

Ezi-SERVO[®] II

Closed Loop Stepping System

- Intergrated Controller
- Position Table
- Closed Loop Stepping System
- No Gain Tuning / No Hunting
- Torque Improvement by Boost Current Control

CC-Link



CE

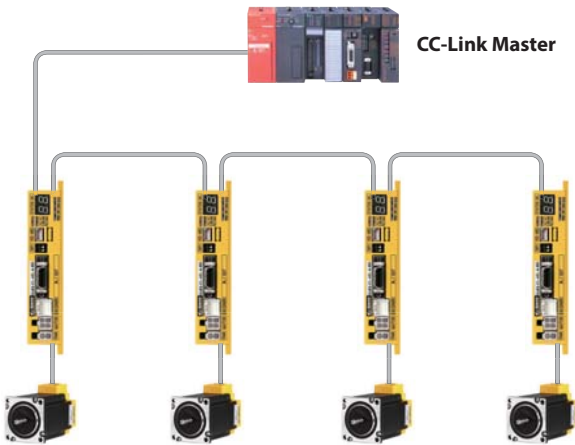
FASTECH

Fast, Accurate, Smooth Motion

Features

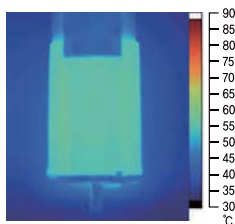
1. CC-Link Based Motion Control

Ezi-SERVO II CC-Link is a stepping motor control system that support CC-Link with high speed fieldbus(Max. 10Mbps)
Ezi-SERVO II CC-Link is a remote device module supporting CC-Link network. Multi-fuction control is possible by occupying 1 station and 1 stations in CC-Link, and motion and monitoring functions are processed by device commands

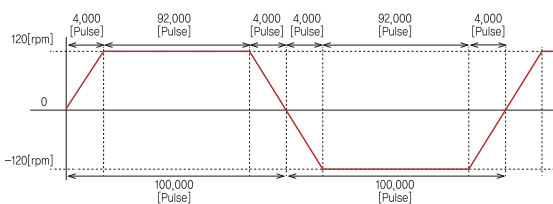


2. Current Control According to Load

Ezi-SERVO II CC-Link automatically control the motor current according to loads. Thus, febricity of motor and drive are minimized so can save the energy as well.



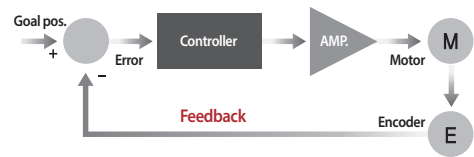
Motor temperature [measured by thermograph]



Condition to measure the motor temperature
[4hours operation, Motor surface temperature saturation]

3. Closed Loop System

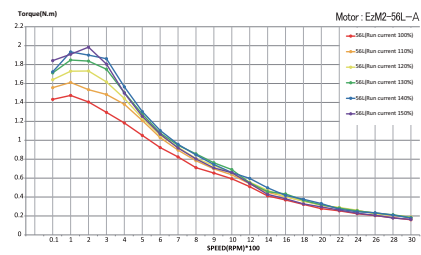
Ezi-SERVO II CC-Link is an innovative closed loop stepping motor and controller that utilizes a high-resolution motor mounted encoder to constantly monitor the motor shaft position. The encoder feedback feature allows the Ezi-SERVO II CC-Link to update the current motor shaft position information every 25 micro seconds. This allows the Ezi-SERVO II CC-Link drive to compensate for the loss of position, ensuring accurate positioning. For example, due to a sudden load change, a conventional stepper motor and drive could lose a step creating a positioning error and a great deal of cost to the end user!



4. Boost Current / Run Current

Accel / Decel characteristics can be improved by set the Boost Current Parameters. Torque can be improved when driving by set the Run Current Parameters.

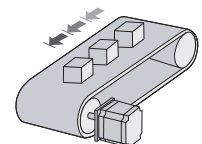
[Example of the Torque Graph According to Run Current Setting]



Measured Condition Drive = Ezi-SERVO II EtherCAT
Motor Voltage = 40VDC
Input Voltage = 24VDC

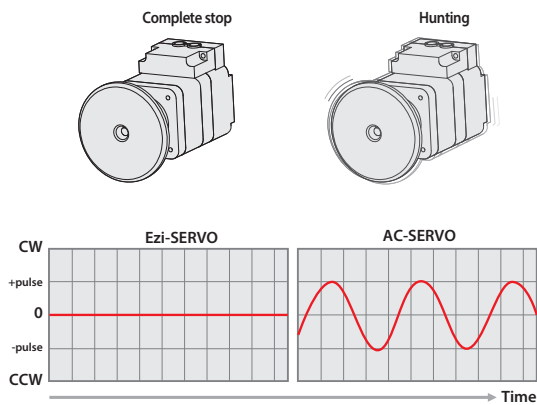
5. No Gain Tuning

Conventional servo systems, to ensure machine performance, smoothness, positional error and low servo noise, require the adjustment of its servo's gains as an initial crucial step. Even systems that employ autotuning require manual tweaking after the system is installed, especially if more than one axis are interdependent. Ezi-SERVO II CC-Link employs the best characteristics of stepper and closed loop motion controls and algorithms to eliminate the need of tedious gain tuning required for conventional closed loop servo systems. This means that Ezi-SERVO II CC-Link is optimized for the application and ready to work right out of the box! The Ezi-SERVO II CC-Link system employs the unique characteristics of the closed loop stepping motor control, eliminating these cumbersome steps and giving the engineer a high performance servo system without wasting setup time. Ezi-SERVO II CC-Link is especially well suited for low stiffness loads(For example, a belt and pulley system) that sometime require conventional servo systems to inertia match with the added expense and bulk of a gearbox. Ezi-SERVO II CC-Link also performs exceptionally, even under heavy loads and high speeds!



6. No Hunting

Traditional servo motor drives overshoot their position and try to correct by overshooting the opposite direction, especially in high gain applications. This is called null hunt and is especially prevalent in systems that the break away or static friction is significantly higher than the running friction. The cure is lowering the gain, which affects accuracy or using Ezi-SERVO II CC-Link Motion Control System! Ezi-SERVO II CC-Link utilizes the unique characteristics of stepping motors and locks itself into the desired target position, eliminating Null Hunt. This feature is especially useful in applications such as nanotech manufacturing, semiconductor fabrication, vision systems and ink jet printing in which system oscillation and vibration could be a problem.



