Ezi-STEP®

Micro Stepping System

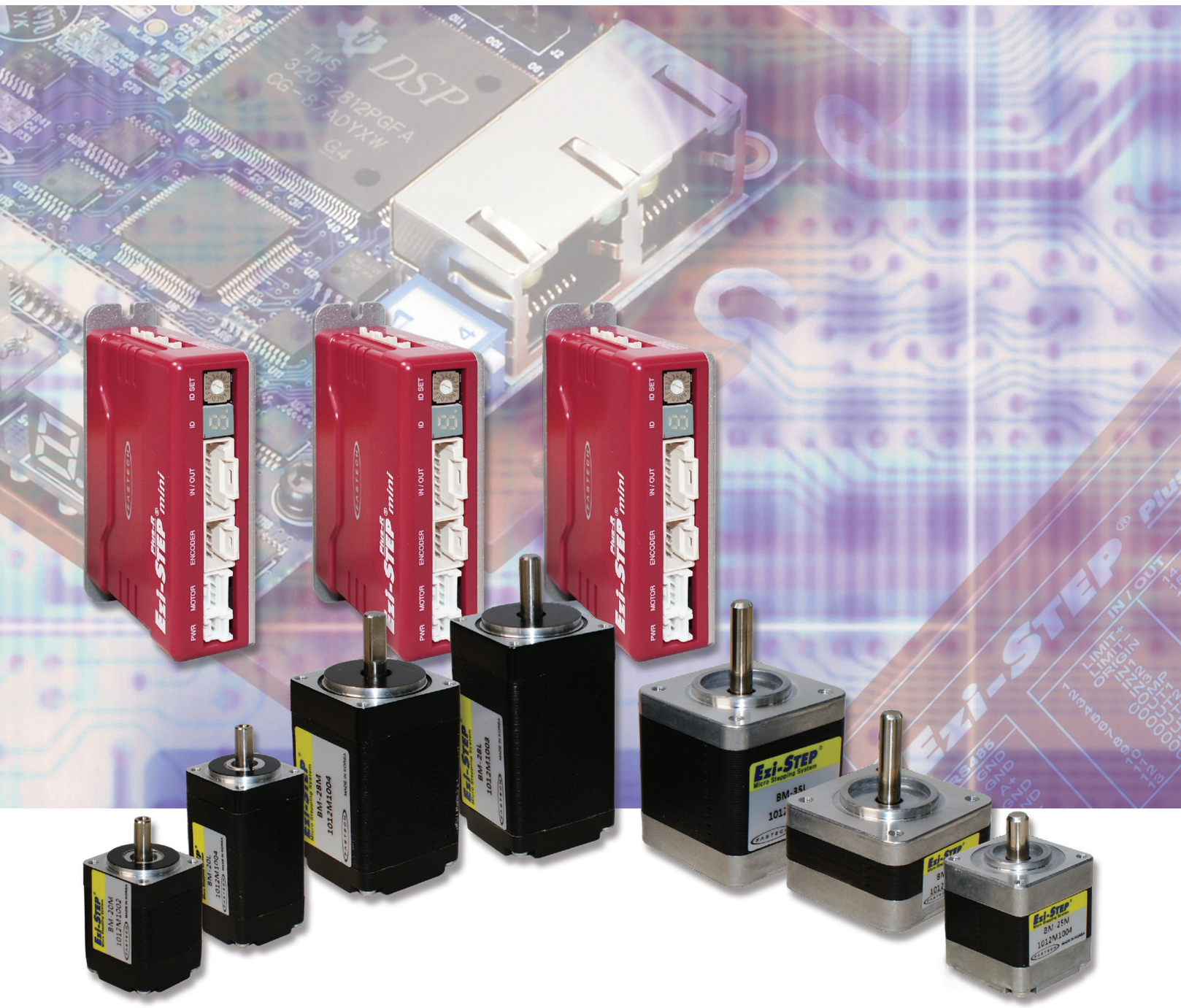
- Embedded Motion Controller
- RS-485 Interface
- Space Saving / Reduced Wiring by Compact Drive
- Position Table
- Microstepping
- Software Damping
- Run/Stop Signal Output

Plus-R MINI

CE

FASTECH

Fast, Accurate, Smooth Motion



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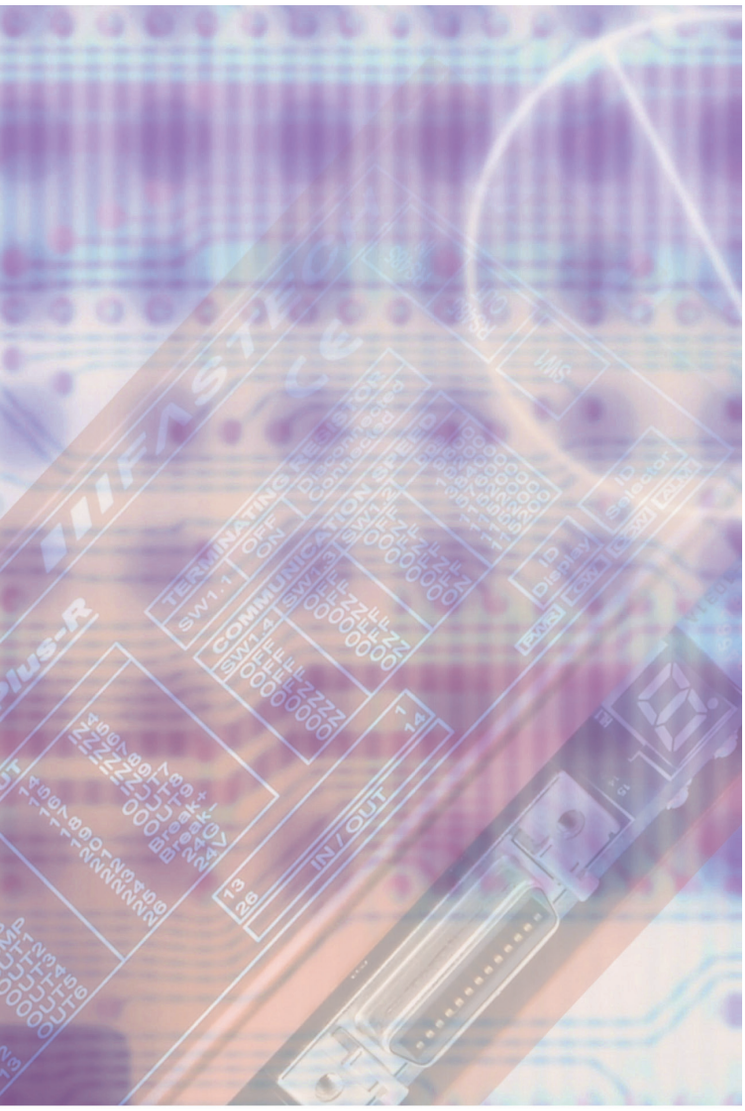


2 Position Table Function

Position Table can be used for motion control by digital input and output signals of host controller.
You can operate the motor directly by sending the position table number, start/stop, origin search and other digital input values from a PC.
The PC can monitor the In-Position, origin search, moving/stop, servo ready and other digital output signals from a drive. A maximum of 64 positioning points can be set from PC.

