

Ezi-STEP[®] II **Plus-E MINI**

Micro Stepping System

User Manual

Text

(Rev.02)



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Manual Version : [ver02]

Used GUI version : 6.47.3.63 or Higher
First Edition : July 24th, 2020

1 . Safety Pre-caution and Note on Installation

※ Before Operation

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

1 - 1 . Precautions

◆ General Precautions

- Contents of this manual are subject to change without prior notice for functional improvements, change of specifications or user's better understanding. Thoroughly read is the manual which is provided with purchased Ezi-STEPⅡ Plus-E MINI.
- In case of manual is damaged or lost, please contact with FASTECH's agent or our company at the address on the last page of this manual.
- It is not responsible for FASTECH to guarantee product randomly reconstructed because this kind of improper action is out of range of guarantee.

◆ Safety Precaution

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

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

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

◆ Check the Product

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

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

◆ Connect Cables

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

◆ Operation & Setting change

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

 Warning	Stop to supply power to the main circuit and wait enough time before checking or repairing this Ezi-STEPⅡ Plus-E MINI. Electricity remaining in the condenser may cause of electric shock. Do not change cabling while power is being supplied. Otherwise, the user may get injured or the product and machine may get damaged. Do not reconstruct the Ezi-STEPⅡ Plus-E MINI. Otherwise, an electric shock may occur or the product and machine get damaged. And the reconstructed product cannot get after service.
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1 - 2 . Note on Installation

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

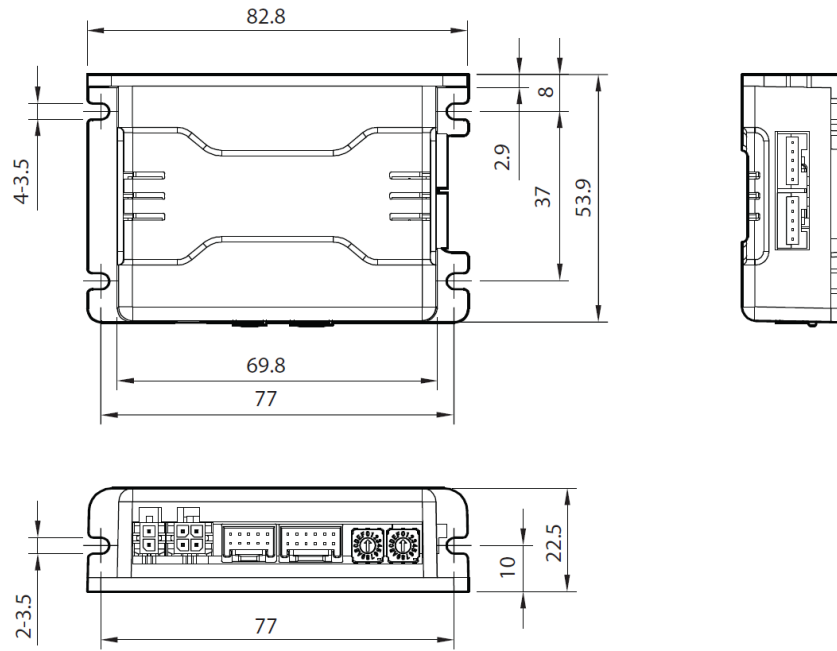
2 . Specifications of the Drive

2 - 1 . Characteristic Table

Type of Drive		EzT2-PE-MI series
Input Voltage		24VDC $\pm$ 10%
Control Method		Control with ARM based 32bit MCU
Multi Axes Drive		Max 254 axes operating (Selectable IP : 1~254)
Position Table		It is possible to design 256 of Motion Step. (Speed, External start, Jump, Loop, Wait and PT finish etc.)
Current Consumption		Max 500mA (Except motor current)
Operating condition	Ambient Temperature	In Use : 0~50°C In Storage : -20~70°C
	Humidity	In Use : 35~85%RH (Non-condensing) In Storage : 10~90%RH (Non-condensing)
	Viv. Resist	0.5G
Function	Rotation Speed	0~3,000rpm ^{*1}
	Resolution[P/R]	500 1,000 1,600 2,000 3,200 ,3600 4,000 5,000 6,400 8,000 10,000 20,000 25,000 36,000 40,000 50,000 (Resolution can be selected by parameter)
	Protection Function	Over current, Over speed, Over temperature, Regenerative voltage error, Motor connect error, ROM error
	LED Display	Power On, Run/Stop, Step On, Alarm
	Rotational Direction	CW/CCW (Selectable by parameter)
	RUN Current	50%~150% (Selectable by parameter) RUN current is flowing current value in the motor when motor is operating (rotating), It is set based on constant current of motor * Default factory setting value : 100%
	STOP Current	20%~100% (Selectable by parameter) It is set as setting value of STOP current 0.1 sec after motor stop. STOP current value is at a ratio against RUN current value of motor * Default factory setting value is : 50%
I/O Signal	Input signal	3 dedicated input (LIMIT+, LIMIT-, ORIGIN), 3 programmable input (Photocoupler)
	Output signal	1 dedicated output (Compare Out), 1 programmable output (Photocoupler), Brake signal
Communication Function		Ethernet TCP, UDP communication with PC Dual port Ethernet switch embedded Communication Speed : 10/100base-T/TX Full duplex DHCP function embedded
Position Control		Incremental mode / Absolute mode Data range: -134,217,728 to +134,217,727 pulse, Operating: Max. 3,000rpm
Return to Origin		Origin Sensor, Z phase, $\pm$ Limit sensor
GUI		User interface Program for Windows
Library		Motion Library (DLL) for Windows XP/Vista/7/8/10

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

2 - 2 . Dimensions



3 . Specifications & Size of the Motor

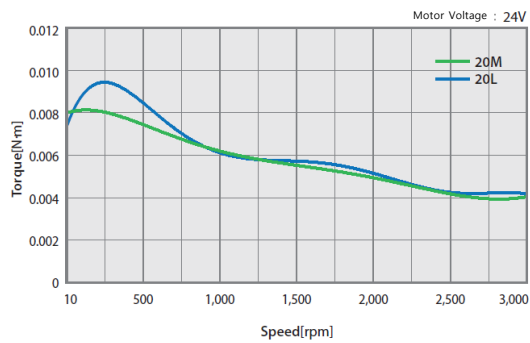
3 - 1 . Motor Specification

MODEL		BM-20 series		BM-28 series			BM-42 series				
		UNIT	20M	20L	28S	28M	28L	42S	42M	42L	42XL
DRIVE METHOD		—	BI-POLAR								
NUMBER OF PHASES		—	2	2	2	2	2	2	2	2	
VOLTAGE		VDC	2,75	3,0	3,0	3,0	3,0	3,36	4,32	4,56	7,2
CURRENT per PHASE		A	0,5	0,5	0,95	0,95	0,95	1,2	1,2	1,2	1,2
RESISTANCE per PHASE		Ohm	5,5	6,0	3,2	3,2	3,2	2,8	3,6	3,8	6,0
INDUCTANCE per PHASE		mH	2,0	2,6	2,0	2,7	3,2	5,4	7,2	8,0	15,6
HOLDING TORQUE		N·m	0,016	0,025	0,069	0,098	0,118	0,32	0,44	0,5	0,65
ROTOR INERTIA		g·cm ²	2,5	3,3	9,0	13	18	35	54	77	114
WEIGHTS		g	53	78	115	174	202	238	303	374	508
LENGTH(L)		mm	28	38	32	45	50	34	40	48	60
PERMISSIBLE OVERHUNG LOAD (DISTANCE FROM END OF SHAFT)	3mm	N	18	18	30	30	30	22	22	22	22
	8mm		30	30	38	38	38	26	26	26	26
	13mm		—	—	53	53	53	33	33	33	33
	18mm		—	—	—	—	—	46	46	46	46
PERMISSIBLE THRUST LOAD		N	Lower than motor weight								
INSULATION RESISTANCE		Mohm	100 MIN,(at 500VDC)								
INSULATION CLASS		—	CLASS B(130℃)								
OPERATING TEMPERATURE		℃	0 to 55								

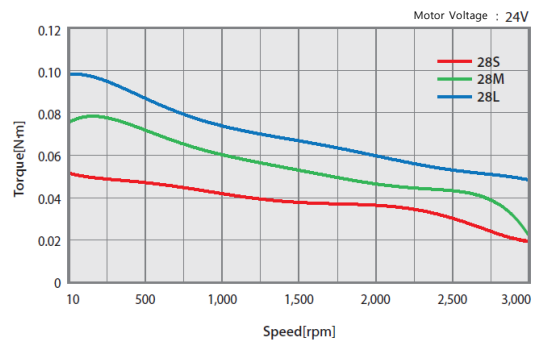
MODEL		BM-56 series			BM-60 series			
		UNIT	56S	56M	56L	60S	60M	60L
DRIVE METHOD		—	BI-POLAR					
NUMBER OF PHASES		—	2	2	2	2	2	2
VOLTAGE		VDC	1,56	1,62	2,64	1,32	1,48	2,2
CURRENT per PHASE		A	3,0	3,0	3,0	4,0	4,0	4,0
RESISTANCE per PHASE		Ohm	0,52	0,54	0,88	0,33	0,37	0,55
INDUCTANCE per PHASE		mH	1,2	2,0	4,0	0,75	1,1	2,7
HOLDING TORQUE		N·m	0,64	1,0	1,5	0,88	1,28	2,4
ROTOR INERTIA		g·cm ²	180	280	520	240	490	690
WEIGHTS		g	548	726	1159	616	793	1349
LENGTH(L)		mm	46	55	80	47	56	85
PERMISSIBLE OVERHUNG LOAD (DISTANCE FROM END OF SHAFT)	3mm	N	52	52	52	70	70	70
	8mm		65	65	65	87	87	87
	13mm		85	85	85	114	114	114
	18mm		123	123	123	165	165	165
PERMISSIBLE THRUST LOAD		N	Lower than motor weight					
INSULATION RESISTANCE		Mohm	100 MIN,(at 500VDC)					
INSULATION CLASS		—	CLASS B(130℃)					
OPERATING TEMPERATURE		℃	0 to 55					