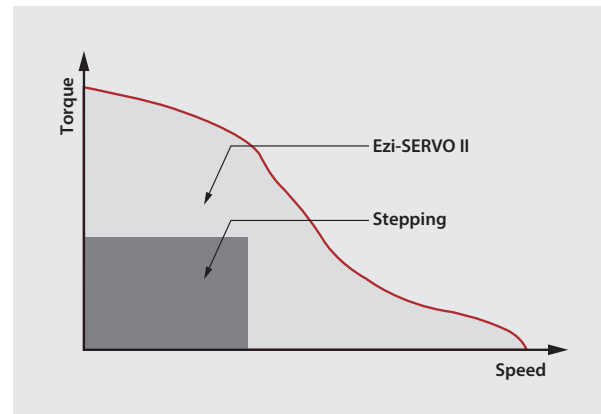
7. Fast Response

Similar to conventional stepping motors, Ezi-SERVO II CC-Link instantly synchronizes with command pulses providing fast positional response. Ezi-SERVO II CC-Link is the optimum choice when zero-speed stability and rapid motions within a short distance are required. Traditional servo motor systems have a natural delay between the commanding input signals and the resultant motion because of the constant monitoring of the current position, necessitating in a waiting time until it settles, called settling time.



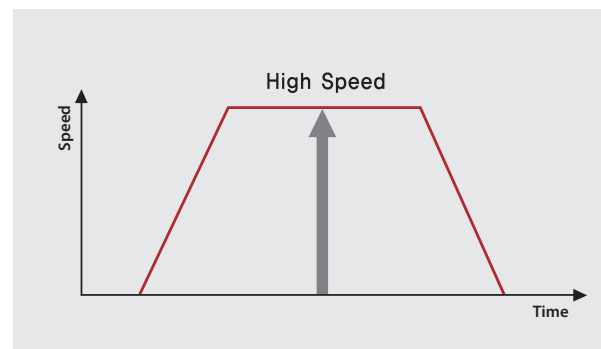
8. High Torque

Compared with common step motors and drives, Ezi-SERVO II CC-Link motion control systems can maintain a high torque state over relatively long period of time. This means that Ezi-SERVO II continuously operates without loss of position under 100% of the load. Unlike conventional Microstep drives, Ezi-SERVO II CC-Link exploits continuous high-torque operation during high-speed motion due to its innovative optimum current phase control.



9. High Speed

The Ezi-SERVO II CC-Link functions well at high speed without the loss of Synchronism or positioning error. Ezi-SERVO II CC-Link's ability of continuous monitoring of current position enables the stepping motor to generate high-torque, even under a 100% load condition.



Part Numbering Method

Ezi-SERVO II-CL-56L-A-BK-PN05-□



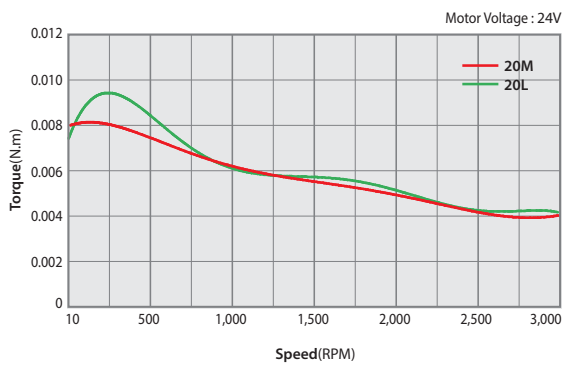
Motor, Drive Combination

UNIT No.	MOTOR No.	DRIVE No.
Ezi-SERVO II-CL-20M-F	EzM2-20M-F	EzS2-CL-20M-F
Ezi-SERVO II-CL-20L-F	EzM2-20L-F	EzS2-CL-20L-F
Ezi-SERVO II-CL-28S-D	EzM2-28S-D	EzS2-CL-28S-D
Ezi-SERVO II-CL-28M-D	EzM2-28M-D	EzS2-CL-28M-D
Ezi-SERVO II-CL-28L-D	EzM2-28L-D	EzS2-CL-28L-D
Ezi-SERVO II-CL-35M-D	EzM2-35M-D	EzS2-CL-35M-D
Ezi-SERVO II-CL-35L-D	EzM2-35L-D	EzS2-CL-35L-D
Ezi-SERVO II-CL-42S-A	EzM2-42S-A	EzS2-CL-42S-A
Ezi-SERVO II-CL-42S-B	EzM2-42S-B	EzS2-CL-42S-B
Ezi-SERVO II-CL-42M-A	EzM2-42M-A	EzS2-CL-42M-A
Ezi-SERVO II-CL-42M-B	EzM2-42M-B	EzS2-CL-42M-B
Ezi-SERVO II-CL-42L-A	EzM2-42L-A	EzS2-CL-42L-A
Ezi-SERVO II-CL-42L-B	EzM2-42L-B	EzS2-CL-42L-B
Ezi-SERVO II-CL-42XL-A	EzM2-42XL-A	EzS2-CL-42XL-A
Ezi-SERVO II-CL-42XL-B	EzM2-42XL-B	EzS2-CL-42XL-B
Ezi-SERVO II-CL-56S-A	EzM2-56S-A	EzS2-CL-56S-A
Ezi-SERVO II-CL-56S-B	EzM2-56S-B	EzS2-CL-56S-B
Ezi-SERVO II-CL-56M-A	EzM2-56M-A	EzS2-CL-56M-A
Ezi-SERVO II-CL-56M-B	EzM2-56M-B	EzS2-CL-56M-B
Ezi-SERVO II-CL-56L-A	EzM2-56L-A	EzS2-CL-56L-A
Ezi-SERVO II-CL-56L-B	EzM2-56L-B	EzS2-CL-56L-B
Ezi-SERVO II-CL-60S-A	EzM2-60S-A	EzS2-CL-60S-A
Ezi-SERVO II-CL-60S-B	EzM2-60S-B	EzS2-CL-60S-B
Ezi-SERVO II-CL-60M-A	EzM2-60M-A	EzS2-CL-60M-A
Ezi-SERVO II-CL-60M-B	EzM2-60M-B	EzS2-CL-60M-B
Ezi-SERVO II-CL-60L-A	EzM2-60L-A	EzS2-CL-60L-A
Ezi-SERVO II-CL-60L-B	EzM2-60L-B	EzS2-CL-60L-B