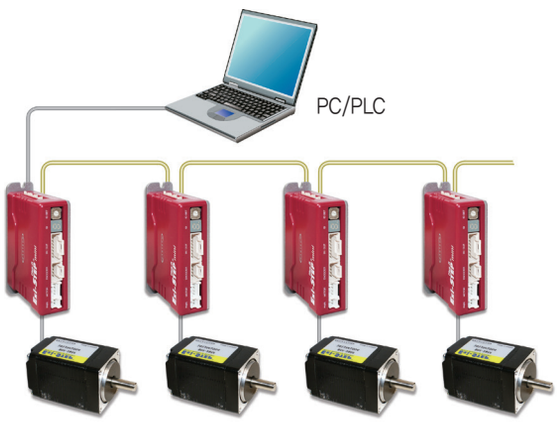
PC/PLC

- Position Table Number
- Start/Stop
- Origin search
- Jog
- Alarm reset
- Teaching
- Pause
- Others

- Origin search OK
- Moving/Stop
- Alarm
- Others

1 RS-485 Based Motion Control

A maximum of 16 axis can be operated from a PC through RS-485 communications. Also, motions are controlled by RS-485, and all of the Motion conditions are set through the network and saved in Flash ROM as a parameter. Motion Library(API) is provided for programming under Windows 7/8/10.



3 Microstep and Filtering

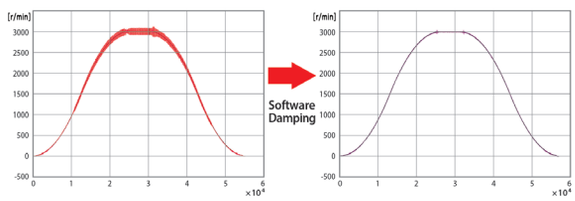
The high-performance MCU operates at step resolutions of 1.8° up to maximum 0.0072° (1/250 steps) and Ezi-STEP adjusts PWM control signal in every 25μ sec, which makes it possible for more precise current control, resulting in high-precision Microstep operation. In addition, Ezi-STEP applies filtering control to enable smooth operation even at very low-speed.

4 Signal Output for Motion Monitoring

Ezi-STEP outputs the Run/Stop signal during operation, so you can check whether the motor is operating normally through the host controller.

5 Software Damping

Motor vibration is created by magnetic flux variations of the motor, lower current from the drive due to back-emf from the motor at high speeds and lowering of phase voltages from the drive.
Ezi-STEP drive detects these problems and the MCU adjusts the phase of the current according to the pole position of the motor, drastically suppressing vibration.
This allows the smooth operation of the motor at high speeds.



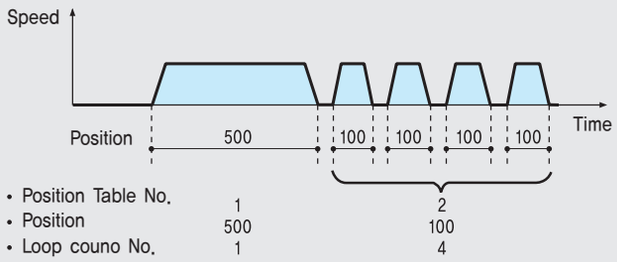
Software Damping OFF　　Software Damping ON

※ This is real measured speed that using 100,000 P/R encoder.

● Motion Controller Features of Ezi-STEP

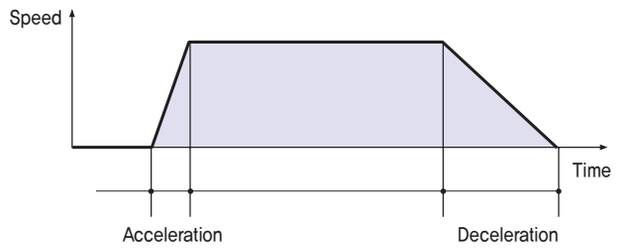
1. Loop Count

This function allows positioning repeatedly according to the Loop Count Number.



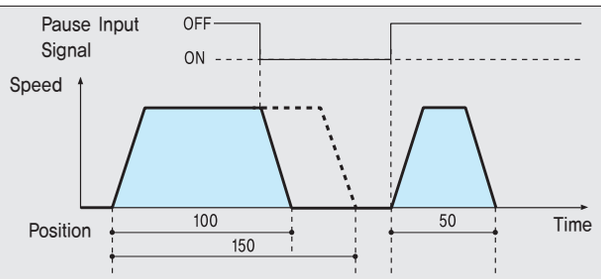
2. Acceleration/Deceleration

For quick acceleration and gradual deceleration, you can set each acceleration and deceleration time separately.



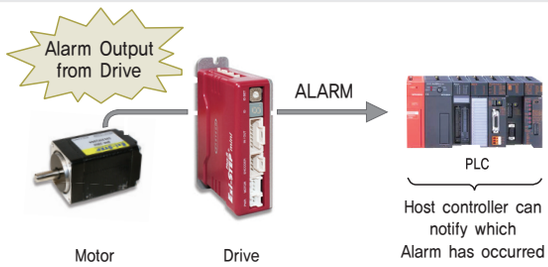
3. Pause

You can pause the motion upon the input of an external signal. When Pause signal change to OFF, the motor will restart to original target position.



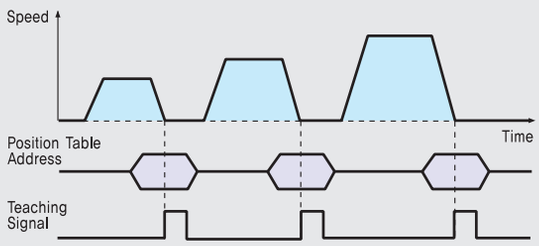
4. Alarm

The number of 7-segment LED display flashing time indicates which Alarm has occurred.



