS-NDR-56L-A
Ezi-SERVO-PR-56L-B	EzM-56L-B	EzS-NDR-56L-B
Ezi-SERVO-PR-56L-C	EzM-56L-C	EzS-NDR-56L-C
Ezi-SERVO-PR-56XL-A	EzM-56XL-A	EzS-NDR-56XL-A
Ezi-SERVO-PR-56XL-B	EzM-56XL-B	EzS-NDR-56XL-B
Ezi-SERVO-PR-56XL-C	EzM-56XL-C	EzS-NDR-56XL-C
Ezi-SERVO-PR-60S-E*1	EzM-60S-E	EzS-NDR-60S-E
Ezi-SERVO-PR-60S-A	EzM-60S-A	EzS-NDR-60S-A
Ezi-SERVO-PR-60S-B	EzM-60S-B	EzS-NDR-60S-B
Ezi-SERVO-PR-60S-C	EzM-60S-C	EzS-NDR-60S-C
Ezi-SERVO-PR-60M-E*1	EzM-60M-E	EzS-NDR-60M-E
Ezi-SERVO-PR-60M-A	EzM-60M-A	EzS-NDR-60M-A
Ezi-SERVO-PR-60M-B	EzM-60M-B	EzS-NDR-60M-B
Ezi-SERVO-PR-60M-C	EzM-60M-C	EzS-NDR-60M-C
Ezi-SERVO-PR-60L-E*1	EzM-60L-E	EzS-NDR-60L-E
Ezi-SERVO-PR-60L-A	EzM-60L-A	EzS-NDR-60L-A
Ezi-SERVO-PR-60L-B	EzM-60L-B	EzS-NDR-60L-B
Ezi-SERVO-PR-60L-C	EzM-60L-C	EzS-NDR-60L-C
Ezi-SERVO-PR-86M-A	EzM-86M-A	EzS-NDR-86M-A
Ezi-SERVO-PR-86L-A	EzM-86L-A	EzS-NDR-86L-A
Ezi-SERVO-PR-86XL-A	EzM-86XL-A	EzS-NDR-86XL-A

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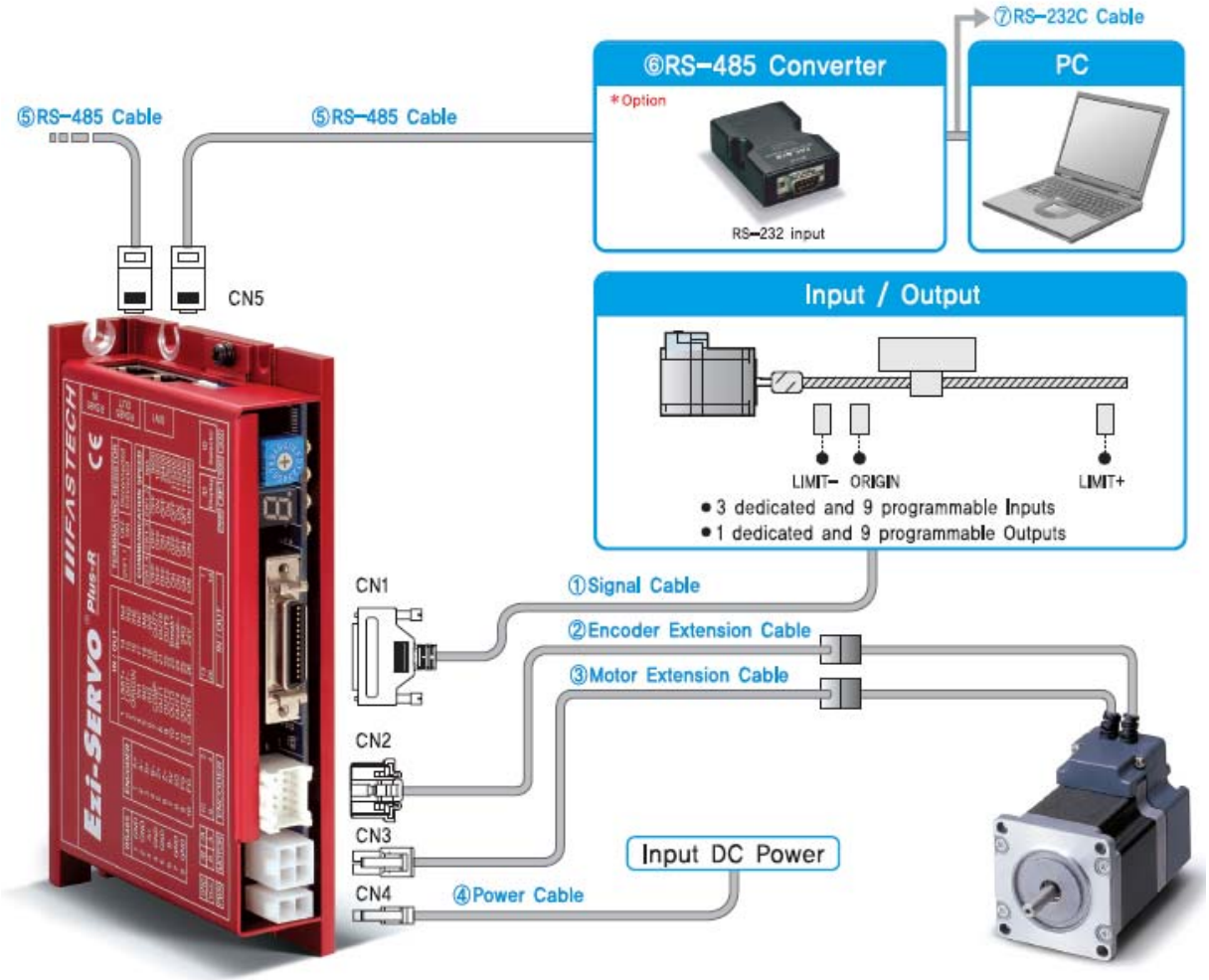
4) Combination of Ezi-SERVO-PR-MI

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

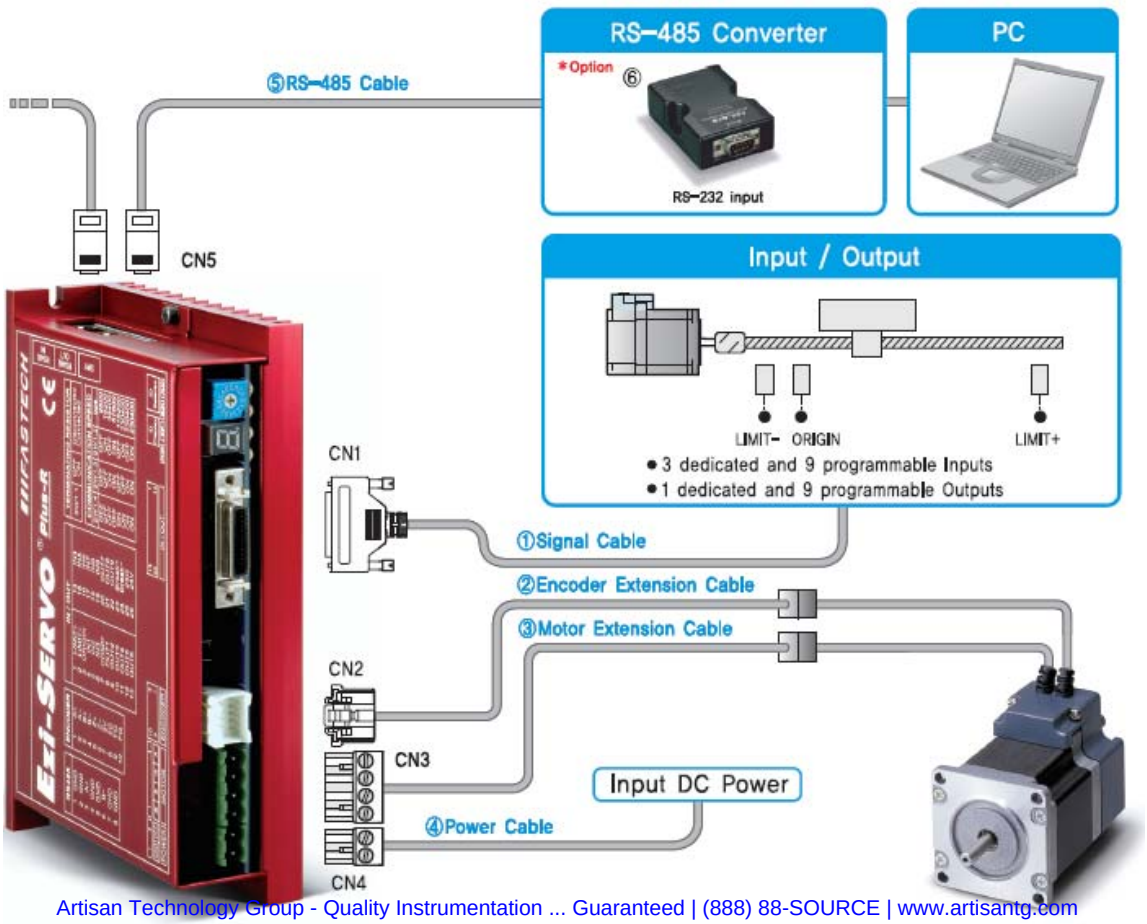
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5.2 Controller Configurtion

1) Configuration of Ezi-SERVO-PR20/ Ezi-SERVO-PR28/ Ezi-SERVO-PR42/ Ezi-SERVO-PR56/ Ezi-SERVO-PR60

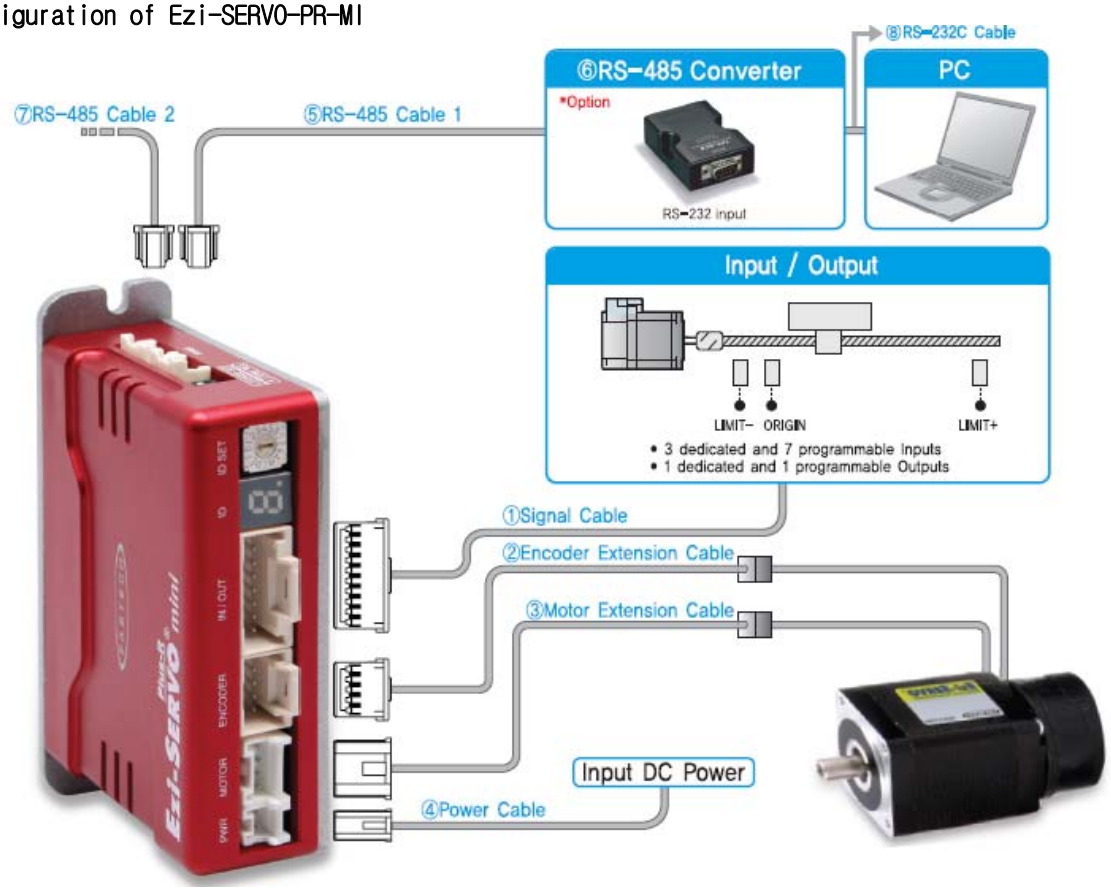


2) Configuration of Ezi-SERVO-PR86



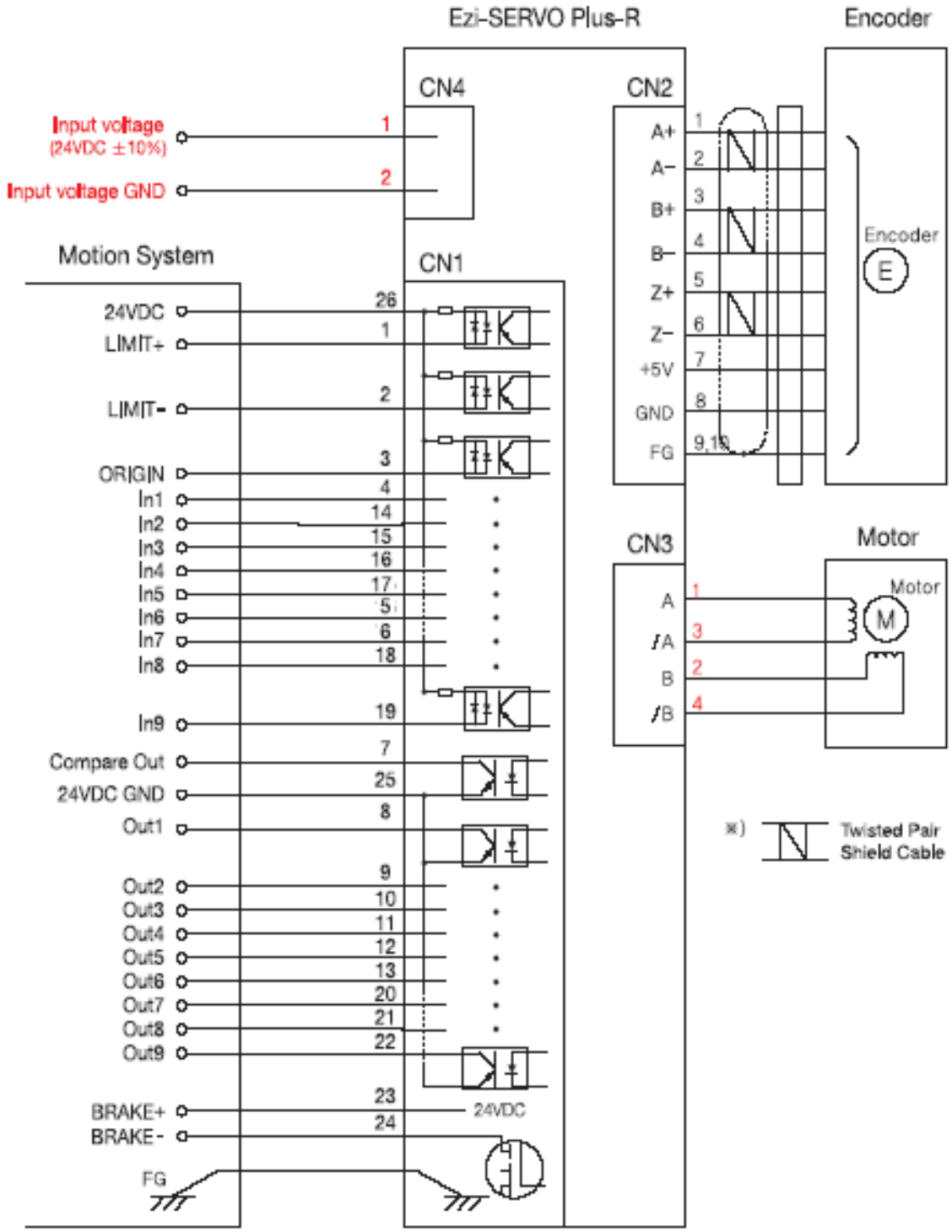
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3) Configuration of Ezi-SERVO-PR-MI