3 - 2 . Motor Torque Graph

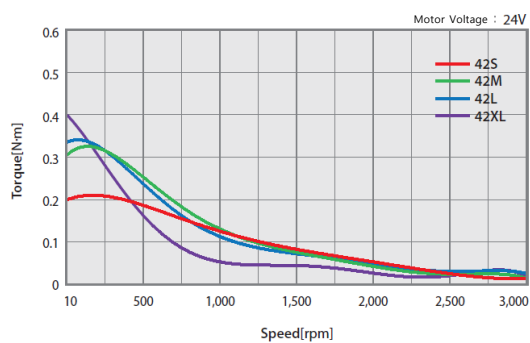
Ezi-STEP II-PE-MI-20 series



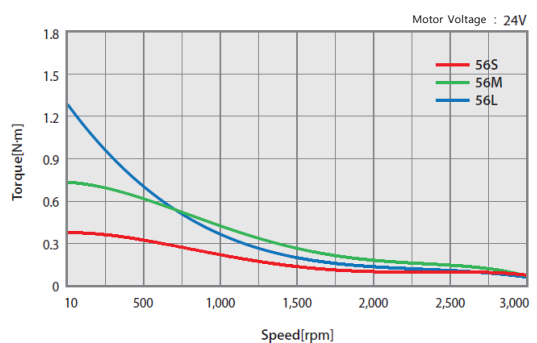
Ezi-STEP II-PE-MI-28 series



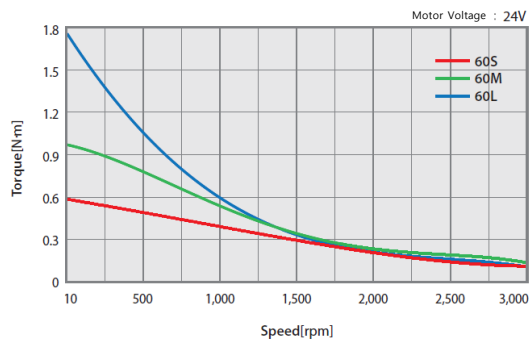
Ezi-STEP II-PE-MI-42 series



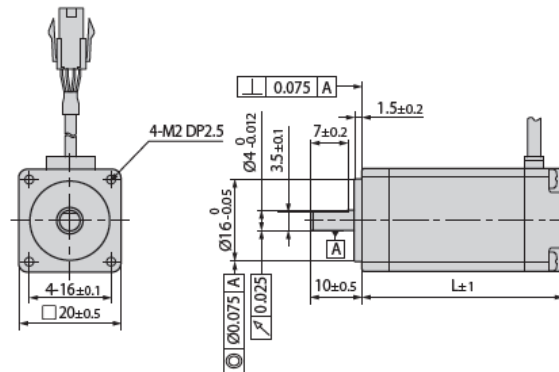
Ezi-STEP II-PE-MI-56 series



Ezi-STEP II-PE-MI-60 series

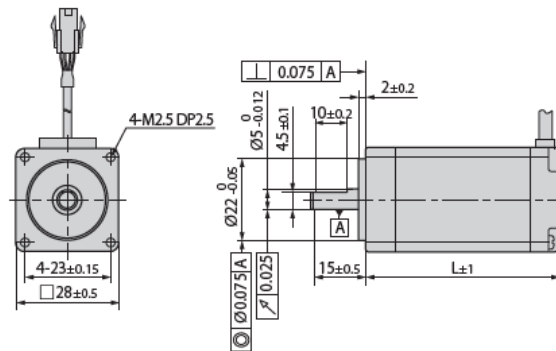


3 - 3 . Motor Size



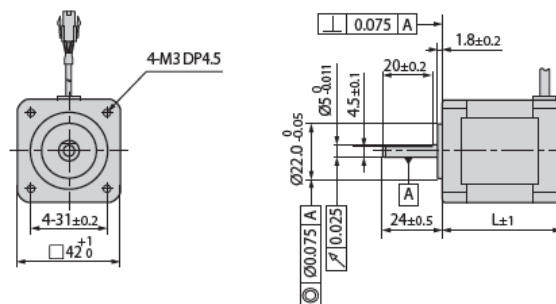
20mm

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



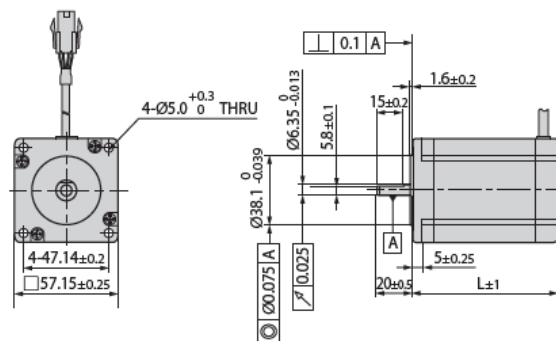
28mm

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



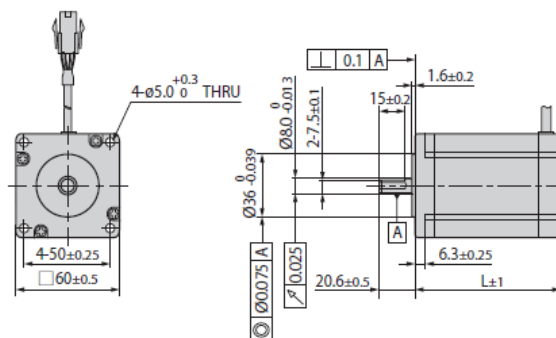
42mm

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



56_{mm}

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



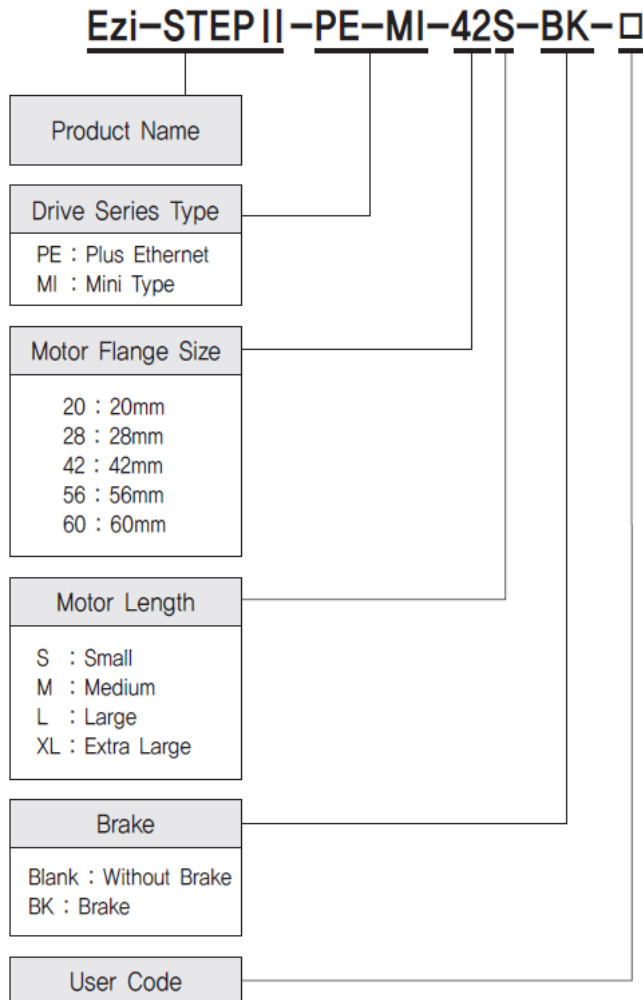
60_{mm}

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

4 . Configuration

4 - 1 . Motor and Drive Combination

1) Ezi-STEPⅡ Plus-E MINI Part Numbering



2) Ezi-STEPⅡ Plus-E MINI Combination (Standard)

Unit Name	Motor Name	Drive Name
Ezi-STEPⅡ-PE-MI-20M	BM-20M	EzT2-PE-MI-20M
Ezi-STEPⅡ-PE-MI-20L	BM-20L	EzT2-PE-MI-20L
Ezi-STEPⅡ-PE-MI-28S	BM-28S	EzT2-PE-MI-28S
Ezi-STEPⅡ-PE-MI-28M	BM-28M	EzT2-PE-MI-28M
Ezi-STEPⅡ-PE-MI-28L	BM-28L	EzT2-PE-MI-28L
Ezi-STEPⅡ-PE-MI-42S	BM-42S	EzT2-PE-MI-42S
Ezi-STEPⅡ-PE-MI-42M	BM-42M	EzT2-PE-MI-42M
Ezi-STEPⅡ-PE-MI-42L	BM-42L	EzT2-PE-MI-42L
Ezi-STEPⅡ-PE-MI-42XL	BM-42XL	EzT2-PE-MI-42XL
Ezi-STEPⅡ-PE-MI-56S	BM-56S	EzT2-PE-MI-56S
Ezi-STEPⅡ-PE-MI-56M	BM-56M	EzT2-PE-MI-56M
Ezi-STEPⅡ-PE-MI-56L	BM-56L	EzT2-PE-MI-56L
Ezi-STEPⅡ-PE-MI-60S	BM-60S	EzT2-PE-MI-60S
Ezi-STEPⅡ-PE-MI-60M	BM-60M	EzT2-PE-MI-60M
Ezi-STEPⅡ-PE-MI-60L	BM-60L	EzT2-PE-MI-60L

3) Ezi-STEPⅡ Plus-E MINI Combination (Brake mounted)

Unit Name	Motor Name	Drive Name
Ezi-STEPⅡ-PE-MI-42S-BK	BM-42S-BK	EzT2-PE-MI-42S
Ezi-STEPⅡ-PE-MI-42M-BK	BM-42M-BK	EzT2-PE-MI-42M
Ezi-STEPⅡ-PE-MI-42L-BK	BM-42L-BK	EzT2-PE-MI-42L
Ezi-STEPⅡ-PE-MI-42XL-BK	BM-42XL-BK	EzT2-PE-MI-42XL
Ezi-STEPⅡ-PE-MI-56S-BK	BM-56S-BK	EzT2-PE-MI-56S
Ezi-STEPⅡ-PE-MI-56M-BK	BM-56M-BK	EzT2-PE-MI-56M
Ezi-STEPⅡ-PE-MI-56L-BK	BM-56L-BK	EzT2-PE-MI-56L
Ezi-STEPⅡ-PE-MI-60S-BK	BM-60S-BK	EzT2-PE-MI-60S
Ezi-STEPⅡ-PE-MI-60M-BK	BM-60M-BK	EzT2-PE-MI-60M
Ezi-STEPⅡ-PE-MI-60L-BK	BM-60L-BK	EzT2-PE-MI-60L

● Brake Specifications

Motor	Electromagnetic Brake					Motor Unit Weight (g)	Permitted Overhung Load(N)				Permitted Thrust Load(N)
	Type	Voltage Input (V)	Rated Current (A)	Power Consump tion (W)	Static Friction Torque (N·m)		Length from Motor Point (mm)				
							3	8	13	18	
BM-42S	Non-excitation run type	24VDC ±10%	0.2 ±10%	5	0.2	500	22	26	33	46	Must be lower than unit's weight
BM-42M						560					
BM-42L						630					
BM-42XL						770					
BM-56S			0.27 ±10%	6.6	0.7	970	52	65	85	123	
BM-56M						1150					
BM-56L						1580					
BM-60S				6.6	0.7	1060	70	87	114	165	
BM-60M						1250					
BM-60L						1790					

Electronic Brake cannot be used for braking. Position hold purpose only when power OFF.
The weight means Motor Unit including Motor and Electronic Brake.

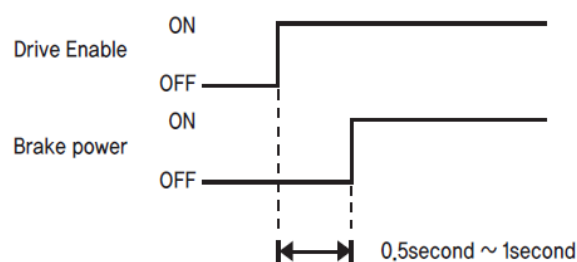
● Brake Operation Timing Chart

Ezi-STEPⅡ Plus-E MINI controls Brake by Drive automatically.

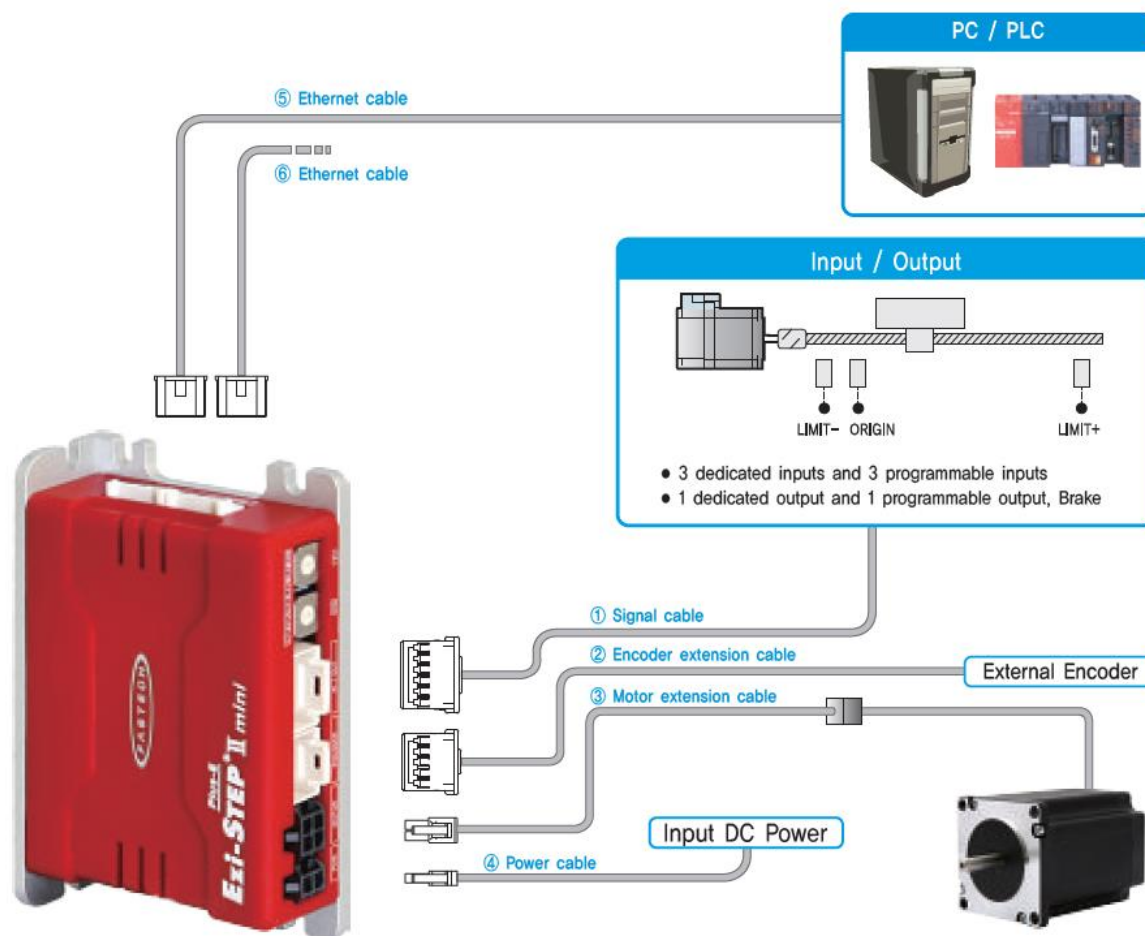
Please refer to below Timing Chart when controlling Brake from upper controller other than using Ezi-STEPⅡ Plus-E MINI Brake control.

Otherwise, Drive malfunctioning and loads might fall.

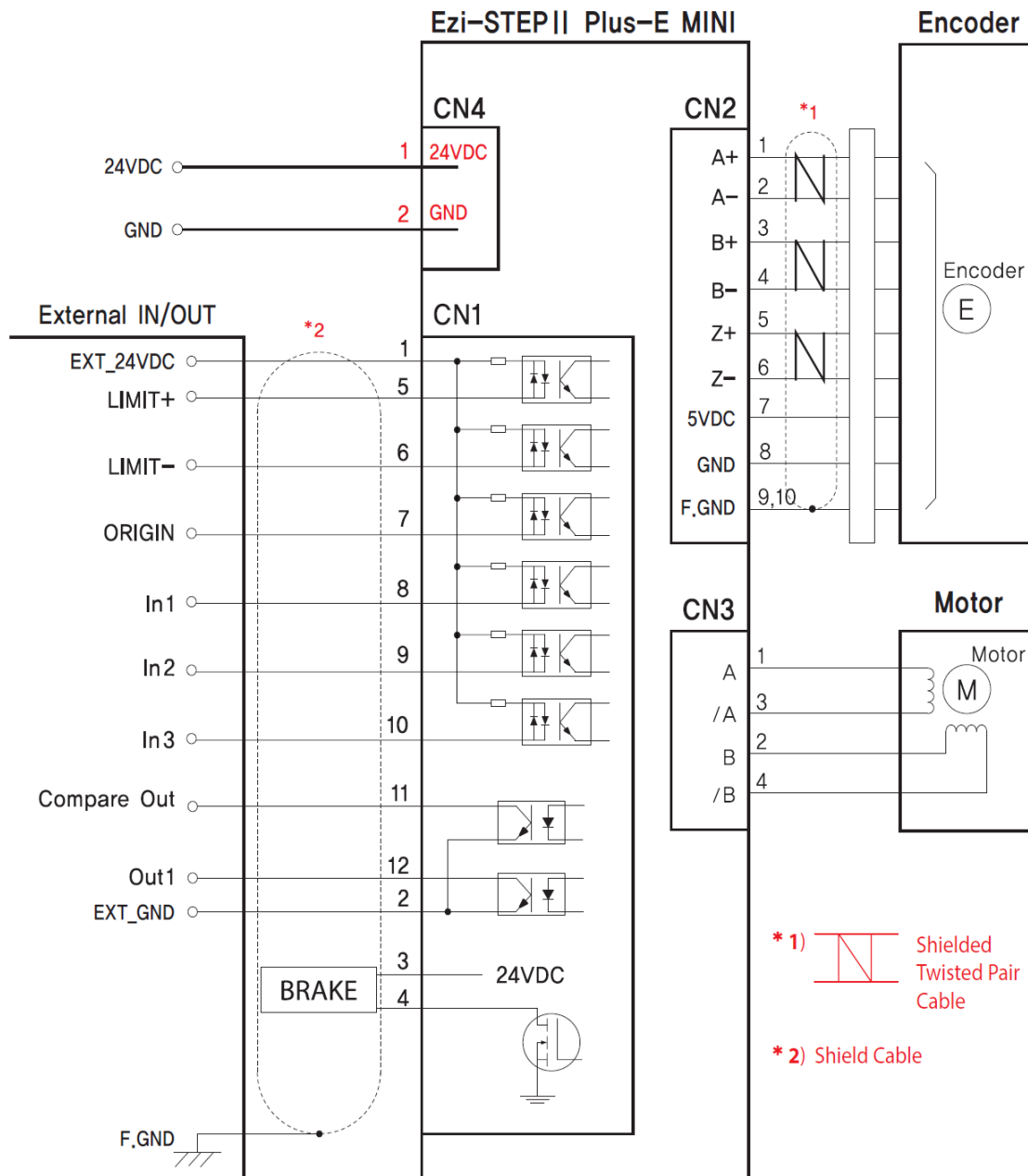
Also, please do not operate Brake while motor operation to prevent damage.



