Ezi-STEP®

Micro Stepping System

- Intergrated Controller
- Position Table
- Micro Stepping
- Sensorless Stall Detection
- Software Damping
- Run / Stop Signal Output

Plus-R

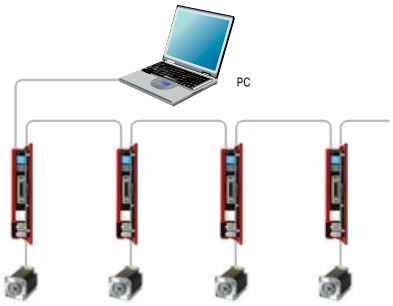
FASTECH

Fast, Accurate, Smooth Motion

Features

1. Network Based Motion Control

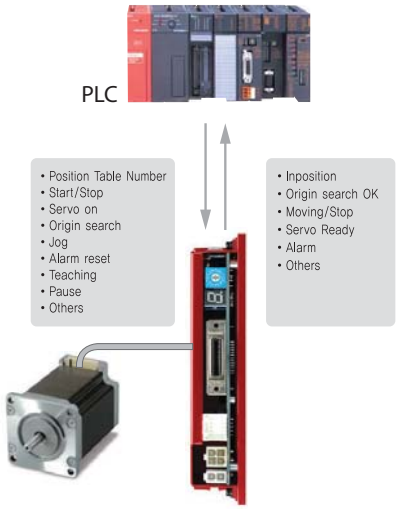
A maximum of 16 axis can be operated from a PC through RS-485 communications. All of the Motion conditions are set through the network and saved in Flash ROM as a parameter. Motion Library(DLL) is provided for programming under Windows 2000 / XP / 7 / 8 / 10 / Vista.



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 PLC.

The PLC can monitor the In-position, origin search, moving / stop, servo ready and other digital output signals from a drive. A maximum of 256 positioning points can be set from PLC.



3. Microstep and Filtering

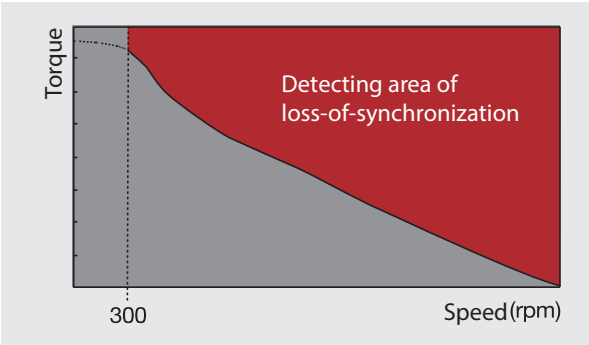
High precision Microstep function and Filtering(Patent pending) The high-performance DSP operates at step resolutions of 1.8° up to maximum 0.0072°steps) and Ezi-STEP Plus-R adjusts PWM control signal in every 25μsec, which makes it possible for more precise current control, resulting in high-precision Microstep operation.

4. Sensorless Stall Detection

Detecting the loss-of-synchronization with on-board DSP(Patent pending Ezi-STEP Plus-R can detect the loss-of-synchronization of a stepping motor without the addition of an external sensor.

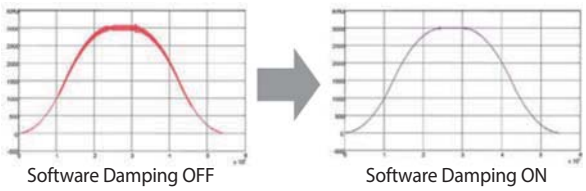
By monitoring the voltage, current, and back-emf signal, the on-board DSP estimates the current position of a rotor and enables it to detect the loss-of-synchronization(an impossible task for a conventional stepping motor drive), this allows for high-speed operation at 100% torque rating without loss-of-synchronization. *1

*1 : Effective only over 300[rpm]



5. Software Damping

Vibration suppression and High-speed operation(Patent pending) 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 Plus-R drive detects these problems and the DSP 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.



[This is real measured speed that using 100000[ppr]encoder.]

6. Drive Output Signal Monitoring

Ezi-STEP Plus-R provides loss of step, run / stop, over-current, over-heat, over-voltage, power, and motor connection alarms that can be monitored by the controller and visible by a motor-mounted flashing led indicator.

7. Improvement of High-Speed Driving

Depending on the speed of a stepping motor, Ezi-STEP Plus-R automatically increases the supply voltage and prevents the torque lowering due to the low operating voltage to the motor caused by back-emf voltage, this enables high-speed operation. Additionally, the software damping algorithm minimizes the vibration and prevents the loss-of-synchronization at high-speed.

Part Numbering Method

Ezi-STEP-PR-56L-BK-□

Ezi-STEP	**Product Name**

MNB : Mini	**Drive Series Type**
MPB : Mini Power	
HPB : High Power	
MI : Mini Type	
PR : Plus RS-485	
PR-MI : Plus RS-485 Mini Type	
BT : Built In	
ALL : All Type	

20mm	**Motor Flange Size**
28mm	
42mm	
56mm	
60mm	
86mm	

User Code	

Brake	No Indication : No
	BK-Brake

Motor Length	**S :** Single
	M : Middle
	L : Large
	XL : Extra Large

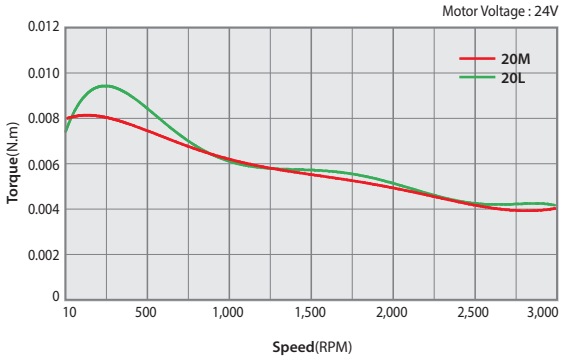
Motor, Drive Combination

UNIT No.	MOTOR No.	DRIVE No.
Ezi-STEP-PR-20M	BM-20M	EzT-NDR-20M
Ezi-STEP-PR-20L	BM-20L	EzT-NDR-20L
Ezi-STEP-PR-28S	BM-28S	EzT-NDR-28S
Ezi-STEP-PR-28M	BM-28M	EzT-NDR-28M
Ezi-STEP-PR-28L	BM-28L	EzT-NDR-28L
Ezi-STEP-PR-42S	BM-42S	EzT-NDR-42S
Ezi-STEP-PR-42M	BM-42M	EzT-NDR-42M
Ezi-STEP-PR-42L	BM-42L	EzT-NDR-42L
Ezi-STEP-PR-42XL	BM-42XL	EzT-NDR-42XL
Ezi-STEP-PR-56S	BM-56S	EzT-NDR-56S
Ezi-STEP-PR-56M	BM-56M	EzT-NDR-56M
Ezi-STEP-PR-56L	BM-56L	EzT-NDR-56L
Ezi-STEP-PR-60S	BM-60S	EzT-NDR-60S
Ezi-STEP-PR-60M	BM-60M	EzT-NDR-60M
Ezi-STEP-PR-60L	BM-60L	EzT-NDR-60L
Ezi-STEP-PR-86M	BM-86M	EzT-NDR-86M
Ezi-STEP-PR-86L	BM-86L	EzT-NDR-86L
Ezi-STEP-PR-86XL	BM-86XL	EzT-NDR-86XL