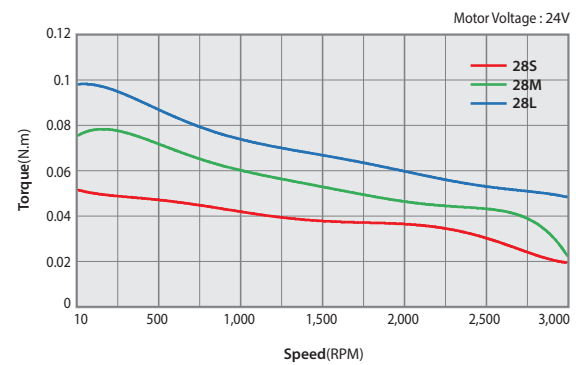
Motor Specification Table

Model	Unit	20		28			35	
		20M	20L	28S	28M	28L	35M	35L
DRIVE METHOD	-	BI-POLAR						
Number OF PHASES	-	2	2	2	2	2	2	2
VOLTAGE	VDC	2.75	3	3	3	3	2.88	4.59
CURRENT per PHASE	A	0.5	0.5	0.95	0.95	0.95	0.6	0.85
RESISTANCE per PHASE	Ohm	5.5	6	3.2	3.2	3.2	4.8	5.4
INDUCTANCE per PHASE	mH	2	2.6	2	2.7	3.2	6.1	6.5
HOLDING TORQUE	N·m	0.016	0.025	0.069	0.098	0.118	0.050	0.176
ROTOR INERTIA	g·cm ²	2.5	3.3	9	13	18	8	11
WEIGHTS	g	50	80	110	140	200	180	260
LENGTH(L)	mm	28	38	32	45	50	26	38
ALLOWABLE OVERHUNG LOAD (DISTANCE FROM END OF SHAFT)	3mm	18	18	30	30	30	22	22
	8mm	30	30	38	38	38	26	26
	13mm	-	-	53	53	53	33	33
	18mm	-	-	-	-	-	46	46
ALLOWABLE THRUST LOAD	N	Lower than motor weight						
INSULATION RESISTANCE	Mohm	100 MΩ MIN.(at 500VDC)						
INSULATION CLASS	-	CLASS B(130°C)						
OPERATING TEMPERATURE	°C	0 to 55						

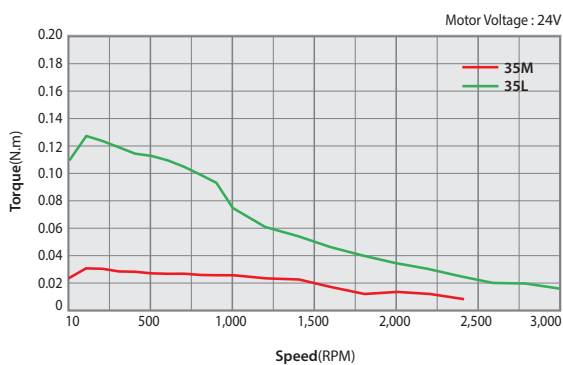
Ezi-SERVO II CC-Link_ 20 Series



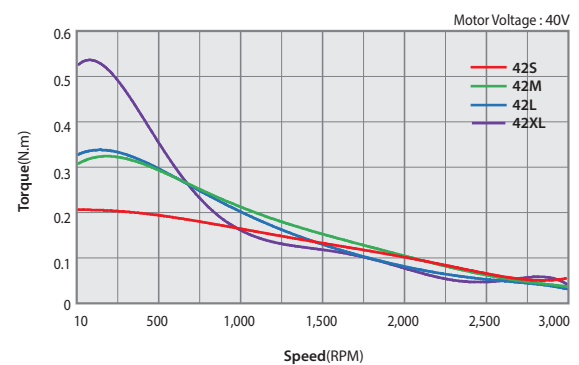
Ezi-SERVO II CC-Link_ 28 Series



Ezi-SERVO II CC-Link_ 35 Series

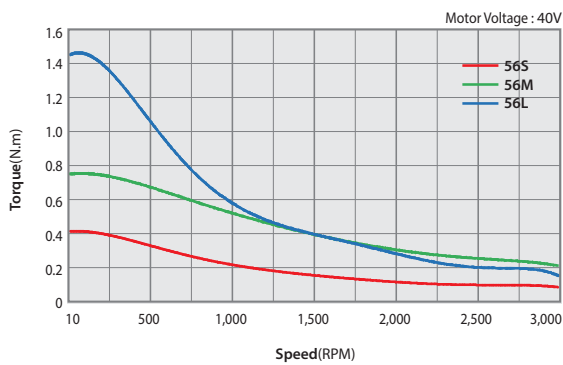


Ezi-SERVO II CC-Link_ 42 Series

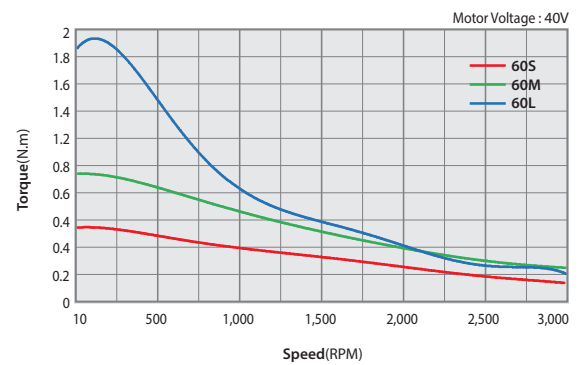


42				56			60		
42S	42M	42L	42XL	56S	56M	56L	60S	60M	60L
BI-POLAR									
2	2	2	2	2	2	2	2	2	2
3.36	4.32	4.56	7.2	1.56	1.62	2.64	1.32	1.48	2.2
1.2	1.2	1.2	1.2	3	3.0	3.0	4.0	4.0	4.0
2.8	3.6	3.8	6	0.52	0.54	0.88	0.33	0.37	0.55
5.4	7.2	8	15.6	1.2	2	4	0.75	1.1	2.7
0.32	0.44	0.5	0.65	0.64	1	1.5	0.88	1.28	2.4
35	54	77	114	180	280	520	240	490	690
250	280	350	500	500	720	1150	600	1000	1300
34	40	48	60	46	55	80	47	56	85
22	22	22	22	52	52	52	70	70	70
26	26	26	26	65	65	65	87	87	87
33	33	33	33	85	85	85	114	114	114
46	46	46	46	123	123	123	165	165	165
Lower than motor weight									
100 MΩ MIN.(at 500VDC)									
CLASS B(130°C)									
0 to 55									