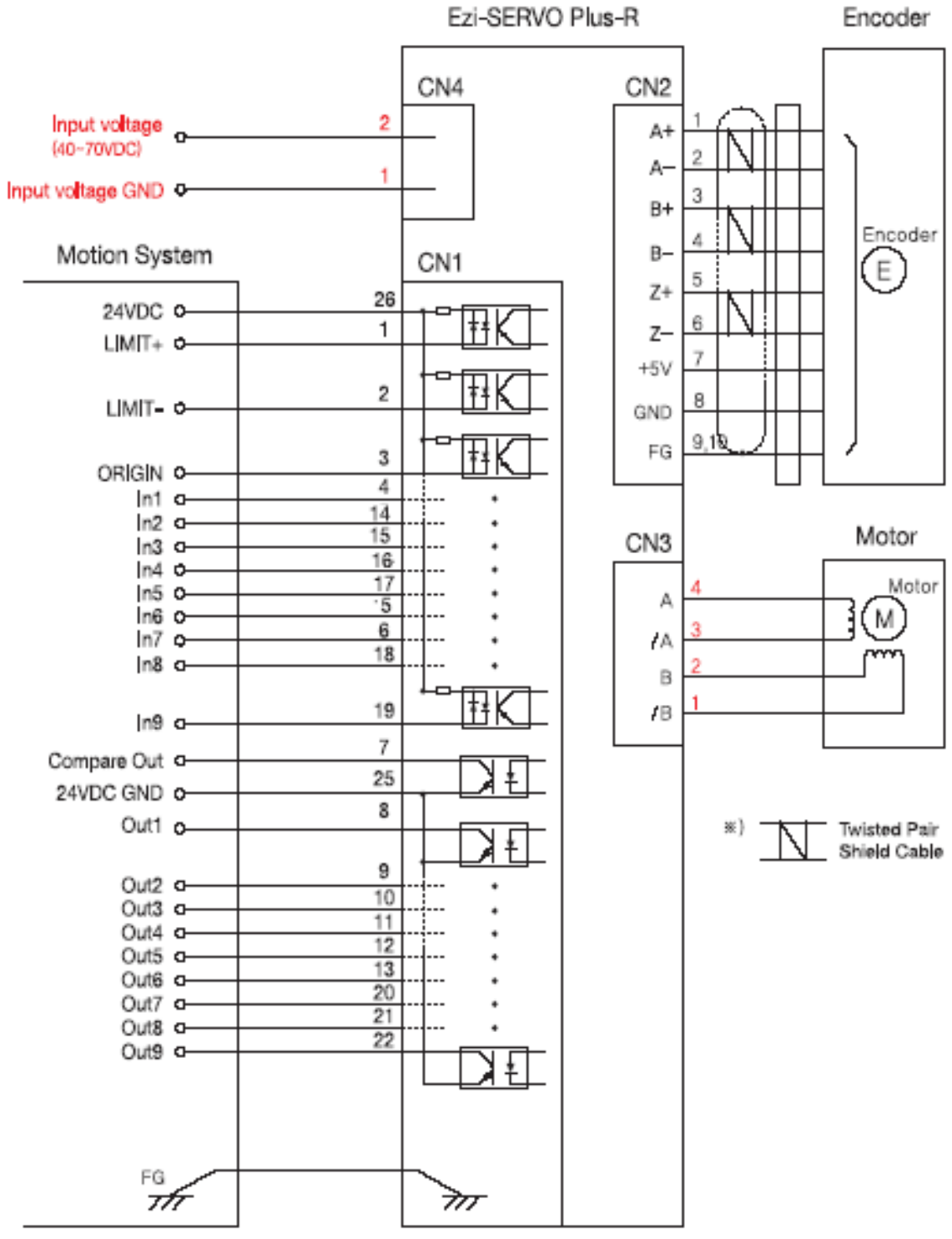


5.3 External Wiring Diagram

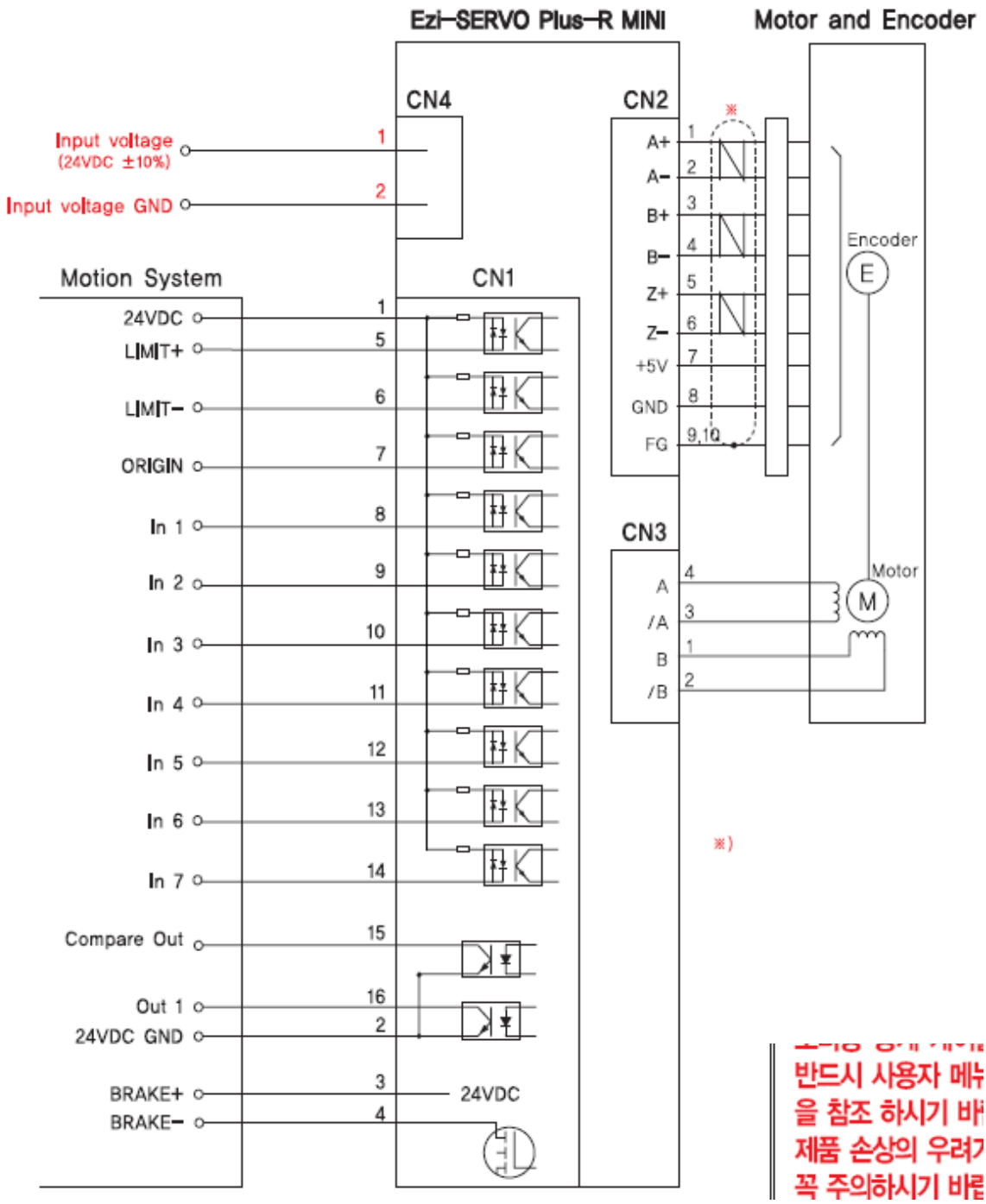
1) Wiring of Ezi-SERVO-PR20/ Ezi-SERVO-PR28/ Ezi-SERVO-PR42/ Ezi-SERVO-PR56/ Ezi-SERVO-PR60



2) Wiring of Ezi-SERVO-PR86



2) Wiring of Ezi-SERVO-PR-MI

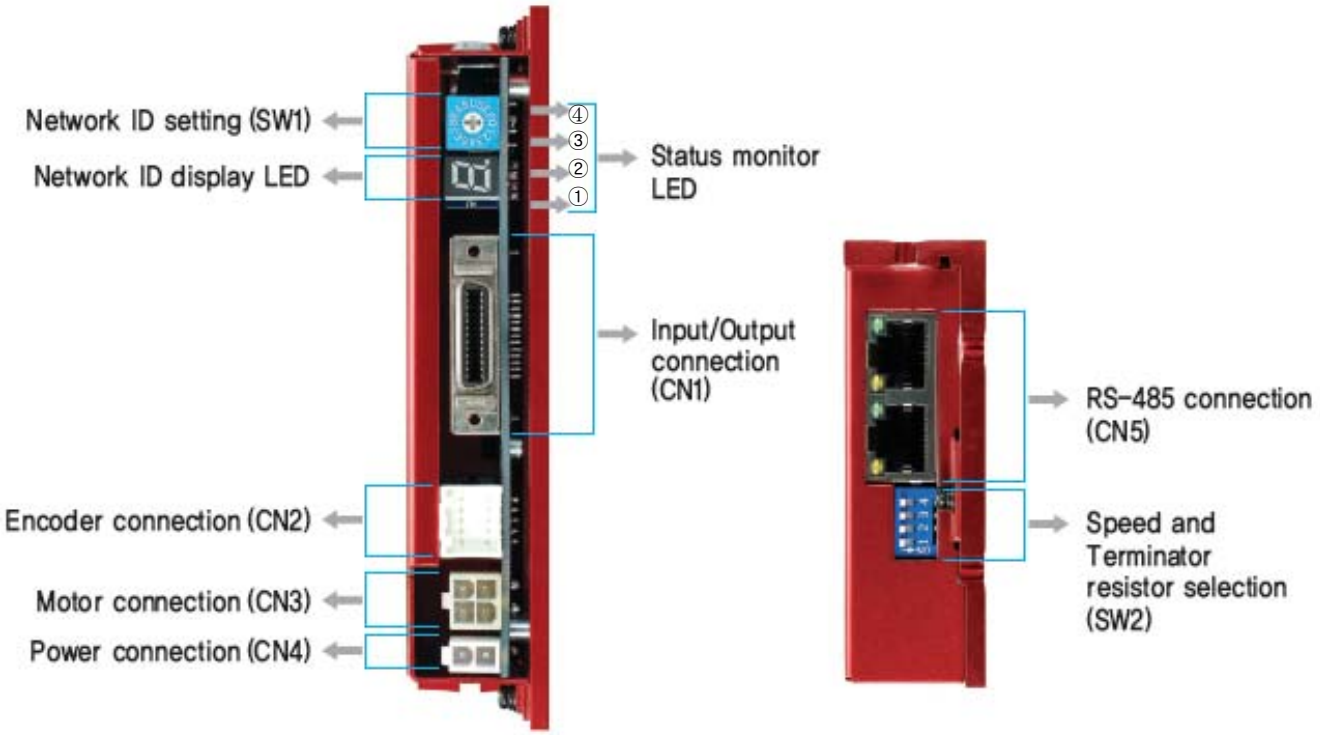


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제품 손상의 우려
꼭 주의하시기 바

6. External Name and Function Setting of Ezi-SERVO-PR

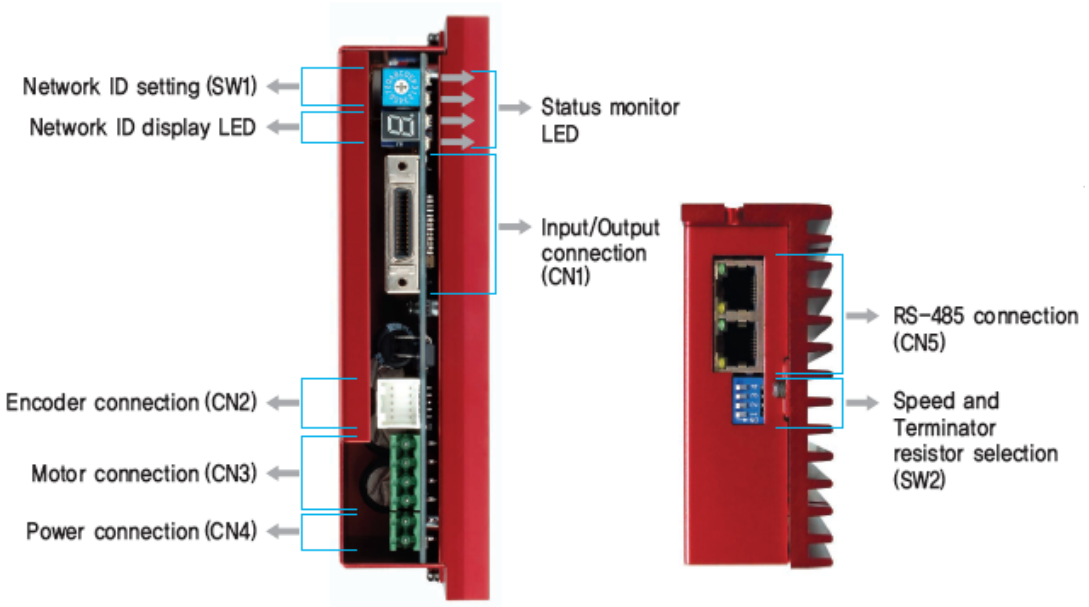
6.1 Appearance and Part Name

1) Ezternal setting of Ezi-SERVO-PR20/ Ezi-SERVO-PR28/ Ezi-SERVO-PR42/ Ezi-SERVO-PR56/ Ezi-SERVO-PR60



2) Ezternal setting of Ezi-SERVO-PR86

◆ 86mm motor drive only(EzS-NDR-86 Series)



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6.2 Status Display LED

Display	Color	Function	On/Off Condition
① POW	Green	Power input indication	Lights On when power is applied.
② INP	Yellow	Complete Positioning motion	When position command pulse input and then the position deviation is within the value set by the parameter, this lights On.
③ SON	Orange	Servo On/Off indication	Servo On : light On Servo Off : light Off
④ ALM	Red	Alarm indication	Flash when protective function is activated. (If you count LED flash time, you can check what protective function is run.)

6.3 Drive ID Switch Selection (SW1)

1) When several modules are connected to one daisy chain network, this switch is to set intrinsic ID to each module.
2) The switch can set intrinsic ID to each module up to 16 numbers from 0 to F(15).

Position	ID No.	Position	ID No.
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



6.4 Communication Speed and Terminal Resistance Select Switch(SW2)

SW2 is to set the communication speed between central controller(PC) and Drive. If corresponding drive module is connected to the end of one network segment, SW2 sets whether terminal resistance is used. SW2.1 is to set the use of terminal resistance, and SW2.2~SW2.4 is to set the communication speed as follows.