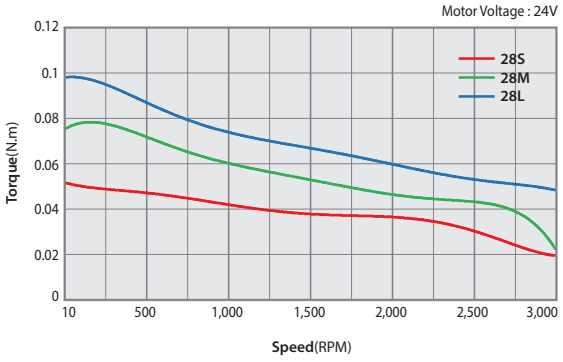
Motor Specification Table

Model		Unit	20		28			42			
			20M	20L	28S	28M	28L	42S	42M	42L	42XL
DRIVE METHOD		-	BI-POLAR								
Number OF PHASES		-	2	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
INDUCTANCE per PHASE		mH	2.0	2.6	2.0	2.7	3.2	5.4	7.2	8	15.6
HOLDING TORQUE		N·m	0.016	0.025	0.069	0.10	0.12	0.320	0.440	0.500	0.800
ROTOR INERTIA		g·cm²	2.5	3.3	9	13	18	35	54	77	114
WEIGHTS		g	50	80	110	140	200	250	280	350	500
LENGTH(L)		mm	28	38	32	45	50	34	40	48	60
ALLOWABLE 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
ALLOWABLE THRUST LOAD		N	Lower than motor weight								
INSULATION RESISTANCE		Mohm	100 MΩ MIN.(at 500VDC)								
INSULATION CLASS		-	CLASS B(130℃)								
OPERATING TEMPERATURE		℃	0 to 55								

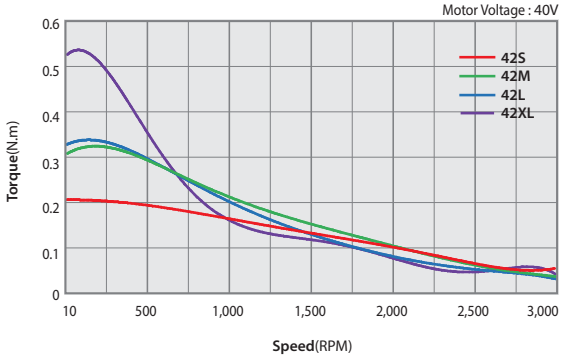
Ezi-STEP Plus-R_ 20 Series



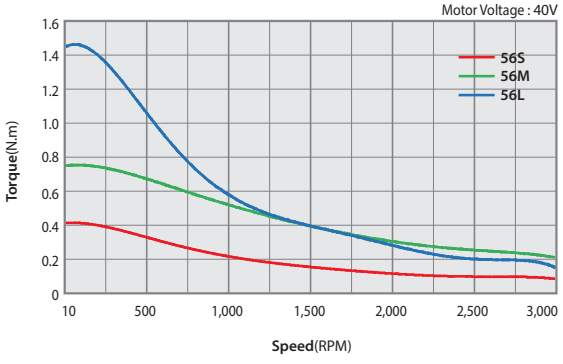
Ezi-STEP Plus-R_ 28 Series



Ezi-STEP Plus-R_ 42 Series

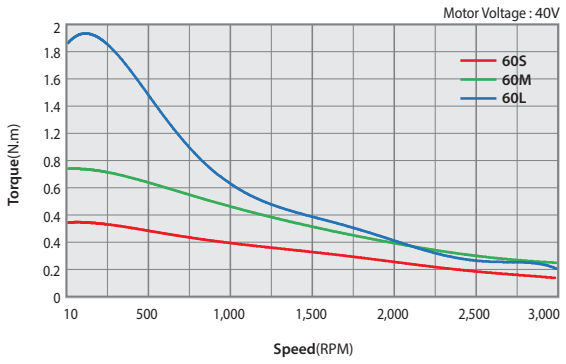


Ezi-STEP Plus-R_ 56 Series

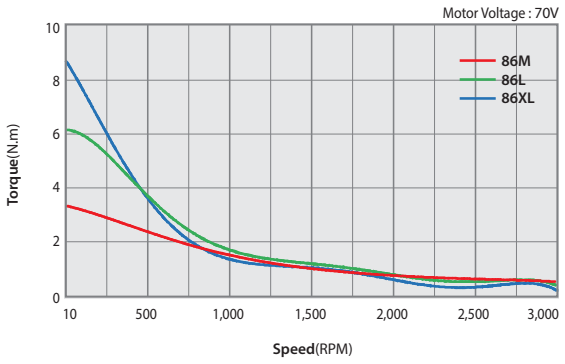


56			60			86		
56S	**56M**	**56L**	**60S**	**60M**	**60L**	**86M**	**86L**	**86XL**
2	2	2	2	2	2	2	2	2
1.35	1.62	2.58	1.44	1.48	2	2.22	3.48	4.68
3	3.0	3.0	4.0	4.0	4.0	6.0	6.0	6.0
0.45	0.54	0.86	0.36	0.37	0.5	0.37	0.58	0.78
1.2	2	4	0.75	1.35	2.6	3	6.5	8.68
0.640	1.00	2.00	0.88	1.28	2.40	4.50	8.50	12.00
180	280	520	240	490	690	1800	3600	5400
500	720	1150	600	1000	1300	2.3	3.8	5.3
46	55	80	47	56	85	78	117	155
52	52	52	70	70	70	270	270	270
65	65	65	87	87	87	300	300	300
85	85	85	114	114	114	350	350	350
123	123	123	165	165	165	400	400	400
Lower than motor weight								
100 MΩ MIN.(at 500VDC)								
CLASS B(130℃)								
0 to 55								