5. Teaching

Teaching signal is used to memorize current Position data into the selected Position Table item.

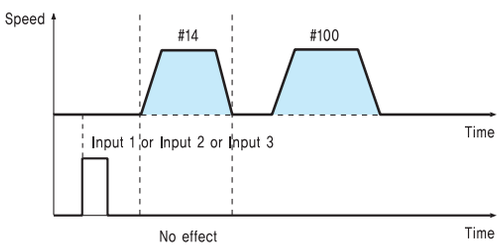


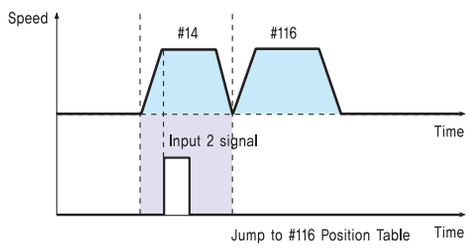
6. Jump

Within one Position Table, you can select various Position Table numbers that you want to jump.
With three external input signal during movement, the next jump Position Table number can be select.

◆ Position Table #14

Position	- - -	Next	- - -	Input 1	Input 2	Input 3	- - -
10000		100		115	116	117	





● Ezi-STEP Plus-R MINI Part Numbering

Ezi-STEP-PR-MI-42M-BK

Product Name

Drive Series

PR : Plus RS-485
MI : Mini Type

Motor Flange Size

20 : 20mm
28 : 28mm
42 : 42mm

Motor Length

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

Brake

Blank : Without Brake
BK : Brake

● Standard Combination

Unit Part Number	Motor Model Number	Drive Model Number
Ezi-STEP-PR-MI-20M	BM-20M	EzT-NDR-MI-20M
Ezi-STEP-PR-MI-20L	BM-20L	EzT-NDR-MI-20L
Ezi-STEP-PR-MI-28S	BM-28S	EzT-NDR-MI-28S
Ezi-STEP-PR-MI-28M	BM-28M	EzT-NDR-MI-28M
Ezi-STEP-PR-MI-28L	BM-28L	EzT-NDR-MI-28L
Ezi-STEP-PR-MI-42S	BM-42S	EzT-NDR-MI-42S
Ezi-STEP-PR-MI-42M	BM-42M	EzT-NDR-MI-42M
Ezi-STEP-PR-MI-42L	BM-42L	EzT-NDR-MI-42L
Ezi-STEP-PR-MI-42XL	BM-42XL	EzT-NDR-MI-42XL

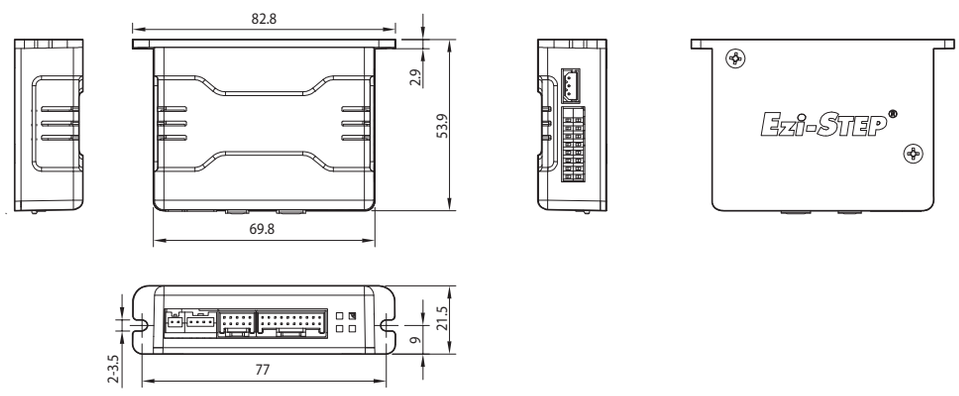
● Combination with Brake

Unit Part Number	Motor Model Number	Drive Model Number
Ezi-STEP-PR-MI-42S-BK	BM-42S-BK	EzT-NDR-MI-42S
Ezi-STEP-PR-MI-42M-BK	BM-42M-BK	EzT-NDR-MI-42M
Ezi-STEP-PR-MI-42L-BK	BM-42L-BK	EzT-NDR-MI-42L
Ezi-STEP-PR-MI-42XL-BK	BM-42XL-BK	EzT-NDR-MI-42XL

Specifications of Drive

Motor Model		BM-20 series	BM-28 series	BM-42 series
Drive Model		EzT-NDR-MI-20 series	EzT-NDR-MI-28 series	EzT-NDR-MI-42 series
Input Voltage		DC24V±10%		
Control Method		Bipolar PWM drive with 32bit MCU		
Multi Axis Drive		Max. 16 axis operating (Daisy Chain)		
Position Table		64 motion command steps		
Current Consumption		Max. 500mA (Except motor current)		
Operating Condition	Ambient Temperature	· In Use: 0~50℃ · In Storage: -20~70℃		
	Humidity	· In Use: 35~85% RH (Non-Condensing) · In Storage: 10~90% RH (Non-Condensing)		
	Vib. Resist.	0.5g		
Function	Rotation Speed	0~3,000r/min		
	Rotation Speed	Configurable Resolution [P/R] 500 1,000 1,600 2,000 3,200 3,600 4,000 5,000 6,400 8,000 10,000 20,000 25,000 36,000 40,000 50,000 (Selectable by parameter)		
	Error Types	Over Current Error, Over Speed Error, Step Out Error, Over Temperature Error, Over Regenerated Voltage Error, Motor Connect Error, Motor Voltage Error, System Error, ROM Error		
	7-Segment LED Display	Network ID, Drive Status		
	STOP Current Selection	20~100% (Set by parameter)		
	Rotation Direction	CW/CCW (Set by parameter)		
I/O Signal	Input Signals	3 dedicated inputs (LIMIT+, LIMIT-, ORIGIN), 7 programmable inputs (Photocoupler Input)		
	Output Signals	1 dedicated output (Compare Out), 1 programmable output (Photocoupler Output), 1 Brake output		
Communication Interface		· RS-485 Communication · Baud Rate : 9,600~921,600bps		
Position Control		· Incremental mode / Absolute mode Data Range: -134,217,728 to +134,217,727 [pulse] · Operating speed: Max. 3,000 r/min		
Return to Origin		Origin Sensor, ±Limit sensor, Z phase(with external encoder)		
GUI		User Interface Program within Windows		
Library		Motion Library (API) for windows 7/8/10		

Dimensions of Drive [mm]