4 - 2 . Controller Configuration

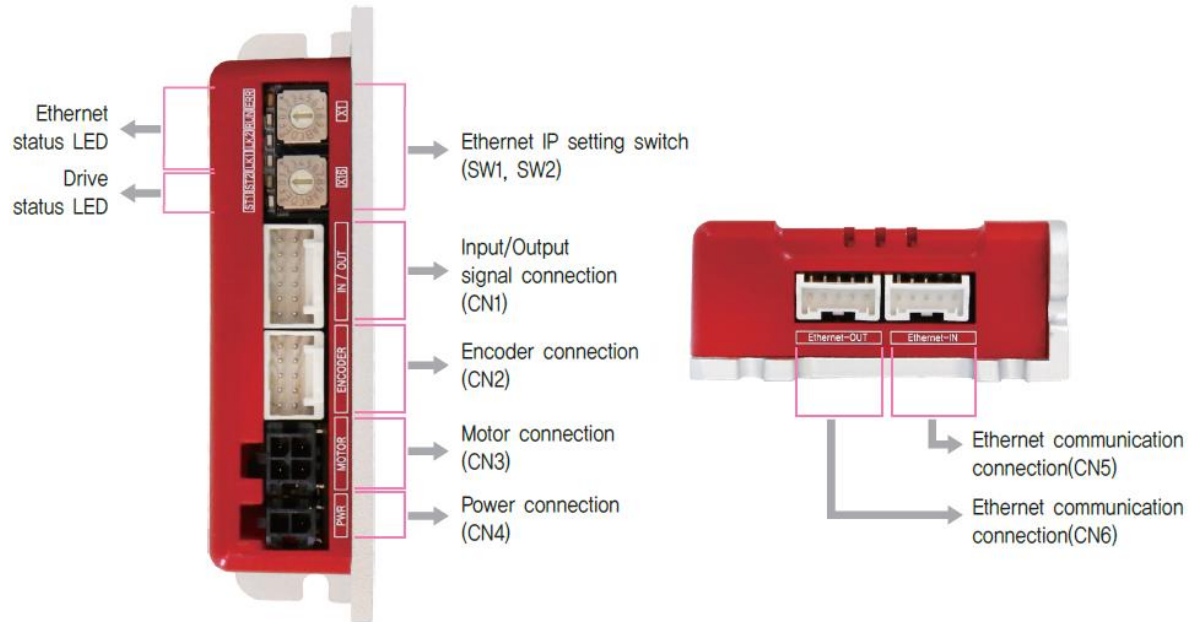


4 - 3 . External Wiring Diagram



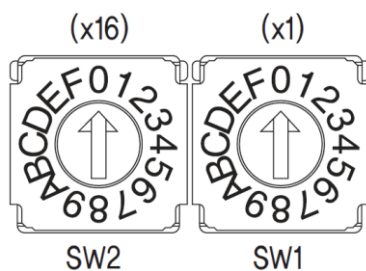
5 . External Name and Function Setting of Ezi-STEPII Plus-E MINI

5 - 1 . Appearance and Part Name



5 - 2 . IP Address Selection Switch (SW1, SW2)

- 1) It can be set from 1 to 254. Please set IP without overlapping.
 - "0", "255" cannot be used for IP setting. Be sure to set it to "1~254".
 - The default Gateway is 192.168.0.1. When the switch is set to "1", change Gateway. Refer to the [Manual - User Program 2-4] section for the change method. If the IP address and gateway are the same, Alarm (201 or 202) occurs.
 - It is recommended to use "2 ~ 254" for IP setting. (Default: SW1: 2, SW2: 0)
- 2) Basic setting is "192.168.0.xxx", and xxx are set by switch.



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

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

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

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

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

(Connect the Ethernet to Ethernet IN connector)

- When connecting directly to the controller (PC/PLC), it needs to be sure to set the IP

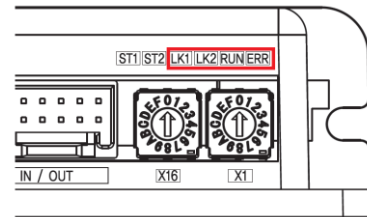
address with switch.

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

5 - 3 . Ethernet Status Display LED

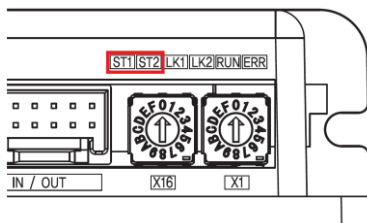
1) This LED indicates the Ethernet communication status.

Name	Color	Status	Description
ERR	Red	OFF	Normal status or Power OFF
		Single Flash	Local Error
LK1/ LK2	Green	OFF	Link deactivated
		ON	Link activated
RUN	Orange	Blinking	In operation



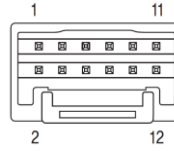
5 - 4 . Drive Status Display LED

Status	LED		Description
Disable	ST1 ST2		ST1 blinking, ST2 OFF
Enable	ST1 ST2		ST1 ON, ST2 OFF
In Motion	ST1 ST2		ST1 ON, ST2 ON
In-position deviation	ST1 ST2		ST1 & ST2 blink alternately
Alarm	ST1 ST2		ST2 blinks as much as the alarm number (Blinks when alarm occurs under No. 15)



5 - 5 . I/O Signal Connector (CN1)

No.	Function	I/O
1	EXT_24VDC	Input
2	EXT_GND	Input
3	Brake +24V (Output)	Output
4	Control signal for Brake(Output)	Output
5	LIMIT+ (Dedicated Input)	Input
6	LIMIT- (Dedicated Input)	Input
7	ORIGIN (Dedicated Input)	Input
8	Digital In1 (Programmable Input)	Input
9	Digital In2 (Programmable Input)	Input
10	Digital In3 (Programmable Input)	Input
11	Compare Out (Dedicated Output)	Output
12	Digital Out1 (Dedicated Output)	Output



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

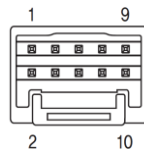


In the control signal for the brake of Pin, connect Brake that current consumption is under 600[mA].

Refer to 6-4. Output Signal for any other brake.

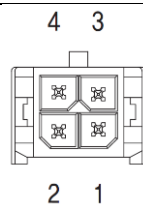
5 - 6 . Encoder Connector(CN2)

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

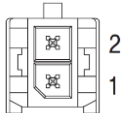


5 - 7 . Motor Connector(CN3)

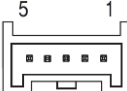
No.	Function
1	A
2	B
3	/A
4	/B



5 - 8 . Power Connector(CN4)

No.	Function	
1	24VDC $\pm 10\%$	
2	GND	

5 - 9 . Ethernet Connector(CN5, CN6)

No.	Function	
1	TD+	
2	TD-	
3	RD+	
4	RD-	
5	F.GND	

6 . Control I/O Signal

6 - 1 . Signal Cabling

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

- 1) **Input** : 「Limit+」, 「Limit-」, 「Origin」 signals are fixed to each assigned No.
Other signals as like 'Reset' and others are assigned to IN1~IN3 terminal blocks.
3 dedicated Input + 3 programmable Input = total 6 Input pins

CN1 No.	Signal Name	Function
5	Limit+	Positive Limit sensor signal
6	Limit-	Negative Limit sensor signal
7	Origin	Origin sensor signal
8	IN1	Clear Pos Position Table A0 ~ Position Table A7 (PT A0~PT A7) Position Table start execution (PT Start) Soft Stop(Stop)
9	IN2	Jog+, Jog- Alarm Reset, Step ON Pause, Origin Search, Teaching Emergency Stop(E-Stop)
10	IN3	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) Jog0~Jog2

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

1 dedicated Output + 1 programmable Output = total 2 Output pins

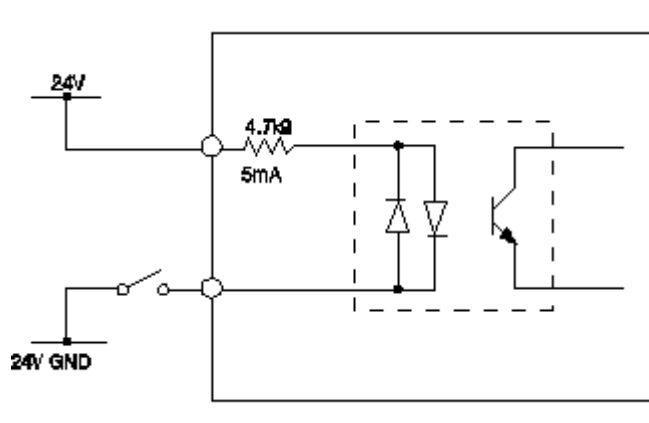
CN1 No.	Signal Name	Function
11	COMP	Specific output signal(Compare Out)
12	OUT1	InPosition, Alarm, Moving Acc/Dec ACK, END OriginSearchOK StepReady Brake Position Table output 0 ~ Position Table output 2 (PT OUT 0 ~ PT OUT 2) User Output

6 - 2 . Connection Circuit

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

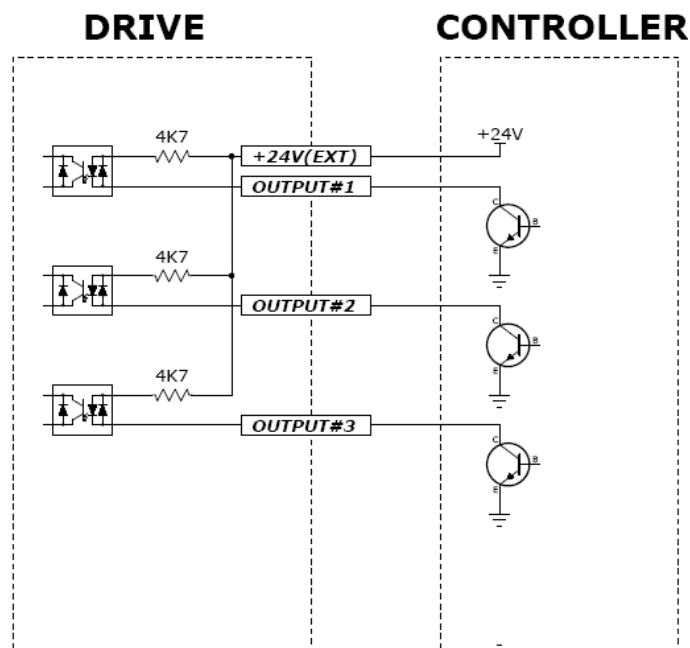
1)Input Circuit

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



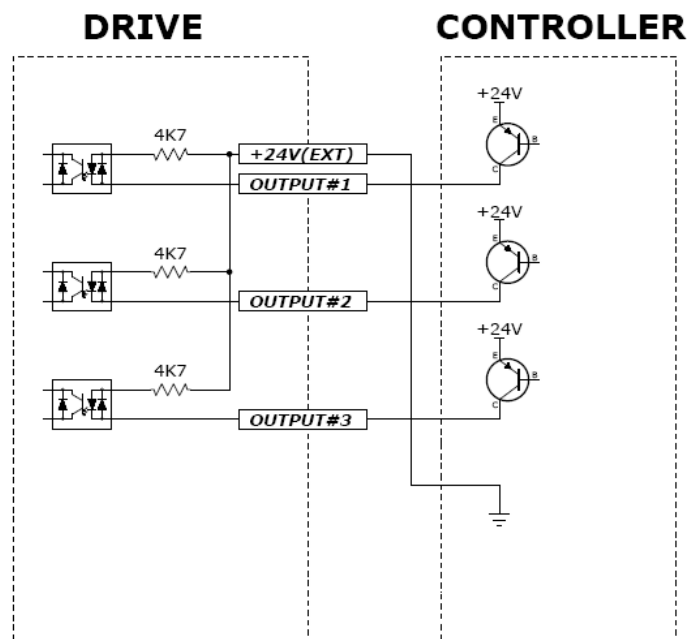
- **Connect NPN type Input signal**

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



- **Connect PNP type Input signal**

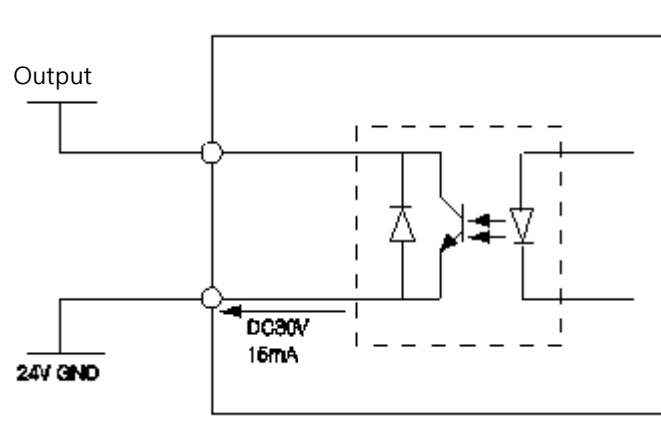
Connect the '+24V external' pin of drive to 'GND' of Controller.