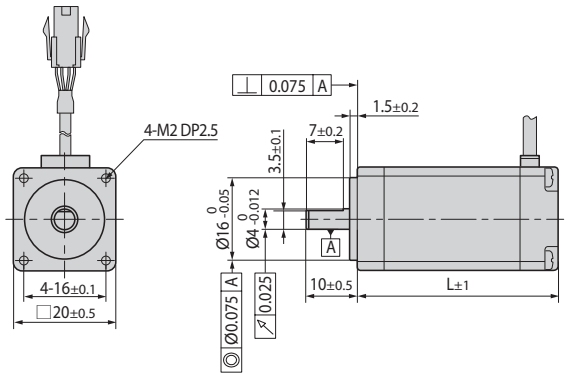
Ezi-STEP Plus-R_ 60 Series



Ezi-STEP Plus-R_ 86 Series

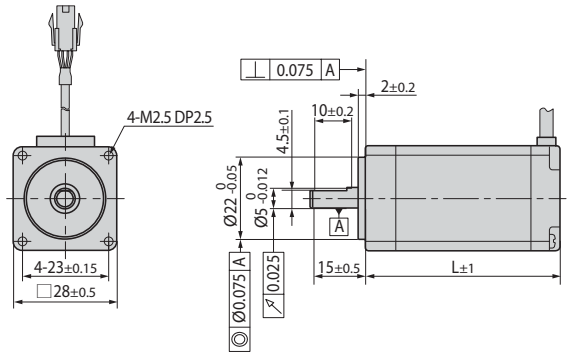


Motor Drawing



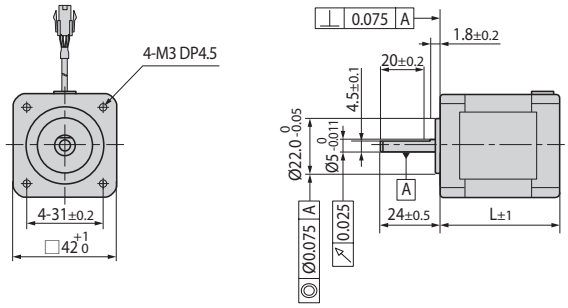
20mm

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



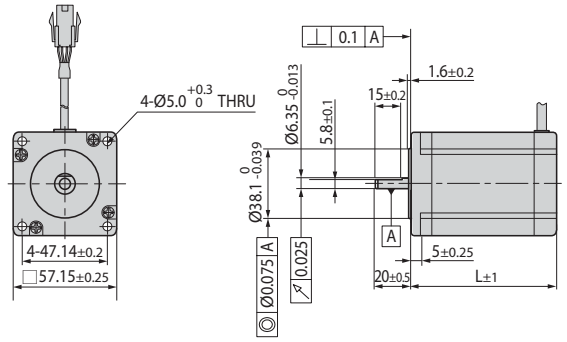
28mm

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



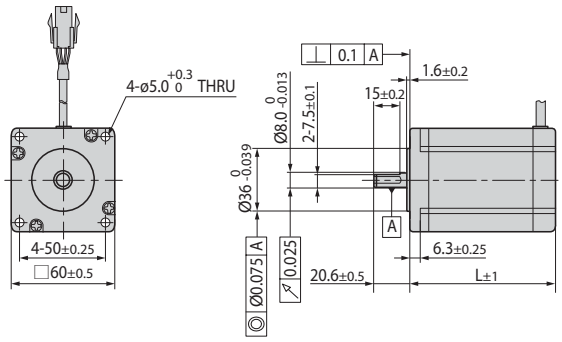
42mm

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



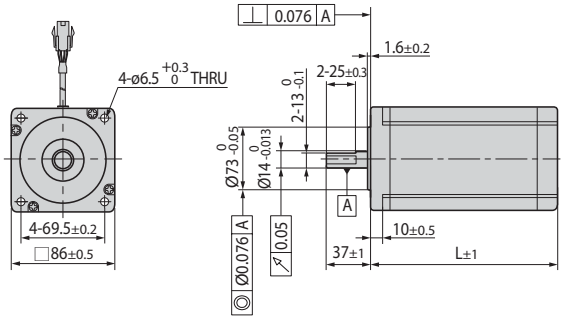
56mm

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



60mm

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



86mm

Model Name	Length(L)
BM-86M	78
BM-86L	117
BM-86XL	155

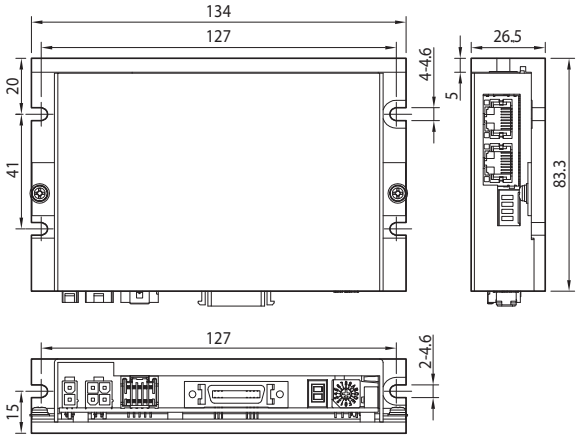
Drive Specification

Specifications

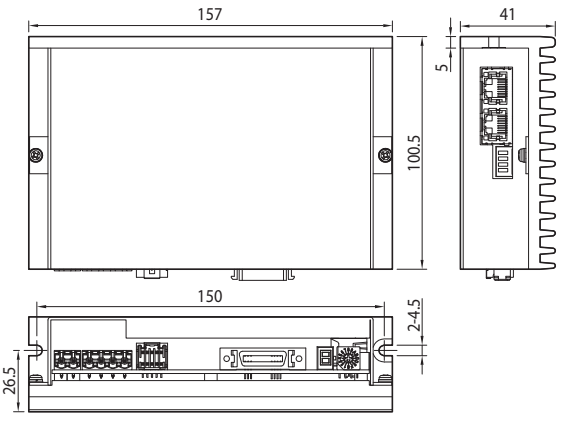
Motor Model		BM -20 Series	BM -28 Series	BM -42 Series	BM -56 Series	BM -60 Series	BM -86 Series
Drive Model		EzT-NDR -20 Series	EzT-NDR -28 Series	EzT-NDR -42 Series	EzT-NDR -56 Series	EzT-NDR -60 Series	EzT-NDR -86 Series
Input Voltage		24VDC ±10%					40 ~ 70VDC
Control Method		Bipolar PWM drive with 32bit DSP					
Multi Axes Drive		Maximum 16 axes through Daisy-Chain					
Position Table		256 Motion Command Steps(Continuous, Wait, Loop, Jump and External start etc.)					
Current Consumption		Max. 500mA(Except Motor Current)					
Operating Condition	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)					
	Vib. Resist.	0.5G					
Function	Rotation Speed	0 ~ 3,000[rpm]					
	Resolution[ppr]	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) ※ Default : 10,000					
	Protection	Over Current Error, Over Speed Error, Step Out Error, Over Temperature Error, Over Regenerated Voltage Error, Motor Connection Error, Motor Voltage Error, System Error, ROM Error					
	LED Display	Power, Alarm, CW Rotation, CCW Rotation					
	Stop Current	10% ~ 100%(Selectable by Parameter) Be setted to set value of Stop Current after 0.1 second after motor stop. ※ Default : 50%					
	Rotational Direction	CW / CCW(Selectable by Parameter) Used when changing the direction of motor rotate. ※ Default : CW					
I/O Signal	Input Signal	3 dedicated input(LIMIT+, LIMIT-, ORIGIN), 9 programmable input(Photocoupler)					
	Output Signal	1 dedicated output(Compare Out), 9 programmable output(Photocoupler), Brake signal					
Communication Interface		The RS-485 serial communication with PC Transmission speed : 9,600 ~ 921,600[bps]					
Position Control		Incremental mode / Absolute mode Data Range : -134,217,727 to +134,217,727pulse, Operating speed : Max. 3000[rpm]					
MPI Version		Origin Sensor, ±Limit sensor, Z phase(By External Encoder)					
GUI		User Interface Program within Windows					
Software		Motion Library(DLL) for windows 2000 / XP / 7 / 8 / 10 / Vista.					