SW2.1	SW2.2	SW2.3	SW2.4	Baud rate [bps]
X	OFF	OFF	OFF	9600
X	ON	OFF	OFF	19200
X	OFF	ON	OFF	38400
X	ON	ON	OFF	57600
X	OFF	OFF	ON	115200 *1
X	ON	OFF	ON	230400
X	OFF	ON	ON	460800
X	ON	ON	ON	921600

*1 : default setting value.



SW2.1 is OFF.: Terminal resistance is Off.
SW2.1 is ON. : Terminal resistance is On.

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

Caution	Support max. 115200[bps] when using RS-232 to RS-485 conveter

6.5 Motor Connection (CN3)

Motor connector

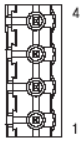
(Connector Type : Molex 5569-04A2)

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



(86mm)

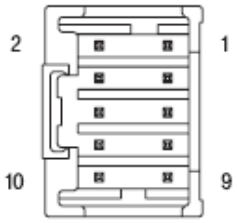
No.	Function
1	/B Phase
2	B Phase
3	/A Phase
4	A Phase



6.6 Encoder Connection (CN2)

Encoder connector (Connector Type : Molex 55959-1030)

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

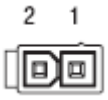


To setup connected encoder resolution, refer to 「13 Parameter」.

6.7 Power Connection(CN4)

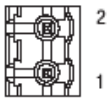
Power supply connector (Connector Type : Molex 5569-02A2)

No.	Function
1	Power input : 24VDC ± 10%
2	Power input : GND



(86mm : PTR AK950-2)

No.	Function
1	Power input : GND
2	Power input : 40~70VDC



6.8 I/O Signal Connection (CN1)

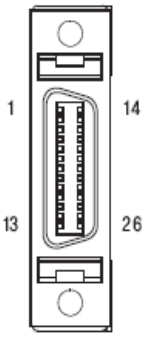
Input/output signal connector (Connector Type : 3M 10226-5A2JL)

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

Caution	Connect the Brake (current consumption is under 200[mA]) for pin 24. Refer to 8.4 Output signal for the Brake that is over 200[mA].

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Function	No	No	Function
LIMIT+ (Dedicated Input)	1	14	Digital In2 (Programmable Input)
LIMIT- (Dedicated Input)	2	15	Digital In3 (Programmable Input)
ORIGIN (Dedicated Input)	3	16	Digital In4 (Programmable Input)
Digital In1 (Programmable Input)	4	17	Digital In5 (Programmable Input)
Digital In6 (Programmable Input)	5	18	Digital In8 (Programmable Input)
Digital In7 (Programmable Input)	6	19	Digital In9 (Programmable Input)
Compare Out/COMP (Dedicated Output)	7	20	Digital Out7 (Programmable Output)
Digital Out1 (Programmable Output)	8	21	Digital Out8 (Programmable Output)
Digital Out2 (Programmable Output)	9	22	Digital Out9 (Programmable Output)
Digital Out3 (Programmable Output)	10	23	+24V for Brake system(Output)
Digital Out4 (Programmable Output)	11	24	Control signal of Brake system(Output)
Digital Out5 (Programmable Output)	12	25	GND external(Input)
Digital Out6 (Programmable Output)	13	26	+24V external(Input)
* This connector fixed pin is connected to frame GND through a mount hall.			



6.9 Communication Connecttion (CN5)

Connector Type : RJ45
Cable Type : UTP/STP CAT5E

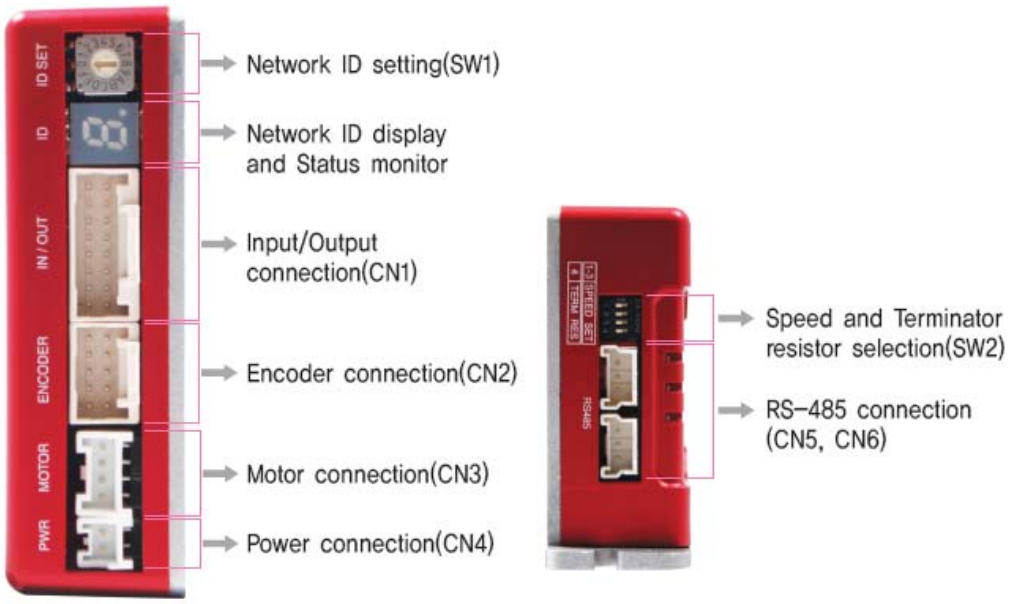
Pin No.	Function
1,2,4,5,7,8	GND
3	Data+
6	Data-
case	Frame GND

LED No.	Display	Color	Lighting Condition
1,3	RUN	Green	Flash when CPU in the drive operates
2,4	COMM	Yellow	Flash when this communicates with the upper controller

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7. External Name and Function Setting of Ezi-SERVO-PR-MIR

7.1 Appearance and Part Name



7.2 Drive ID Switch Selection (SW1) and 7-segmant

1) When several modules are connected to one daisy chain network, this switch is to set intrinsic ID to each module.
2) The switch can set intrinsic ID to each module up to 16 numbers from 0 to F(15).
3) 7-segmant of status monitor is display the ID number in normal status, but in alarm status it display the protection number by flash times.

Position	ID No.	Position	ID No.
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



7.3 Communication Speed and Terminal Resistance Select Switch(SW2)

SW2 is to set the communication speed between central controller(PC) and Drive. If corresponding drive module is connected to the end of one network segment, SW2 sets whether terminal resistance is used. SW2.1 is to set the use of terminal resistance, and SW2.2~SW2.4 is to set the communication speed as follows.

SW2.1	SW2.2	SW2.3	SW2.4	Baud rate [bps]
X	OFF	OFF	OFF	9600
X	ON	OFF	OFF	19200
X	OFF	ON	OFF	38400
X	ON	ON	OFF	57600

*1 : default setting value.



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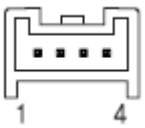
X	OFF	OFF	ON	115200 *1	SW2.1 is OFF.: Terminal resistance is Off. SW2.1 is ON. : Terminal resistance is On.
X	ON	OFF	ON	230400	
X	OFF	ON	ON	460800	
X	ON	ON	ON	921600	

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

Caution	Support max. 115200[bps] when using RS-232 to RS-485 conveter

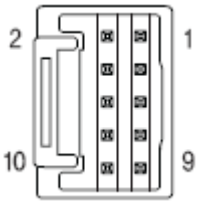
7.4 Motor Connection (CN3)

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



7.5 Encoder Connection (CN2)

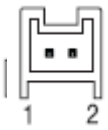
No.	Function
1	A+
2	A-
3	B+
4	B-
5	Z+
6	Z-
7	5VDC
8	5VDC GND
9	Frame GND
10	Frame GND



To setup connected encoder resolution, refer to 「13 Parameter」.

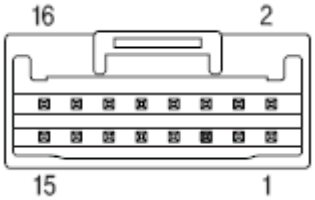
7.6 Power Connection(CN4)

No.	Function
1	Power input : 24VDC ± 10%
2	Power input : GND



7.7 I/O Signal Connection (CN1)

No.	Function	Input/Output
1	24VDC	Input
2	24VDC GND	Input
3	BRAKE+	Output
4	BRAKE-	Output
5	+Limit sensor	Input
6	-Limit sensor	Input



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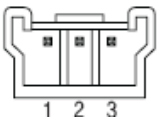
7	Origin sensor	Input
8	Digital IN1	Input
9	Digital IN2	Input
10	Digital IN3	Input
11	Digital IN4	Input
12	Digital IN5	Input
13	Digital IN6	Input
14	Digital IN7	Input
15	Compare Out (COMP)	Output
16	Digital OUT1	Output

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

Caution	Connect the Brake (current consumption is under 200[mA]) for pin 24. Refer to 8.4 Output signal for the Brake that is over 200[mA].

7.8 Communication Connecttion (CN5)

No.	Function
1	Data+
2	Data-
3	GND



8. Control I/O Signal

8.1 Signal Cabling

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

1) Input : 「Limit+」, 「Limit-」, 「Origin」 signals are fixed to CN1 No. 1,2,3.
Other signals as like 'Clear Pos' are assigned to IN1~IN9 terminal blocks.
(3 dedicated input + 9 programmable input = total 12 input pins.)
Ezi-SRERVO-PR : 3 dedicated In + 9 programmable In = 12 Inputs
Ezi-SRERVO-PR-MI : 3 dedicated In + 7 programmable In = 10 Inputs

Ezi-SERVO-PR CN1 No.	Ezi-SERVO-PR-MI CN1 No.	Signal Name	Function
1	5	Limit+	Positive limit sensor signal
2	6	Limit-	Negative limit sensor signal
3	7	Origin	Origin sensor signal
4	8	IN1	Clear Pos Position table A0 ~ Position table A7 (PT A0~PT A7) Position table start execution (PT Start) Soft Stop(Stop) Jog+ Jog- AlarmReset ServoON Pause Origin Search Teaching Emergency Stop(E-Stop) Jump Position Table input 0 ~ Jump Position Table input 2 (JPT IN 0~ JPT IN 2) Jump Position Table start (JPT Start) User input 0 ~ User input 8 (User IN 0 ~ User IN 8)
14	9	IN2	
15	10	IN3	
16	11	IN4	
17	12	IN5	
5	13	IN6	
6	14	IN7	
18	None	IN8	
19	None	IN9	

2) Output : 「COMP」 signal is dedicated to CN1 No.7. Other signals like Inposition are assigned to OUT1~OUT9 terminal blocks.
Ezi-SRERVO-PR : 1 dedicated Out + 9 programmable Out = 10 Outputs
Ezi-SRERVO-PR-MI : 1 dedicated Out + 1 programmable Out = 2 Outputs

Ezi-SERVO-PR CN1 No.	Ezi-SERVO-PR-MI CN1 No.	Signal Name	Function
7	15	COMP	Specific output signal (Compare Out)
8	16	OUT1	InPosition Alarm Moving 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
9	None	OUT2	
10	None	OUT3	
11	None	OUT4	
12	None	OUT5	
13	None	OUT6	
20	None	OUT7	
21	None	OUT8	
22	None	OUT9	

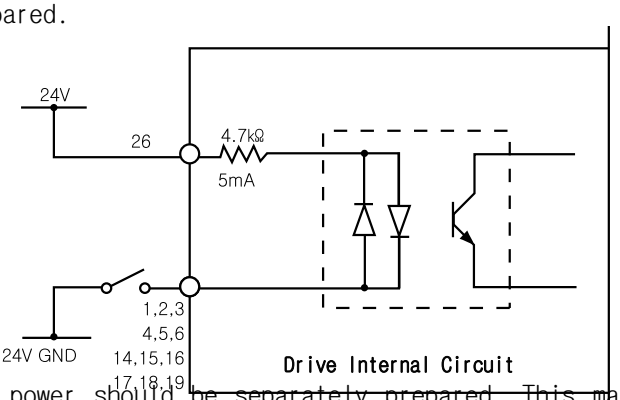
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8.2 Connection Circuit

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.

1) Input Circuit

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

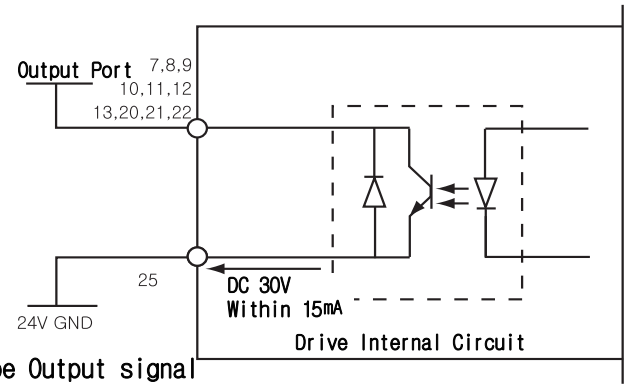


2) Output Circuit

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.

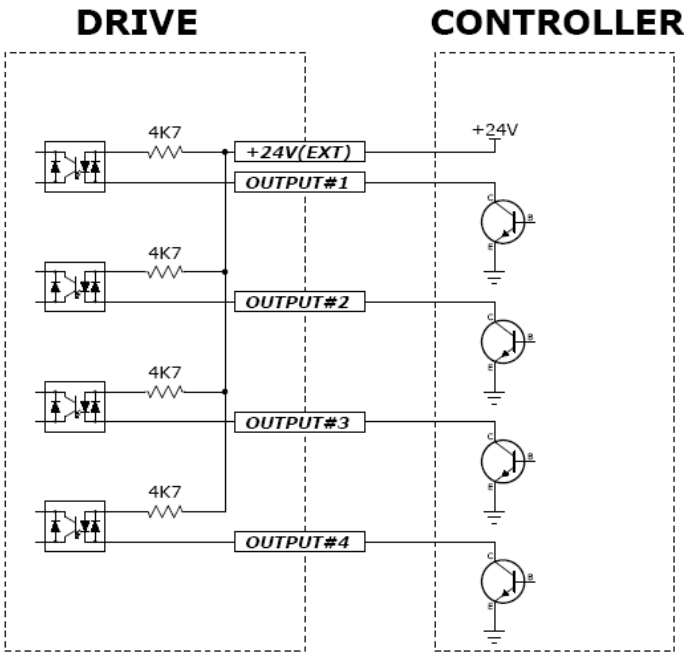
Applied voltage and power capacity in the control output port are as follows.

- Applied voltage ≤ 30V
- Electrified current ≤ 15mA



3) Connect NPN type Output signal

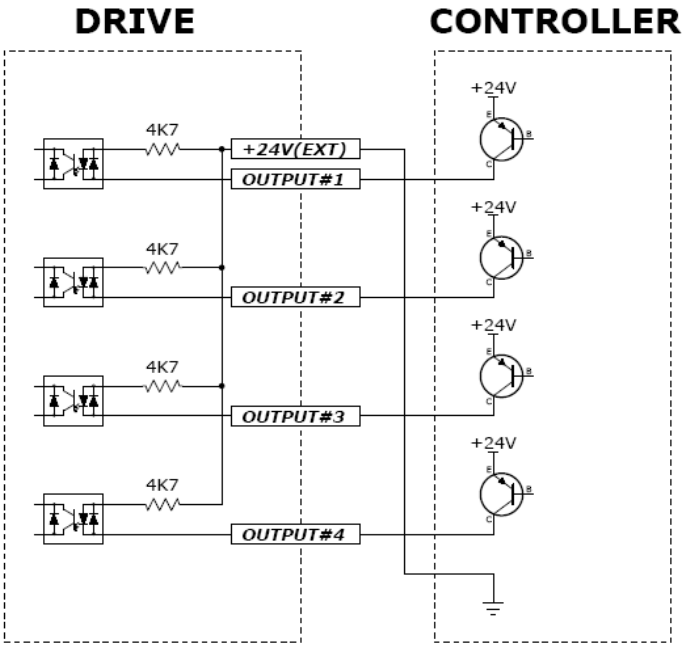
Connect the '+24V external' signal of drive to '+24V' of Controller .