2) Output Circuit

Output circuit power should be separately prepared. This may share input circuit power. In this case, power capacity should add output power capacity to input power capacity. Applied voltage and power capacity in the control output port are as follows.

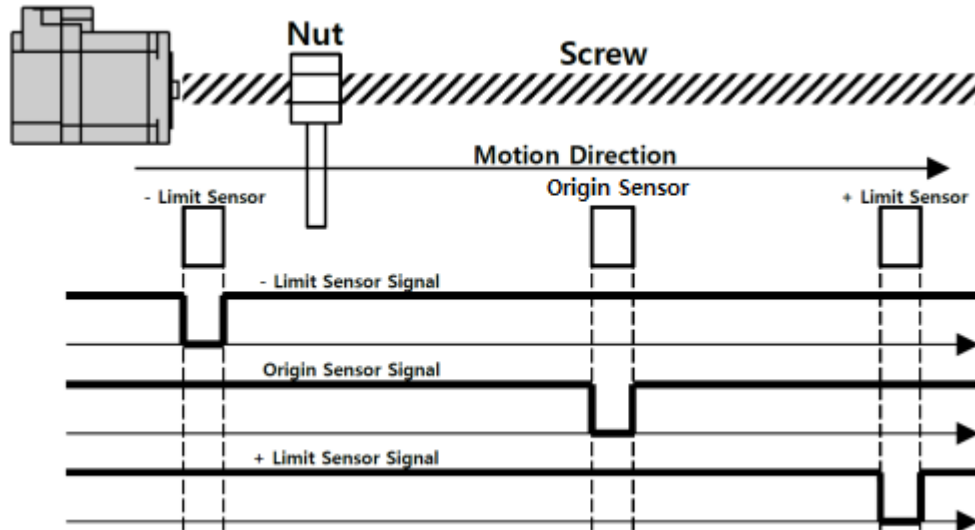
- Applied voltage $\leq 30V$
- Electrified current $\leq 15mA$



6 - 3 . Input Signal

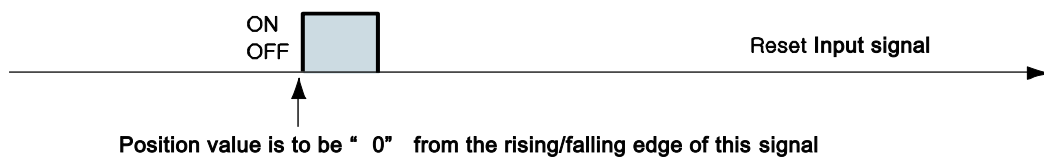
1) Limit Sensor and Origin Sensor

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



2) Clear Pos

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



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

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

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

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

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

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

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

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

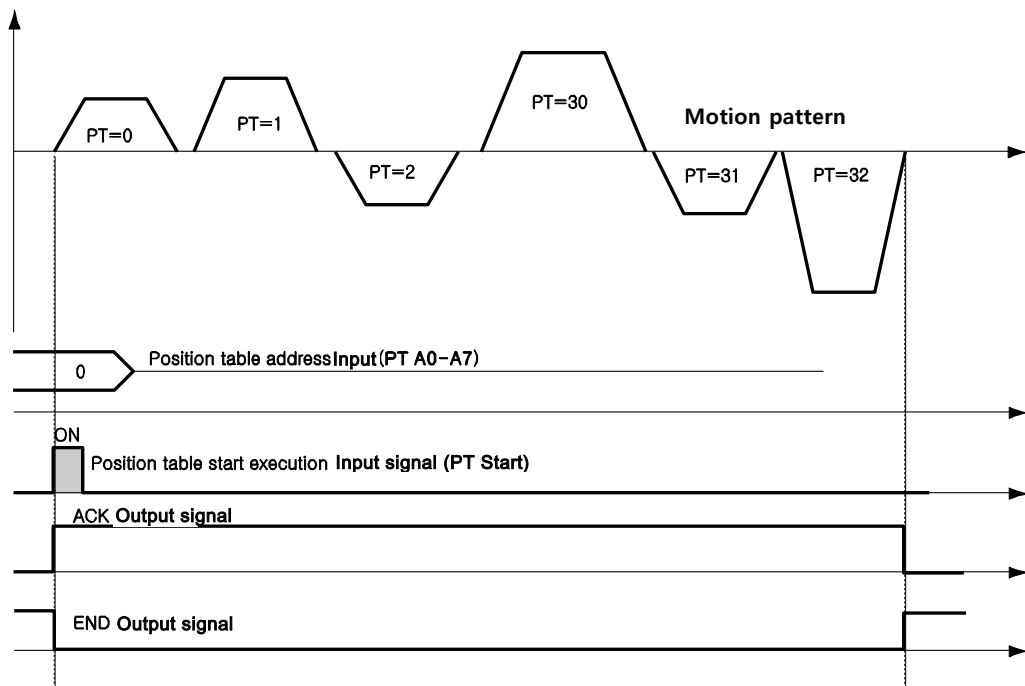
This signal can be used as 'PT A5~A7' when PT function is used, and also can be used as 'User IN6~IN8' signal when the input signal 'User IN0~IN5' is not enough.

4) Position Table start (PT Start) Input

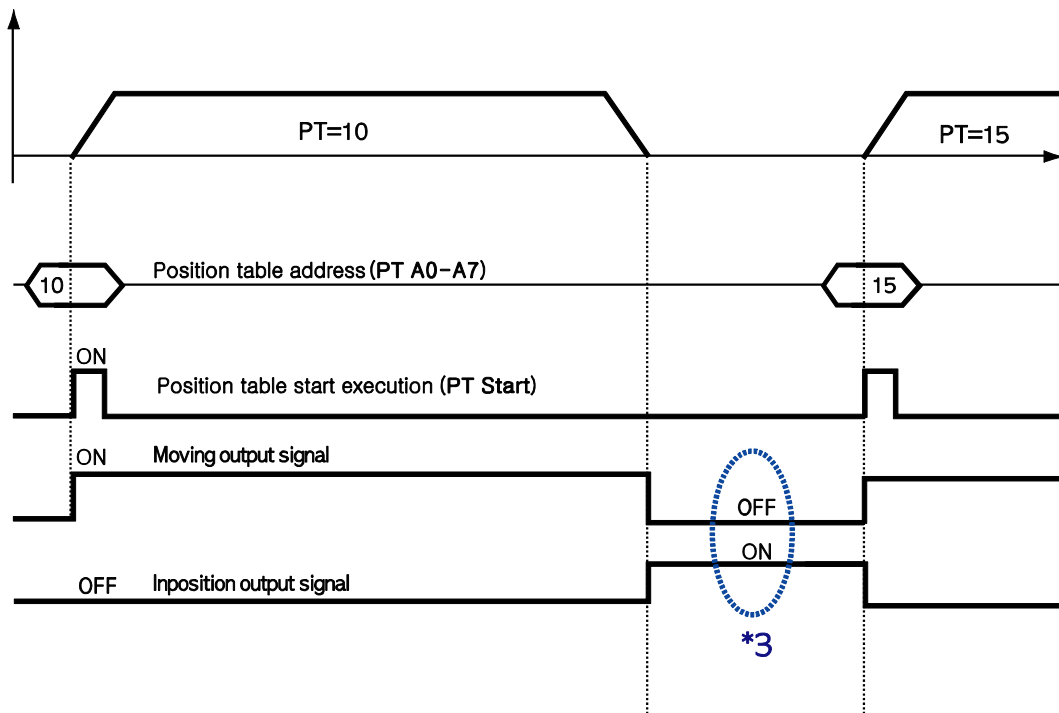
If set and input the running start number at the same time by using PT A0~A7 signals, the motion pattern corresponds to the PT No. will be executed.

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

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

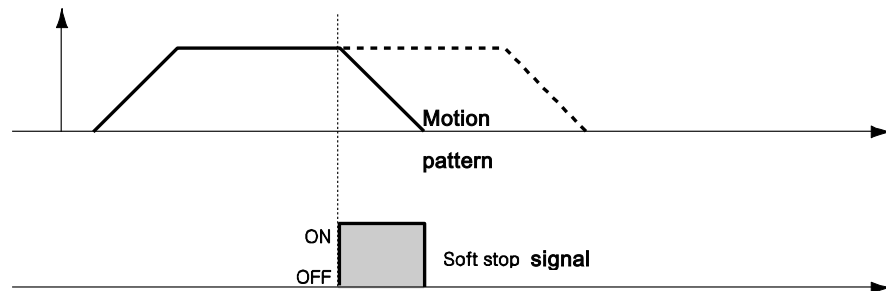


- *1. Order of signal : 'PT A0~A7' signals must be set over 50[msec] before 'PT Start' signal to be [ON].
- *2. Save signal cabling : If it starts 'PT Start' without designating 'PT A0~A7' signals, Start PT number set to be '0'.
- *3. In case of using 'PT Start' command sequentially, before executing the next 'PT Start' command check motion status('Moving' signal and 'Inpositon' signal).



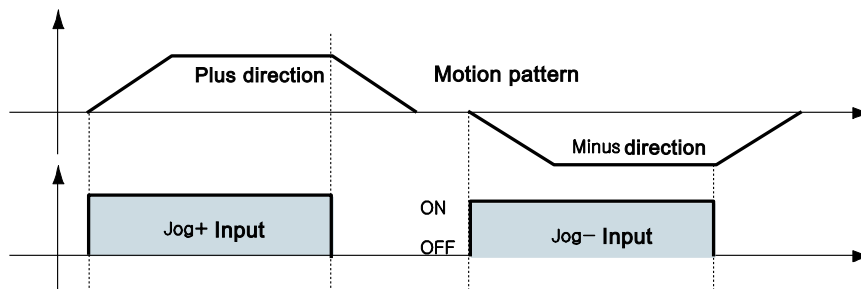
5) Stop Input

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



6) Jog+ and Jog- Input

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



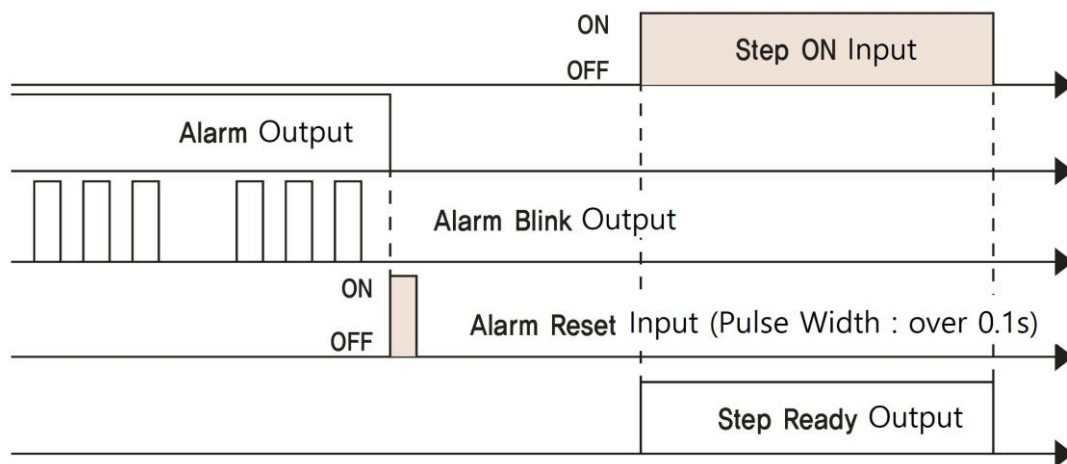
7) Step ON and Alarm Reset Input

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

When Step 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 Step ON/OFF signal is set to [ON], the drive restarts to supply the current to the motor and its torque is recovered. Before operating the motor, the user must set it to [ON].

When the drive is to be Step ON status, CN1 connector's 「Step Ready」 output signal is set to [ON].

 Caution	If the Step ON command is assigned to control input, Step ON command from GUI or DLL library will not be executed.
--	---



*1. In Step On status by an input signal, No.0 : Pulse per Revolution among the Parameter List is not changed.

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

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

8) Pause Input

When 「Pause」 signal is set to [ON], the motion in service is stopped

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

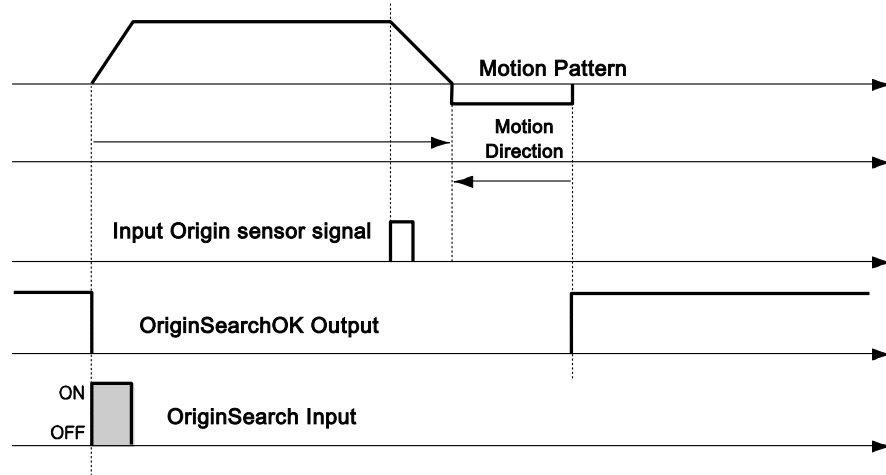
The pulse width of the pause signal is 10ms or more.

9) Origin Search Input

When 「Origin Search」 signal is set to [ON] (10ms or more), it starts to search the origin

position according to selected conditions. The conditions are subject to parameters such as No.20:Org Method, No.17:Org Speed, No.18:Org Search Speed, No.19:Org AccDec Time, No.21:Org Dir. (For more information, refer to '[10.Parameter](#)').