Drive Dimension(mm)

1. Drive

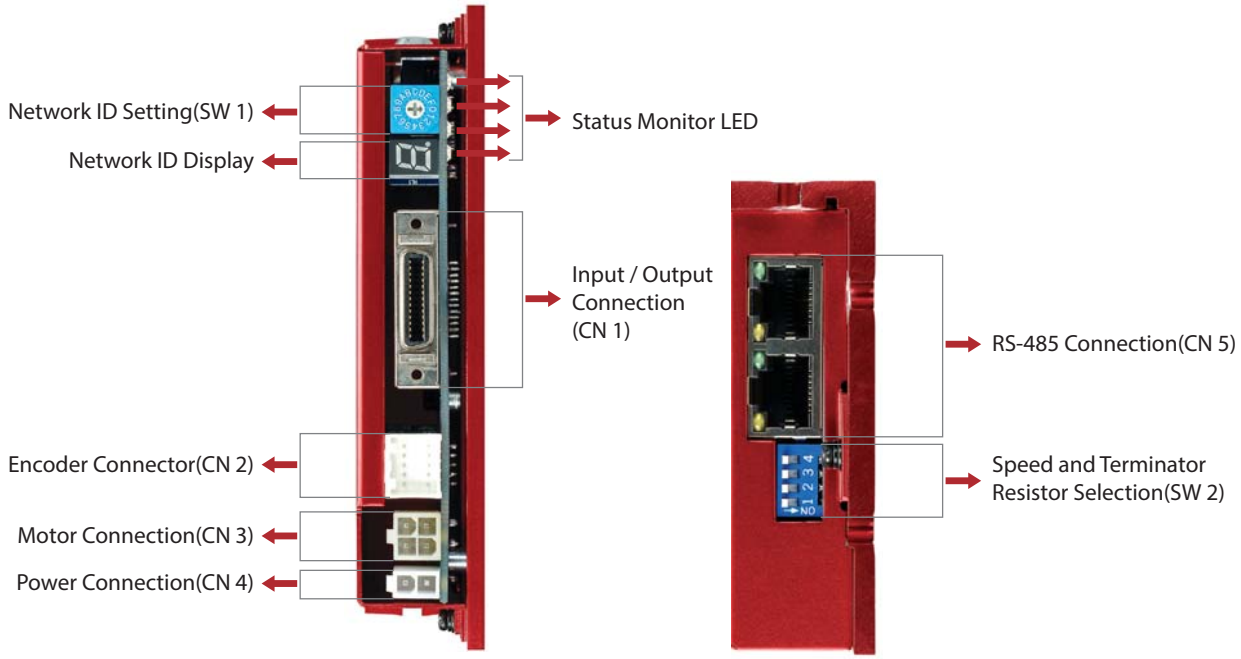


2. 86mm Motor Drive(EzS-NDR-86 Series)

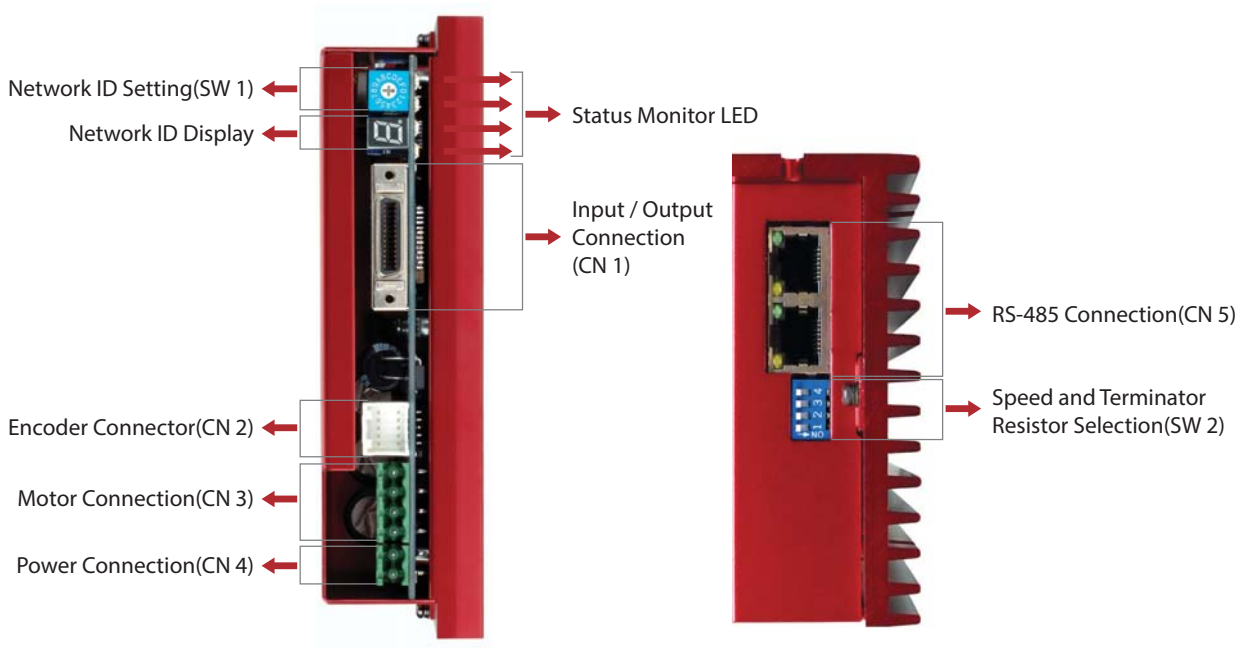


Setting and Operation

1. Drive



2. 86mm Motor Drive(EzT-NDR-86 Series)



System Operation Manual

Status Monitor LED

1. Status Monitor LED

Indication	Color	Function	ON/OFF Condition
PWR	Green	Power Input Indication	LED is turned ON when power is applied
ALM	Red	Alarm Indication	Flash when protection function is activated(Identifiable which protection mode is activated by counting the blinking times)
CW	Yellow	Motor Rotation Direction	Lights when motor rotate CW direction
CCW	Orange	Motor Rotation Direction	Lights when motor rotate CCW direction

2. Protection functions and LED flash times

Time	Protection	Conditions
1	Over Current Error	The current through power devices in inverter exceeds the limit value
2	Over Speed Error	Motor speed exceed 3,000[rpm]
3	Step Out Error	Abnormally motor do not followed pulsed input
5	Over Temperature Error	Internal temperature of a motor drive exceeded 55˚C
6	Over Regenerativted Voltage Error	Back-EMF more high limit value *1
7	Motor Connect Error	The power is ON without connection of the motor cable to drive
9	Motor Voltage Error	Motor voltage is out of limited value *2
11	System Error	Error occurs in drive system
12	ROM Error	Error occurs in parameter storage device(ROM)

*1 : Voltage limit of Back-EMF depends on motor model

*2 : Motor limit voltage value depends on motor model

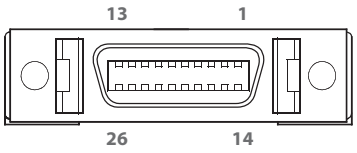
※Please refer to the manual

Alarm LED Flash(ex : Step out)

