

# **Ezi-STEP<sup>®</sup>** **CC-Link IE TSN**

## **Micro Stepping System** **ALL**

- CC-Link IE TSN-compatible Microstepping System
- CiA402 Drive Profile
- Software Damping (Resonance & Vibration Suppression)
- Motor + Drive Integrated
- Space Saving, Reduced Wiring

[Draft ver.]

CE



Fast Accurate Smooth Motion

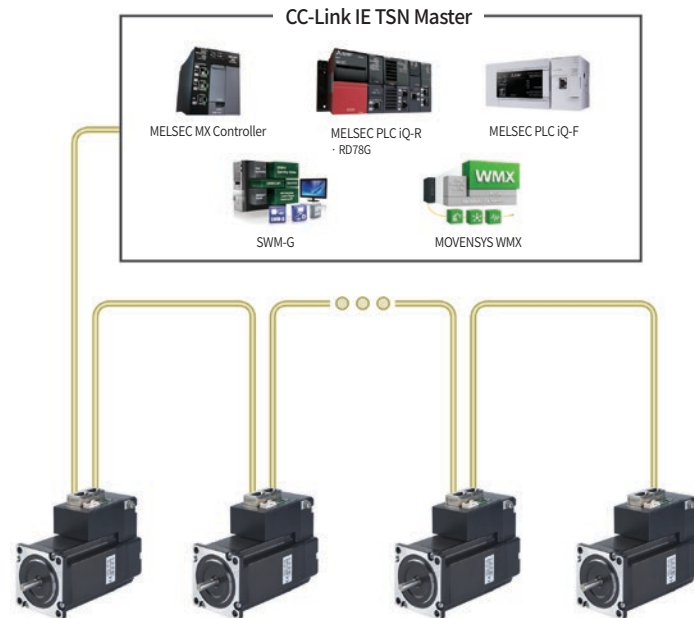
# **Ezi-STEP<sup>®</sup>** CC-LínkIE TSN

Micro Stepping System **ALL**



## CC-Link IE TSN-compatible Motion Control

Ezi-STEP CC-Link IE TSN ALL is stepper motor control system that supports CC-Link IE TSN, an industrial network based on high-speed Ethernet (1 Gbps, full-duplex communication). Ezi-STEP CC-Link IE TSN ALL employs CiA402 drive profile and supports Cyclic Synchronous Position Mode (CSP Mode), Profile Position Mode (PP Mode) and Homing Mode (HM Mode).



## Microstep and Filtering

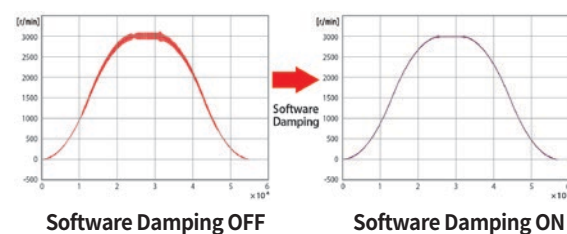
Ezi-STEP adopts a microstepping drive method, allowing the basic step angle of  $1.8^\circ$  to be subdivided up to  $1/250$  ( $0.0072^\circ$ ) for high-precision control. Unlike conventional drives, it performs PWM control every  $50 \mu\text{s}$ , enabling enhanced current control for even more precise motion.

In addition, Ezi-STEP incorporates filtering control technology, ensuring smooth operation even at very low speeds.

## Software Damping

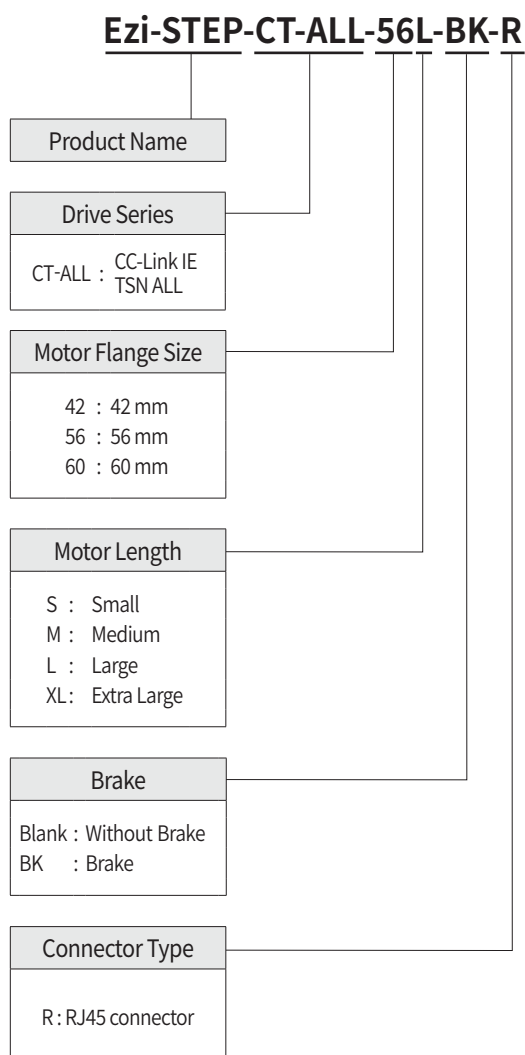
Motor vibration is created by magnetic flux variations of the motor, lower current from the drive due to back-emf from the motor at high speeds and lowering of phase voltages from the drive. Ezi-STEP drive detects these problems and the MCU adjusts the phase of the current and the pole position of the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

This allows the smooth operation of the motor at high speeds.