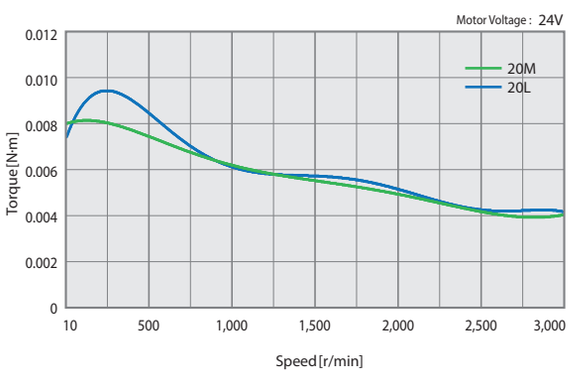


● Specifications of Motor

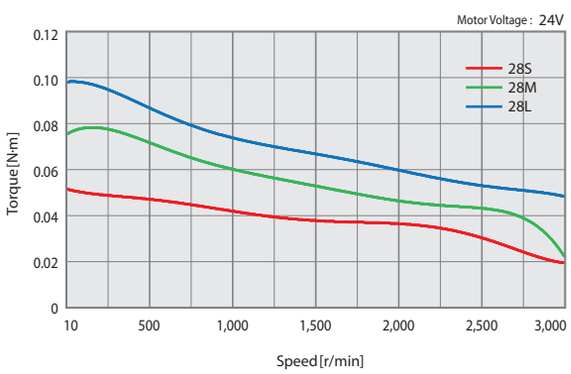
MODEL			UNIT	BM-20 series 20M	BM-20 series 20L	BM-28 series 28S	BM-28 series 28M	BM-28 series 28L	BM-42 series 42S	BM-42 series 42M	BM-42 series 42L	BM-42 series 42XL
DRIVE METHOD			–	Bipolar								
NUMBER OF PHASES			–	2 Phase								
CURRENT per PHASE			A/Phase	0.5	0.5	0.95	0.95	0.95	1.2	1.2	1.2	1.2
MAXIMUM HOLDING TORQUE			N·m	0.016	0.025	0.069	0.098	0.118	0.32	0.44	0.5	0.65
ROTOR INERTIA			$g \cdot cm^2$	2.5	3.3	9.0	13	18	35	54	77	114
WEIGHTS			kg	0.053	0.078	0.115	0.174	0.202	0.238	0.303	0.374	0.508
LENGTH(L)			mm	28	38	32	45	50	34	40	48	60
PERMISSIBLE RADIAL 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 AXIAL LOAD			N	Lower than Motor Unit's Weight								
INSULATION RESISTANCE			MΩ	Min. 100(When measured with a DC500V insulation resistance meter)								
INSULATION CLASS			–	CLASS B(130℃)								
OPERATING TEMPERATURE			℃	0 ~ 55								

● Torque Characterisics of Motor

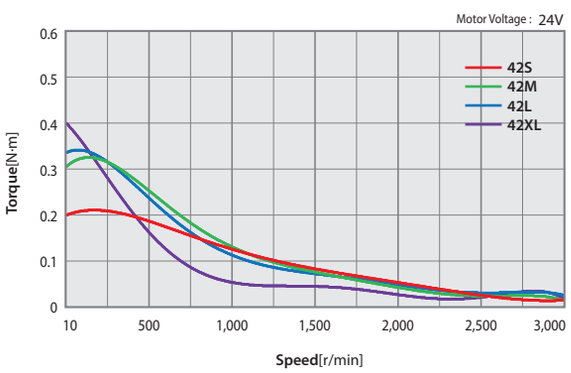
Ezi-STEP-PR-MI-20 series



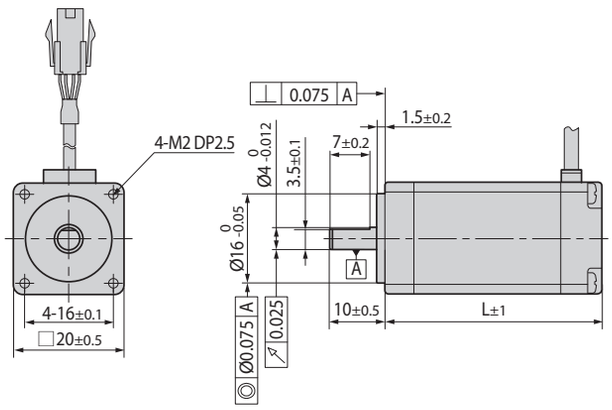
Ezi-STEP-PR-MI-28 series



Ezi-STEP-PR-MI-42 series

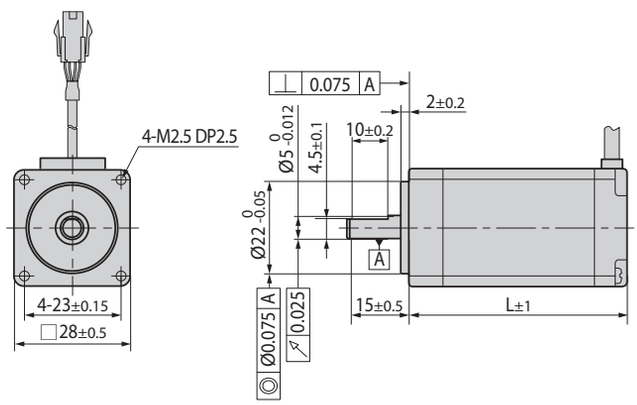


● Dimensions of Motor [mm]



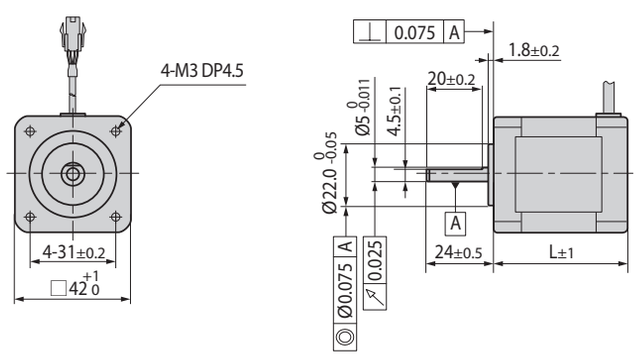
20mm

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

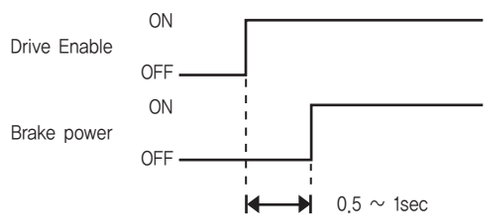
● Specifications of Motor with Brake

Unit Part Number	Motor Model Number	Electromagnetic Brake					Motor Unit Weight [kg]	Permissible Radial Load [N]				Permissible Axial Load [N]
		Type	Voltage Input [V]	Rated Current [A]	Power Consumption [W]	Static Friction Torque [N·m]		Distance from End of Shaft [mm]				
								3	8	13	18	
Ezi-STEP-PR-MI-42S-BK	BM-42S-BK	Non-excitation run Type	DC24V ±10%	0.2	5	0.2	0.500	22	26	33	46	Must be Lower than Motor Unit Weight
Ezi-STEP-PR-MI-42M-BK	BM-42M-BK						0.560					
Ezi-STEP-PR-MI-42L-BK	BM-42L-BK						0.630					
Ezi-STEP-PR-MI-42XL-BK	BM-42XL-BK						0.770					