Connector

1. Input / Output Connection(CN 1)

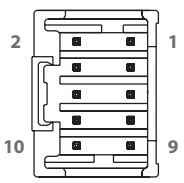
No.	Function	I/O
1	Limit +	Input
2	Limit-	Input
3	ORIGIN	Input
4	Digital IN 1	Input
5	Digital IN 6	Input
6	Digital IN 7	Input
7	Compare Out 1	Output
8	Digital OUT 1	Output
9	Digital OUT 2	Output
10	Digital OUT 3	Output
11	Digital OUT 4	Output
12	Digital OUT 5	Output
13	Digital OUT 6	Output
14	Digital IN 2	Input
15	Digital IN 3	Input
16	Digital IN 4	Input
17	Digital IN 5	Input
18	Digital IN 8	Input
19	Digital IN 9	Input
20	Digital OUT 7	Output
21	Digital OUT 8	Output
22	Digital OUT 9	Output
23	BRAKE+	Output
24	BRAKE-	Output
25	24VDC GND	Input
26	24VDC	Input



※ There is no BRAKE function for 86mm motor drive.

2. Encoder Connector(CN 2)

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

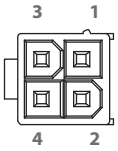


※ Used for monitoring the external encoder signal.

3. Motor Connection(CN 3)

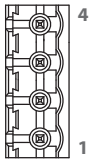
· Drive

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



· 86mm Motor Drive

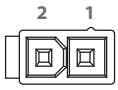
No.	Function
1	/ B Phase
2	B Phase
3	/ A Phase
4	A Phase



4. Power Connection(CN 4)

· Drive

No.	Function
1	24VDC ±10%
2	GND



· 86mm Motor Drive

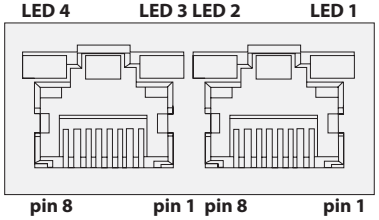
No.	Function
1	GND
2	40 ~ 70VDC

5. RS-485 Communication connection(CN 5)

There is converter for connecting PC.

RS-232 to RS-485

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



Switch

1. Network ID Setting(SW 1)

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

※ Maximum 16 axis can be connected in one network.

2. Speed and Terminator Resistor Selection Switch(SW 2)

The purpose of this is to setting the communication speed and connect a terminator resistor if drive is installed at the end of network.

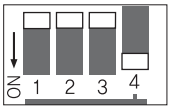
SW 2.1 used for connecting the terminator resistor.
SW 2.2~SW 2.4 used for setting speed as follows.

SW 2.1	SW 2.2	SW 2.3	SW 2.4	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

※ Possible to use common PCI Bus type RS-485 communication board for High speed communication.
(Please contact with Distributor)

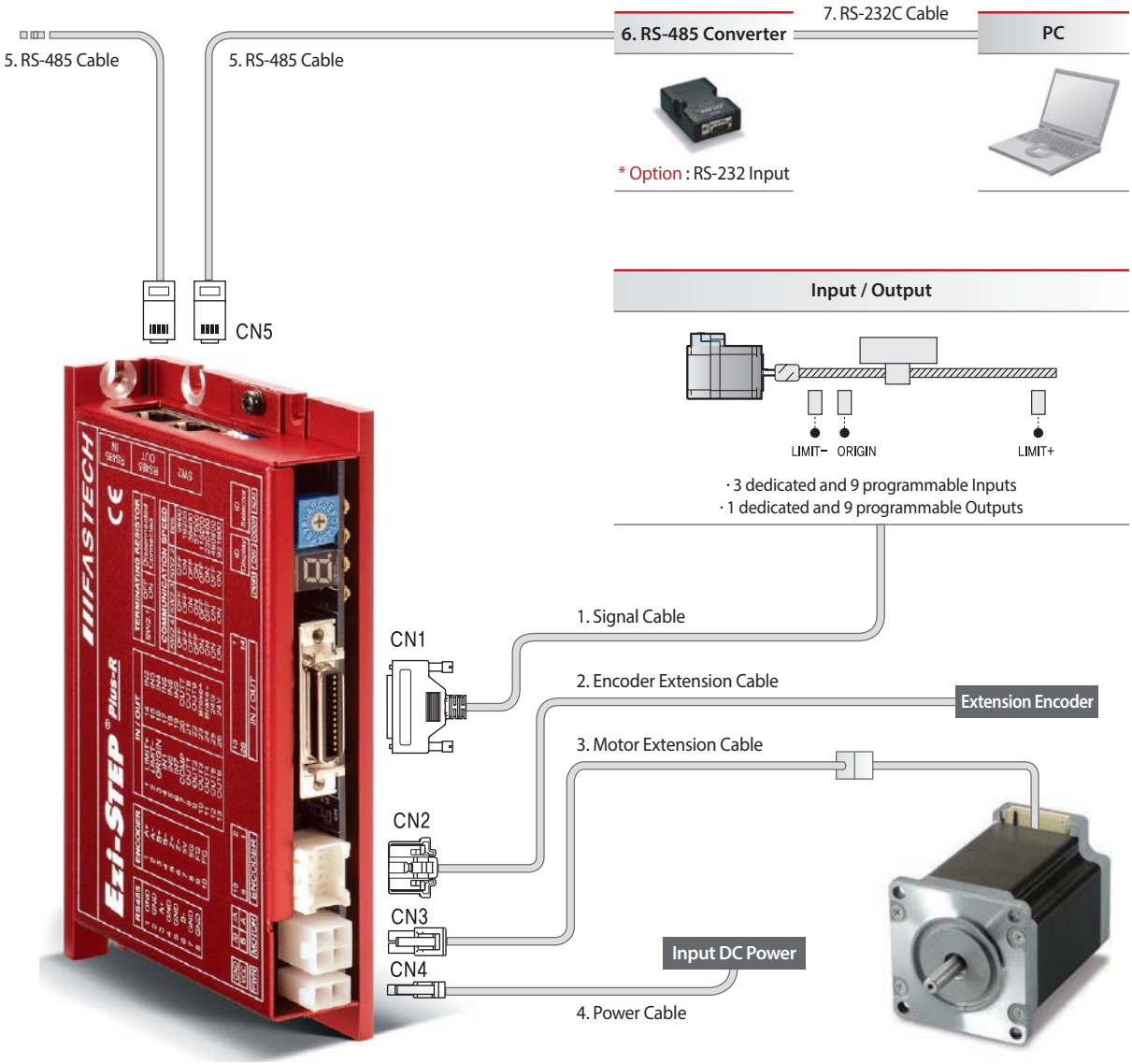
***1** : Default setting value

If SW 2.1 is OFF, terminator resistor is disconnected.
If SW 2.2 is ON, terminator resistor is connected.



System Configuration

Drive



Type	Signal Cable	Encoder Cable	Motor Cable	Power Cable	RS-485 Cable
Standard Length	-	-	30cm	-	-
Max. Length	20m	20m	20m	2m	30m

Option

1. Signal Cable

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

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

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

2. Encoder Extension Cable

Available to extended connection between Encoder and Ezi-STEP Plus-R.