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

## Ezi-STEP-CT-ALL Part Numbering



## Standard Combination

| Unit Part Number       | Motor Model Number              | Drive Model Number |
|------------------------|---------------------------------|--------------------|
| Ezi-STEP-CT-ALL-42M-R  | Integrated Motor and Drive Unit |                    |
| Ezi-STEP-CT-ALL-42L-R  |                                 |                    |
| Ezi-STEP-CT-ALL-42XL-R |                                 |                    |
| Ezi-STEP-CT-ALL-56S-R  |                                 |                    |
| Ezi-STEP-CT-ALL-56M-R  |                                 |                    |
| Ezi-STEP-CT-ALL-56L-R  |                                 |                    |
| Ezi-STEP-CT-ALL-60S-R  |                                 |                    |
| Ezi-STEP-CT-ALL-60M-R  |                                 |                    |
| Ezi-STEP-CT-ALL-60L-R  |                                 |                    |

## Combination with Brake

| Unit Part Number          | Motor Model Number              | Drive Model Number |
|---------------------------|---------------------------------|--------------------|
| Ezi-STEP-CT-ALL-42M-BK-R  | Integrated Motor and Drive Unit |                    |
| Ezi-STEP-CT-ALL-42L-BK-R  |                                 |                    |
| Ezi-STEP-CT-ALL-42XL-BK-R |                                 |                    |
| Ezi-STEP-CT-ALL-56S-BK-R  |                                 |                    |
| Ezi-STEP-CT-ALL-56M-BK-R  |                                 |                    |
| Ezi-STEP-CT-ALL-56L-BK-R  |                                 |                    |
| Ezi-STEP-CT-ALL-60S-BK-R  |                                 |                    |
| Ezi-STEP-CT-ALL-60M-BK-R  |                                 |                    |
| Ezi-STEP-CT-ALL-60L-BK-R  |                                 |                    |

## Specifications of Drive

| Model               |                        | Ezi-STEP-CT-ALL-42 series                                                                                                        | Ezi-STEP-CT-ALL-56 series |        |        |        | Ezi-STEP-CT-ALL-60 series |       |       |       |       |        |  |
|---------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------|---------------------------|--------|--------|--------|---------------------------|-------|-------|-------|-------|--------|--|
| Input Voltage       |                        | 24 V DC $\pm$ 10 %                                                                                                               |                           |        |        |        |                           |       |       |       |       |        |  |
| Control Method      |                        | Bipolar PWM drive with 32 bit MCU                                                                                                |                           |        |        |        |                           |       |       |       |       |        |  |
| Current Consumption |                        | Max. 500 mA (Except motor current)                                                                                               |                           |        |        |        |                           |       |       |       |       |        |  |
| Operating Condition | Ambient Temperature    | · In Use: 0 ~ 50°C<br>· In Storage: -20 ~ 70°C                                                                                   |                           |        |        |        |                           |       |       |       |       |        |  |
|                     | Humidity               | · In Use: 35 ~ 85 % RH (Non-Condensing)<br>· In Storage: 10 ~ 90 % RH (Non-Condensing)                                           |                           |        |        |        |                           |       |       |       |       |        |  |
|                     | Vib. Resist.           | 0.5 g                                                                                                                            |                           |        |        |        |                           |       |       |       |       |        |  |
| Function            | Rotation Speed         | 0 ~ 3,000 r/min                                                                                                                  |                           |        |        |        |                           |       |       |       |       |        |  |
|                     | Resolution             | 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 Type             | Over Current Error, Over Speed Error, Over Temperature Error, Over Regenerative Voltage Error, Motor Connection Error, ROM Error |                           |        |        |        |                           |       |       |       |       |        |  |
| CC-Link IE TSN      | Communication Protocol | CC-Link IE TSN Class B                                                                                                           |                           |        |        |        |                           |       |       |       |       |        |  |
|                     | Operation Mode         | CiA402 Drive Profile: Cyclic Synchronous Position Mode(CSP), Profile Position Mode(PP), Homing Mode(HM)                          |                           |        |        |        |                           |       |       |       |       |        |  |
|                     | Synchronization        | Minimum Cycle Time: 250 $\mu$ s / Synchronous Comm. (CSP, PP, HM) / Asynchronous Comm. (PP, HM)                                  |                           |        |        |        |                           |       |       |       |       |        |  |
| I/O Signal          | Input Signals          | 3 dedicated inputs (LIMIT+, LIMIT-, ORIGIN), 3 user inputs (photocoupler inputs)                                                 |                           |        |        |        |                           |       |       |       |       |        |  |
|                     | Output Signals         | 2 user outputs (photocoupler outputs), 1 brake signal output                                                                     |                           |        |        |        |                           |       |       |       |       |        |  |