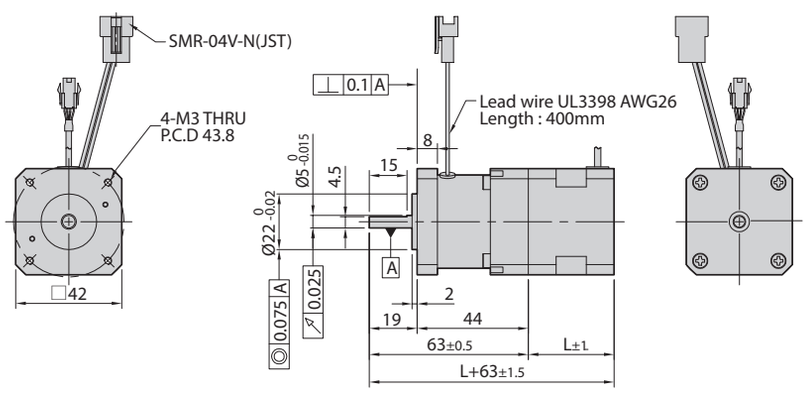
* Electronic Brake cannot be used for braking. Position hold purpose only when power OFF.
* The weight means Motor Unit Weight including Motor and Electronic Brake.
* Motor Model Number is combined model name of Motor and Brake.
* Motor specification and torque characteristic are same as Standard Motor.

* Brake Operation Timing Chart

Ezi-STEP Plus-R MINI controls Brake by Drive automatically.
Please refer to below Timing Chart when Brake is controlled by the upper controller other than using Ezi-STEP Plus-R MINI Brake control.
Otherwise, Drive might malfunction and loads might fall down.
Also, please do not operate Brake during motor operation to prevent damage.



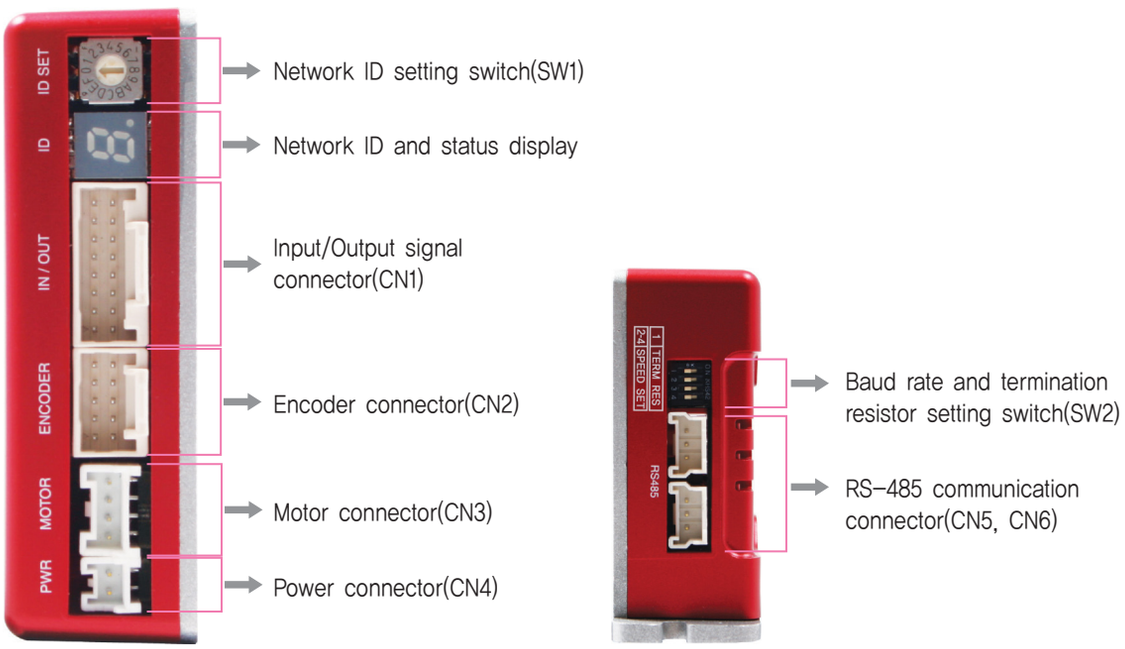
● Dimensions of Motor with Brake [mm]



42mm

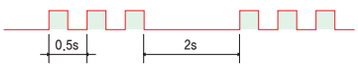
Model Name	Length(L)
BM-42S	34
BM-42M	40
BM-42L	48
BM-42XL	60

Settings and Operation



1. List of error types by the number of 7-segment LED display blinking

No.	Error Type	Causes
1	Over Current Error	The current through power devices in drive exceeds the limit.*1
2	Over Speed Error	The motor speed exceeds 3,000r/min.
3	Step Out Error	The motor does not follow the pulse input normally.
5	Over Temperature Error	Internal temperature of the drive exceeds 85℃.
6	Over Regenera-tive Voltage Error	Back-EMF is higher than 50V.
7	Motor Power Error	There is a problem with the connection between the drive and the motor.
9	Motor Voltage Error	The voltage supplied to the motor is lower than 20V.
11	System Error	There is a problem in the drive system (Watchdog Timer Out).
12	ROM Error	Error occurs in parameter storage device(ROM).

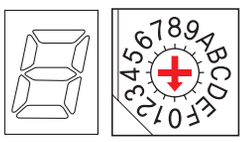


Alarm LED flash (e.g., Step Out Error)

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

2. Network ID Setting Switch(SW1)

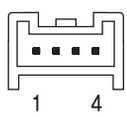
Value	ID No.	Value	ID No.
0	0	8	8
1	1	9	9
2	2	A	10
3	3	B	11
4	4	C	12
5	5	D	13
6	6	E	14
7	7	F	15



※ ID No. is displayed on 7-segment LED display
※ Up to 16 axis can be operated with one network.