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4) Connect PNP type Output signal

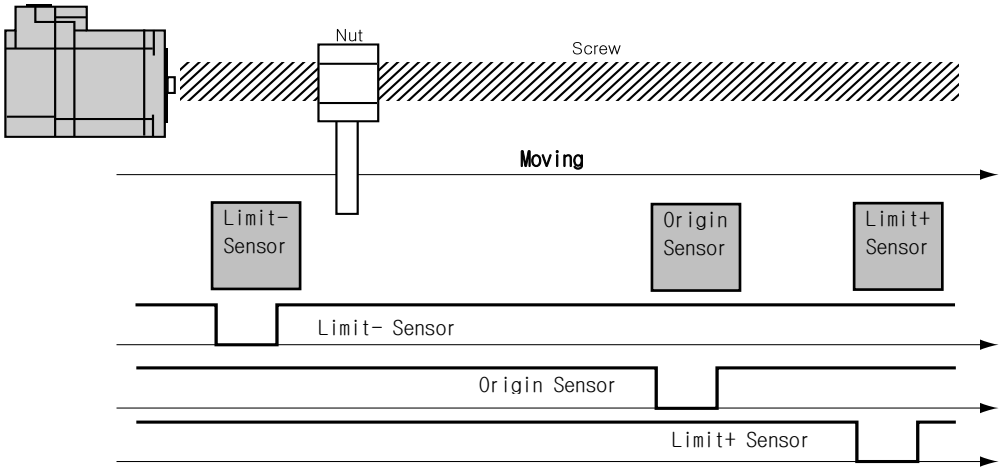
Connect the '+24V external' signal of drive to 'GND' of Controller .



8.3 Input Signal

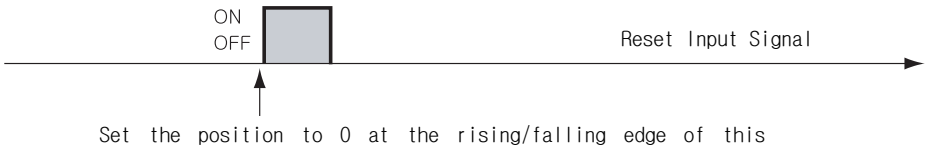
1) 'Limit' Sensor and 'Origin' Sensor

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



2) 'Clear Pos' Input

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



3) 'Position Table A0 - A7 (PT A0~A7)' Input

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

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

*** Ezi-SRERVO-PR-MI** : maximum 64 position table numbers can be set.

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

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

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

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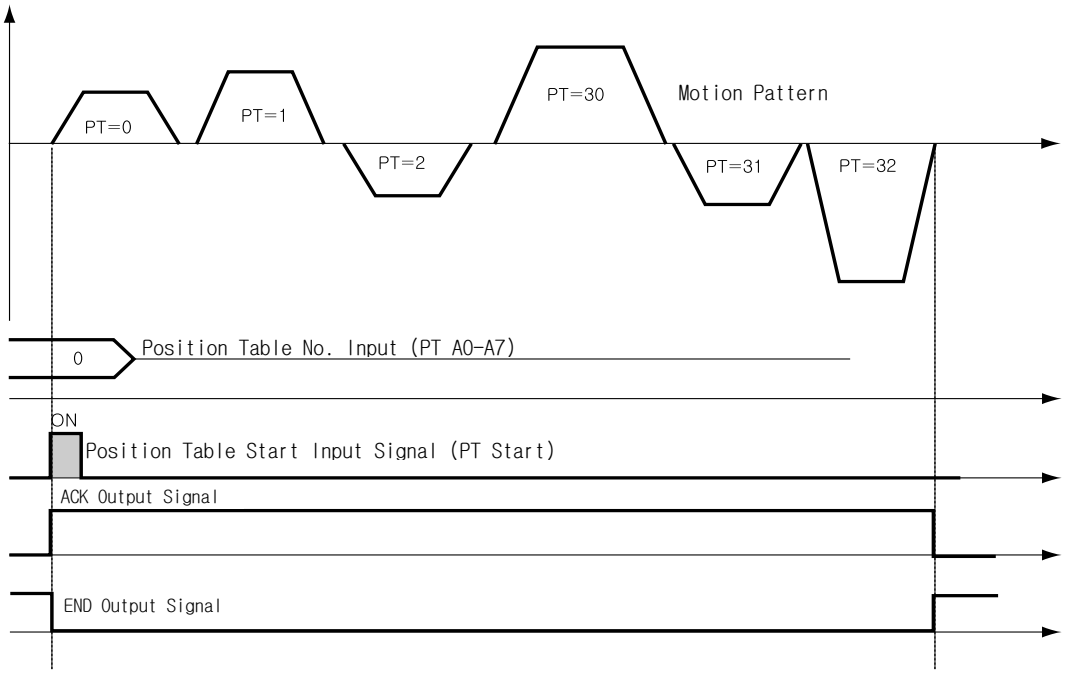
A7	A6	A5 ~ A3	A2	A1	A0	PT No.
0	0	0	0	0	0	0
0	0	0	0	0	1	1
0	0	0	0	1	0	2
0	0	0	0	1	1	3
… … … … … … … … … … … … … … … … … … … …						
1	1	1	1	1	0	254
1	1	1	1	1	1	255

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.

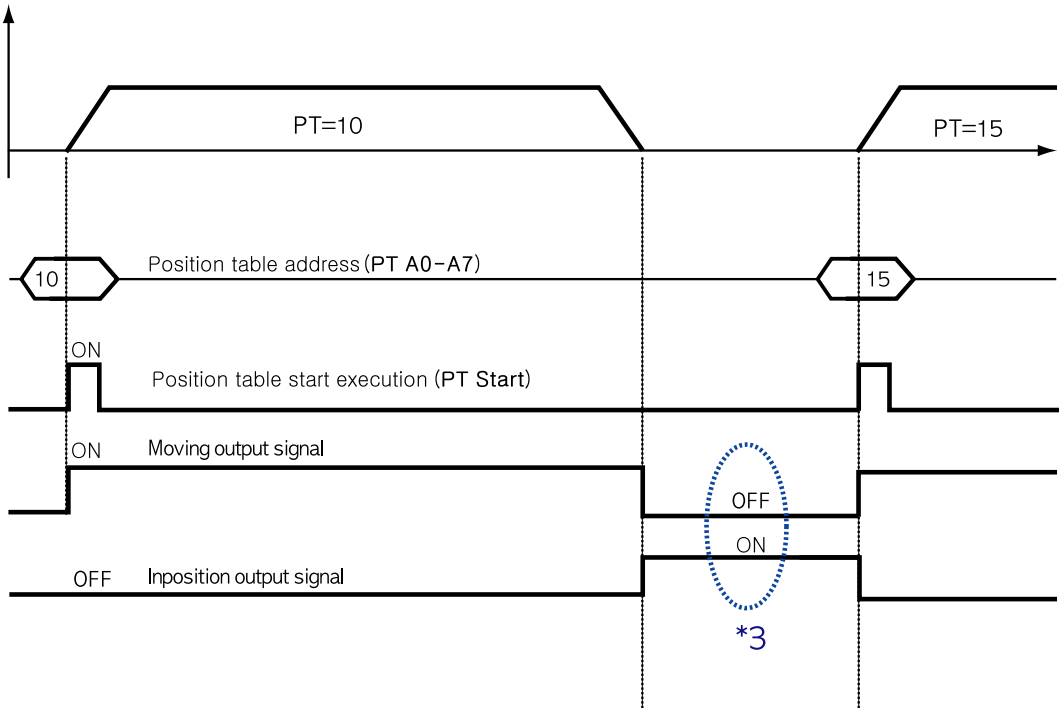
1) All of PT A0~A7 is set to '0' and PT number is set to '0'.
2) Set PT Start signal to [ON], and PT No.0 motion pattern will be executed.
3) When the motion pattern is started by PT, ACK signal and END signal are displayed to [ON] at CN1 output port as illustrated below. The signal is kept until one 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.



*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.

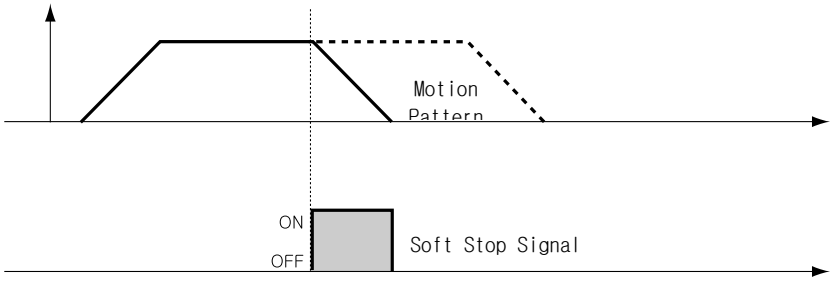
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*3. Checking the 'Moving' and 'Inposition' signals :
Between sequencial 'PT Start' motion command signal, the checking step for motion status(Moving, Inposition) is needed before next motion command.

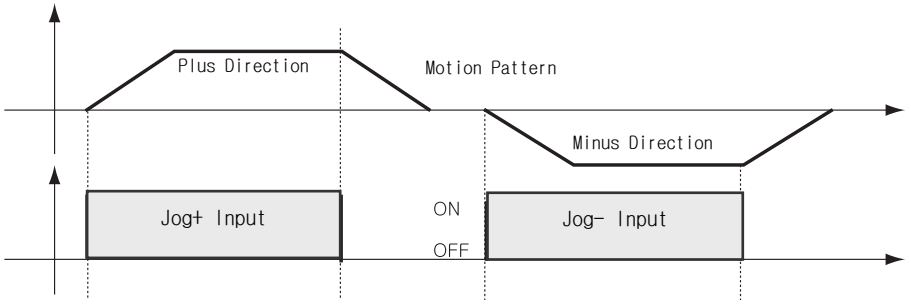
5) 'Soft Stop' Input

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



6) 'Jog+' and 'Jog-' Input

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



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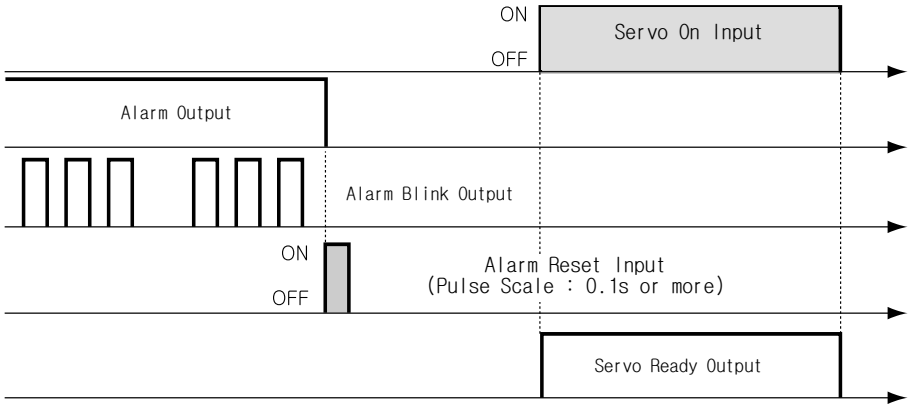
7) 'Servo ON' and 'AlarmReset' Input

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.

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



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

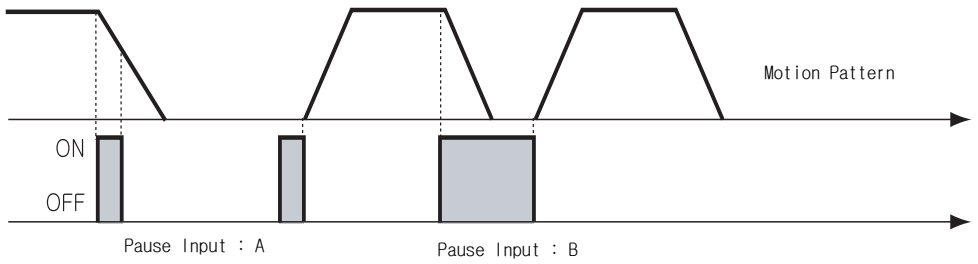
8) 'Pause' Input

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

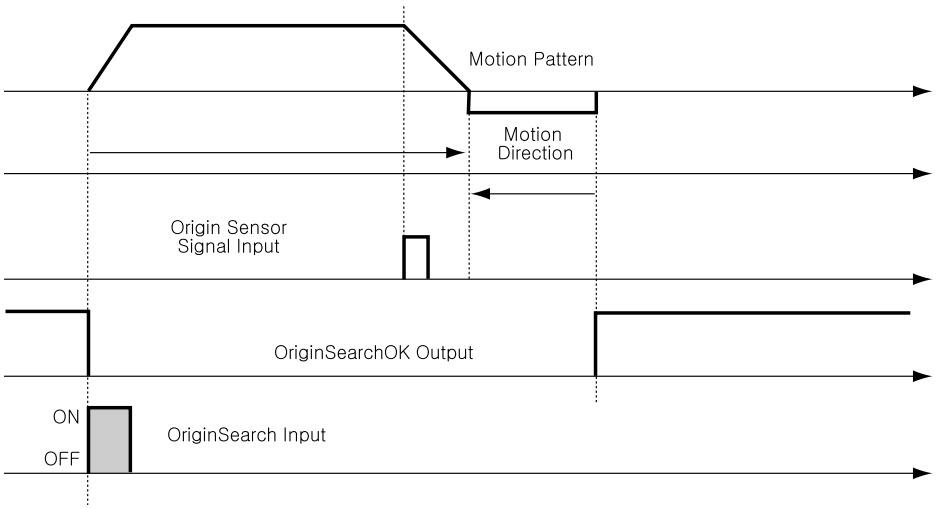
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*1. This function is not applied while 'Repeat Test' of the User Program(GUI) is executing.

9) 'Origin Search' Input

When 'Origin Search' signal is set to ON (10ms or more), it starts to search the origin position according to selected conditions. The conditions are subject to parameters such as No.20:Org Method, No.17:Org Speed, No.18:Org Search Speed, No.19:Org AccDec Time, No.21:Org Dir. (For more information, refer to '13.Parameter'.) When the origin search command is completed, 'Origin Search OK' signal is set to ON to CN1 connector's output port.