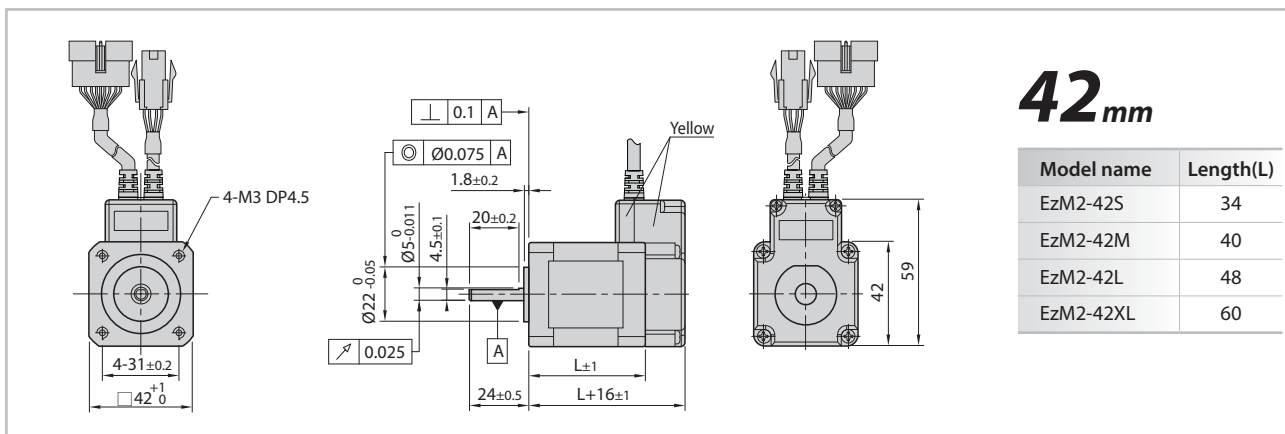
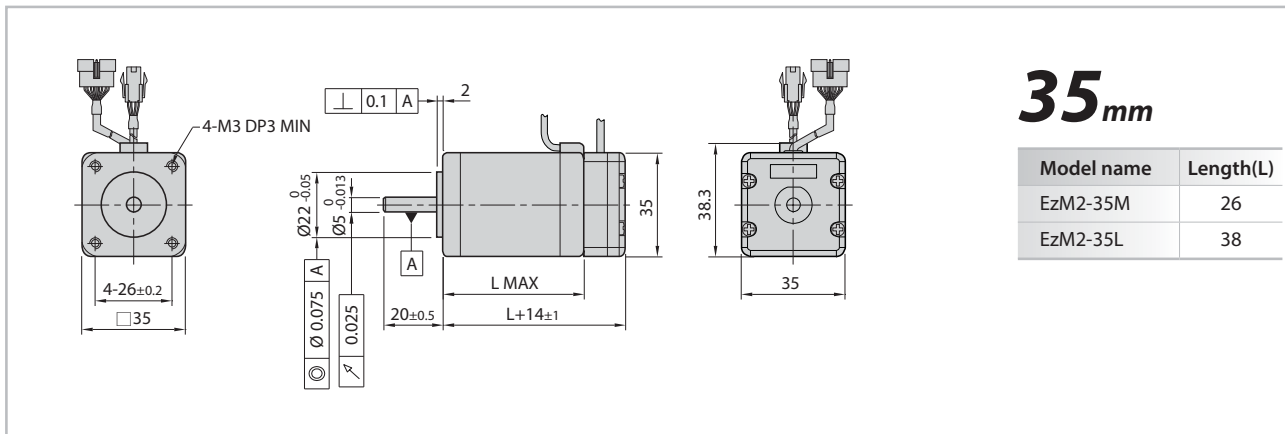
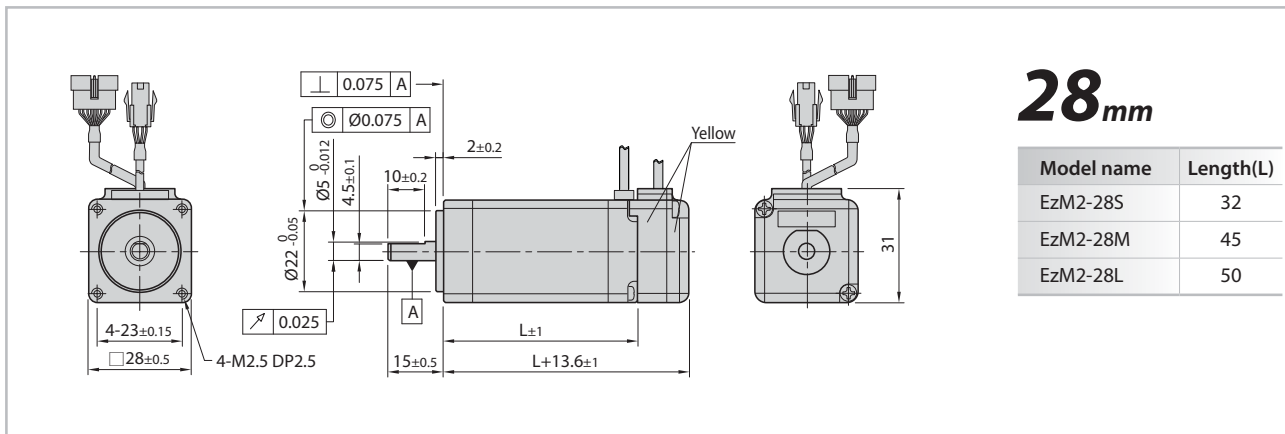
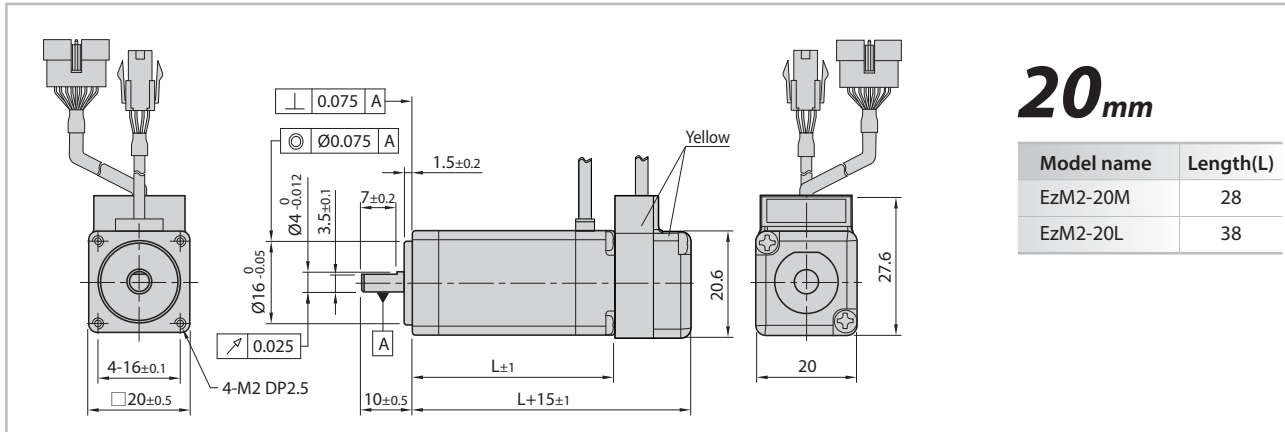
Ezi-SERVO II CC-Link_ 56 Series