Model Name	Length[m]	Remark
CTPR-E-□□□F	□□□	Normal Cable
CTPR-E-□□□M	□□□	Robot Cable

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

3. Motor Extension Cable

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

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

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

4. Power Cable

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

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

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

5. RS-485 Cable

Model Name	Length[m]	Remark
CGNR-R-0R6F	0.6	Normal Cable
CGNR-R-001F	1	
CGNR-R-1R5F	1.5	
CGNR-R-002F	2	
CGNR-R-003F	3	
CGNR-R-005F	5	

6. FAS-RCR(RS-232C to RS-485 Converter)

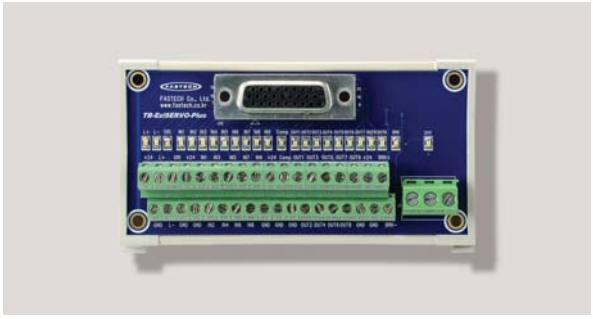
Type	Specification
Transmission speed	Max. 115.2Kbps
Comm. Distance	RS-232C : Max. 15m RS-485 : Max. 1.2km
Connector	RS-232C : DB9 Female RS-485 : RJ-45
Dimension	50×75×23mm
Weight	38g
Power Status	Powered from PC (Usable for external DC5~24V)

7. RS-232C Cable

Model Name	Length[m]	Remark
CGNR-C-1R8F	1.8	Normal Cable
CGNR-C-003F	3	
CGNR-C-005F	5	

8. TB-Plus(Interface Board)

Available to connect more conveniently between Input / Output signal and Ezi-STEP Plus-R.



Interface Cable

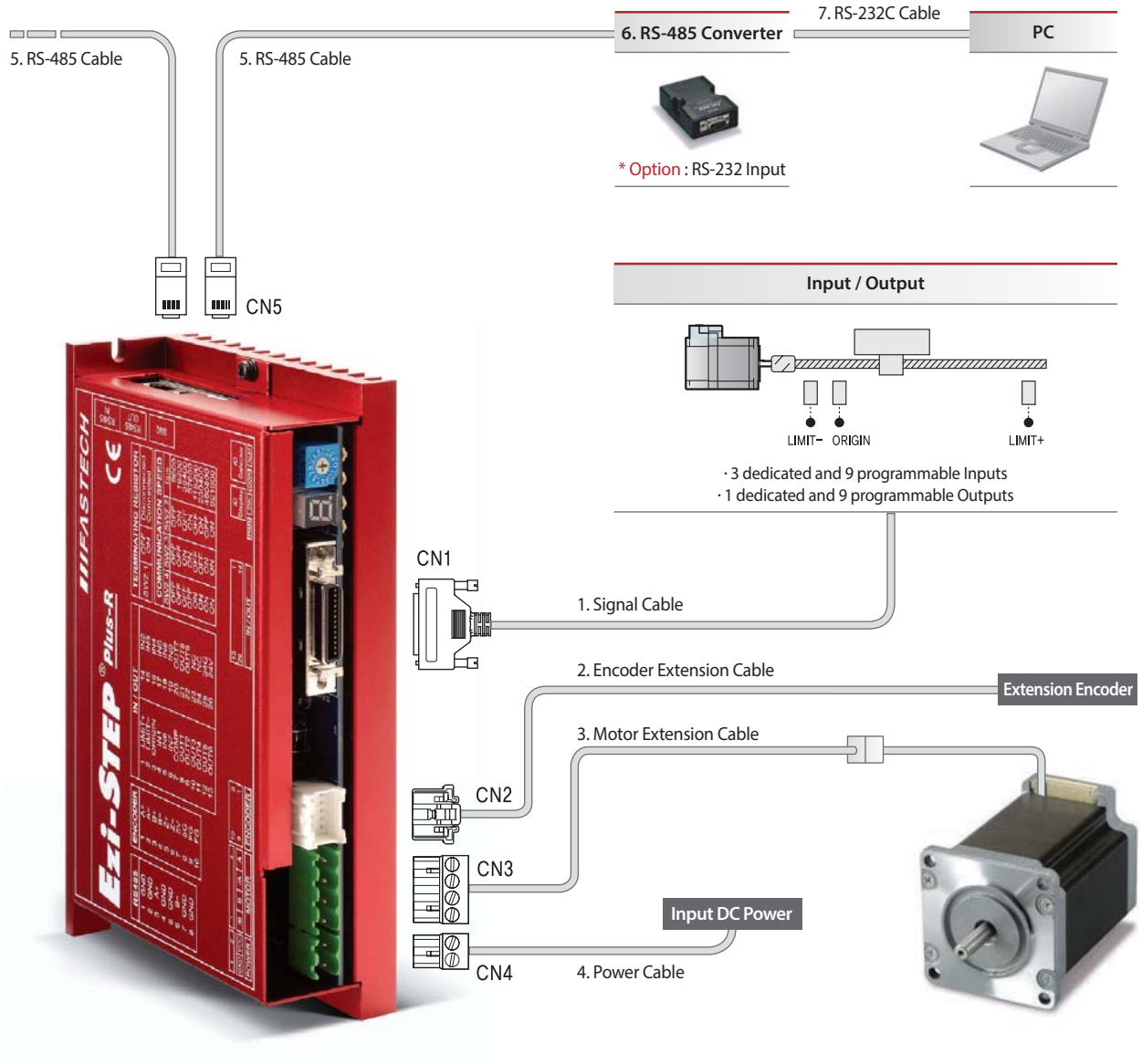
Available to Connect between TB-Plus Interface Board and Ezi-STEP Plus-R.

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

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

System Configuration

86mm Motor Drive(EzT-NDR-86 Series)



Type	Signal Cable	Encoder Cable	Motor Cable	Power Cable	RS-485 Cable
Standard Length	-	-	30cm	-	-
Max. Length	20m	20m	20m	2m	30m

Option

1. Signal Cable

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

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

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

2. Encoder Extension Cable

Available to extended connection between Encoder and Ezi-STEP Plus-R.