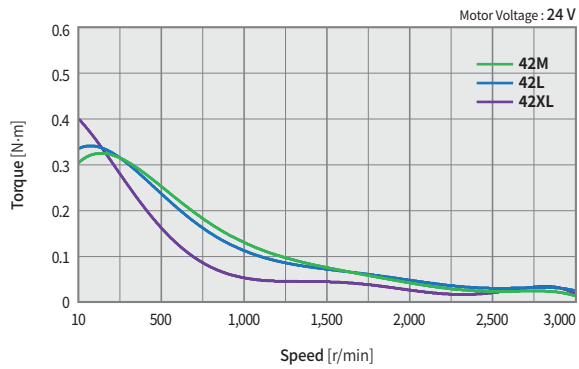
## Specifications of Motor

| Model                   |                                          |       |   | Ezi-STEP-CT-ALL-42 Series |                                                                      |       | Ezi-STEP-CT-ALL-56 Series |       |       |       |  |
|-------------------------|------------------------------------------|-------|---|---------------------------|----------------------------------------------------------------------|-------|---------------------------|-------|-------|-------|--|
|                         |                                          |       |   | UNIT                      | 42M                                                                  | 42L   | 42XL                      | 56S   | 56M   | 56L   |  |
| Drive Method            |                                          |       |   | -                         | Bipolar                                                              |       |                           |       |       |       |  |
| Number Of Phases        |                                          |       |   | -                         | 2 Phase                                                              |       |                           |       |       |       |  |
| Current per Phase       |                                          |       |   | A/Phase                   | 1.2                                                                  | 1.2   | 1.2                       | 3.0   | 3.0   | 3.0   |  |
| Maximum Holding Torque  |                                          |       |   | N·m                       | 0.44                                                                 | 0.5   | 0.65                      | 0.64  | 1.0   | 1.5   |  |
| Rotor Inertia           |                                          |       |   | g·cm <sup>2</sup>         | 54                                                                   | 77    | 114                       | 180   | 280   | 520   |  |
| Weights                 |                                          |       |   | kg                        | 0.440                                                                | 0.520 | 0.660                     | 0.760 | 0.920 | 1.360 |  |
| Length(L)               |                                          |       |   | mm                        | 40                                                                   | 48    | 60                        | 46    | 55    | 80    |  |
| Permissible Radial Load | Dis-<br>tance<br>From<br>End Of<br>Shaft | 3 mm  | N | 22                        | 22                                                                   | 22    | 52                        | 52    | 52    |       |  |
|                         |                                          | 8 mm  |   | 26                        | 26                                                                   | 26    | 65                        | 65    | 65    |       |  |
|                         |                                          | 13 mm |   | 33                        | 33                                                                   | 33    | 85                        | 85    | 85    |       |  |
|                         |                                          | 18 mm |   | 46                        | 46                                                                   | 46    | 123                       | 123   | 123   |       |  |
| Permissible Axial Load  |                                          |       |   | N                         | Lower than motor unit's weight                                       |       |                           |       |       |       |  |
| Insulation Resistance   |                                          |       |   | MΩ                        | Min. 100 (When measured with a 500 V DC insulation resistance meter) |       |                           |       |       |       |  |
| Insulation Class        |                                          |       |   | -                         | Class B (130 °C)                                                     |       |                           |       |       |       |  |
| Operating Temperature   |                                          |       |   | °C                        | 0 ~ 55                                                               |       |                           |       |       |       |  |

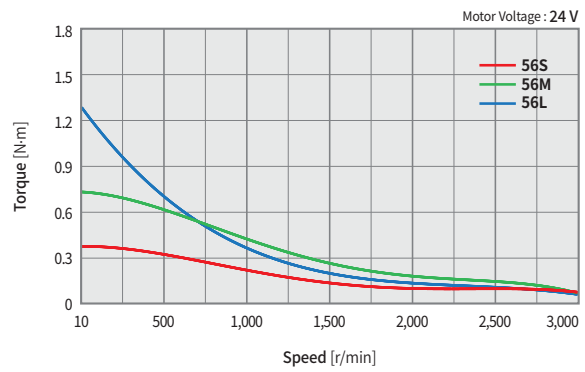
| Model                   |                                          |       | Ezi-STEP-CT-ALL-60 Series |                                                                      |  |       |  |       |
|-------------------------|------------------------------------------|-------|---------------------------|----------------------------------------------------------------------|--|-------|--|-------|
|                         |                                          |       | UNIT                      | 60S                                                                  |  | 60M   |  | 60L   |
| Drive Method            |                                          |       | -                         | Bipolar                                                              |  |       |  |       |
| Number Of Phases        |                                          |       | -                         | 2 Phase                                                              |  |       |  |       |
| Current per Phase       |                                          |       | A/Phase                   | 4.0                                                                  |  | 4.0   |  | 4.0   |
| Maximum Holding Torque  |                                          |       | N·m                       | 0.88                                                                 |  | 1.28  |  | 2.4   |
| Rotor Inertia           |                                          |       | g·cm <sup>2</sup>         | 240                                                                  |  | 490   |  | 690   |
| Weights                 |                                          |       | kg                        | 0.840                                                                |  | 0.980 |  | 1.540 |
| Length(L)               |                                          |       | mm                        | 47                                                                   |  | 56    |  | 85    |
| Permissible Radial Load | Dis-<br>tance<br>From<br>End Of<br>Shaft | 3 mm  | N                         | 70                                                                   |  | 70    |  | 70    |
|                         |                                          | 8 mm  |                           | 87                                                                   |  | 87    |  | 87    |
|                         |                                          | 13 mm |                           | 114                                                                  |  | 114   |  | 114   |
|                         |                                          | 18 mm |                           | 165                                                                  |  | 165   |  | 165   |
| Permissible Axial Load  |                                          |       | N                         | Lower than motor unit's weight                                       |  |       |  |       |
| Insulation Resistance   |                                          |       | MΩ                        | Min. 100 (When measured with a 500 V DC insulation resistance meter) |  |       |  |       |
| Insulation Class        |                                          |       | -                         | Class B (130 °C)                                                     |  |       |  |       |
| Operating Temperature   |                                          |       | °C                        | 0 ~ 55                                                               |  |       |  |       |