3. Motor Connector(CN3)

No.	Function	I/O
1	B Phase	Output
2	$\overline{B}$ Phase	Output
3	$\overline{A}$ Phase	Output
4	A Phase	Output



4. Baud Rate and Termination Resistor Setting Switch(SW2)

Termination Resistor Setting Switch(SW2.1)

When using multiple drives, set a termination resistor for the drive installed at the end of the network for stable operation.

· SW2.1 ON: Termination resistor is set

· SW2.1 OFF: Termination resistor is not set

Baud Rate Setting Switch(SW2.2~SW2.4)

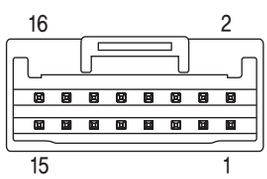
Baud rate is set by SW2.2~SW2.4 as follows.

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

*1 : Default Value

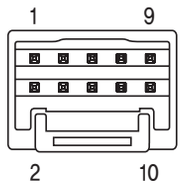
5. Input/Output Signal Connector(CN1)

No.	Function	I/O
1	EXT_DC24V	Input
2	EXT_GND	Input
3	BRAKE+	Output
4	BRAKE–	Output
5	LIMIT+	Input
6	LIMIT–	Input
7	ORIGIN	Input
8	Digital In1	Input
9	Digital In2	Input
10	Digital In3	Input
11	Digital In4	Input
12	Digital In5	Input
13	Digital In6	Input
14	Digital In7	Input
15	Compare Out	Output
16	Digital Out1	Output



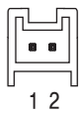
6. Encoder Connector(CN2)

No.	Function	I/O
1	A+	Input
2	A–	Input
3	B+	Input
4	B–	Input
5	Z+	Input
6	Z–	Input
7	DC5V	Output
8	GND	Output
9	F.GND	----
10	F.GND	----



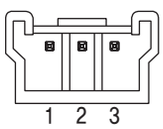
7. Power Connector(CN4)

No.	Function	I/O
1	DC24V	Input
2	GND	Input

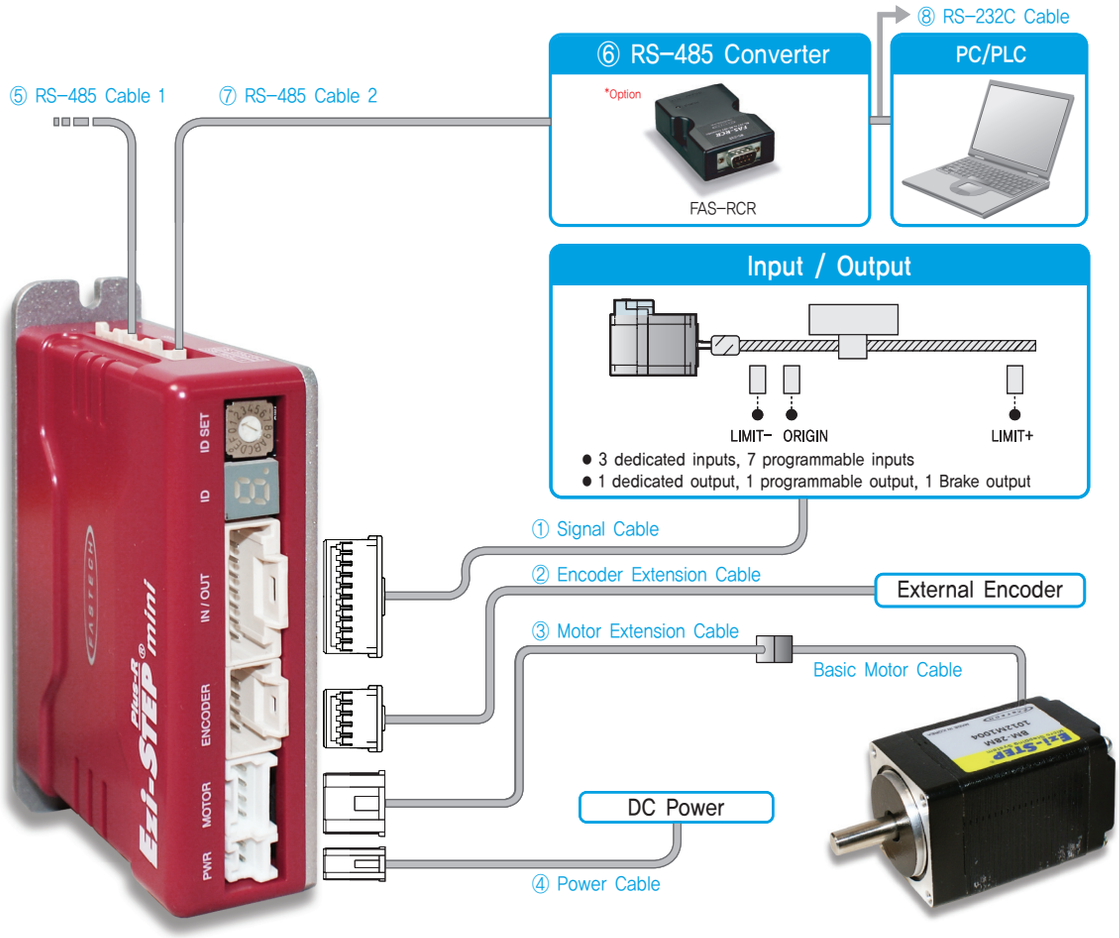


8. RS-485 Communication Connector(CN5, CN6)

No.	Function
1	Data+
2	Data–
3	GND



System Configuration



Cable Type	Max. Length	Remarks
① Signal Cable	20m	Options (Sold separately)
② Encoder Extension Cable	20m	
③ Motor Extension Cable	20m	
④ Power Cable	2m	
⑤ RS-485 Cable 1	30m	
⑦ RS-485 Cable 2	30m	
Basic Motor Cable	0.3m (Basic length)	Basic cables are attached to motors.

1. Accessories

Connectors

These are connector specifications for drive cabling.

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

※ The connectors above are supplied with the product. If you are using other parts, please make sure they meet the specifications.

2. Options

① Signal Cable

These are the cables to connect Ezi-STEP Plus-R MINI drive and other input/output devices.