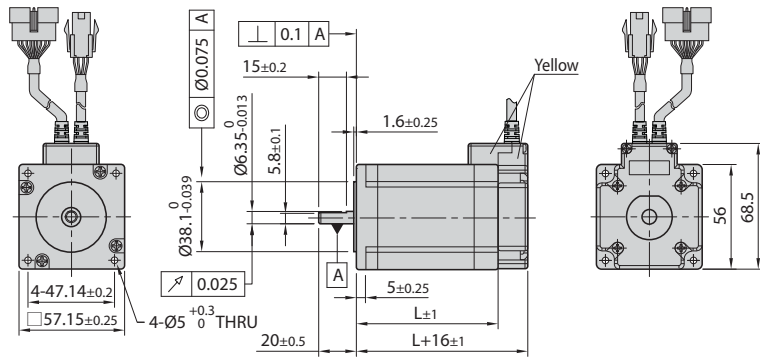


Ezi-SERVO II CC-Link_ 60 Series



Motor Drawing

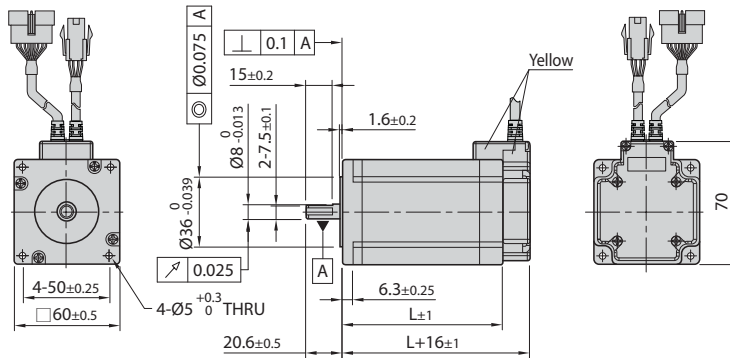




56mm

Model name	Length(L)
EzM2-56S	46
EzM2-56M	55
EzM2-56L	80

※ There are 2 kinds size of front shaft diameter for EzM2-56 series as $\Phi 6.35$ and $\Phi 8.0$.



60mm

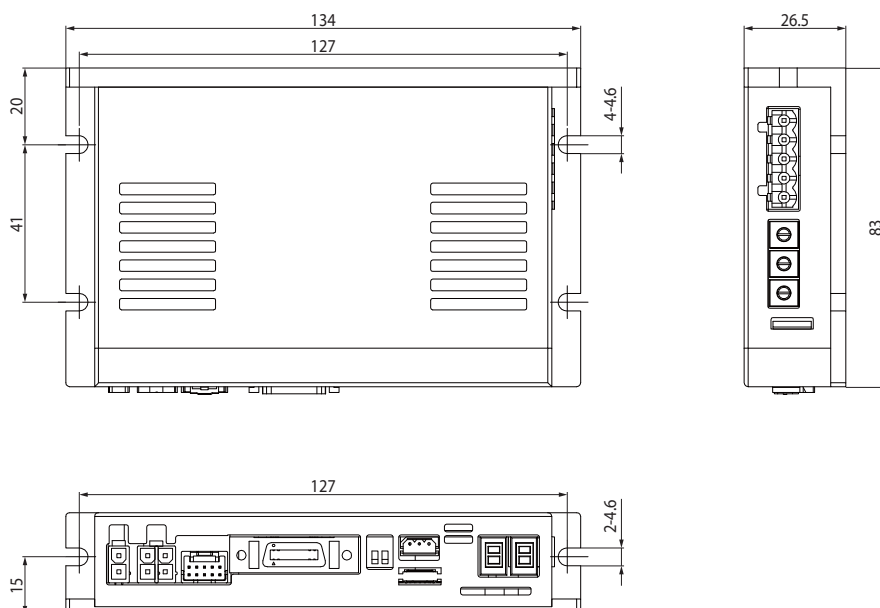
Model name	Length(L)
EzM2-60S	47
EzM2-60M	56
EzM2-60L	85