## Torque Characteristics of Motor

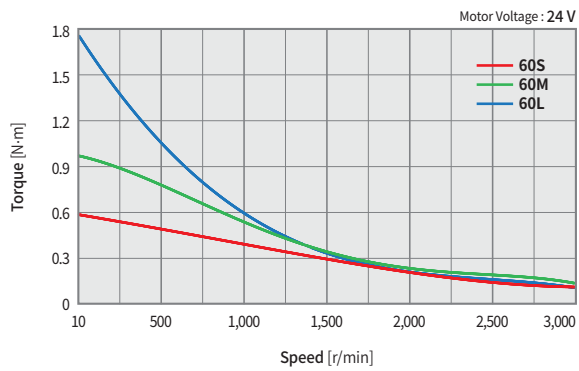
Ezi-STEP-CT-ALL-42 series



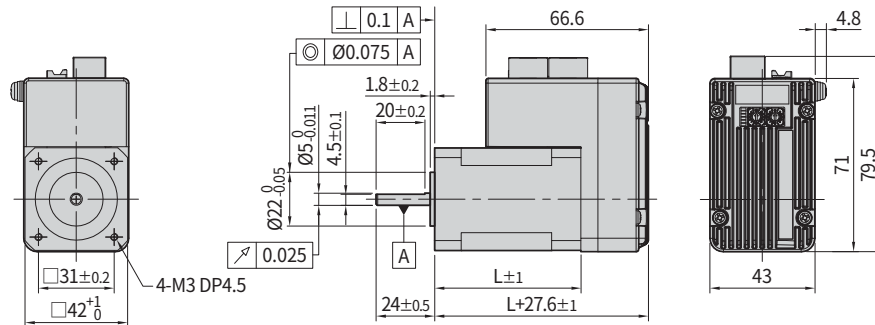
Ezi-STEP-CT-ALL-56 series



Ezi-STEP-CT-ALL-60 series

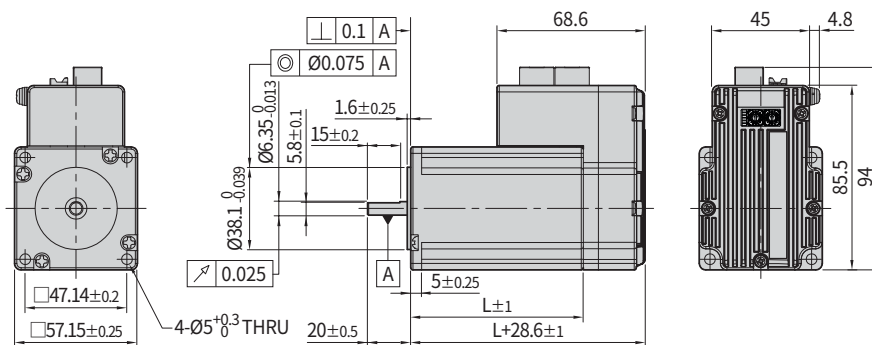


## Dimensions of Motor [mm]



# 42 mm

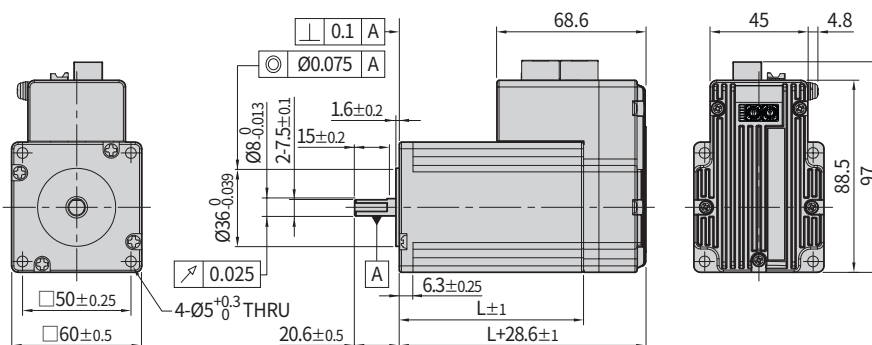
| Model Name | Length(L) |
|------------|-----------|
| 42M        | 40        |
| 42L        | 48        |
| 42XL       | 60        |



# 56 mm

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

※ There are 2 kinds size of front shaft diameter for Ezi-STEP-CT-ALL-56 type as  $\varnothing 6.35$  and  $\varnothing 8.0$ .