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

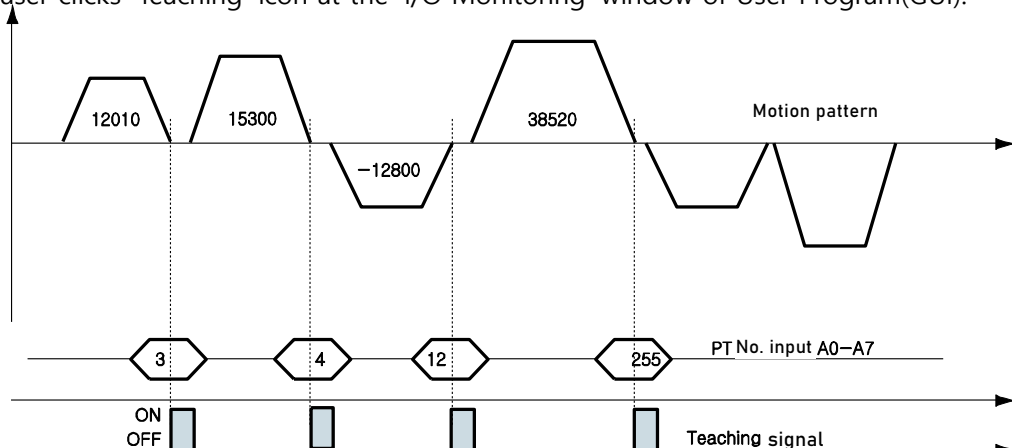


10) Teaching Input

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

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

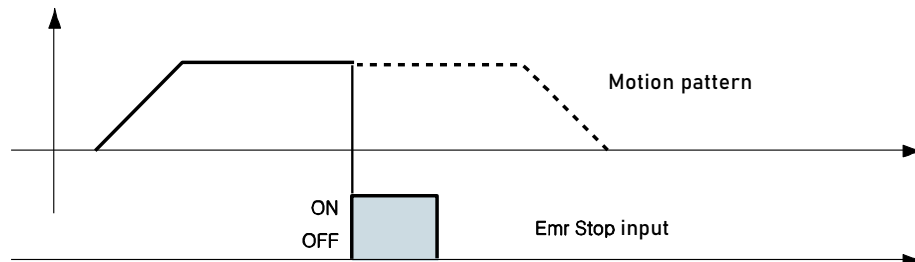
- *1. After executing Teaching, click 'Refresh' icon on Teaching Dialog window to display written position value on position table.
- *2. Click 'Save to ROM' icon to save written position value in the ROM area.
- *3. Teaching signal can be used by two methods; the user assigns actual signal to the motor,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



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

11) E-Stop Input

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



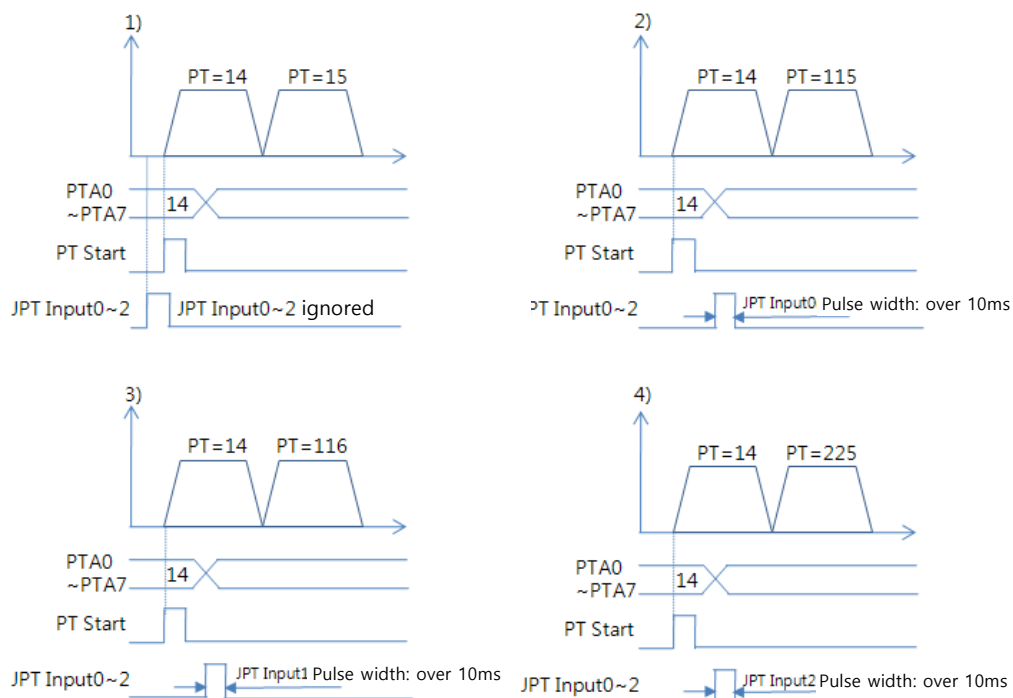
12) JPT Input0~Input2 (Jump Position Table Input) Input

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

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

PT 14 Data

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



13) JPT(Jump Position Table) Start Input

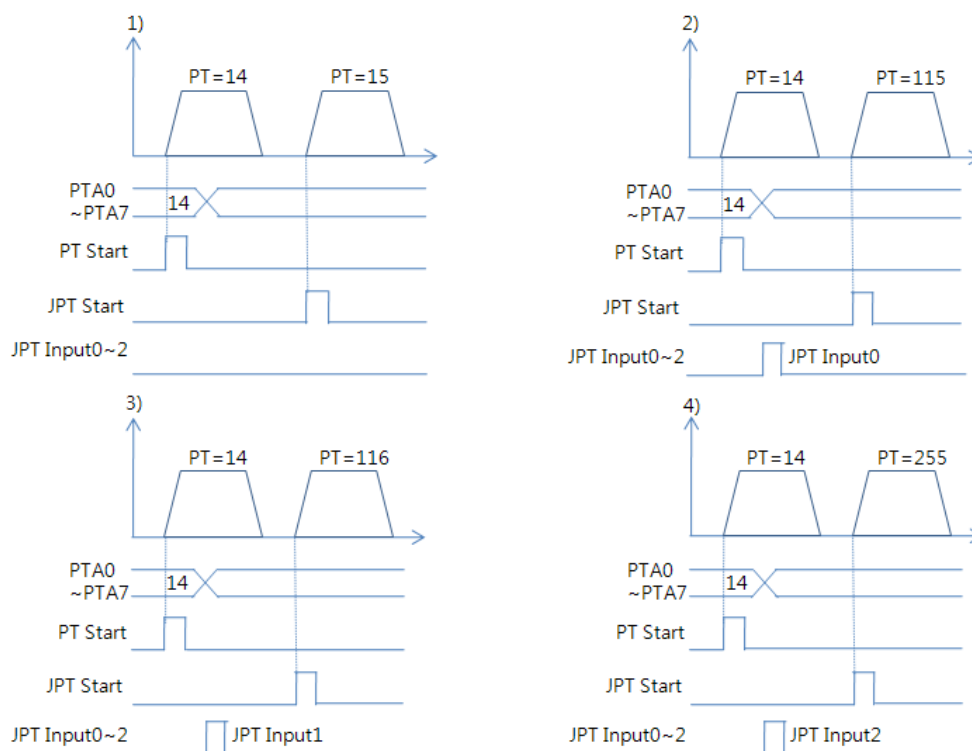
To select motion pattern (position table number) to be subsequently executed according to input signal conditions. The difference from Paragraph 12), 「JPT Input0~Input2 Input」, is:

- 1) PT number to be jumped must be composed to 10XXX;
- 2) Next motion is not executed until 'JPT Start' is set to [ON].

If 'Wait Time' value of PT data is more than '0', the time lapses additionally and then next motion is executed.

【Example】

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



6 - 4 . Output Signal

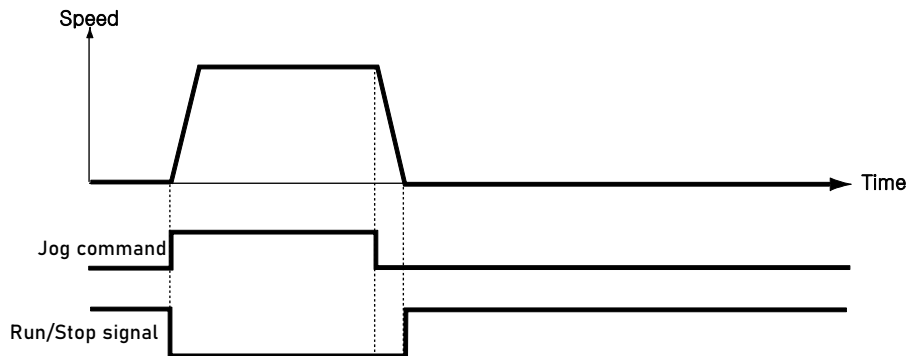
1) Compare Out/Trigger Pulse Output

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

(For more information, refer to '[8-5.Trigger Pulse Output](#)')

2) Run/Stop Output

[ON] signal is output when the motor is running in the Step On state.



3) Alarm

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

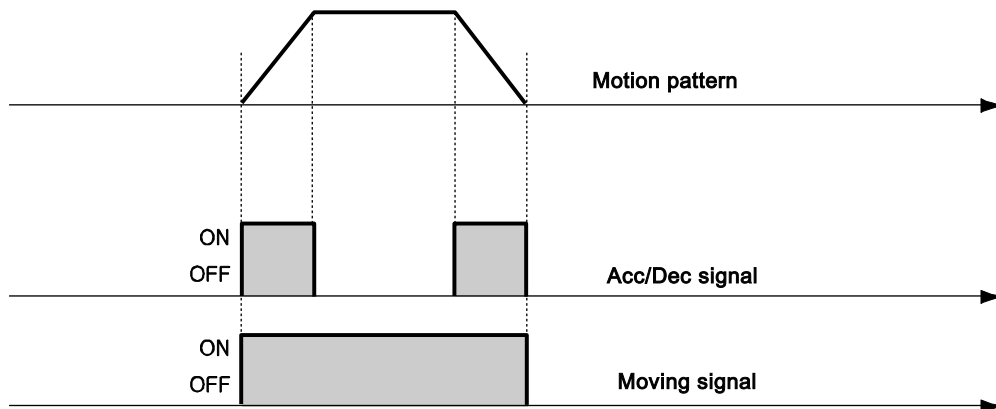
4) PT ACK and PT End Output

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

Refer to '[Ezi-STePII Plus-E MINI User Manual – 'Position Table Function'](#)'」.

5) Moving and Acc/Dec Output

becomes [ON] and Acc/Dec signal becomes [ON] in the acceleration and deceleration section only.



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 「[6-3. Input signal 8\)Origin Search Input](#)」.

7) Step Ready Output

When the drive supplies power to the motor by Step ON signal or command and is ready to perform motion command, 「Step Ready」 signal displays [ON] signal.

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

It is control output used for 「Start/Stop Message Function」. When these items are set, this signal enables the user to check if corresponding PT motion starts or stops through control output signal(PT Output 0~2). If 「Start/Stop Message Function」 is not used, 「PT Set」 item of position table should be set to 0~8. At the position set with other values, the motion operates as follows.

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

For more information, refer to 「[Ezi-STEPⅡ Plus-E MINI User Manual – Position Table Function](#)」

9) BRAKE+ and BRAKE-

This brake function is used to protect a motor rotation in Step OFF status by using pin3

and pin4 of CN1. 'BRAKE+' is +24V which supplied to the brake, 'BRAKE-' is an output signal for real brake control.

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

This output function must be used to the Brake of current consumption is under 600[mA]/DC24V.

10) Brake for High current

This brake function is for preventing motor rotation under Step OFF status through pertinent pin if the inverter output terminal is selected among OUT1~OUT9. The output relation between Step ON command and Brake signal is same as [9\) BRAKE+ and BRAKE-](#). This signal used for the Brake that is over 600[mA]/DC24V of current consumption.

Brake, relay and diode is needed for this function and the signal connection diagram is as follows.

7 . Operation

7 - 1 . Power Supply Timing

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

The default setting of Ezi-STEPⅡ Plus-E MINI after power supply is Step OFF.

7 - 2 . Step ON Operation

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

- ① Click 「STEP ON」 button at the User Program(GUI).
- ② Give a command through communication by using DLL library.
- ③ Assign 「STEP ON」 to control input pin, and supply signal through the pin.



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

7 - 3 . Operation Mode

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

(1) I/O Command Mode

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

(2) Communication Command Mode

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

Position Table Operation Sequence

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

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

Stopping Continuous Operation of Position Table

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

- ① To use DLL program or control input signal corresponding to 「Stop」 and 「E-Stop」.
In this case, operation is completely finished and is not connected to next operation.

- ② The user can click 「Pause」 at User Program(GUI) to temporarily stop operating. In this case, click 「Pause」 again, and remaining operation will be executed again.