Drive Specification

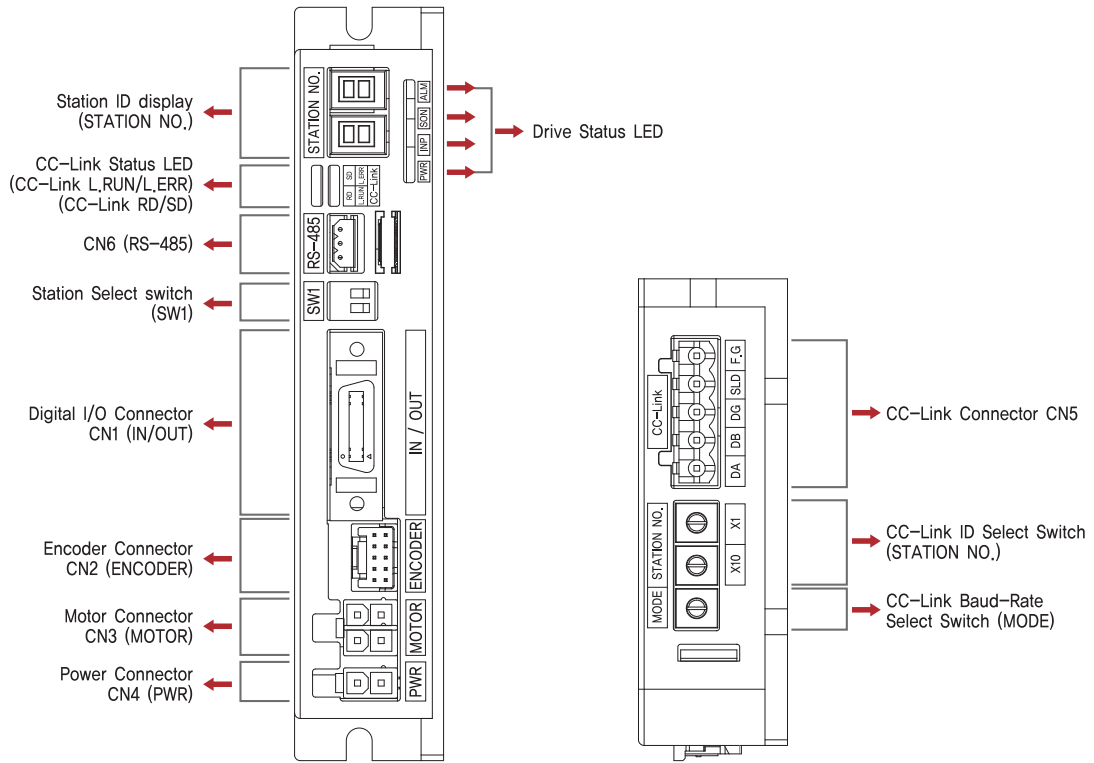
Specifications

Motor	EzM2-20 series	EzM2-28 series	EzM2-35 series	EzM2-42 series	EzM2-56 series	EzM2-60 series
Drive	EzS2-CL-20 series	EzS2-CL-28 series	EzS2-CL-35 series	EzS2-CL-42 series	EzS2-CL-56 series	EzS2-CL-60 series
Input Voltage	24VDC \pm 10%					
Control Method	Closed Loop Control by ARM-based 32-bit MCU					
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				
Drive	Rotation Speed	0~3,000[rpm]				
	Resolution[ppr]	· 4,000[ppr] Encoder model : 500 / 1,000 / 1,600 / 2,000 / 3,600 / 5,000 / 6,400 / 7,200 / 10,000 / 4,000 · 10,000[ppr] Encoder model : 500 / 1,000 / 1,600 / 2,000 / 3,600 / 5,000 / 6,400 / 7,200 / 10,000 · 16,000[ppr] Encoder model : 500 / 1,000 / 1,600 / 2,000 / 3,600 / 5,000 / 6,400 / 7,200 / 10,000 / 16,000 · 20,000[ppr] Encoder model : 500 / 1,000 / 1,600 / 2,000 / 3,600 / 5,000 / 6,400 / 7,200 / 10,000 / 20,000 (Selected by Parameter)				
	Protection Functions	Over Current Error, Over Speed Error, Position Tracking Error, Over Load Error, Over Temperature Error, Over Regenerated Voltage, Motor Connection Error, Encoder Connection Error, Motor Voltage Error, In-Position Error, ROM Error, Position Overflow Error				
	LED Display	Power Status, In-Position Status, Servo on Status, Alarm Status				
	Station Type	Remote Device Station				
CC-Link	Station Type	Remote Device Station				
	Number of occupied Station	1 station, 2 station				
I/O Signal	Input signal function	3 dedicated inputs(LIMIT+, LIMIT-, ORIGIN), 7 user inputs				
	Output signal function	2 dedicated outputs(BRAKE+, BRAKE-), 6 user outputs(photocoupler)				

Drive Dimension(mm)



Setting and Operation



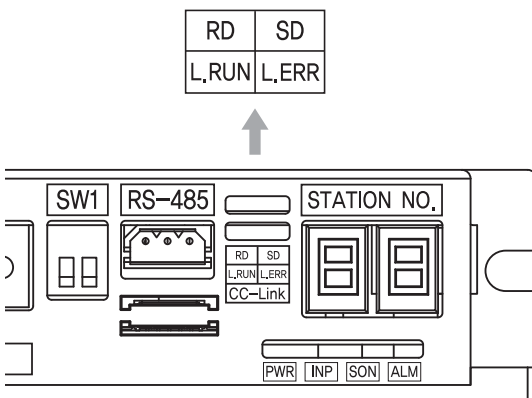
System Configuration

Status Monitor LED

1. CC-Link Status LED

LED indicated communication status of CC-Link.

Name	Color	Status	Fuction	Explanation
L. RUN	Green	Off	Power off	Checking the power status.
			No network connection	Checking the status of the network cable and Master controller.
		On	Normal operation	CC-Link network connection is normal status
L. ERROR	Red	Off	Normal operation	No error occurred
			Critical error	Communication process fails.
		Flashing	Communication error	Error occurred in the CC-Link network. Check the 7-segment display information and process it.
			CRC error, Network cable error	There is a contact error of the network connector or noise in the cable line. To Check the terminating resistor attachment status, network wiring, and the grouding status of the frame.
RD	Orange	Off	No data receiving	
		On	Data receiving	
SD	Yellow	Off	No data transmission	
		On	Data transmitting	



2. CC-Link Network Status 7-Segment Display Information

ERROR display	Description
E-0□□.	Normal CC-Link network status
E-1□□.	CC-Link station number switch setting is incorrect
E-2□□.	CC-Link mode switch steering is incorrect
E-3□□.	CC-Link station number switch setting is changed
E-4□□.	CC-Link mode switch steering is changed
E-5□□.	CRC error occurs in CC-Link communication
E-6□□.	Timeout occurs during communication with master
E-7□□.	Communication with master is disconnected
E-8□□.	CC-Link Processor Error 1
E-9□□.	CC-Link Processor Error 2
E-A□□.	Data link error
E-B□□.	Remote I/O error
E-C□□.	Remote register error

3. Status LED

Indiation	Color	Fuction	On/Off Condition
PWR	Green	Power Input Indication	LED is turned ON when power applied
INP	Yellow	Complete Positioning Motion	Lights On when Positioning error reaches within the pre-set pulse selected by rotaty switch
SON	Orange	Servo on/off indication	· Servo On : Light on · Servo Off : Lights off
ALM	Red	Alarm Indication	Flash when protection function is activated

Alarm LED Flushing(ex: Position Tracking Error)



Switch

4. Protection functions and LED flash times

Error Code *2	Protection	Conditions
E-001	Over current Error	The current through power devices in inverter exceeds the limit value
E-002	Over speed Error	Motor speed exceed 3,000[rpm]
E-003	Position tracking Error	Position error value is higher than 90° in motor run state
E-004	Over load Error	The motor is continuously operated more than 5 second under a load exceeding the Max. torque
E-005	Over temperature Error	Temperature of inside of drive exceed 85°C
E-006	Over regenerative voltage Error	Back EMF of motor exceeds limit value *1
E-007	Motor connect Error	The power is ON without connection of the motor cable to drive
E-008	Encoder connect Error	There is connection error between drive and encoder
E-00A	In-Positon Error	After operation is finished, a position error occurs
E-00C	ROM Error	Error occurs in parameter storage device(ROM)
E-00F	Position overflow Error	Position error value is higher than 90° in motor stop state

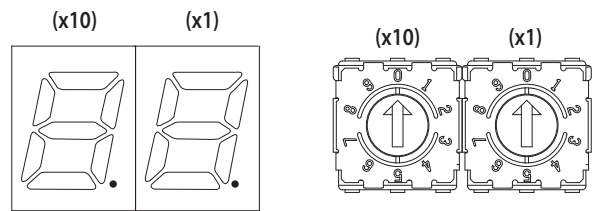
*1 : Voltage limit of Back-EMF depends on motor model

*3 : The Alarm occurs, error code is displayed instead of CC-Link Station No. on the Station ID display

※ Please refer to User Manual for the other protection Functions.