# 60 mm

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

## 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-CT-ALL-42M-BK-▲  | Motor & Drive Integrated | Non-excitation run Series | 24 V DC ± 10 %    | 0.2               | 5                     | 0.2                          | 0.700                  | 22                              | 26 | 33  | 46  | Must be Lower than Motor Unit Weight |
| Ezi-STEP-CT-ALL-42L-BK-▲  |                          |                           |                   |                   |                       |                              | 0.780                  |                                 |    |     |     |                                      |
| Ezi-STEP-CT-ALL-42XL-BK-▲ |                          |                           |                   |                   |                       |                              | 0.920                  |                                 |    |     |     |                                      |
| Ezi-STEP-CT-ALL-56S-BK-▲  |                          |                           |                   | 0.27              | 6.6                   | 0.7                          | 1.180                  | 52                              | 65 | 85  | 123 |                                      |
| Ezi-STEP-CT-ALL-56M-BK-▲  |                          |                           |                   |                   |                       |                              | 1.340                  |                                 |    |     |     |                                      |
| Ezi-STEP-CT-ALL-56L-BK-▲  |                          |                           |                   |                   |                       |                              | 1.780                  |                                 |    |     |     |                                      |
| Ezi-STEP-CT-ALL-60S-BK-▲  |                          |                           |                   |                   |                       |                              | 1.280                  | 70                              | 87 | 114 | 165 |                                      |
| Ezi-STEP-CT-ALL-60M-BK-▲  |                          |                           |                   |                   |                       |                              | 1.420                  |                                 |    |     |     |                                      |
| Ezi-STEP-CT-ALL-60L-BK-▲  |                          |                           |                   |                   |                       |                              | 1.980                  |                                 |    |     |     |                                      |

\* The code of connector type will be marked in “▲”.

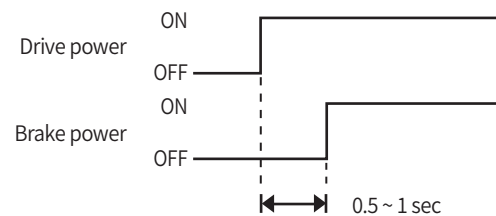
\* Electronic Brake cannot be used for braking. Position hold purpose only when power OFF.

\* The weight means Motor Unit Weight including Motor and Electronic Brake.

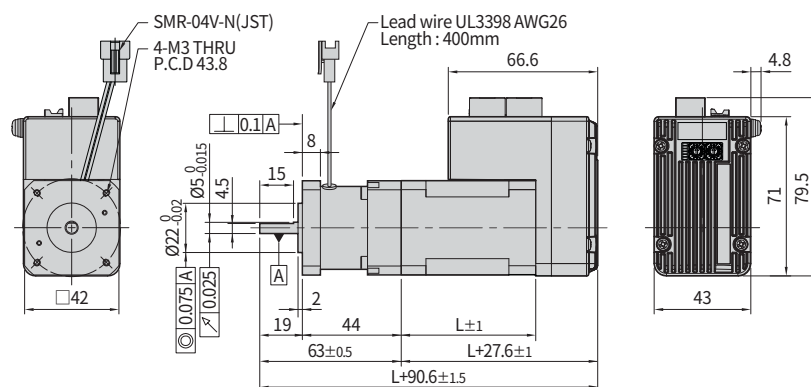
\* Motor specification and torque characteristic are same as Standard Motor.

### \* Brake Operation Timing Chart

Ezi-STEP CC-Link IE TSN ALL controls Brake by Drive automatically. Please refer to Timing Chart on the right when Brake is controlled by the upper controller other than using Ezi-STEP CC-Link IE TSN ALL Brake control. Otherwise, Drive might malfunction and loads might fall down. Also, please do not operate Brake during motor operation to prevent damage.

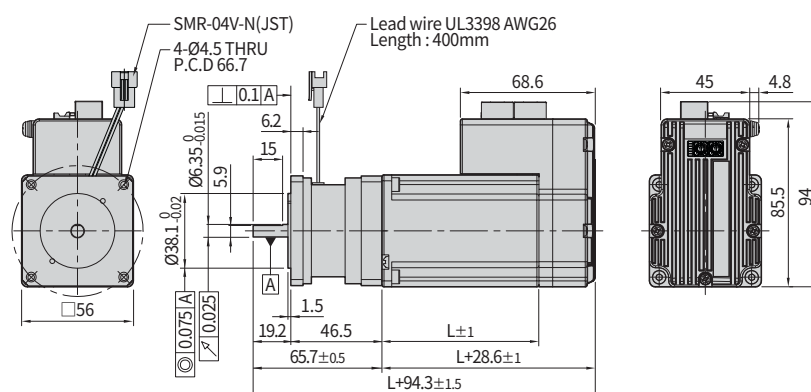


## Dimensions of Motor with Brake [mm]



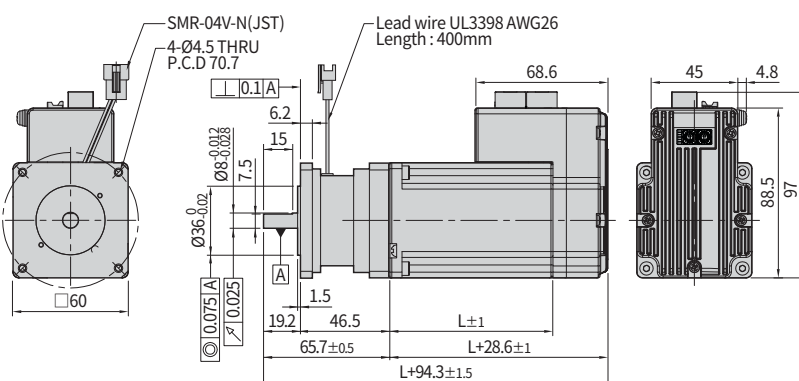
# 42 mm

| Model Name | Length(L) |
|------------|-----------|
| 42M        | 40        |
| 42L        | 48        |
| 42XL       | 60        |