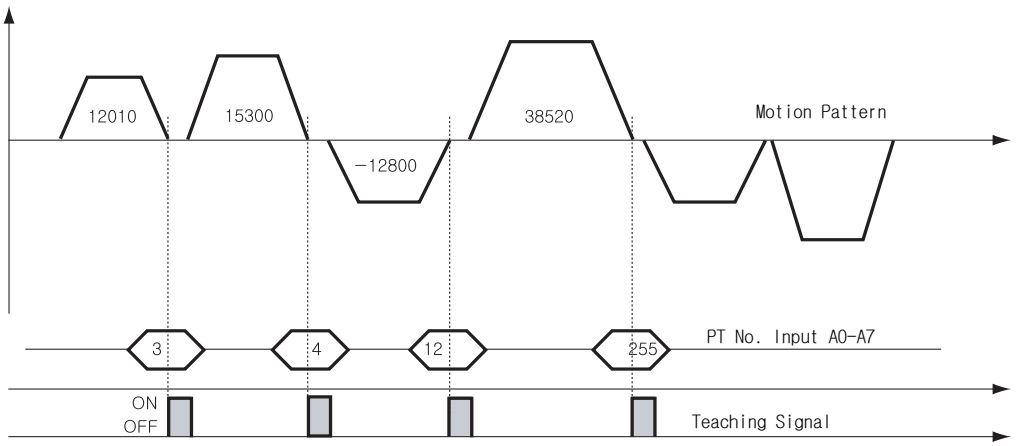


10) 'Teaching' Input

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

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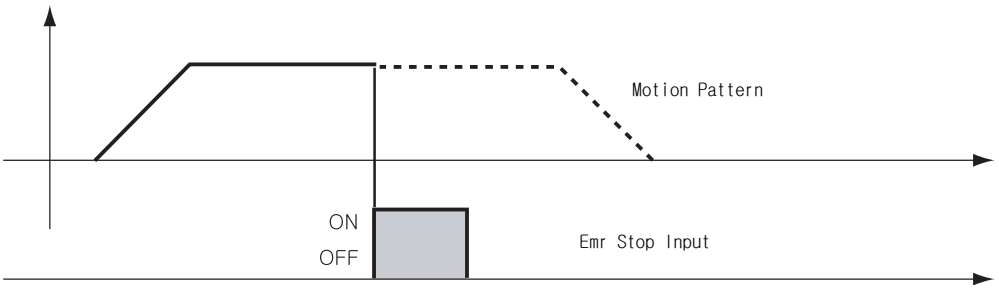


PT No.	Position Value [pulse] of Corresponding PT
3	12010
4	15300
12	-12800
255	38520

* After executing Teaching, click 'Refresh' icon, and the position value will be displayed to the position table.
* Click 'Save to ROM' icon, and the position value will be saved to the ROM area.
* 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).

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.



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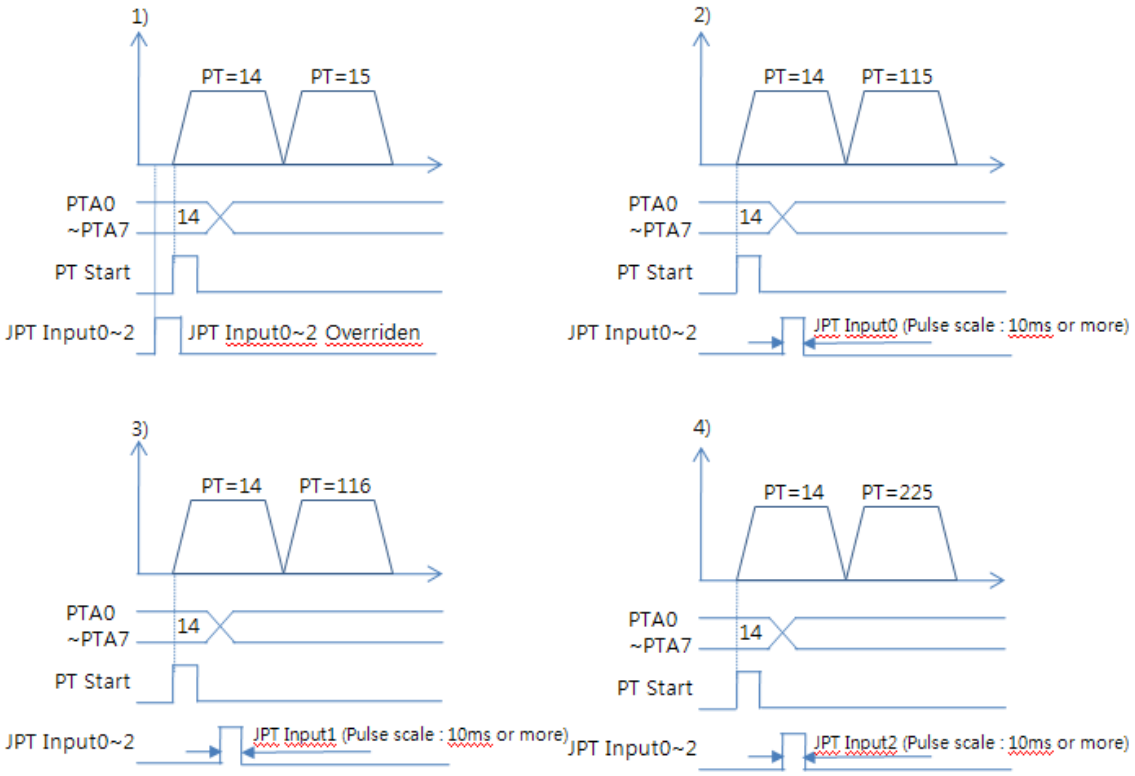
12) 'JPT Input0~Input2 (Jump Position Table Input)' Input

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

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

PT 14 Data

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



13) 'JPT(Jump Position Table) Start' Input

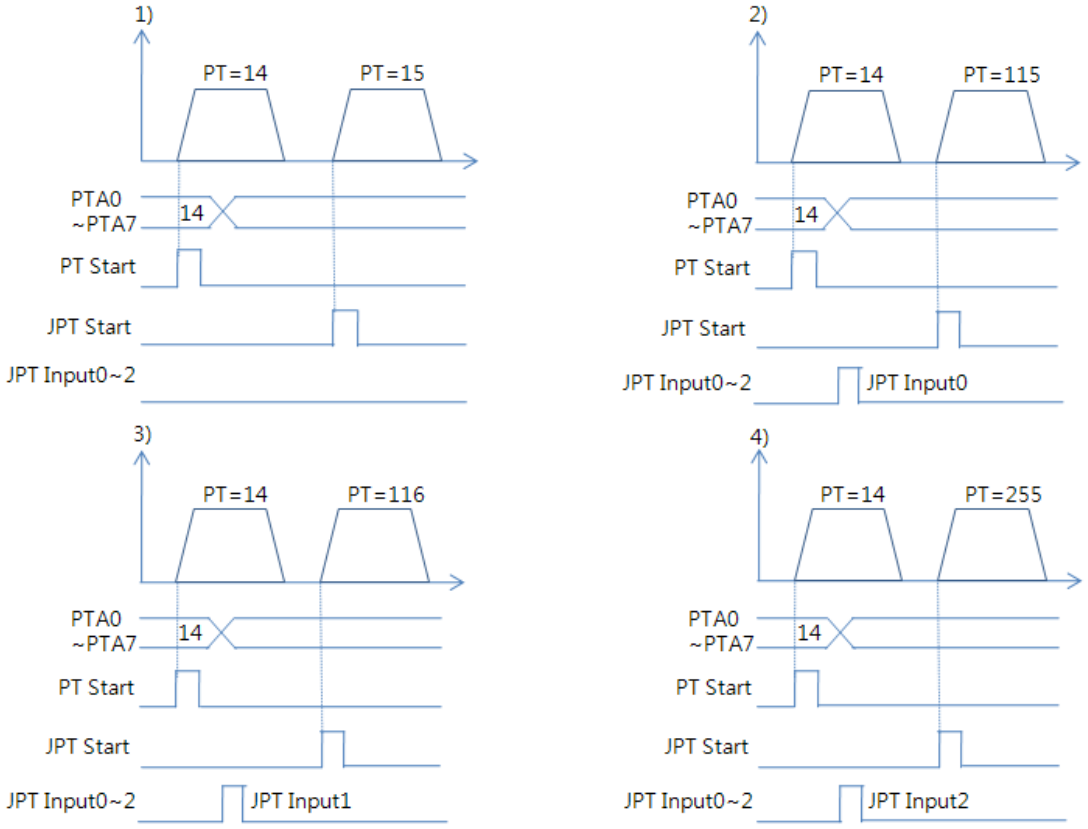
To select motion pattern(position table number) to be subsequently executed according to input signal conditions. The difference from Paragraph 「13) 'JPT Input0~Input2 Input」 is:

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

【Example】

PT 14 Data

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



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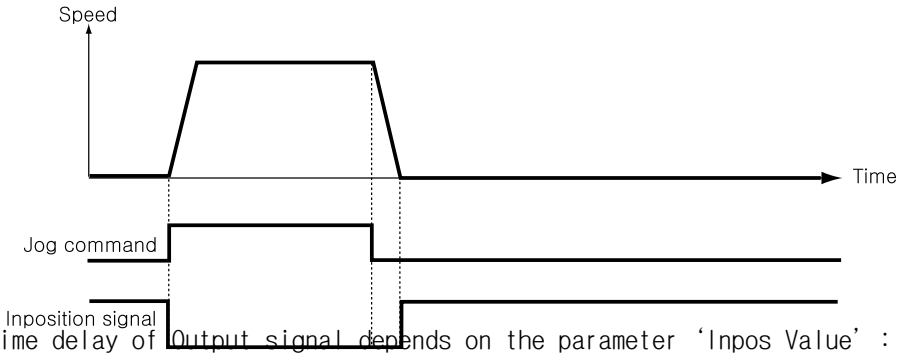
8.4 Output Signal

1) 'Compare Out' / ' Trigger Pulse Output' Output

'Trigger Pulse Output' signal is displayed when specific conditions are performed. It is fixed to CN1 connector's COMP (Compare Out) pin. And it is available when the motor needs to be synchronously controlled by an external controller. Refer to 「10.5 Trigger Pulse Output」.

2) 'Inposition' Output

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



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

Value	Mode	Description
0~7	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)

3) 'Alarm' & '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.

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 55℃.
6	Over regenerativ ed 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

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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.
14	Drive voltage error	The power supplied to the drive is higher than limit value.*4
15	Pos. Error Overflow*6	Position error value is higher than specified value*1 in motor stop status. *5

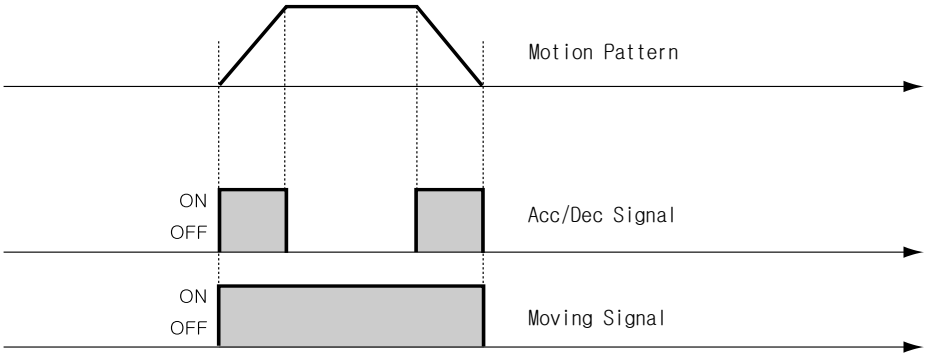
*1 Values[pulse] of parameter 'Pos Tracking Limit[No.27]
*2 70V : EzS-NDR-20, EzS-NDR-28, EzS-NDR-42, EzS-NDR-56, EzS-NDR-60 model
90V : EzS-NDR-86 model
*3 20V : EzS-NDR-20, EzS-NDR-28, EzS-NDR-42, EzS-NDR-56, EzS-NDR-60 model
40V : EzS-NDR-86 model
*4 32V : EzS-NDR-20, EzS-NDR-28, EzS-NDR-42, EzS-NDR-56, EzS-NDR-60 model
70V : EzS-NDR-86 model
*5 Values[pulse] of parameter 'Pos. Error Overflow Limit[No.33]
*6 It can be applied over the Firmware version of 06.03.043.10.

4) 'PT ACK' and 'PT End' Output

'PT ACK' and 'PT End' signals are available only when the motion is executed by position table. When 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. Refer to 「Ezi-SERVO Plus-R User Manual - 'Position Table Function'」.

5) 'Moving' and 'Acc/Dec' Output

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



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

6) 'Org Search OK' Output

When the origin return motion is executed by origin search command, 'Origin Search OK' signal is set to OFF. When the origin return motion is normally finished by the origin sensor, 'Origin Search OK' is set to ON. Refer to 「8.3 Input Signal - 9) Origin Search Input」.

7) 'Servo Ready' Output

When the drive supplies power to the motor by Servo ON signal or command and is ready to perform motion command, 'ServoReady' signal displays ON signal. Refer to 「8.3 Input Signal - 7) Servo On and AlarmReset Input」.

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

Control output used for 'Start/Stop Message Function'. When these items are set, this signal enables the user to check if corresponding PT motion starts or stops

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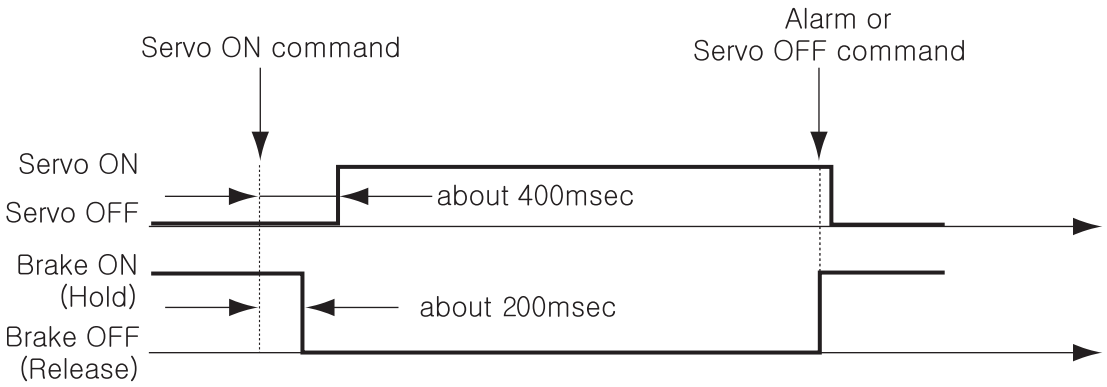
through control output signal. If 'Start/Stop Message Function' is not used, this signal should be set to 0 or 8. At the position set with other values, the motion operates as follows.

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

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

9) 'BRAKE+' and 'BRAKE- ' Output

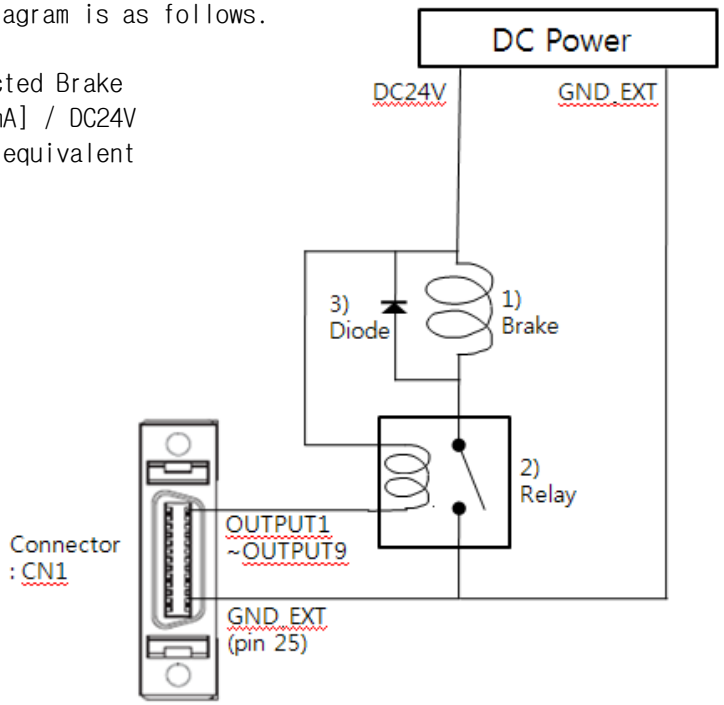
This function is used to protect motor rotation in Servo ON status by pin24 And pin25 of CN1 connector. DC +24V is connect to 'BRAKE+' for brake logic and brake control signal is connect to 'BRAKE- '.
This output function must be used to the Brake that is under 200[mA]/DC24V of current consumption.