Position control Operation

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

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

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

Parameter Name	Description	Range
Axis Max Speed	Constant operation speed after acceleration is finished	1~2,500,000[pps]
Axis Start Speed	Operation start speed before acceleration starts	1~35,000[pps]
Axis Acc Time	Required time until the motor reaches the axis max speed from stop status	1~9,999[ms]
Axis Dec Time	Required time until the motor reaches from the axis max speed to the stop status	1~9,999[ms]
Motion Dir	To select motion direction (CW or CCW)	0~1
Pulse per Revolution	Number of pulses per revolution. The range of 'Axis Max Speed' parameter depends on this value.	0~15

Teaching Function

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

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

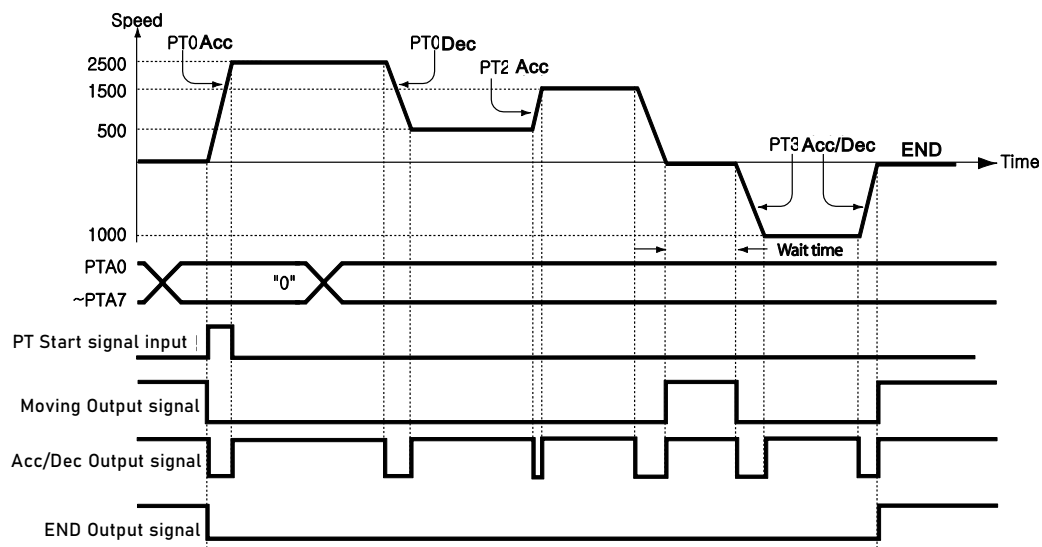
8 . Other Operation Functions

8 - 1 . Position Table(PT) Operation Example

Set PT number by 'PT A0 ~ PT A7' input and start speed control operation inputting 'PT Start' signal. For more information, refer to 「[User Manual – Position Table Function](#)」.

【Position Table Setting】

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

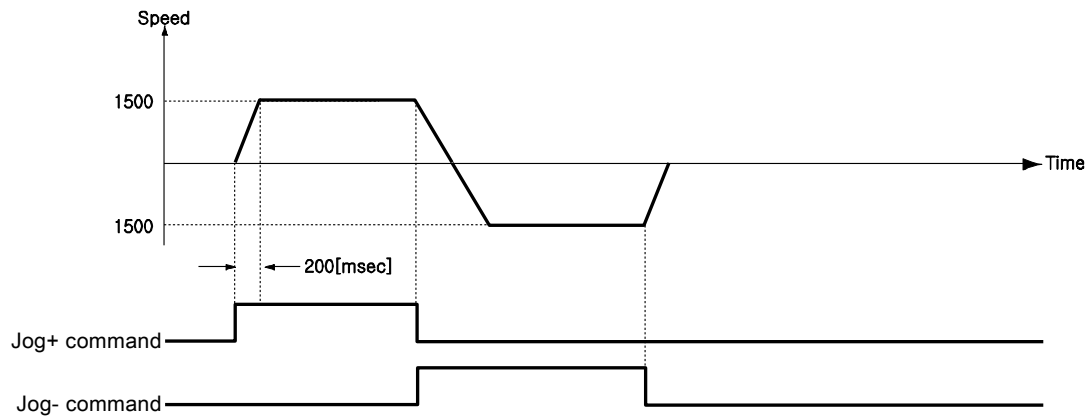


8 - 2 . Jog Operation Example

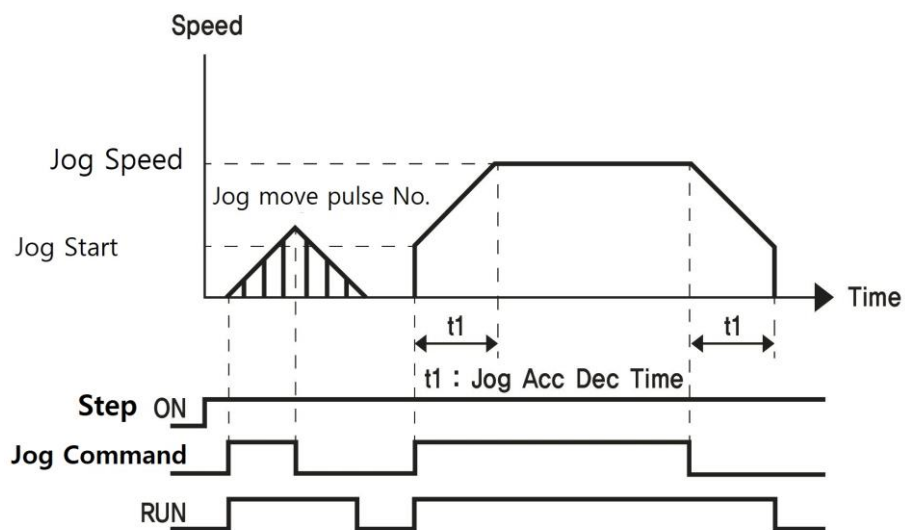
It starts speed control operation using a parameter condition by Jog+, Jog- signal input.

【Parameter Setting】

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



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



8 - 3 . Origin Return

If a machine operates as I/O command mode, it can execute origin return by inputting 「Origin Search」 signal. Also, it can execute origin return by a command from User Program(GUI) or DLL program.

The following table shows parameter types related to origin return.

Parameter Name	Description	Range
Org Speed	Operation speed when origin return starts	1~500,000[pps]
Org Search Speed	Low-speed operation speed after origin sensor is sensed and operation start speed when origin starts.	1~50,000[pps]
Org Acc Dec Time	The time assigned to the acceleration/deceleration section when origin return starts and stops.	1~9,999[ms]
Org Method	To select how to return the origin(8 types)	0~7
Org Dir	To select operation direction(CW or CCW)	0~1
Org Offset	After origin return is finished, the motor moves additionally as this setting value and then stops.	-134,217,728 ~ 134,217,727
Org Position Set	After origin return is finished, 'Command Pos' value is set to this setting value.	-134,217,728~ 134,217,727
Org Sensor Logic	To set the origin sensor signal level.	0~1

(1) Origin Return method setting

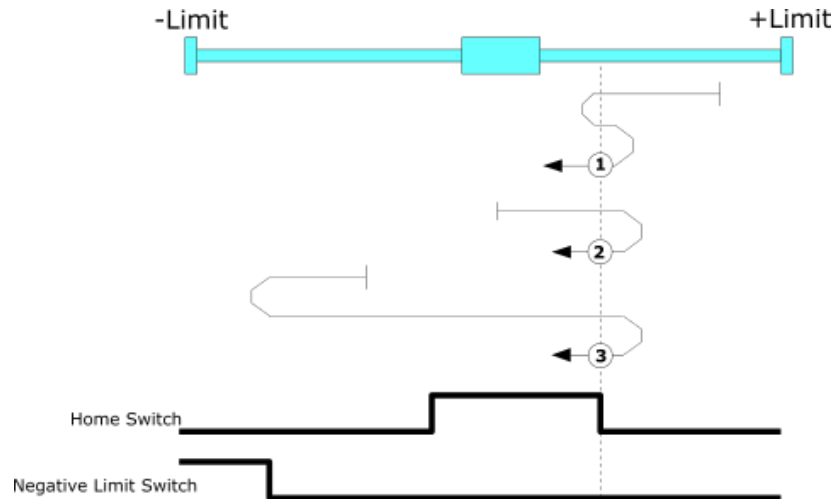
To execute origin return, 「Org Method」 parameter should be set as follows.

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

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

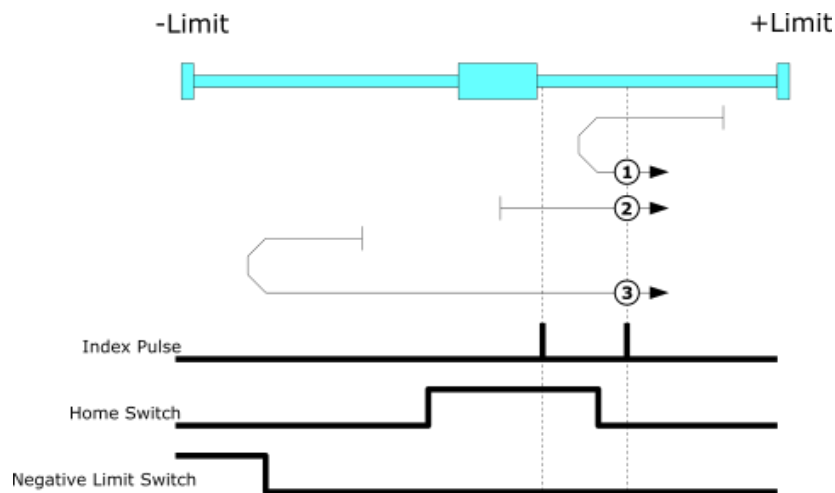
- Index Pulse is Z Phase.
- The origin return by Z Phase operates only when an external encoder is used.
- In the case of origin return by a Z-pulse, after the completion of low speed origin return in 'Org Search Speed' value, Z-pulse origin return is done twice to complete the return to origin with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

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



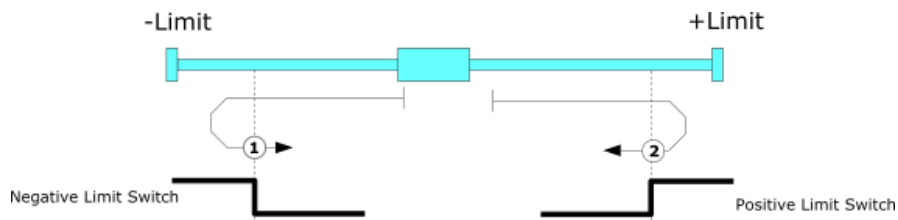
- ① : In case of position of sensor dog is between the origin and +Limit Sensor
- ② : In case of position of sensor dog is in the origin Sensor
- ③ : In case of position of sensor dog is between the origin and -Limit Sensor

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



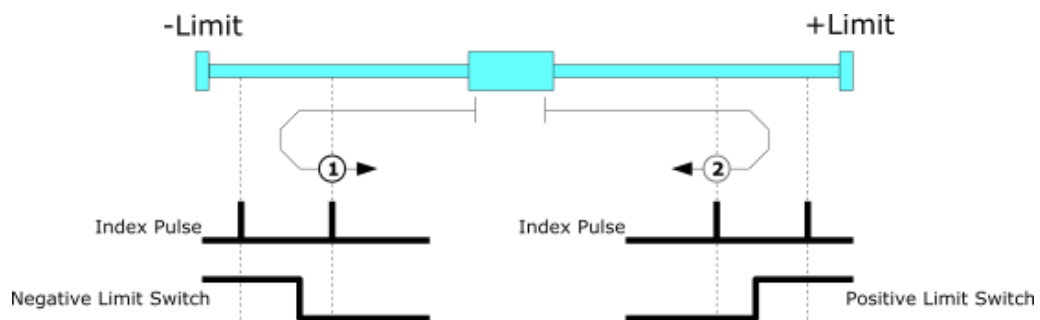
- ① : In case of position of sensor dog is between the origin and +Limit Sensor
- ② : In case of position of sensor dog is in the origin Sensor
- ③ : In case of position of sensor dog is between the origin and -Limit Sensor

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



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

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

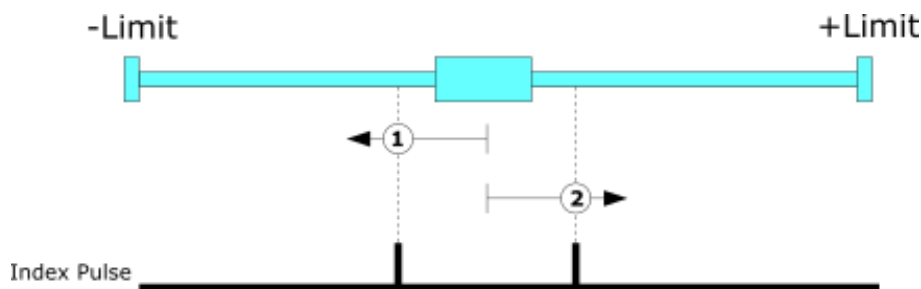


- ① : In case of Org Dir is 1(CCW)
- ② : In case of Org Dir is 0(CW)

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

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

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



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

(2) Origin return Procedure

Origin return is executed according to the following procedure.

- ① Set parameters required to origin return.
- ② If the Step is OFF, (reset an alarm when it occurs) input Step ON control or send a communication program so that the Step can be ON

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

(3) Interruption of Origin Return

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

(4) Origin return finish output

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

8 - 4 . Stop Operation

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

8 - 5 . Trigger Pulse Output

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

(1) Control Method

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

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

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

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

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

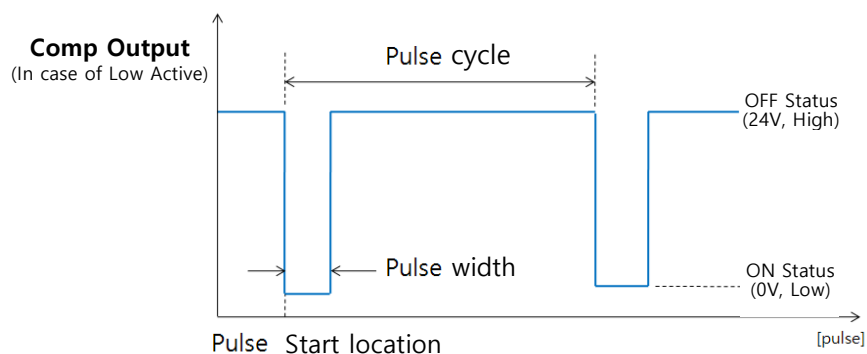
ex) Pulse period : 100[pulse], Moving velocity: 10,000[pps], Pulse width : 1[ms]

Pulse period[ms] = 100/10000 * 1000 + 1 = 11

- In case that Start/End is not set as '0', if moving command having target position be transferred, trigger output is operated.
- After trigger output, if command having no target position as like Jog command, Start/End set as '0' automatically.

(2) Output signal

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

**Caution**

The pulse is output only in the area larger than the pulse start position value, regardless of the direction of movement.