# 56 mm

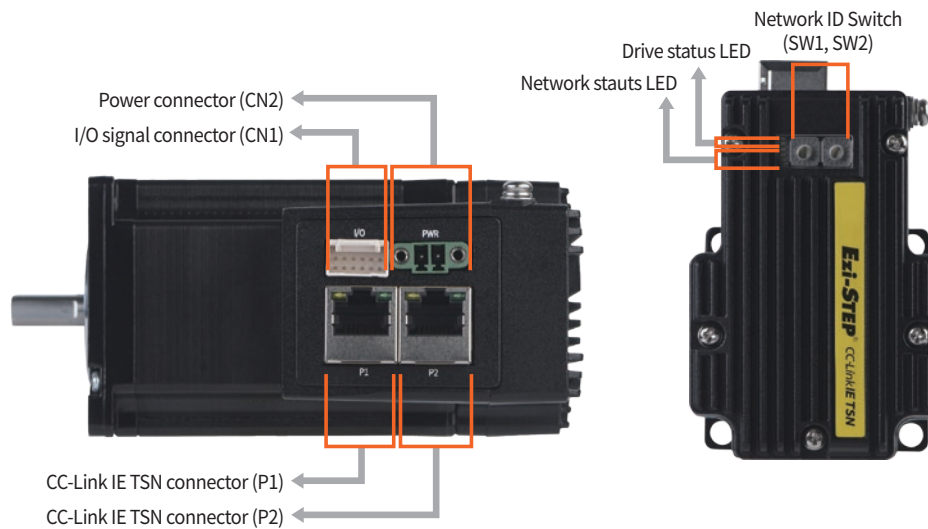
| Model Name | Length(L) |
|------------|-----------|
| 56S        | 46        |
| 56M        | 55        |
| 56L        | 80        |



# 60 mm

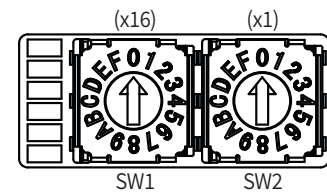
| Model Name | Length(L) |
|------------|-----------|
| 60S        | 47        |
| 60M        | 56        |
| 60L        | 85        |

## Settings and Operation



### 1. Network ID Switch

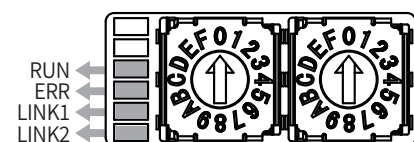
These switches are used to configure the fourth octet of the IP address. SW1 sets the X16 digit, and SW2 sets the X1 digit. (For more details, please refer to the relevant user manual.)



### 2. Network Status LED

LED indicates communication status of CC-Link IE TSN.

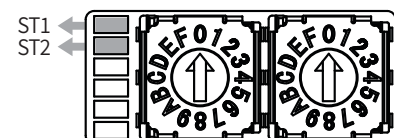
| Indicator       | Color | Status       | Description                        |
|-----------------|-------|--------------|------------------------------------|
| RUN             | Green | OFF          | Power off                          |
|                 |       | Single Flash | Not connected to master            |
|                 |       | Double Flash | Pre-operational state              |
|                 |       | Blinking     | Safe-operational state             |
|                 |       | Interval Off | Operational state                  |
| Indicator       | Color | Status       | Description                        |
| ERR             | Red   | OFF          | No error or power off              |
|                 |       | Blinking     | Drive error                        |
|                 |       | Single Flash | CC-Link IE TSN communication error |
|                 |       | Double Flash | IP address conflict error          |
| Indicator       | Color | Status       | Description                        |
| LINK1/<br>LINK2 | Green | OFF          | Link inactive                      |
|                 |       | ON           | Link active                        |



### 3. Drive Status LED

LED informs operation status of the drive.

| LED Indicator | LED Status                                                                                  | Description |
|---------------|---------------------------------------------------------------------------------------------|-------------|
| ST1 :         | ST1 blinks, ST2 is OFF.                                                                     | STEP Off    |
| ST1 :         | ST1 is ON, ST2 is OFF.                                                                      | STEP On     |
| ST1 :         | ST1 and ST2 are ON.                                                                         | In Motion   |
| ST1 :         | ST1 is OFF, ST2 blinks repeatedly for a set number of times depending on the type of error. | Error       |



## List of error types by the number of ST2 LED blinking

| No. | Error Type                      | Causes                                                                      |
|-----|---------------------------------|-----------------------------------------------------------------------------|
| 1   | Over Current Error              | The current through power devices in drive exceeds the limit. <sup>*1</sup> |
| 2   | Over Speed Error                | The motor speed exceeds 3,000 r/min                                         |
| 5   | Over Temperature Error          | Internal temperature of the drive exceeds 85 °C                             |
| 6   | Over Regenerative Voltage Error | Back-EMF is higher than limit value <sup>*2</sup>                           |
| 7   | Motor Connect Error             | There is a problem with the connection between the drive and the motor      |
| 12  | ROM Error                       | Error occurs in parameter storage device (ROM)                              |

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

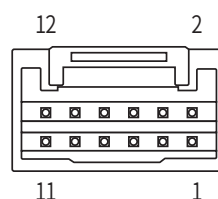
\*2: Voltage limit of Back-EMF depends on motor model. (Refer to the Manual)



Alarm LED flash (e.g., Over Speed Error)

## 4. I/O Signal Connector (CN1)

| No. | Function     | I/O    |
|-----|--------------|--------|
| 1   | EXT_24V DC   | 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 Out1 | Output |
| 12  | Digital Out2 | Output |