1. CC-Link Station Display and Select switch

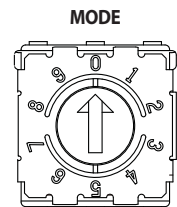
There are two Rotary switch to set value of CC-Link station No. Switch on the right side(x1) indicates the one's(1) digit and Switch on the left side(x10) indicates ten's(10) digit.



2. CC-Link Mode Select Switch

The setting of CC-Link Baud-Rate can be set with Rotary switch. Changing of mode selection switch(SW 3) can set the Baud-Rate as follows.

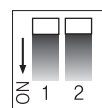
Mode	CC-Link Baud-Rate
0	156Kbps
1	625Kbps
3	2.5Mbps
4	5Mbps
5	10Mbps
6	None
7	None
8	None
9	None



3. CC-Link Station Select Switch

Ezi-SERVO II CC-Link provides various functions depending on the station occupancy. Select the station occupancy with Dip-switch(SW 1).

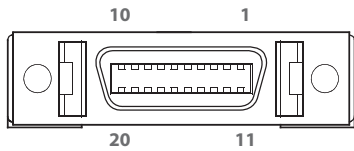
SW 1.1	SW 1.2	CC-Link Baud-Rate
OFF	OFF	1station occupation
ON	OFF	2station occupation



Connector

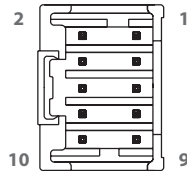
1. Input / Output Signal(IN/OUT)

No	Function	I/O	No	Function	I/O
1	LIMIT+	Input	11	Digital Output 1	Output
2	LIMIT-	Input	12	Digital Output 2	Output
3	ORIGIN	Input	13	Digital Output 3	Output
4	Digital Input 1	Input	14	Digital Output 4	Output
5	Digital Input 2	Input	15	Digital Output 5	Output
6	Digital Input 3	Input	16	Digital Output 6	Output
7	Digital Input 4	Input	17	BRAKE+	Output
8	Digital Input 5	Input	18	BRAKE-	Output
9	Digital Input 6	Input	19	24VDC GND	Input
10	Digital Input 7	Input	20	24VDC	Input



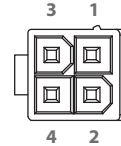
2. Encoder Connector(Encoder)

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	----



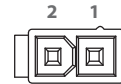
3. Motor Connector(Motor)

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



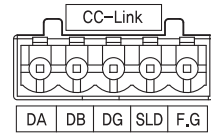
4. Power Connector(PWR)