Model Name	Length[m]	Remark
CTPR-E-□□□F	□□□	Normal Cable
CTPR-E-□□□M	□□□	Robot Cable

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

3. Motor Extension Cable

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

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

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

4. Power Cable

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

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

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

5. RS-485 Cable

Model Name	Length[m]	Remark
CGNR-R-0R6F	0.6	Normal Cable
CGNR-R-001F	1	
CGNR-R-1R5F	1.5	
CGNR-R-002F	2	
CGNR-R-003F	3	
CGNR-R-005F	5	

6. FAS-RCR(RS-232C to RS-485 Converter)

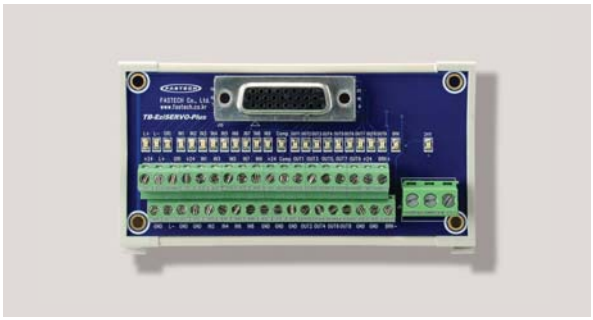
Type	Specification
Transmission speed	Max. 115.2Kbps
Comm. Distance	RS-232C : Max. 15m RS-485 : Max. 1.2km
Connector	RS-232C : DB9 Female RS-485 : RJ-45
Dimension	50×75×23mm
Weight	38g
Power Status	Powered from PC (Usable for external DC5~24V)

7. RS-232C Cable

Model Name	Length[m]	Remark
CGNR-C-1R8F	1.8	Normal Cable
CGNR-C-003F	3	
CGNR-C-005F	5	

8. TB-Plus(Interface Board)

Available to connect more conveniently between Input / Output signal and Ezi-STEP Plus-R.



Interface Cable

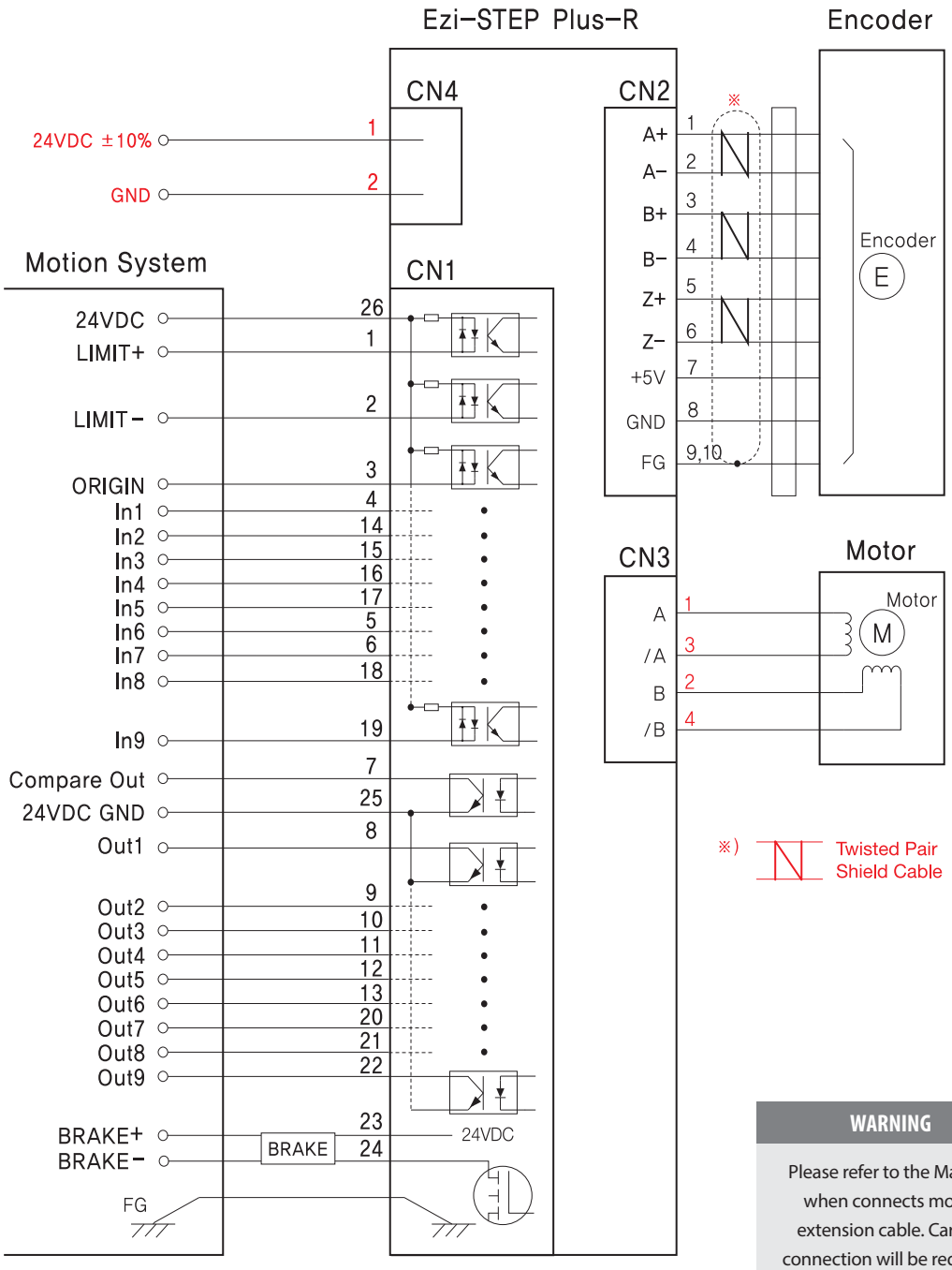
Available to Connect between TB-Plus Interface Board and Ezi-STEP Plus-R.