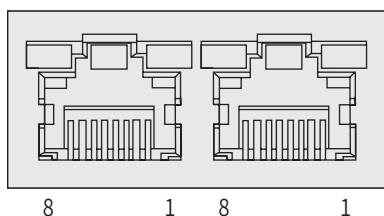
## 5. Power Connector (CN2)

| No. | Function | I/O   |
|-----|----------|-------|
| 1   | 24 V DC  | Input |
| 2   | GND      | Input |

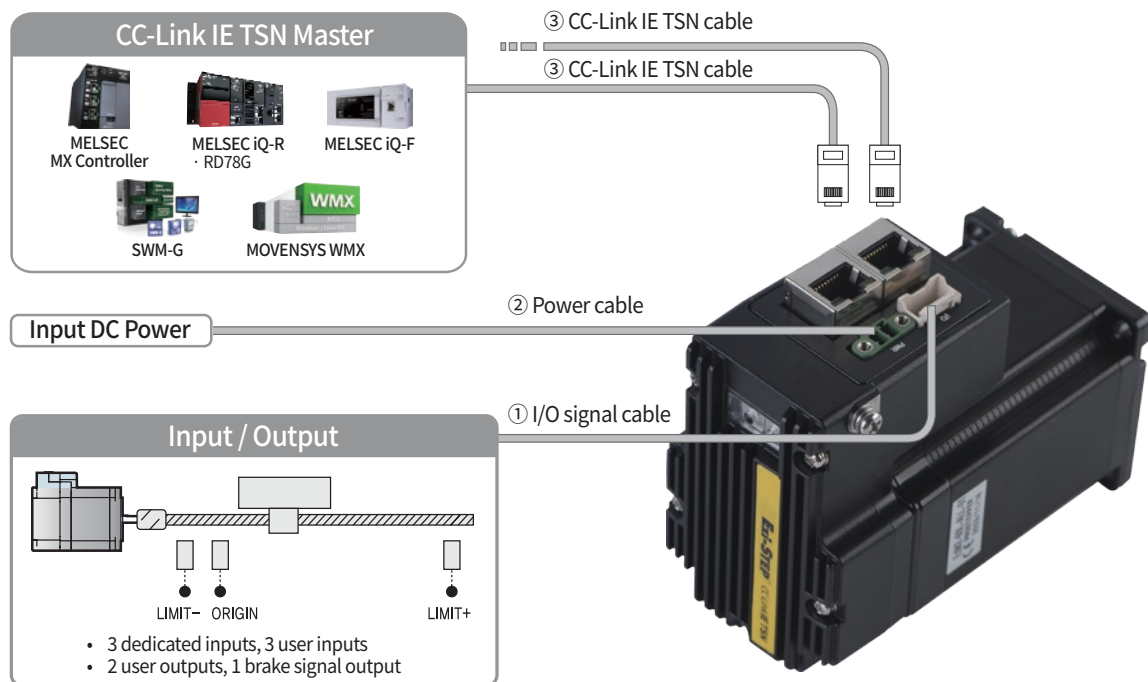


## 6. CC-Link IE TSN Connector (P1, P2)

| No. | Function | No.            | Function |
|-----|----------|----------------|----------|
| 1   | DA+      | 6              | DB-      |
| 2   | DA-      | 7              | DD+      |
| 3   | DB+      | 8              | DD-      |
| 4   | DC+      | Connector hood | F.GND    |
| 5   | DC-      |                |          |



## System Configuration



| Cable Type             | Max. Cable Length | Remarks                   |
|------------------------|-------------------|---------------------------|
| ① I/O Signal Cable     | 20 m              | Options (Sold separately) |
| ② Power Cable          | 2 m               |                           |
| ③ CC-Link IE TSN Cable | 100 m             |                           |

## 1. Accessories

### Connectors

These are connector specifications for drive cabling.

| Purpose          | Item           | Part Number               | Manufacturer |
|------------------|----------------|---------------------------|--------------|
| I/O Signal (CN1) | Terminal Block | MC421-38102               | DECA         |
| Power (CN2)      | Housing        | 501646-1200               | 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 I/O Signal Cable

These are the cables to connect Ezi-STEP CC-Link IE TSN ALL drive and other input/output devices.

| Purpose                       | Part Number | Length [m] | Cable Type     | Remarks                 |
|-------------------------------|-------------|------------|----------------|-------------------------|
| Drive - I/O Device Connection | CSNR-S-001F | 1          | Fixed Cable    | Max. Cable Length: 20 m |
|                               | CSNR-S-002F | 2          |                |                         |
|                               | CSNR-S-003F | 3          |                |                         |
|                               | CSNR-S-005F | 5          |                |                         |
|                               | CSNR-S-001M | 1          | Flexible Cable |                         |
|                               | CSNR-S-002M | 2          |                |                         |
|                               | CSNR-S-003M | 3          |                |                         |
|                               | CSNR-S-005M | 5          |                |                         |

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

### ② Drive Power Cable

These are the cables to connect Ezi-STEP CC-Link IE TSN ALL drive and the power.