10) 'Brake' Output

This function can be used when the Brake signal is assigned to one of OUTPUT1~ OUTPUT9 of CN1 connector. This is used for protect motor rotation in Servo ON status. The signal timing diagram between Servo ON command and Brake signal is same as 9) 'BRAKE+' and 'BRAKE- ' Output.
This signal used for the Brake that is over 200[mA]/DC24V of current consumption. Brake, Relay and diode is needed for this function and the signal connection diagram is as follows.

*1 Brake : User selected Brake
*2 Relay : under 15[mA] / DC24V
*3 Diode : 1N4004 or equivalent



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9. Operation

9.1 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.

9.2 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.



't1' is the time until Servo ON command is given and then the position is decided. It is about 400 msec. It is subject to the rising time of supplying power and the motor status.

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

9.3 Operation Mode

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

(1) I/O Command Mode

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

(2) Communication Command Mode

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

Position Table Operation Sequence

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.

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Stopping Continuous Operation of Position Table

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.

Speed Control Operation

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

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

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

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

Teaching Function

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

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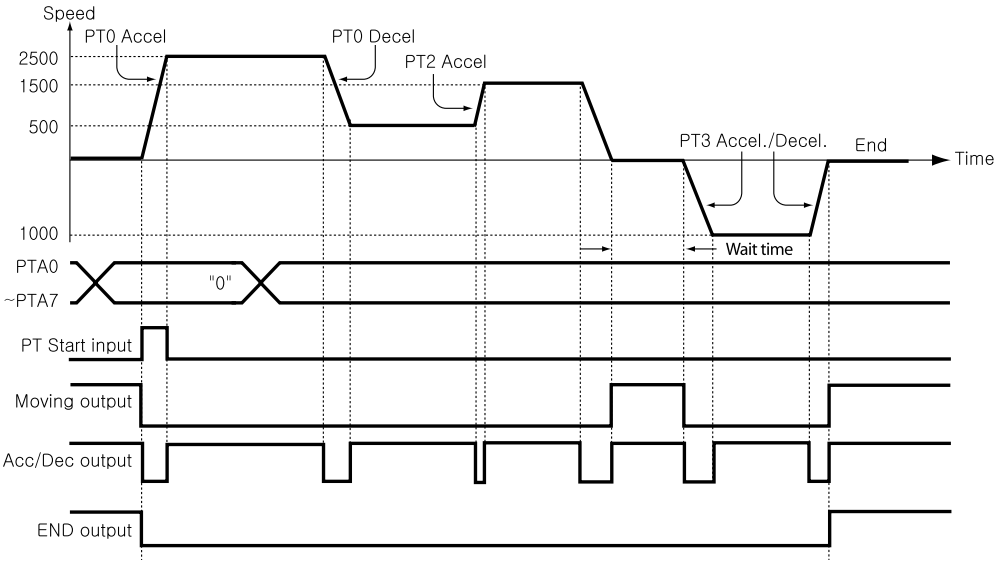
10. Other Operation Functions

10.1 Position Table(PT) Operation Example

Input 'PT A0~ PT A7' signals to set PT number. Input 'PT Start' number to execute speed control operation. For more information, refer to 「User Manual - Position Table Function」.

【Position Table Setting】

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

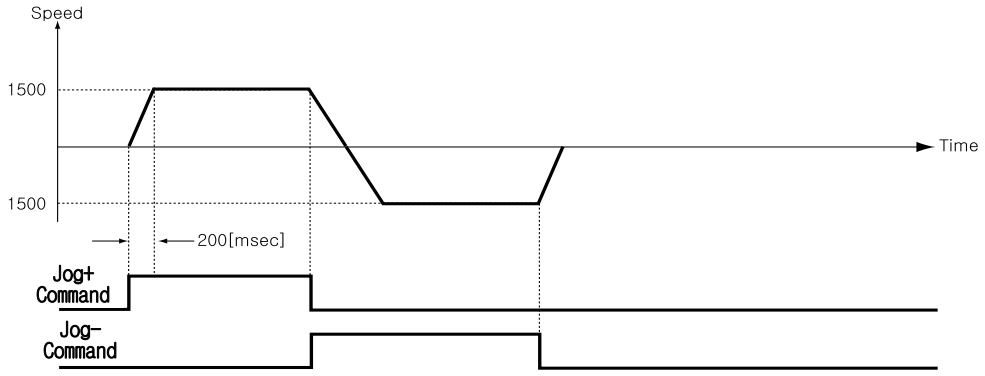


10.2 Jog Operation Example

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

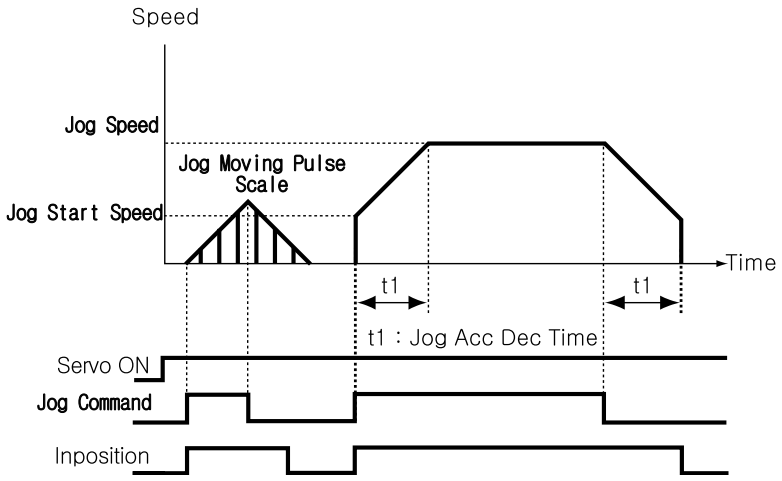
【Parameter Setting】

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



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



10.3 Origin Return

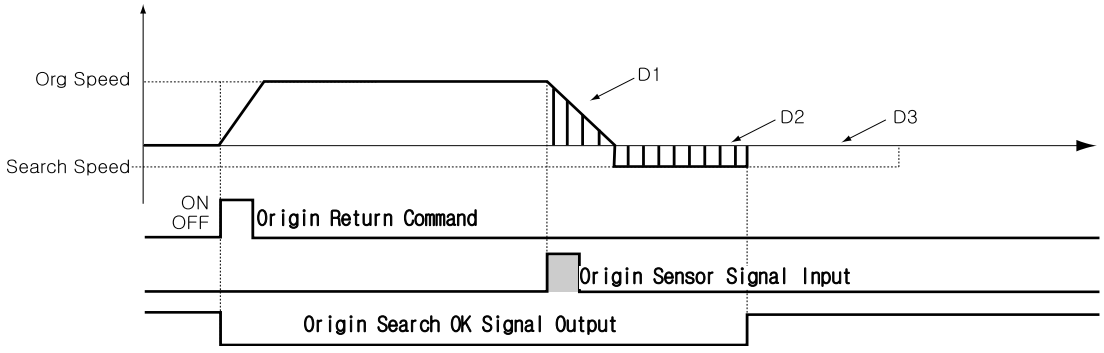
If the machine is operated by I/O signals, the motor can execute origin return by inputting 'Origin Search' signal. Also, the motor can execute origin return with User Program(GUI) and DLL program. The following table shows parameter types related to origin return.

Parameter Name	Description	Range
Org Speed	Operation speed when origin return starts	1~500,000[pps]
Org Search Speed	Low-speed operation speed after origin sensor is sensed	1~50,000[pps]
Org Acc Dec Time	The time assigned to the acceleration/deceleration section when origin return starts and stops.	1~9,999[ms]
Org Method	To select how to return the origin	0~4
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 ~ 134,2177,27
Org Sensor Logic	To set the origin sensor signal level.	0~1
Org Torque Ratio	To set the torque ratio during Torque origin method	10~100[%]

(1) Origin Return Method Setting

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

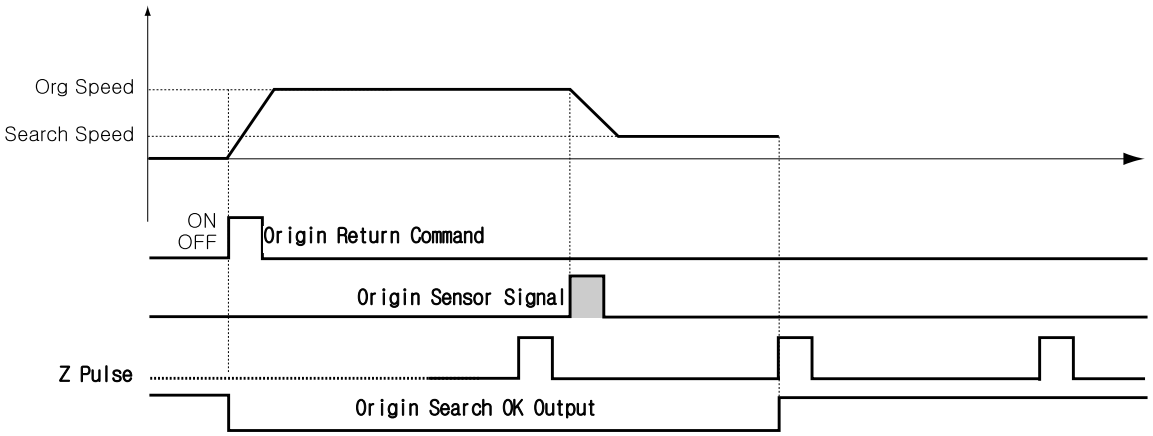
① Common Origin (In case of 'Org Method' = 0)



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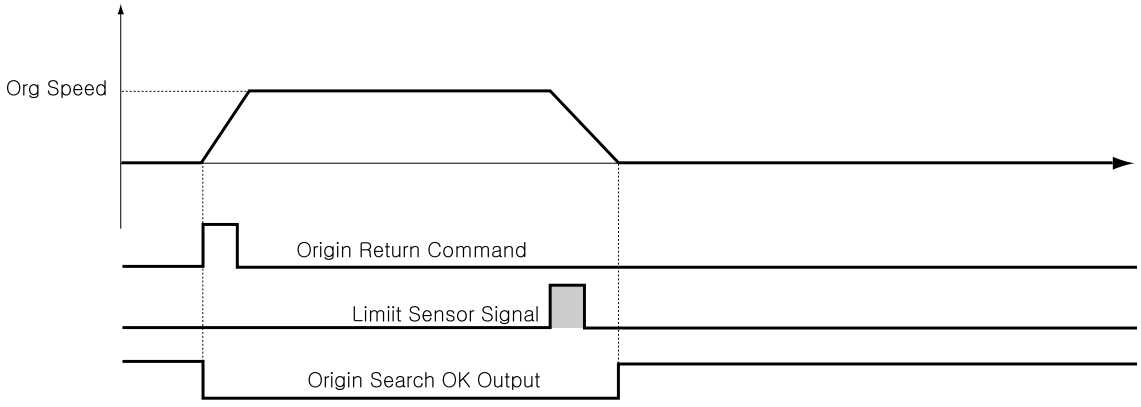
The machine moves up to the origin sensor by 'Org Speed' and 'Org Acc Dec Time' parameters and then completes precise origin return at the low speed set to 'Org Search Speed'. The machine senses the origin sensor and moves as far as D1 and then stops. And the machine changes its moving direction and additionally moves as far as D2 and then stops. D1 and D2 are the same moving distance. If Org Offset parameter is not '0', the machine moves additionally as much as the parameter (ex: D3) and then stops. If the limit sensor is sensed while the machine is under origin return, the machine stops and reverses its moving direction and then continues to origin return operation.

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



The machine moves up to the origin sensor by 'Org Speed' and 'Org Acc Dec Time' parameters and then completes Z-pulse origin return at the low speed set to 'Org Search Speed'. That is, after the origin sensor is sensed, the machine moves slowly to the original moving direction until Z-pulse signal is sensed.

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



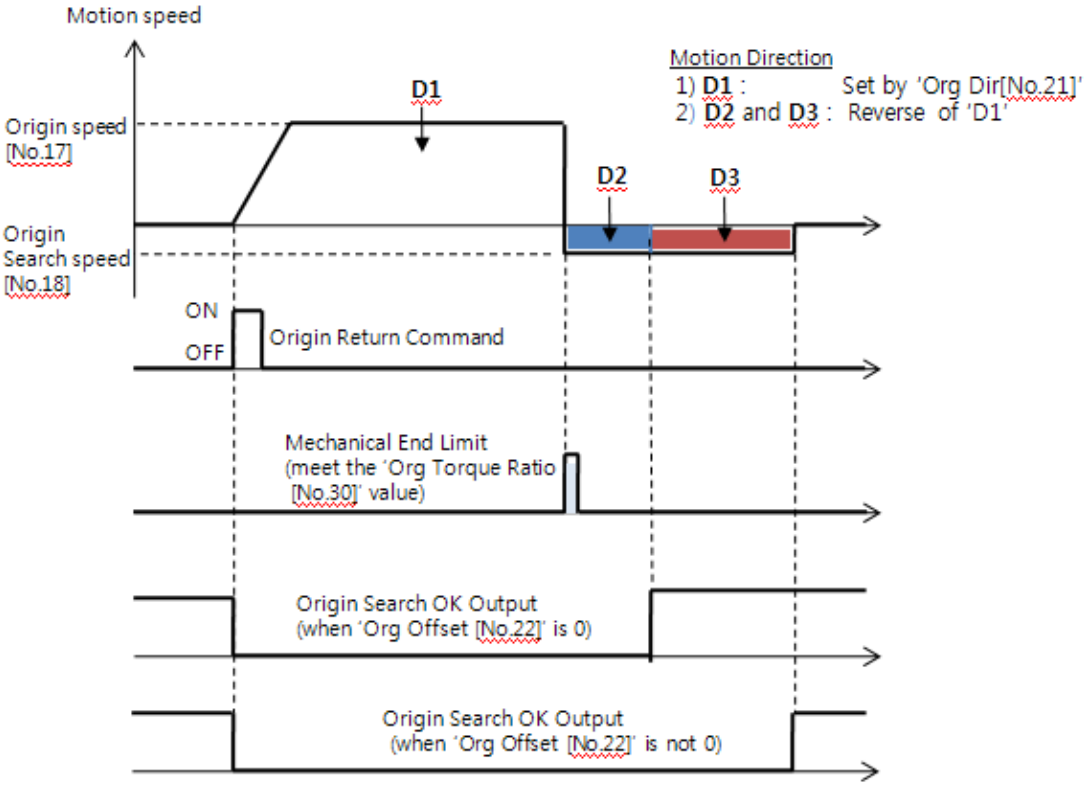
The machine moves up to the position which the limit sensor is sensed by 'Org Speed' & 'Org Search Speed' parameters, and stops by 'Org Acc Dec Time' value. The moving direction complies with as set in 'Org Dir'.
If there's no limit sensor on your system, you can set 'Origin' by 'S/W Limit Plus Value' and 'S/W Limit Minus Value' of parameters.

④ Torque Origin (In case of 'Org Method' = 3)

The machine moves up to the wall which the pushing torque is reached to 'Org Torque Ratio' value. This method can be used without origin sensor and without

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limit sensor.