Purpose	Part Number	Length [m]	Cable Type	Remarks
Drive – I/O Device Connection	CSVA-S-001F	1	Normal Cable	Maximum Length: 20m
	CSVA-S-002F	2		
	CSVA-S-003F	3		
	CSVA-S-005F	5		
	CSVA-S-001M	1	Robot Cable	
	CSVA-S-002M	2		
	CSVA-S-003M	3		
	CSVA-S-005M	5		

* If you need cables with length(in units of 1m) not listed on the table, please contact FASTECH for more information.

② Encoder Extension Cable

These are the cables to connect Ezi-STEP Plus-R MINI drive and the encoder.

Purpose	Part Number	Length [m]	Cable Type	Remarks
Drive – External Encoder Connection	CSVI-E-001F	1	Normal Cable	Maximum Length: 20m
	CSVI-E-002F	2		
	CSVI-E-003F	3		
	CSVI-E-005F	5		
	CSVI-E-001M	1	Robot Cable	
	CSVI-E-002M	2		
	CSVI-E-003M	3		
	CSVI-E-005M	5		

* If you need cables with length(in units of 1m) not listed on the table, please contact FASTECH for more information.

③ Motor Extension Cable

These are the cables to connect Ezi-STEP Plus-R MINI drive and the motor.

Purpose	Part Number	Length [m]	Cable Type	Remarks
Drive – Basic Motor Cable Connection	CMNB-M-001F	1	Normal Cable	Maximum Length: 20m
	CMNB-M-002F	2		
	CMNB-M-003F	3		
	CMNB-M-005F	5		
	CMNB-M-001M	1	Robot Cable	
	CMNB-M-002M	2		
	CMNB-M-003M	3		
	CMNB-M-005M	5		

* If you need cables with length(in units of 1m) not listed on the table, please contact FASTECH for more information.

④ Drive Power Cable

These are the cables to connect Ezi-STEP Plus-R MINI drive and the power.

Purpose	Part Number	Length [m]	Cable Type	Remarks
Drive – Power Connection	CMNB-P-001F	1	Normal Cable	Maximum Length: 2m
	CMNB-P-002F	2		
	CMNB-P-001M	1	Robot Cable	
	CMNB-P-002M	2		

⑤ RS-485 Cable 1

These are the cables to connect Ezi-STEP Plus-R MINI with RS-485 network.

Purpose	Part Number	Length [m]	Cable Type
RS-485 Connection	CGNB-R-0R6F	0.6	Normal Cable
	CGNB-R-001F	1	
	CGNB-R-1R5F	1.5	
	CGNB-R-002F	2	
	CGNB-R-003F	3	
	CGNB-R-005F	5	

* If you need cables with length(in units of 1m) not listed on the table, please contact FASTECH for more information.

⑥ RS-485 Converter

Purpose	Part Number	Specifications		Product Image
RS-232C to RS-485 Converter	FAS-RCR	Baud Rate	Max. 115.2kbps	
		Comm. Distance	RS-232C: Max. 15m RS-485: Max. 1.2km	
		Connector	RS-232C: DB9 Female RS-485: RJ-45	
		Dimensions	50X75X23mm	
		Weight	38g	
		Power	Power supplied by RS-232C (DC5~24V external power can be applied)	

⑦ RS-485 Cable 2

These are the cables to connect Ezi-STEP Plus-R MINI drive and FAS-RCR.

Purpose	Part Number	Length [m]	Cable Type
RS-485 Connection	CGNA-R-0R6F	0.6	Normal Cable
	CGNA-R-001F	1	
	CGNA-R-1R5F	1.5	
	CGNA-R-002F	2	
	CGNA-R-003F	3	
	CGNA-R-005F	5	

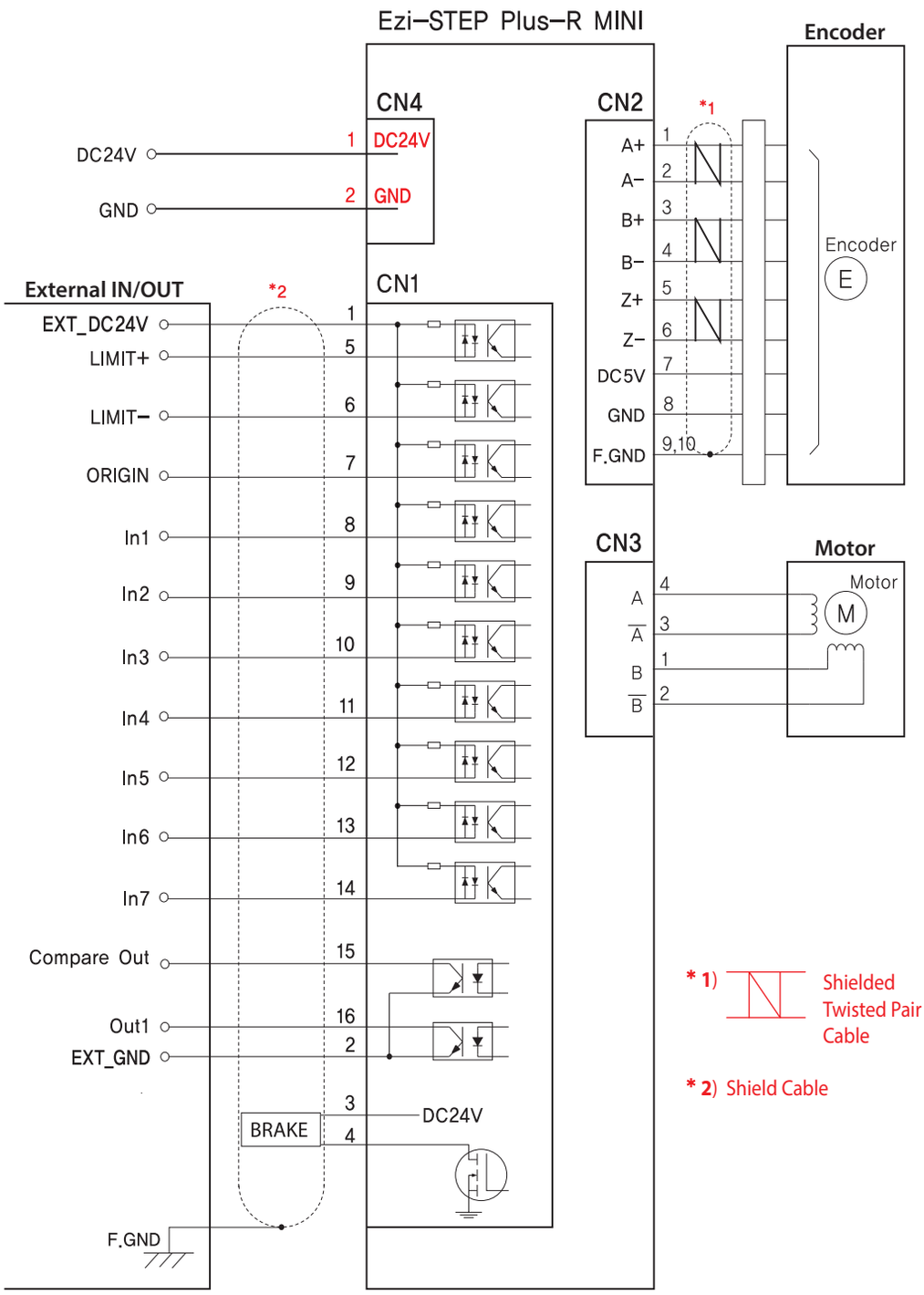
* If you need cables with length(in units of 1m) not listed on the table, please contact FASTECH for more information.