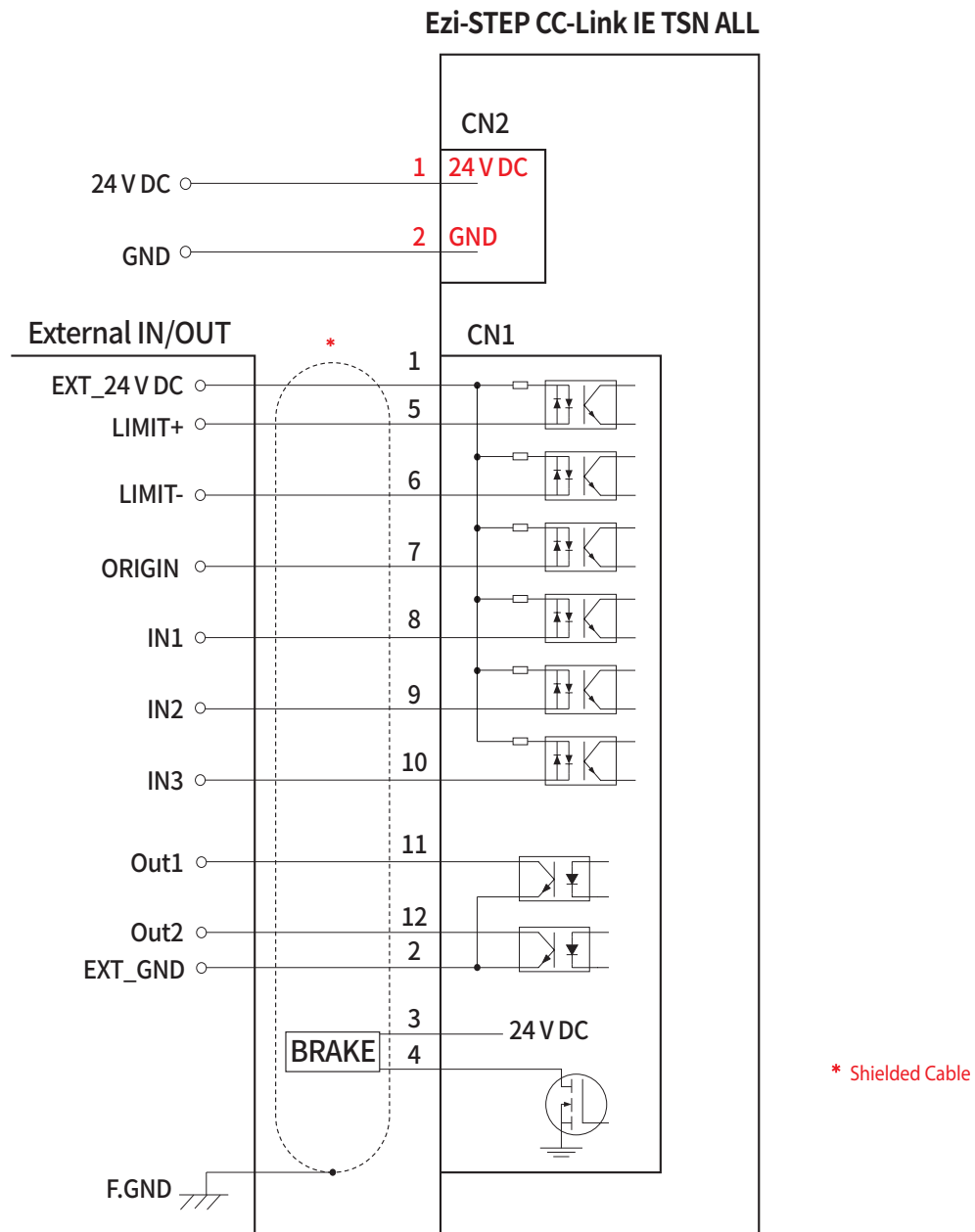
| Purpose                  | Part Number | Length [m] | Cable Type     | Remarks                |
|--------------------------|-------------|------------|----------------|------------------------|
| Drive - Power Connection | CSVA-P-001F | 1          | Fixed Cable    | Max. Cable Length: 2 m |
|                          | CSVA-P-002F | 2          |                |                        |
|                          | CSVA-P-001M | 1          | Flexible Cable |                        |
|                          | CSVA-P-002M | 2          |                |                        |

### ③ CC-Link IE TSN Cable

| Purpose                   | Part Number  | Length [m] | Cable Type     | Remarks                                                                                                                                            |
|---------------------------|--------------|------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| CC-Link IE TSN Connection | CGNR-EC-001F | 1          | Fixed Cable    | <ul style="list-style-type: none"><li>• STP(Shielded Twisted Pair) Cable</li><li>• Category 5e higher</li><li>• Max. Cable Length: 100 m</li></ul> |
|                           | CGNR-EC-002F | 2          |                |                                                                                                                                                    |
|                           | CGNR-EC-003F | 3          |                |                                                                                                                                                    |
|                           | CGNR-EC-005F | 5          |                |                                                                                                                                                    |
|                           | CGNR-EC-001M | 1          | Flexible Cable |                                                                                                                                                    |
|                           | CGNR-EC-002M | 2          |                |                                                                                                                                                    |
|                           | CGNR-EC-003M | 3          |                |                                                                                                                                                    |
|                           | CGNR-EC-005M | 5          |                |                                                                                                                                                    |

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

## External Wiring Diagram



※ When connecting the I/O cable between the drive and the master controller, be sure to turn off the power to both the master controller and the drive. Failure to do so may result in electric shock or product damage.

### CAUTION

To ensure the safe and proper use of the products listed in this catalog, please be sure to read the user manual thoroughly before use.



Fast Accurate Smooth Motion

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※ Please note that the color and size of the products in this catalog may different depending on the measurement method  
and the specifications can be changed without prior notice for quality improvement.