No	Function
1	24VDC ±10%
2	GND



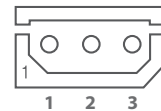
5. EtherCAT Communication Connector

No	Function
1	DA
2	DB
3	DG
4	SLD
5	F.G



6. RS-485 Communication Connector

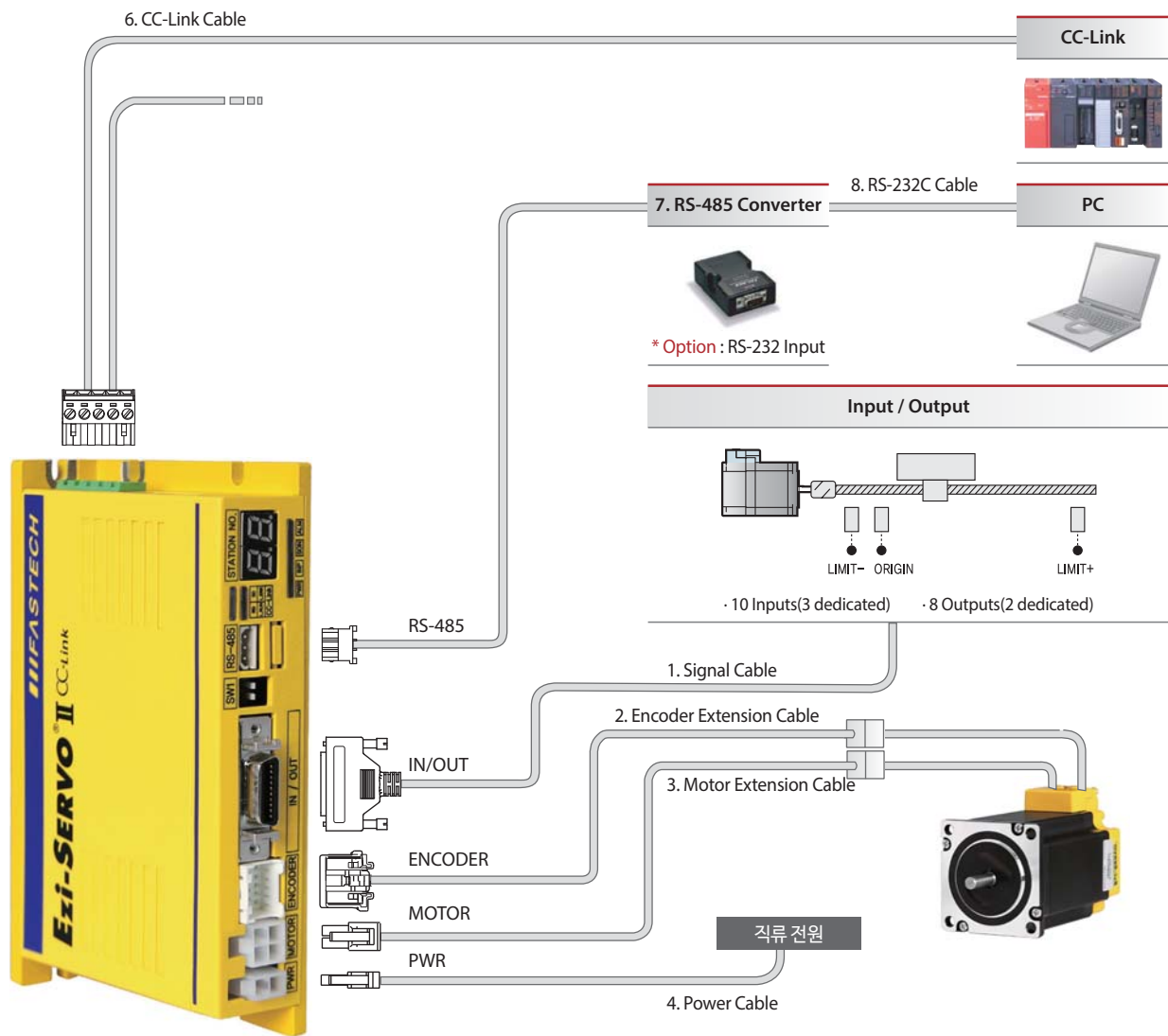
No	Function
1	DATA+
2	DATA-
3	GND



Connector for Cabling

Purpose	ITEM	Standard	Manufacturer
CN 1 : Input / Output Signal(IN/OUT)	Connector	10120-3000PE	3M
	Shell	10320-52FO-008	
CN 2 : Encoder Connector(Encoder)	Housing	51353-1000	MOLEX
	Terminal	56134-9000	
CN 3 : Motor Connection(Motor)	Housing	5557-04R	MOLEX
	Terminal	5556T	
CN 4 : Power Connection(PWR)	Housing	5557-02R	MOLEX
	Terminal	5556T	
CN 5 : CC-Link Connector	Pin Strip / Terminal Blocks	AK950-5P	PTR
CN 6 : RS-485 Connector	Housing	5264-03	MOLEX
	Terminal	5263PBT	

System Configuration



Type	Signal Cable	Encoder Cable	Motor Cable	Power Cable	CC-Link Cable
Standard Length	-	30cm	30cm	-	-
Max. Length	20m	20m	20m	2m	100m

Option Cable

1. Signal Cable

Available to extended connection between motor and Ezi-SERVO II CC-Link.

Model Name	Length[m]	Remark
CSVN-S-□□□ F	□□□	Normal Cable
CSVN-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-SERVO II CC-Link.

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

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

3. Motor Extension Cable

Available to connect between Ezi-SERVO II CC-Link and Input / Output signals.

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-SERVO II CC-Link.

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

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

5. RS-485 Cable

Ezi-SERVO II CC-Link to RS-485 network

Model Name	Length[m]	Remark
CGNR-RT-□□□ F	□□□	Normal Cable

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

6. CC-Link Network Cable

It is a cable to connect Ezi-SERVO II CC-Link to CC-Link network.

※ This cable is not provided and it is recommended to use the cable specified by CC-Link Association.

7. FAS-RCR(RS-232 to RS-485 Converter)

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

8. RS-232 Cable

Model Name	Length[m]	Remark
CGNR-C-002F	2	Normal Cable
CGNR-C-003F	3	
CGNR-C-005F	5	

Option

1. TB-Plus(Interface Board)

Available to connect more conveniently between Input / Output signal and Ezi-SERVO II CC-Link.



Interface Cable

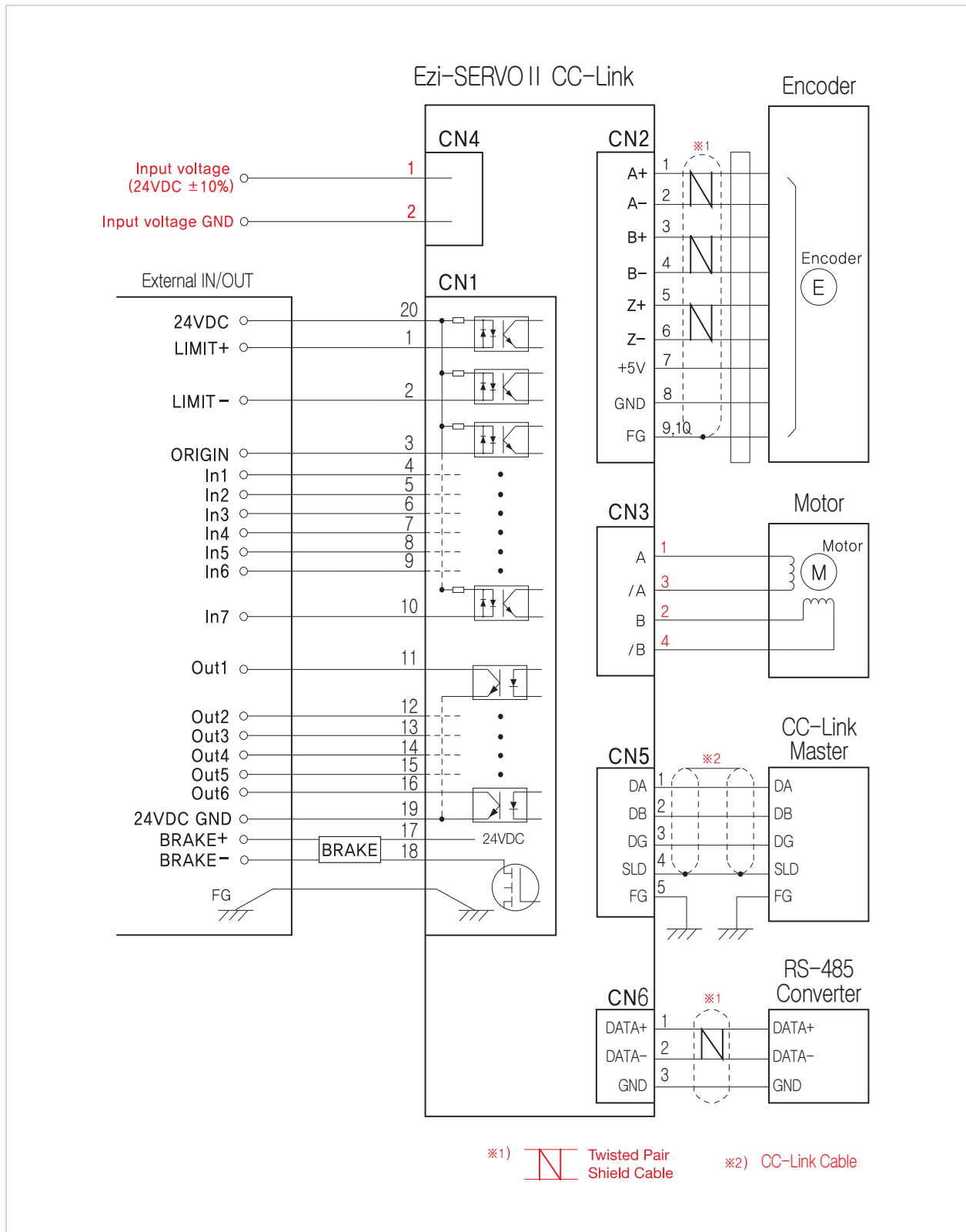
Available to Connect between TB-Plus Interface Board and Ezi-SERVO II CC-Link.

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

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

External Wiring Diagram

Ezi-SERVO II CC-Link





Fast, Accurate, Smooth Motion

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