(3) Output check

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

9 . Communication Function

- 1) It has embedded 2 Port Ethernet switching Hub for daisy-chain connection.
- 2) It uses TCP and UDP Protocol.
- 3) By using TCP, it can connect and use drive at the same time at GUI(Graphical User Interface) and user program.
- 4) By using UDP, it can connect and use drive at the same time at GUI(Graphical User Interface) and one more user program. But if a user connects application programs over 2, it can generate communication delay.
- 5) Refer to 「[4-2. Controller configuration](#)」 for PC connection example.
- 6) The signal contents of the RJ45 connector of the drive are as follows.

RJ45 Pin No.	Function
1	TD+
2	TD
3	RD+
4	RD-
5	F.GND

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

1 0 . Parameter

1 0 - 1 . Parameter List

No.	Name	Unit	Lower Limit	Upper Limit	Default
0	Pulse Per Revolution		0	15	10
1	Axis Max Speed	[pps]	1	500,000	500,000
2	Axis Start Speed	[pps]	1	35,000	1
3	Axis Acc Time	[msec]	1	9,999	100
4	Axis Dec Time	[msec]	1	9,999	100
5	Speed Override	[%]	1	500	100
6	Jog Speed	[pps]	1	500,000	5,000
7	Jog Start Speed	[pps]	1	35,000	1
8	Jog Acc Dec Time	[msec]	1	9,999	100
9	S/W Limit Plus Value	[pulse]	-2,147,483,648	2,147,483,647	2,147,483,647
10	S/W Limit Minus Value	[pulse]	-2,147,483,648	2,147,483,647	-2,147,483,648
11	S/W Limit Stop Method		0	2	2
12	H/W Limit Stop Method		0	1	0
13	Limit Sensor Logic		0	1	0
14	Org Speed	[pps]	1	500,000	5,000
15	Org Search Speed	[pps]	1	50,000	1,000
16	Org Acc Dec Time	[msec]	1	9,999	50
17	Org Method		0	5	0
18	Org Dir		0	1	1
19	Org Offset	[pulse]	-2,147,483,648	2,147,483,647	0
20	Org Position Set	[pulse]	-2,147,483,648	2,147,483,647	0
21	Org Sensor Logic		0	1	0
22	Motion Dir		0	1	0
23	Limit Sensor Dir		0	1	0
24	Brake Delay Time	[msec]	10	5,000	200
25	Run Current	*10[%]	5	15	10
26	Boost Current	*50[%]	0	7	0
27	Stop Current	*10[%]	2	10	5
28	Encoder Multiply Value		0	3	0
29	Encoder Dir		0	1	0
30	Jog EXT FUNC USE		0	1	0
31	Jog Speed1	[pps]	1	500,000	5,000
32	Jog Speed2	[pps]	1	500,000	5,000
33	Jog Speed3	[pps]	1	500,000	5,000
34	Jog Speed4	[pps]	1	500,000	5,000

35	Jog Speed5	[pps]	1	500,000	5,000
36	Jog Speed6	[pps]	1	500,000	5,000
37	Jog Speed7	[pps]	1	500,000	5,000
38	Use Motion Queue		0	1	0
39	Disconnection Option		0	4	0
40	Communication Timeout	msec	100	60,000	100
41	Motion Profile		0	1	0
42	ORG RET OK OFF OPTION		0	3	0

●Parameter No.42 is available from Firmware [ver.6.1.xx.19].

1 0 - 2 . Parameter Description

No.	Description	Unit	Lower Limit	Upper Limit	Default																																				
0	Pulse per Revolution : It means number of pulses per revolution. If this value changes, the motor is set to Step OFF. <table><tr><th>Value</th><th>Pulse/Revolution</th><th>Value</th><th>Pulse/Revolution</th></tr><tr><td>0</td><td>500</td><td>8</td><td>6,400</td></tr><tr><td>1</td><td>1,000</td><td>9</td><td>8,000</td></tr><tr><td>2</td><td>1,600</td><td>10</td><td>10,000</td></tr><tr><td>3</td><td>2,000</td><td>11</td><td>20,000</td></tr><tr><td>4</td><td>3,200</td><td>12</td><td>25,000</td></tr><tr><td>5</td><td>3,600</td><td>13</td><td>36,000</td></tr><tr><td>6</td><td>4,000</td><td>14</td><td>40,000</td></tr><tr><td>7</td><td>5,000</td><td>15</td><td>50,000</td></tr></table> ● When 'Step On' status by an input signal, Pulse per Revolution cannot be changed.	Value	Pulse/Revolution	Value	Pulse/Revolution	0	500	8	6,400	1	1,000	9	8,000	2	1,600	10	10,000	3	2,000	11	20,000	4	3,200	12	25,000	5	3,600	13	36,000	6	4,000	14	40,000	7	5,000	15	50,000		0	15	10
Value	Pulse/Revolution	Value	Pulse/Revolution																																						
0	500	8	6,400																																						
1	1,000	9	8,000																																						
2	1,600	10	10,000																																						
3	2,000	11	20,000																																						
4	3,200	12	25,000																																						
5	3,600	13	36,000																																						
6	4,000	14	40,000																																						
7	5,000	15	50,000																																						
1	Axis Max Speed : When position moving commands (absolute move, incremental move) are given, this mode sets the maximum speed which the motor can operate. So, the motor cannot be operated faster than this value in any case. This value is set to [pps] unit. Upper Limit value has limited by Pulse per resolution value *In case of 10000 : 500,000 In case of 20000 : 1,000,000	pps	1	500,000	500,000																																				
2	Axis Start Speed : When position moving commands (absolute move, incremental move) are given, this mode sets the operation start speed to [pps] unit.	pps	1	35,000	1																																				
3	Axis Acc Time : When position moving commands (absolute move, incremental move) are given, this mode sets the acceleration section of operation start segment to [msec] unit. Possible range is different from Axis Speed. (Ex.1) Axis Start Speed=1, Move Speed=400000 : 1~1430 [msec] (Ex.2) Axis Start Speed=1, Move Speed=10000 : 1~350 [msec]	msec	1	9,999	100																																				
4	Axis Dec Time : When position moving commands (absolute move, incremental move) are given, this mode sets the deceleration section of operation stop segment to [msec] unit. Possible range is limited according to Axis Speed as like as 'Axis Acc Time'.	msec	1	9,999	100																																				
5	Speed Override : When position moving commands (absolute move, incremental move) are given, the operation speed is subject to the ratio set to 'Move Speed'. (Ex) If current move speed is 10,000 and speed override is 200, actual motion speed is set to 20,000.	%	1	500	100																																				

6	Jog Speed : When jog position moving command is given, this mode sets the motor revolution value to [pps] unit.	pps	1	500,000	5,000
7	Jog Start Speed : When jog position moving command is given, this mode sets the operation start speed to [pps] unit.	pps	1	35,000	1
8	Jog Acc Dec Time : In case of jog operation, this mode sets the time of acceleration and deceleration sections to [msec] unit.	msec	1	9,999	100
9	S/W Limit Plus Value : When position moving commands (absolute move, incremental move, jog) are given, this mode set the maximum input limit value that the motor can move to the plus (+) direction with 28 bits.	pulse	-2,147,483,648	+2,147,483,647	+2,147,483,647
10	S/W Limit Minus Value : When position moving commands (absolute move, incremental move, jog) are given, this mode set the minimum input limit that the motor can move to the minus (-) direction with 28 bits.	pulse	-2,147,483,648	+2,147,483,647	-2,147,483,648
11	S/W Limit Stop Method : Sets how to stop the motor by SW Limit Plus/Minus Value', not stop motion by the limit sensor. ◆ 0 : stops the motor immediately by emergency stop mode. ◆ 1 : stops the motor gradually by soft stop mode. ◆ 2 : Do not use S/W Limit.		0	2	0
12	H/W Limit Stop Method: In case of stop motion by the limit sensor, this mode sets how to stop the motor. ◆ 0 : stops the motor immediately by emergency stop mode. ◆ 1 : stops the motor gradually by soft stop mode. ●The above stop method is applied even when the limit sensor is detected during Home Search motion.		0	1	0
13	Limit Sensor Logic : Sets the signal level so that the motor can recognize limit sensor's input to ON. ◆ 0 : 0 V (Active low level) ◆ 1 : 24V(Active high level)		0	1	0
14	Org Speed : In case of origin return command, this mode sets the operation speed until the motor senses the origin sensor to [pps] unit	pps	1	500,000	5,000
15	Org Search Speed : In case of origin return command, the low operation speed for precise origin return after the motor senses the origin sensor is set to [pps] unit by this mode	pps	1	500,000	1,000

16	Org Acc Dec Time : In case of origin return command, the acceleration/deceleration section time of the operation start/stop segment is set to [msec] unit by this mode	msec	1	9,999	50
17	Org Method : The user can select origin return command types. ◆ 0 : The motor moves up to the origin sensor spot by 'Org Speed' and then executes precise origin return at the low value of 'Org Search Speed'. ◆ 1 : The motor moves up to the origin sensor spot by 'Org Speed' and then executes Z-pulse origin return at the low value of 'Org Search Speed'. ◆ 2 : The motor moves up to the limit sensor spot by 'Org Speed' and then immediately stops. ◆ 3 : The motor moves up to the limit sensor spot by 'Org Speed' and then executes Z-pulse origin return at the low value of 'Org Search Speed'. ◆ 4 : To set origin in current mechanical position. ◆ 5 : To execute the Z-pulse origin return at the low value of 'Org Search Speed'. For more information, refer to 「 8-3. Origin Return 」. ※ In the case of origin return by a Z-pulse, after the completion of low speed origin return in 'Org Search Speed' value, Z-pulse origin return (fixed rate) is done twice to complete the return to origin with 10[pps] speed. (Fixed speed) (It is method for precise return to Z-pulse origin.) ※ In the case of origin return by a Z-pulse, please connect an external encoder.		0	5	0
18	Org Dir : In case of origin return, this mode sets the revolution direction of the motor. ◆ 0 : moves to CW direction. ◆ 1 : moves to CCW direction.		0	1	0
19	Org Offset : After origin return is completed, the motor moves additionally as this setting value and then stops. 'Command Pos/Actual Pos' is set to '0'.	pulse	-2,147,483,648	+2,147,483,647	0
20	Org Position Set : After origin return is completed, 'Command Pos/Actual Pos' value is set to this setting value.	pulse	-2,147,483,648	+2,147,483,647	0
21	Org Sensor Logic : Sets the origin sensor signal level so that the motor can recognize origin sensor's input to [ON]. ◆ 0 : 0 V (low level) ◆ 1 : 24V(high level)		0	1	0

22	Motion Dir : When the motor operates by position command, this mode sets the revolution direction of the motor. ◆ 0 : moves to CW direction. ◆ 1 : moves to CCW direction.		0	1	0
23	Limit Sensor Dir : Sets the limit sensor direction to stop the motor to the limit spot under operation. In the general system, set the same as parameter '28'. ◆ 0 : When operation direction is 'CW', input the sensor signal to the Limit+ direction, and the motor will stop. ◆ 1 : When operation direction is 'CW', input the sensor signal to the Limit- direction, and the motor will stop.		0	1	0
24	Brake Delay Time : According to the STEP ON command, it can set the brake operation time. ※ 86[mm] drive cannot apply Brake Delay Time.	msec	10	5,000	200
25	Run Current: Run Current is value of running current during the operating of motor, it is set based on rated current of motor. This value is related with torque in operating of motor, if this value is big, motor torque getting high in operation. So, in case of lack of torque, it can be raising the torque by increasing the run current value. Precaution) 1) To be notified If Run Current value is high, heat temperature can be increasing. 2) Maximum set value of Run Current (150%) is limited by 4[A]. So, in case of motor (56,60mm) of rated current value is exceed 2.7[A], set value is not increased as much as set-up, even increasing the set value. 3) Run Current is automatically controlled according to load, so please use in case of lacking torque in operation.	X10[%]	5	15	10
26	Boost Current : It is the parameter of supplied current to motor to improve for character of acceleration in case of cannot set the acceleration time sufficiently. (It is applied to acceleration.) Example of use) 1) BM2-42XL (Current: 1.2[A]) 2) Run Current : 10(100[%]) 3) Boost Current : 1(50[%]) 4) Control current in case of acceleration : $1.2[A] + 1.2[A] * 50[\%] = 1.8[A]$ ※ The control current is limited by 4[A] same as Run Current case. In case of motor (56, 60mm) of rated current value is	X50[%]	0	7	0

	exceed 2.7[A], set value is not increased as much as set-up, even increasing the set value.																																								
27	Stop Current: Stop Current is meaning of motor current which is automatically set after 0.1 second since motor stop. This parameter is using to decrease the temperature when motor stopped long- time. It also can be increased the motor temperature in case set-up more than 60%.	X10[%]	20	10	5																																				
28	Encoder Multiply: Set the multiplication for the input of the external encoder. <table border="1"><thead><tr><th>Value</th><th>Pulse/Revolution</th></tr></thead><tbody><tr><td>0</td><td>Not in use</td></tr><tr><td>1</td><td>*1</td></tr><tr><td>2</td><td>*2</td></tr><tr><td>3</td><td>*4</td></tr></tbody></table>	Value	Pulse/Revolution	0	Not in use	1	*1	2	*2	3	*4		0	3	3																										
Value	Pulse/Revolution																																								
0	Not in use																																								
1	*1																																								
2	*2																																								
3	*4																																								
29	Encoder Direction: Set the count direction of the encoder. ◆ 0 : CW (When motor runs in CW, count increases) ◆ 1 : CCW (When motor runs in CCW, count increases)		0	1	0																																				
30	Jog EXT FUNC USE: It is used to change Jog movement command by input signal to other speed than setting speed in parameter No.6. ◆ 0 : Not using Jog speed expand function ◆ 1 : Using Jog speed expand function There are seven additional speeds to choose from. Speed selection is determined by the input signals Jog0, Jog1, and Jog2. <table border="1"><thead><tr><th>Jog2</th><th>Jog1</th><th>Jog0</th><th>Setting Speed</th></tr></thead><tbody><tr><td>OFF</td><td>OFF</td><td>OFF</td><td>Parameter No.6</td></tr><tr><td>OFF</td><td>OFF</td><td>ON</td><td>Parameter No.34</td></tr><tr><td>OFF</td><td>ON</td><td>OFF</td><td>Parameter No.35</td></tr><tr><td>OFF</td><td>ON</td><td>ON</td><td>Parameter No.36</td></tr><tr><td>ON</td><td>OFF</td><td>OFF</td><td>Parameter No.37</td></tr><tr><td>ON</td><td>OFF</td><td>ON</td><td>Parameter No.38</td></tr><tr><td>ON</td><td>ON</td><td>OFF</td><td>Parameter No.39</td></tr><tr><td>ON</td><td>ON</td><td>ON</td><td>Parameter No.40</td></tr></tbody></table> ※ 1) 1) Only jog speed by Input is applied. 2) Since Jog0~Jog2 are used in common with PT5~7, the number of position table may be limited when using the above function. 3) After Jog0 ~ Jog2 is input, the Jog movement command by the signal should be input to operate normally.	Jog2	Jog1	Jog0	Setting Speed	OFF	OFF	OFF	Parameter No.6	OFF	OFF	ON	Parameter No.34	OFF	ON	OFF	Parameter No.35	OFF	ON	ON	Parameter No.36	ON	OFF	OFF	Parameter No.37	ON	OFF	ON	Parameter No.38	ON	ON	OFF	Parameter No.39	ON	ON	ON	Parameter No.40		0	1	0
Jog2	Jog1	Jog0	Setting Speed																																						
OFF	OFF	OFF	Parameter No.6																																						
OFF	OFF	ON	Parameter No.34																																						
OFF	ON	OFF	Parameter No.35																																						
OFF	ON	ON	Parameter No.36																																						
ON	OFF	OFF	Parameter No.37																																						
ON	OFF	ON	Parameter No.38																																						
ON	ON	OFF	Parameter No.39																																						
ON	ON	ON	Parameter No.40																																						