When the machine moves up to the mechanical limit by 'Org Dir' direction, it stop immediately and moves in reverse direction until 'D2' distnace. If the 'Org Offset' parameter is not 0, it moves more as 'D3' distance.

⑤ Torque Z Origin (In case of 'Org Method' = 4)

After the machine moves up to 'Torque Origin', it moves additionally up to meet 'Z-pulse' of encoder. The motioning of 'Torque Origin' is same as ④ Torque Origin (In case of 'Org Method' =3) and the remaining Z-pulse motioning is same as ② Z-pulse Origin(In case of 'Org Method' =1).

(2) Origin Return Procedure

Origin return is executed according to the following procedure.

① Set parameters required to origin return.

② If the Servo is OFF, (reset an alarm when it occurs) input a control input Servo ON command or send a communication program so that the Servo can be ON.

③ Start origin return operation to the rising edge of control input origin search or the communication program.

(3) Interruption of Origin Return

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

(4) Output of Origin Return Finish

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

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10.4 Stop Operation

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

10.5 Trigger Pulse Output

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

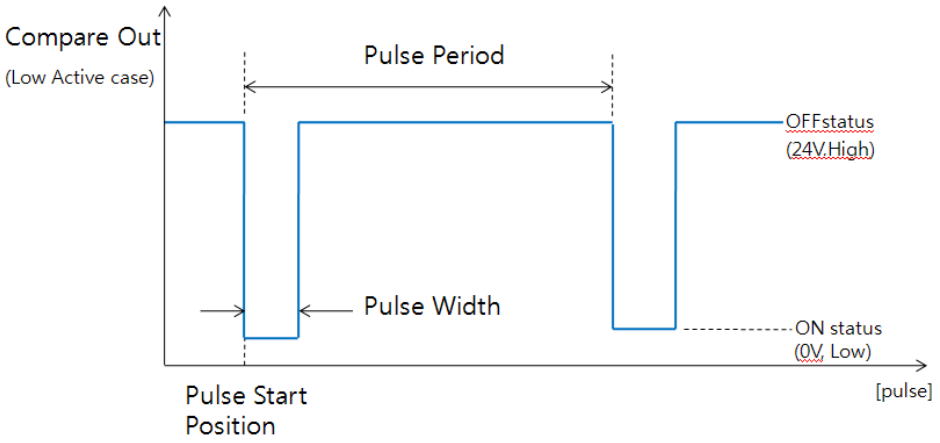
(1) Setting

This function is working with RS-485 communication (DLL library) method.
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	1~9,999[ms]
Pulse Width	Setting the pulse width	1~100[ms]

(2) Signal Output

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



(3) Status Check

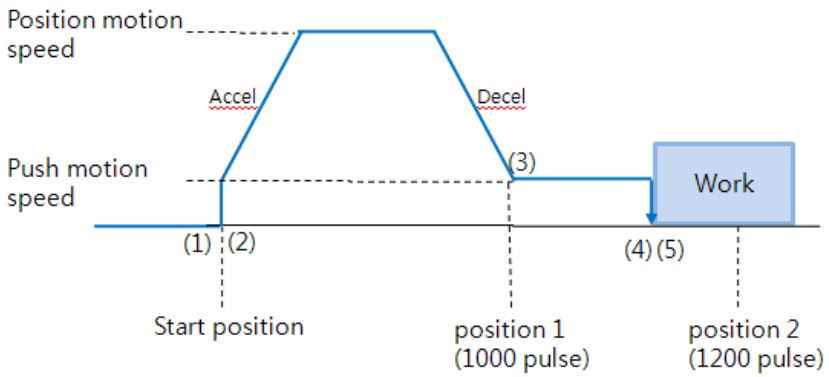
By using DLL program, the user can check the trigger pulse output status.
Refer to 「User Manual - Communication Function」.

10.6 Push Motion

This function is used when the specified motor torque is needed during motioing and stop status.

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(1) Function



① Start Push Motion command
② Normal position motion command is executed.
(status : position mode)
③ Decelerate the speed from position motion to push motion.
(push motion speed must be lower than 300[rpm].)
④ Push motioning until the work detected with specified motor torque.
(status : push mode)
⑤ Even if the work detected, the motor torque will be maintained and the 'inposition' and other signal is effective. The maintained motor torque will be return to normal(Servo ON) status by 'stop' command or other 'position' command.
(status : release push mode and return to position mode)

(2) 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.

① DLL library method
The following table shows the setting conditions and refer to 「User Manual - Communication Function」.
There is another library for status checking of push motioning.

Setting Item	Description	Range
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 taregt position value of position command	134,217,727 ~ 134,217,727
Accel time	Accel time of position motion	1~9,999[ms]
Deceleration time	Decelerate time of position motion	1~9,999[ms]
Push Torque Ratio	Motor torque ratio in push mode	10~100[%]
Push command Moving speed	Moving speed of Push motion	1~50000[pps]
Push command Target position	Absolute taregt position value of push command	134,217,727 ~ 134,217,727

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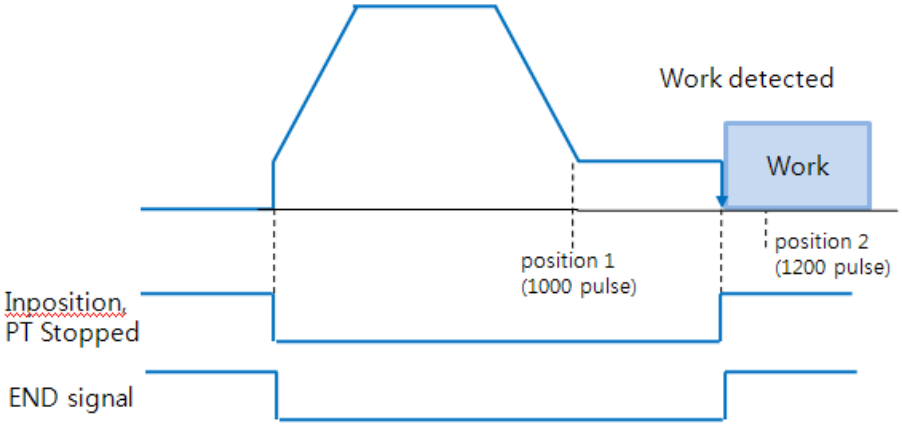
② Input signal(PT Start) Method

Firstly the position table data must be entered before the push motioning and refer to 「User Manual - Position Table Function」.

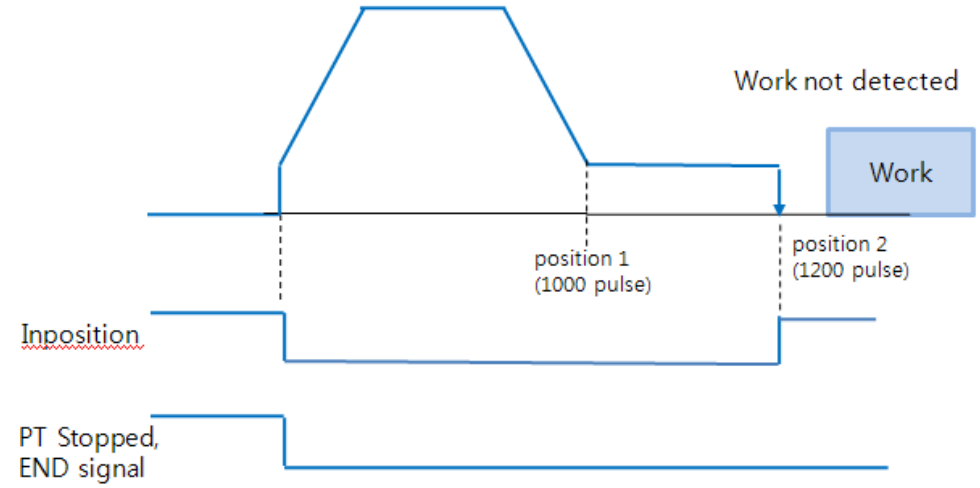
(3) Status Check

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

① Work detected



② Work not detected



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11. Communication Function

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

Caution	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.

11.1 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.

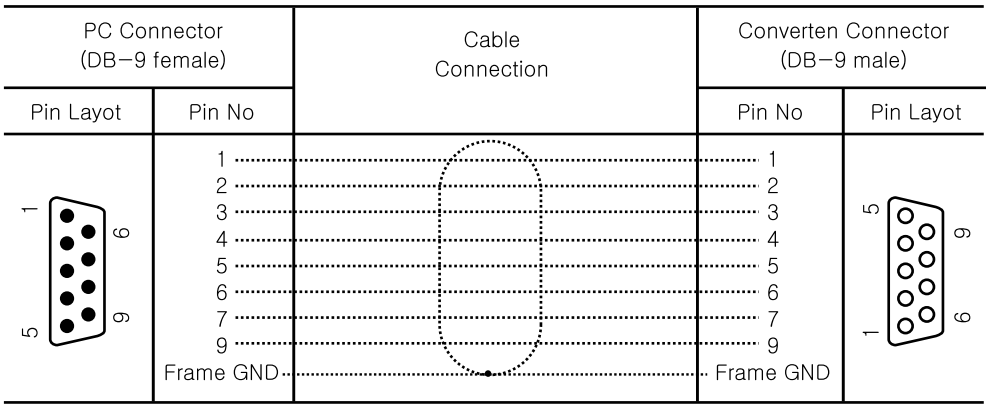


RS-485 Converter (to RS-232)

For connection with the PC, refer to 「5.2 Controller Configuration」.

1) 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.



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2) Cable of connecting RS-485 Converter and Drive Module(CN5 : Ezi-SERVO-PR only)

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 CAT5E 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/Brown	GND
8	Brown	GND
case		Frame GND

Caution	The cable length of RS-485 Converter<->Drive or Drive<->Drive must be longer than 60 cm.

3) Cable of connecting RS-485 Converter and Drive Module(CN5 : Ezi-SERVO-PR-MI only)

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

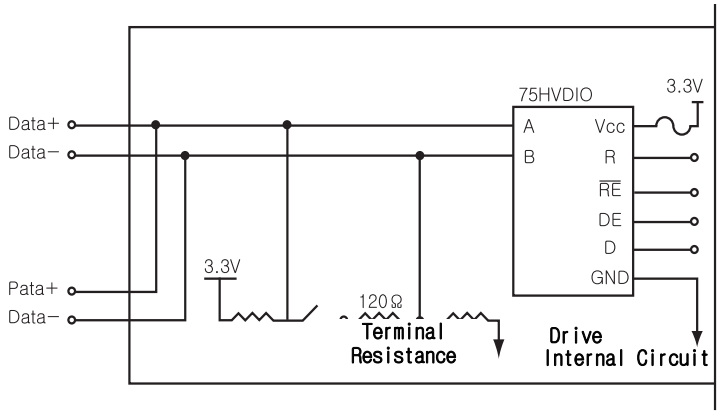
If multi-axis connection is required at one segment, up to 16 drive modules can be connected by the daisy-chain method. The pin signal content is as follows.

Pin No.	Function
1	Data+
2	Data-
3	GND

Cautio	Signal cable 'Data+' and 'Data-' are differential type signals. These two signal cables must be twisted.

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11.2 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.

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12. Protective Function

12.1 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.

Alarm Table

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 55℃.
6	Over regenerativedvoltage	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.
14	Drive voltage error	The power supplied to the drive is higher than limit value.*4
15	Pos. Error Overflow*6	Position error value is higher than specified value*1 in motor stop status. *5

*1 Values[pulse] of parameter 'Pos Tracking Limit[No.27]

*2 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
40V : EzS-NDR-86 model

*4 32V : EzS-NDR-20, EzS-NDR-28, EzS-NDR-42, EzS-NDR-56, EzS-NDR-60 model
70V : EzS-NDR-86 model

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

*6 It can be applied over the Firmware version of 06.03.043.10.

12.2 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 occured.

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12.3 Alarm 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	Check the mechanical status such as parameter setting, motor's short-circuit, or machine load (whether machine edge is collided), etc.	Valid
2	Overspeed	Check parameter setting, and abnormal operation of the motor.	Valid
3	Position Tracking	Get down the load or increase the acceleration or deceleration speed.	Valid
4	Overload	Compare the motor's rating with load scale.	Valid
5	Overheat	Get down the ambient temperature or install a cooling fan.	Valid
6	Over regeneratived voltage	In case of high-speed operation, check if the acceleration or deceleration speed is low.	Valid
7	Motor connection	Check the connection status of drive and motor.	Invalid
8	Encoder connection	Check the connection status of drive and encoder.	Invalid
9	Motor voltage error	Check if power is supplied to the drive.	Invalid
10	Inposition error	Check if parameters are set correctly or the machine is over-loaded.	Valid
11	System error	Check if current of power supply is supplied to the drive.	Invalid
12	ROM error	Contact to distributor.	Invalid
14	Drive voltage error	Check if power is supplied to the drive.	Invalid
15	Pos. Error Overflow	Get down the load or increase the acceleration or deceleration speed.	Valid

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13. Parameter

13.1 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	9999	100
5	Speed Override	[%]	1	500	100
6	Jog Speed	[pps]	1	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		0	1	0
10	Servo On Logic		0	1	0
11	Servo Alarm Reset Logic		0	1	0
12	S/W Limit Plus Value	[pulse]	-134,217,727	+134,217,727	+134,217,727
13	S/W Limit Minus Value	[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	4	0
21	Org Dir		0	1	0
22	Org Offset	[pulse]	-134,217,727	+134,217,727	0
23	Org Position Set	[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	[pulse]	0	+134,217,727	5,000
28	Motion Dir		0	1	0
29	Limit Sensor Dir		0	1	0
30	Org Torque Ratio	[%]	10	100	50
31	Motor Lead *1		1	50	1
32	Gear Ratio *1		1	50	1
33	Pos. Error Overflow Limit *2	[pulse]	0	+134,217,727	5,000

*1 It can be applied over the Firmware version of 08.13.045.1

*2 It can be applied over the Firmware version of 06.03.043.10

13.2 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

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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.