⑧ RS-232C Cable

These are the cables to connect FAS-RCR and RS-232C port of the host controller.

Purpose	Part Number	Length [m]	Cable Type
FAS-RCR – RS-232C Connection	CGNR-C-002F	2	Normal Cable
	CGNR-C-003F	3	
	CGNR-C-005F	5	

External Wiring Diagram



* 1) Shielded Twisted Pair Cable

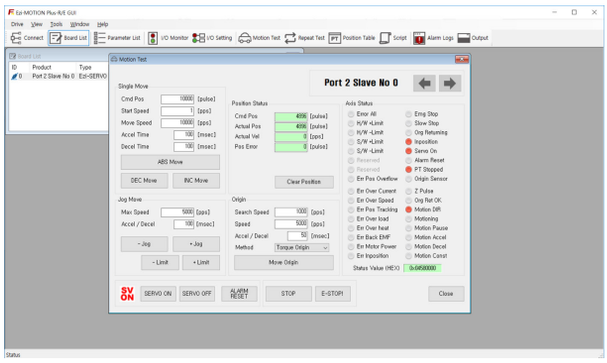
* 2) Shield Cable

※ When connecting I/O cable between controller and drive, please turn off the power of both controller and drive to prevent electric shock or to protect the drive from any damage.

CAUTION

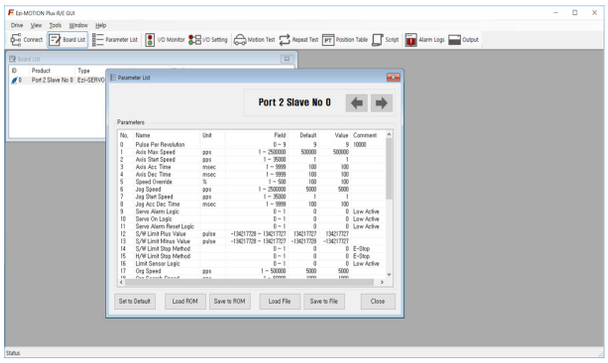
In order to use the products listed in this catalog safely and correctly, be sure to read the instruction manual before using the product.

● GUI(Graphic User Interface) Program



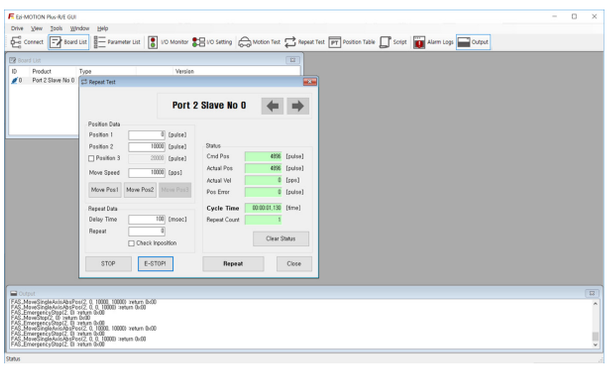
◆ Product List and Motion Test

The product list shows the products connected to the host controller. You can test single position movements, jog movements, and origin search operations, and monitor the operation status on the motion test window.



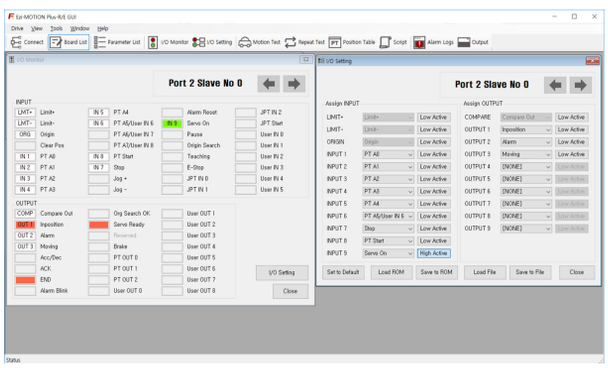
◆ Parameter List

All of the parameters are displayed and modified on this screen.



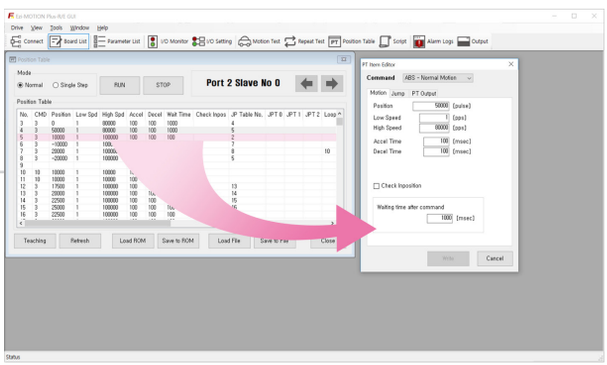
◆ Motion Repeat and Status Monitoring

You can set the target position value, speed, delay time and number of repetitions for repeated motion test. A motion libarry(API) is also displayed on the screen.



◆ I/O Monitoring and Setting

You can check the status of input/output signals related to the current operation status, and you can assign the signals to the desired input/output channels.



◆ Position Table

You can configure the data for the position table function or drive the motor with the position table. The position table is a function that allows you to easily operate the motor with motion data stored in memory in advance.

※ GUI Program(Ezi-MOTIONLINK Plus-R) can be downloaded from website. (www.fastech-motions.com)
※ GUI Program(Ezi-MOTIONLINK Plus-R) supports Windows 7/8/10.
※ GUI Program(Ezi-MOTIONLINK Plus-R) is subject to change without prior notice ofr performance improvement.

MEMO

FASTECH

Fast, Accurate, Smooth Motion

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