31 ~37	Jog Speed1~Jog Speed7: Set Jog speed which is extended according to input signal Jog0, Jog1, Jog2.	pps	1	500,000	5000
38	Use Motion Queue: If another move command is received before the move command is completed, the current move command is executed and the next move command is executed. ◆ 0 : Using Motion Queue function ◆ 1 : No using Motion Queue function (Return error (0x85) if another move is made during the move) ※ Move commands are only available for Incremental / Absolute commands. If more than one command is received, only one is executed and the other commands return an error.		0	1	0
39	Disconnection Option Code: This function is used to stop the move command when communication end or communication cable disconnection is issued while moving command is being executed. ◆ 0 (None) : Executing moving command ◆ 1 (Stop) : Deceleration stop ◆ 2 (E-Stop) : Emergency stop ◆ 3 (Stop&Step Off) : Step Off after deceleration stop ◆ 4 (E-Stop&Step Off) : Step Off after emergency stop ※ Only available when connecting communication by TCP. The above function does not apply to GUI program connection termination.		0	4	0
40	Communication Timeout: This parameter sets the timeout time for communication. ※ If timeout occurs, it executes the function set in parameter 42.	msec	100	60,000	100
41	Motion Profile : This parameter sets the acceleration / deceleration profile. ◆ 0 : Trapezoid ◆ 1 : S-curve ※ If you set Motion Profile as S-curve, the deceleration time will be as same as the acceleration time. That is, when set to S-curve, the move command is not executed with asymmetric acceleration / deceleration.		0	1	0
45	Org Ret OK Flag Off Option Set the condition that the [Org Ret OK] flag of Axis Status becomes off. ◆ 0 : When the [Org Ret OK] flag of Axis Status is On and Origin search is interrupted while searching		0	3	0

	◆ 1 : Same as No. 0 ◆ 2 : When Drive Alarm (Axis Status Err Servo Alarm flag On) occurs (including No. 0) ◆ 3 : Drive Alarm (Axis Status Err Servo Alarm flag On) occurs or Servo off command executed (including No. 0)				
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●Parameter No.42 is available from Firmware [ver.6.1.xx.19].

1 1 . Protection Function

1 1 - 1 . Type of Alarm

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

Alarm No.	Alarm Name	Description
1	Overcurrent	The current through power devices in inverter exceeds the limit value *1
2	Overspeed	Command speed for motor exceeds 3,300[rpm].
5	Overheat	The internal temperature of the drive exceeds 85°C.
6	Over regenerative voltage	Back-EMF exceeds 48V.
7	Motor connection	The connection of drive and motor is defective.
12	ROM error	Error is occurred in parameter saving device(ROM).
50	Internal communication	A communication error has occurred between parts in the drive.
51	STEP ON failure	If the STEP ON command fails
60		
201	IP setting error	In case of IP and Gateway set value is same
202	IP conflict	If there are any product that has the same IP address existing on the connected network. (Including other products)

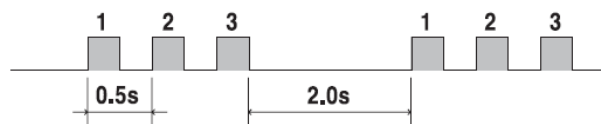
*1 Detection current : 4.8A

1 1 - 2 . Acquiring the Alarm Information

If an alarm occurs, the motor will go into STEP OFF state and will stop if it is running. At the same time, the control output 「Alarm」 is output.

「Alarm」 is outputs repeatedly until the alarm is released by 「Alarm Reset」 command or signal.

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



1 1 - 3 . Alarm Check and Release

If an alarm occurs, remove its cause and then release it. The alarm can be released as follows. In case of alarms of which [Reset] column is indicated to 「invalid」, power must be off prior to releasing the alarms

Alarm No.	Alarm Name	Description	Reset
1	Overcurrent	1)Check the motor's short-circuit (A, /A, B, /B) 2)Check the mechanical status such as parameter setting.	Valid
2	Overspeed	1)Check parameter setting, and abnormal operation of the motor. 2)Check the speed command of upper controller(ex:PLC).	Valid
5	Overheat	1)Get down the ambient temperature or install a cooling fan. 2)Check the distance is over 50mm between drivers.	Valid
6	Over regenerative voltage	1)In case of high-speed operation, check if the acceleration or deceleration speed is low.	Valid
7	Motor connection	1)Check the connection status of drive and motor.	Invalid
12	ROM error	1)Contact to distributor.	Invalid
14	Drive voltage error	1)Check if power is supplied to the drive.	Invalid
50	Internal communication	1) Power on the drive again.	Invalid
51,60	STEP ON failure	1) Pass the STEP ON command again. 2) Power on the drive again.	Valid
201	IP setting error	1) Set the last number of IP and Gateway differently. 2) If using the basic IP address, set the IP setting from 2 to 254.	Invalid
202	IP conflict	1) IP conflict with other drives (including other products), so check the settings of each drive (including other products).	Invalid

1 2 . Appendix

1 2 - 1 . Option for Motor Drive

■ I/O connection cable

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

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

□ is cable length.

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

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

■ Drive power cable

It is used to connect between drive and power.

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

□ is cable length.

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

■ Extension cable for motor

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

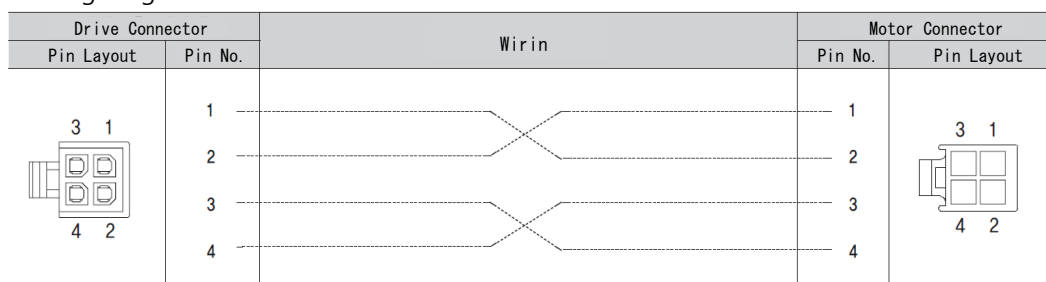
Part Name	Length[m]	Remark
CSMI-M-□□□F	□□□	Normal cable
CSMI-M-□□□M	□□□	Robot cable

□ is cable length.

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

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

※ Wiring Diagram



■ Extension cable for encoder

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

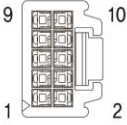
Part Name	Length[m]	Remark
CTPM-E-□□□F	□□□	Normal cable
CTPM-E-□□□M	□□□	Robot cable

□ is cable length.

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

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

※ Wiring Diagram

Drive Connector		Wiring	Motor Connector Open
Pin Layout	Pin No.		
	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	10		

- The above connectors are the most suitable for Ezi-STEPⅡ Plus-E MINI.
You can also use equivalent or alternative products.

■ 1) Ethernet cable : For Ezi-STEPⅡ Plus-E MINI

It is a STP(Shielded Twisted Pair) cable.(CAT5E)

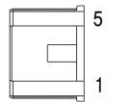
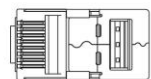
Part Name	Length[m]	Remark
CGNE-EC-□□□F	□□□	Normal Cable

□ is cable length.

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

It connects Ezi-STEPⅡ Plus-E MINI with the controller, Ezi-STEPⅡ Plus-E, and Ezi-SERVOⅡ Plus-E ALL R type. It consists of 5-pin connector(for Ezi-STEPⅡ Plus-E MINI) and RJ45 connector.

※ Wiring Diagram

Pin Layout	Pin No.	Wiring	Pin No.	Pin Layout
	1		1	
	2		2	
	3		3	
	4		6	
	5		Connection Hood	

2) Ethernet cable : For Ezi-STEPⅡ Plus-E MINI

It is a STP(Shielded Twisted Pair) cable.(CAT5E)

Part Name	Length[m]	Remark
CGNI-EC-□□□F	□□□	Normal Cable

□ is cable length.

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

It connects between Ezi-STEPⅡ Plus-E MINI.

※ Wiring Diagram



■ Connector

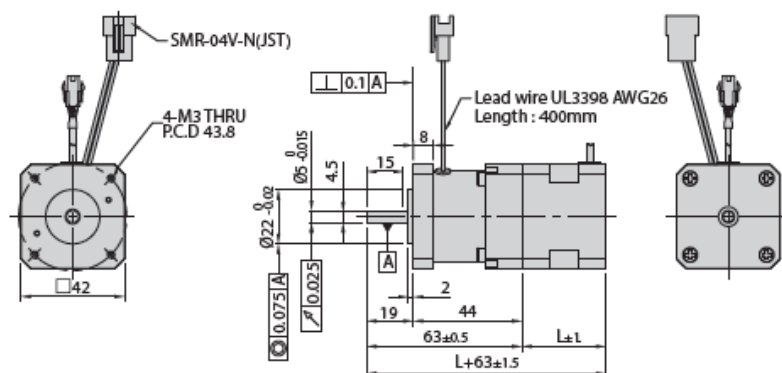
Specifications for connectors used in drive connection.

Use		ITEM	Specification	Manufacturer
Ethernet communication (CN5, CN6)		Housing	PAP-05V-S	JST
		Terminal	SPHD-001T-P0.5	JST
Power connection(CN4)		Housing	43025-0200	MOLEX
		Terminal	43030-0001	MOLEX
Motor connection	Drive (CN3)	Housing	43025-0400	MOLEX
		Terminal	43030-0001	MOLEX
	Motor	Housing	5557-04R	MOLEX
		Terminal	5556T	MOLEX
Encoder Connection	Drive (CN2)	Housing	501646-1000	MOLEX
		Terminal	501648-1000	MOLEX
I/O connection (CN1)		Housing	501646-1200	MOLEX
		Terminal	501648-1000	MOLEX

※ The above connectors are the most suitable for Ezi-STEPⅡ Plus-E MINI.

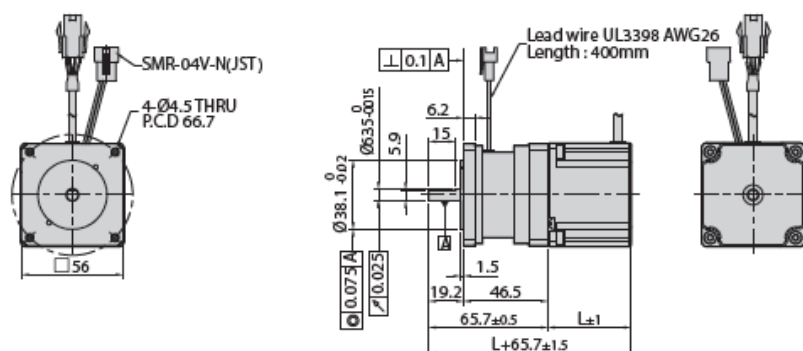
You can also use equivalent or alternative products.

1 2 - 2 . Brake Installed Motor Specifications and Size



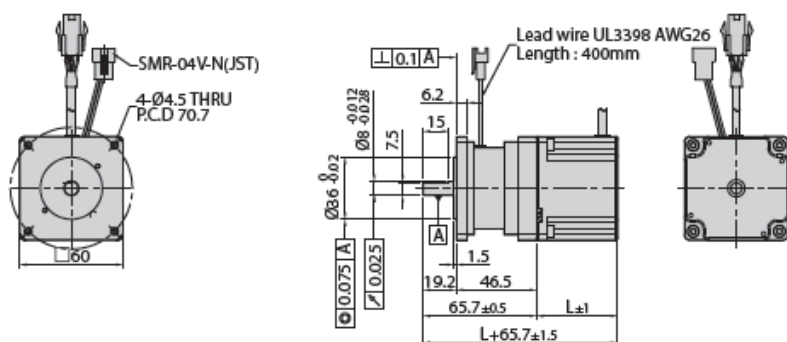
42mm

Model Name	Length(L)	Weight(kg)
BM-42S	34	0.50
BM-42M	40	0.56
BM-42L	48	0.63
BM-42XL	60	0.77



56mm

Model Name	Length(L)	Weight(kg)
BM-56S	46	0.97
BM-56M	55	1.15
BM-56L	80	1.58



60mm

Model Name	Length(L)	Weight(kg)
BM-60S	47	1.06
BM-60M	56	1.23
BM-60L	85	1.79



Fast, Accurate, Smooth Motion

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