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13.3 Parameter Description

<table>
<tr><th>No.</th><th>Description</th><th>Unit</th><th>Lower Limit</th><th>Upper Limit</th><th>Default</th></tr>
<tr><td>0</td><td>Pulse per Revolution :
Number of pulses per revolution.
If this value is changed, the motor is set to Servo OFF.
<table>
<tr><th>Value</th><th>Pulse/Revolution</th><th>Value</th><th>Pulse/Revolution</th></tr>
<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>
</table>
*1 : In case of encoder resolution is 2000,4000, 16000, 20000 32000</td><td></td><td>0</td><td>9</td><td>9</td></tr>
<tr><td>1</td><td>Axis Max Speed :
When position moving commands(absolute move, incremental move) are given, this mode sets the maximum speed which the motor can operate. So, the motor cannot be operated faster than this value in any case. This value is set to [pps] unit.
Upper Limit value has limit by encoder resolution value.
*in case of 10,000 : 500,000
In case of 32,000 : 1,600,000</td><td>pps</td><td>1</td><td>2,500,000</td><td>500,000</td></tr>
<tr><td>2</td><td>Axis Start Speed :
When position moving commands(absolute move, incremental move) are given, this mode sets the operation start speed to [pps] unit.</td><td>pps</td><td>1</td><td>35,000</td><td>1</td></tr>
<tr><td>3</td><td>Axis Acc Time :
When position moving commands(absolute move, incremental move) are given, this mode sets the acceleration section of operation start segment to [msec] unit.
Possible range is different from Axis Speed.
(Ex.1) Axis Start Speed=1, Move Speed=400000 : 1~1430 [msec]
(Ex.2) Axis Start Speed=1, Move Speed=10000 : 1~350 [msec]</td><td>msec</td><td>1</td><td>9,999</td><td>100</td></tr>
<tr><td>4</td><td>Axis Dec Time :
When position moving commands(absolute move, incremental move) are given, this mode sets the deceleration section of operation stop segment to [msec] unit.
Possible range is different from Axis Speed same as ‘Axis Acc Time’ parameter</td><td>msec</td><td>1</td><td>9,999</td><td>100</td></tr>
<tr><td>5</td><td>Speed Override :
When position moving commands(absolute move, incremental move) are given, the operation speed is subject to the ratio set to ‘Move Speed’.
(Ex) If current move speed is 10,000 and speed override is 200, actual motion speed is set to 20,000.</td><td>%</td><td>1</td><td>500</td><td>100</td></tr>
<tr><td>6</td><td>Jog Speed :
When jog position moving command is given, this mode sets the motor revolution value to [pps] unit.</td><td>pps</td><td>1</td><td>500,000</td><td>5000</td></tr>
<tr><td>7</td><td>Jog Start Speed :
When jog position moving command is given, this mode sets the operation start speed to [pps] unit.</td><td>pps</td><td>1</td><td>35,000</td><td>1</td></tr>
<tr><td>8</td><td>Jog Acc Dec Time :
In case of jog operation, this mode sets the time of acceleration and deceleration sections to [msec] unit.</td><td>msec</td><td>1</td><td>9,999</td><td>100</td></tr>
</table>

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9	**Servo Alarm Logic :** 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 level) ♦ 1 : 24V (Active high level)		0	1	0
10	**Servo On Logic :** 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	1	0
11	**Servo Alarm Reset Logic :** 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 level) ♦ 1 : 24V(Active high level)		0	1	0
12	**S/W Limit Plus Value :** 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. When this value set to '0', S/W Limit function is canceled	pulse	-134,217,727	+134,217,727	+134,217,727
13	**S/W Limit Minus Value :** When position moving commands(absolute move, incremental move, jog) are given, this move set the minimum input limit that the motor can move to the minus(-) direction with 28 bits. When position reach to this value during 'Limit Origin', it will Be recognized to Origin. When this value set to '0', S/W Limit function is canceled	pulse	-134,217,727	+134,217,727	-134,217,727
14	**S/W Limit Stop Method :** Sets how to stop the motor by SW Limit Plus/Minus Value', not stop motion by the limit sensor. ♦ 0 : stops the motor immediately by emergency stop mode. ♦ 1 : stops the motor gradually by soft stop mode.		0	1	1
15	**H/W Limit Stop Method:** In case of stop motion by the limit sensor, this mode sets how to stop the motor. ♦ 0 : stops the motor immediately by emergency stop mode. ♦ 1 : stops the motor gradually by soft stop mode.		0	1	1
16	**Limit Sensor Logic :** Sets the signal level so that the motor can recognize limit sensor's input to ON. ♦ 0 : 0 V (Active low level) ♦ 1 : 24V(Active high level)		0	1	0

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17	**Org Speed :** In case of origin return command, this modes sets the operation speed until the motor senses the origin sensor to [pps] unit.	pps	1	500,000	5,000
18	**Org Search Speed :** In case of origin return command, The low operation speed for precise origin return after the motor senses the origin sensor is set to [pps] unit by this mode.	pps	1	500,000	1,000
19	**Org Acc Dec Time :** In case of origin return command, the acceleration/deceleration section time of the operation start/stop segment is set to [msec] unit by this mode.	msec	1	9,999	50
20	**Org Method :** The user can select origin return command types. ♦ 0 : The motor moves up to the origin sensor spot by 'Org Speed' and then executes precise origin return at the low value of 'Org Search Speed'. ♦ 1 : The motor moves up to the origin sensor spot by 'Org Speed' and then executes Z-pulse origin return at the low value of 'Org Search Speed'. ♦ 2 : The motor moves up to the limit sensor spot by 'Org Speed' and then immediately stops. ♦ 3 : The motor moves up to the 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'. For more information, refer to '10.3 Origin Return'.		0	4	0
21	**Org Dir :** 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	1	0
22	**Org Offset :** After origin return is completed, the motor moves additionally as this setting value and then stops. 'Command Pos/Actual Pos' is set to '0'. If 'Org Method' is set to '2', this value is ignored.	pulse	-134,217,727	+134,217,727	0
23	**Org Position Set :** After origin return is completed, 'Command Pos/Actual Pos' value is set to this setting value.	pulse	-134,217,727	+134,217,727	0
24	**Org Sensor Logic :** Sets the origin sensor signal level so that the motor can recognize origin sensor's input to ON. ♦ 0 : 0 V (low level) ♦ 1 : 24V(high level)		0	1	0
25	**Position Loop Gain :** 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 performance that responds fast and stably. Set this mode as follows. 1) Set the value to '0'. 2) Increase the value until the motor's response is stabilized. 3) Previously adjust the setting status by increasing/decreasing one or two steps of the current setting value.		0	15	4

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Value	Integral Part's Time Constant*	Proportional Gain*	Value	Integral Part's Time Constant*	Proportional Gain*
0	1	1	8	2	3
1	1	2	9	2	4
2	1	3	10	2	5
3	1	4	11	3	1
4	1	5	12	3	2
5	1	6	13	3	3
6	2	1	14	3	4
7	2	2	15	3	5

* The above value is not the actual value used inside the drive but the relative value.

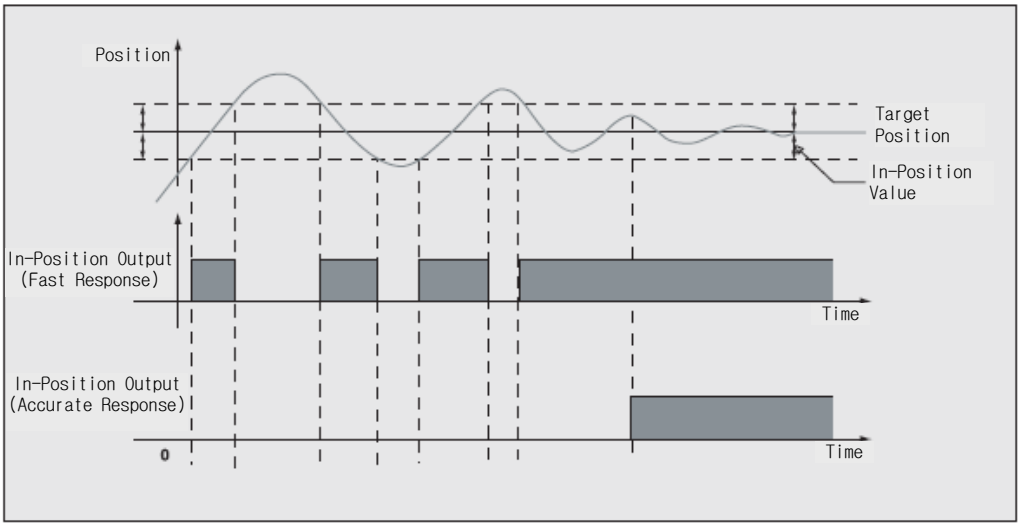
26 **Inpos Value :**

Sets the output condition of the in-position finish signal. After position command pulse is finished, when the position deviation from target position is within 'Inpos Value', this mode displays in-position finish signal.

Value	In-position [pulse] Fast Response	Value	In-position [pulse] Accurate Response
0	0	8	0
1	1	9	1
2	2	10	2
3	3	11	3
4	4	12	4
5	5	13	5
6	6	14	6
7	7	15	7

0	15	0

Fast response and accurate response can be controlled as illustrated below.



27 **Pos Tracking Limit :**

Acts to protect the motor and the drive. While the motor is run, when 'Position Error' is greater than this setting value, this mode generates an alarm to stop a flow of electricity to the motor and then set it to Servo OFF.

pulse	1	+134,217,727	5,000

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28	**Motion Dir :** When the motor operates by position command, this mode sets the revolution direction of the motor. ♦ 0 : moves the motor clockwise. ♦ 1 : moves the motor counterclockwise. If this parameter is changed, normally 'Limit Sensor Dir' is also changed.		0	1	0
29	**Limit Sensor Dir :** Sets the limit sensor direction to stop the motor to the limit spot under operation. ♦ 0 : When operation direction is 'CW', input the sensor signal to the Limit+ direction, and the motor will stop. ♦ 1 : When operation direction is 'CW', input the sensor signal to the Limit− direction, and the motor will stop. If this parameter is changed, normally 'Motion Sensor Dir' is also changed.		0	1	0
30	**Org Torque Ratio :** 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)	%	10	100	50
31	**Motor Lead :** ' Prepare for future use *1		1	50	1
32	**Gear Ratio :** ' Prepare for future use *1		1	50	1
33	**Pos. Error Overflow Limit :** Acts to protect the motor and the drive. While the motor stops and is set to Servo ON, when 'Position Error' is greater than this setting value, this mode generates an alarm to stop a flow of electricity to the motor and then set it to Servo OFF. *2	pulse	1	+134,217,727	5,000

*1 It can be applied over the Firmware version of 08.13.045.1

*2 It can be applied over the Firmware version of 06.03.043.10

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Appendix

Option for RS-485 Communication

■ RS485 Converter : Common

Available to communicate between the PC and the drive. One module per multi-drop link is required.

Type	Item	Max comm. Speed [bps]	External Power
RS485 to RS232	FAS-RCR	115,200	No need (5~24VDC optional)



FAS-RCR

■ RS232 Connection Cable for FAS-RCR : Common

Universal DB-9 male-female type cable is used.

Item	Length
CGNR-C-1R8F	1.8m
CGNR-C-003F	3m
CGNR-C-005F	5m



For more information wiring diagram and connector, refer to 「10. Communication Function」.

■ RS-485 Connection Cable : Ezi-SERVO-PR only

Universal RJ-45 (STP:CAT5E category) straight type cable is used.

Item	Length
CGNR-R-0R6F	60cm
CGNR-R-001F	100cm
CGNR-R-1R5F	150cm
CGNR-R-002F	200cm
CGNR-R-003F	300cm
CGNR-R-005F	500cm



For more information wiring diagram and connector, refer to 「11. Communication Function」.

For cabling position, refer to ⑤ of 「5.2 Controller Configuration」.

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■ RS-485 Connection Cable : Ezi-SERVO-PR-MI only

Item	Length
CGNA-R-0R5F	50cm
CGNA-R-001F	100cm
CGNA-R-1R5F	150cm
CGNA-R-002F	200cm
CGNA-R-003F	300cm
CGNA-R-005F	500cm

For more information wiring diagram and connector, refer to 「11. Communication Function」.

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Option for Interface Board : Ezi-SERVO-PR only

■ Terminal Block

Type	Item	
Interface (Terminal Block) Board	TB-Plus	

No. of CN1	Signal name	Signal name of TB-Plus
1	Limit+	L+
2	Limit-	L-
3	Origin	ORI
4	IN1	I1
5	IN6	I6
6	IN7	I7
14	IN2	I2
15	IN3	I3
16	IN4	I4
17	IN5	I5
18	IN8	I8
19	IN9	I9

No. of CN1	Signal name	Signal name of TB- Plus
7	COMP	CO
8	OUT1	O1
9	OUT2	O2
10	OUT3	O3
11	OUT4	O4
12	OUT5	O5
13	OUT6	O6
20	OUT7	O7
21	OUT8	O8
22	OUT9	O9
23	Brake+	B+
24	Brake-	B-

■ Extension cable for Interface Board

Available to extend the distance between the terminal block board and the drive.

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

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



The cable connection is 1:1 straight type.

Use	Item	Specification	Maker
Terminal Block connector	Connector	DB-26 male type	
Drive connector(CN1)	Connector Housing	10126-30000VE	3M
	Backshell	10320-52A0-008	3M

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Option for Motor Drive : Ezi-SERVO-PR only

■ Cable for Input/Output Signal

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

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

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

Refer to ① of 「5.2 Controller Configuration」.

■ Cable for Power

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

Item	Length[m]	Remark
CSVO-P-□□□F	□□□	Normal Cable
CSVO-P-□□□M	□□□	Robot Cable

□ is for Cable Length. The unit is 1m and Max. 2m length.

Next is for 86mm drive.

Item	Length[m]	Remark
CSVP-P-□□□F	□□□	Normal Cable
CSVP-P-□□□M	□□□	Robot Cable

□ is for Cable Length. The unit is 1m and Max. 2m length.

Refer to ④ of 「5.2 Controller Configuration」.

■ Extension Cable for Motor

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

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

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



Next is for 86mm drive.

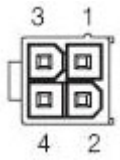
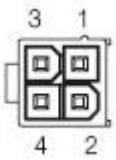
Item	Length[m]	Remark
CSVP-M-□□□F	□□□	Normal Cable
CSVP-M-□□□M	□□□	Robot Cable

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

Refer to ③ of 「5.2 Controller Configuration」.

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Wiring Diagram

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

Connector Specification

Item	Specification	Maker
Housing	5557-04	MOLEX
Terminal	5556	MOLEX

■ Extension cable for Encoder

Available to extend the distance between the encoder and Ezi-SERVO Plus-R.

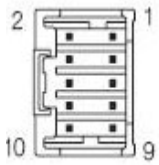
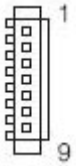
Item	Length[m]	Remark
CSVO-E-□□□F	□□□	Normal Cable
CSVO-E-□□□M	□□□	Robot Cable

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

Refer to ② of 「5.2 Controller Configuration」.



Wiring Diagram

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

Connector Specification

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

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■ Connector for cabling

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

CN1 : Input/Output Connector

Item	Specification	Maker
Connector	10126-3000PE	3M
Shell	10326-52F0-008	3M

CN2 : Encoder Connector

Item	Specification	Maker
Housing	51353-1000	MOLEX
Terminal	56134-9000	MOLEX

CN3 : Motor Connector

Item	Specification	Maker
Housing	5557-04	MOLEX
Terminal	5556	MOLEX

CN4 : Power Connector

Item	Specification	Maker
Housing	5557-02	MOLEX
Terminal	5556	MOLEX

CN3 : Motor Connector (86mm motor drive only)

Item	Specification	Maker
Terminal Block	AK950-4	PTR

CN4 : Power Connector (86mm motor drive only)

Item	Specification	Maker
Terminal Block	AK950-2	PTR

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Option for Motor Drive : Ezi-SERVO-PR-MI only

■ Cable for Input/Output Signal

Available to connect between Control System and Ezi-SERVO-PR-MI.

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

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

Refer to ① of 「5.2 Controller Configuration」.

■ Cable for Power

Available to connect between Power and Ezi-SERVO-PR-MI.

Item	Length[m]	Remark
CMNB-P-□□□F	□□□	Normal Cable
CMNB-P-□□□M	□□□	Robot Cable

□ is for Cable Length. The unit is 1m and Max. 2m length.

Refer to ④ of 「5.2 Controller Configuration」.

■ Extension Cable for Motor

Available to extended connection between motor and Ezi-SERVO-PR-MI.

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

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

Refer to ③ of 「5.2 Controller Configuration」.

■ Extension cable for Encoder

Available to extend the distance between the encoder and Ezi-SERVO-PR-MI.

Item	Length[m]	Remark
CSVI-E-□□□F	□□□	Normal Cable
CSVI-E-□□□M	□□□	Robot Cable

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

Refer to ② of 「5.2 Controller Configuration」.

■ Connector for cabling

These connectors are serviced together with Ezi-SERVO-PR-MI except when purchasing Option cables.

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

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