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

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

External Wiring Diagram

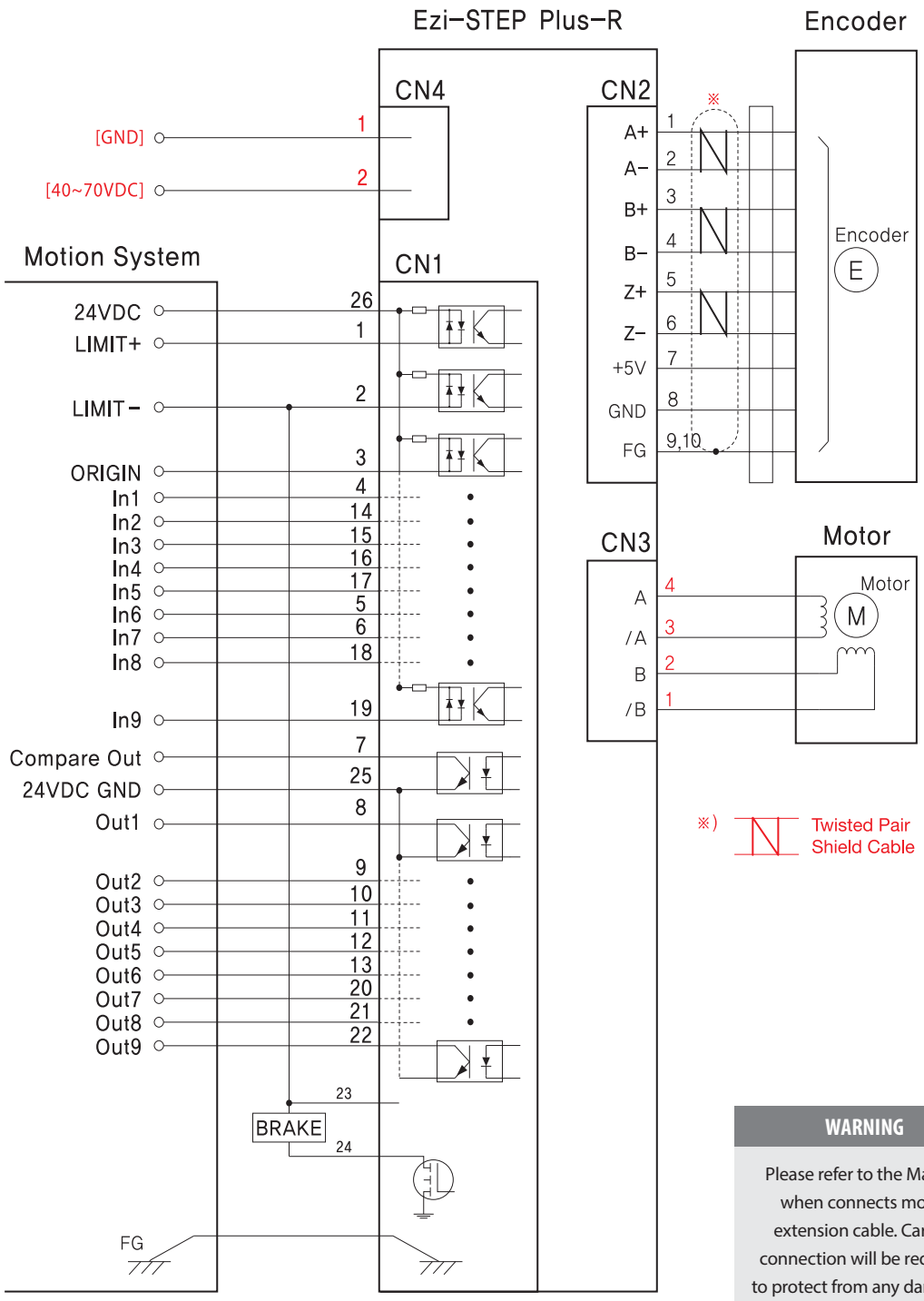
Ezi-STEP Plus-R



WARNING

Please refer to the Manual when connects motor extension cable. Careful connection will be required to protect from any damages.

Ezi-STEP Plus-R_ 86mm



WARNING

Please refer to the Manual when connects motor extension cable. Careful connection will be required to protect from any damages.

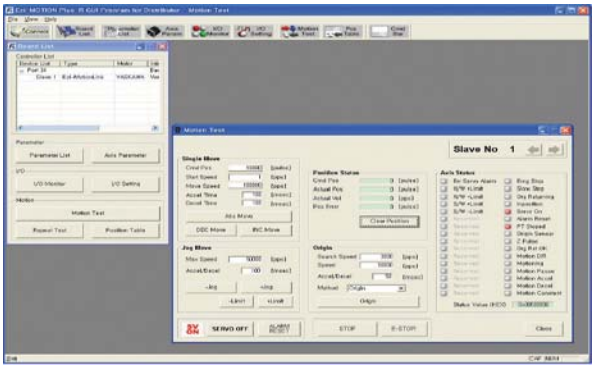
※ It is the wiring diagram of exclusive 86mm the motor drive(EzS-NDR-86 Series). Please note that each marked parts in red are different

Graphic User Interface(GUI)

Screen Configuration

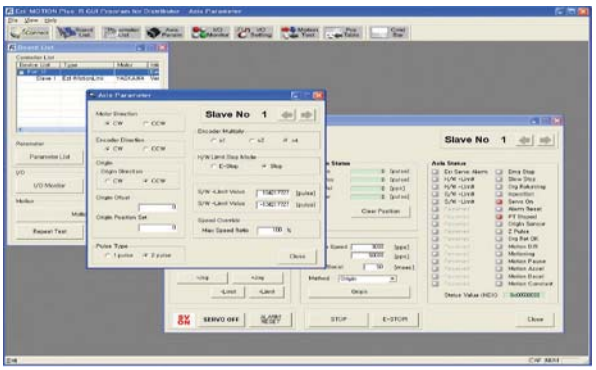
1. Controller Lists and Motion Test

This screen display the controller list that connected to system.
You can make a single move, jog and origin command and also the motor status is displayed.



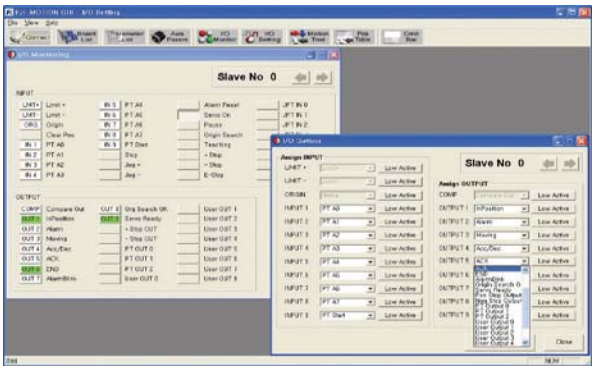
2. Axis Parameter Setup

You can select various parameters that frequently used.
(ex : sensor input logic)



3. I/O Monitoring and Setting

You can select various digital input and output signals of controller.

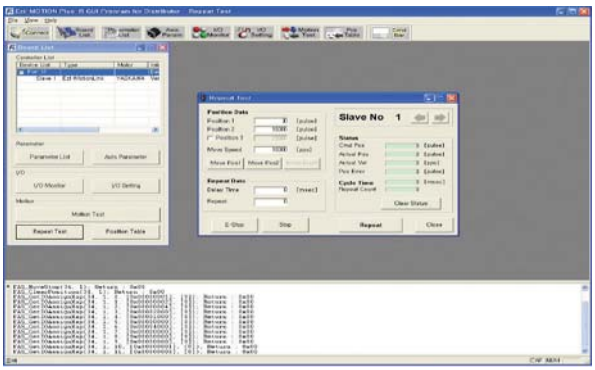


4. Parameter List

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

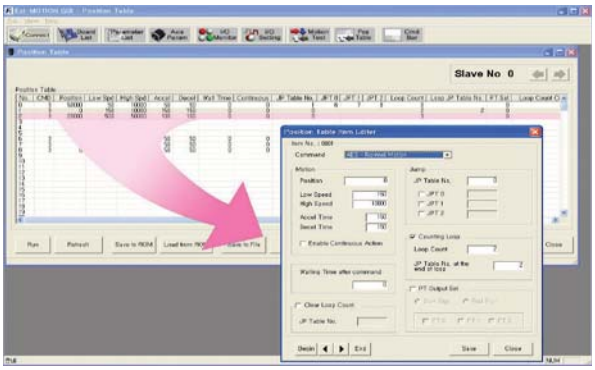
5. Motion Repeat and Monitor Status

Target position, speed, delay time and repeat count are selected for repeat motion test. Motion library(DLL) is also displayed on screen.



6. Position Table

You can edit the position table and execute it. The position table data can be saved and loaded from Flash ROM and Windows file.



FASTECH

Fast, Accurate, Smooth Motion

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