

# Ball Screw Linear Actuators

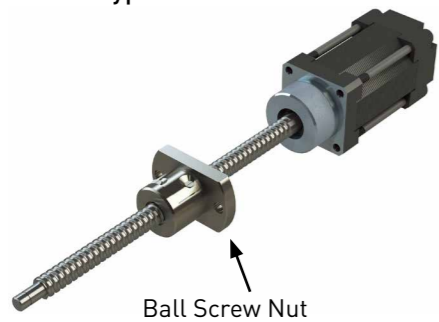
- This is a Ball Screw type Compact Electric Linear Actuators with Stepping Motor.
- 3 types of Linear Actuators, Captive, Non-captive, & External, are provided for customer's usage.
- KSS is only one manufacturer who has all 3-types of Linear Actuators.
- Wide variety of selection of Motor & Ball Screw are available.

### ●Features

- High accuracy & compactness are achieved due to direct drive structure.
- Compact design, to reduce the number of components, to save the labor cost are possible.
- High efficiency, long life & high accuracy can be achieved compared to lead screw type.
- Pick one models that fits your application or specifications among variety of combination, Motor size, Ball screw type & screw lead.

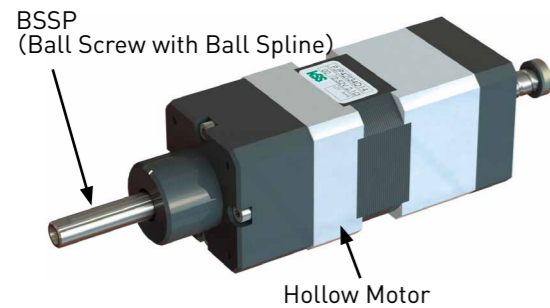
### ●Variation and Structure

#### External type



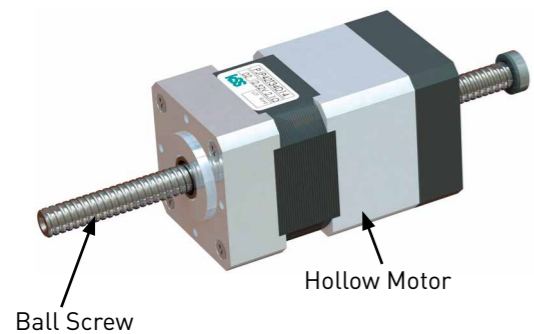
Stepping Motor is directly mounted onto Ball Screw shaft, so that Coupling is not required in this type of Actuator.

#### Captive type



Ball Screw with Ball Spline(BSSP) is built in the Hollow Motor. Ball Spline Nut plays a role of anti-rotating device and slide guide. No need to set up anti-rotating design outside the Actuators.

#### Non-Captive type



This is the simple design Linear Actuator with Ball Screw built in Hollow Motor. Anti-rotating device should be set up outside Actuators when usage.

# Linear Actuator External type



It's a Compact Linear Actuator series, what we call MoBo.

The MoBo is the combined product that Stepping Motor Shaft is directly mounted onto Ball Screw Shaft, and eliminated Coupling accordingly.

In KSS, we always pursue the downsizing of our products that is the mission of the Miniature Ball Screw manufacturer. Linear Actuator External type is one of our representative product, which combines a Motor Shaft and a Ball Screw.

External type can achieve shortening the longitudinal dimension by eliminating the Coupling.

Since KSS launched the first version of External type in 2001, we continued to add various type of External type on our line-up and provides the variety of choices to our customer.

Linear Actuator (External type) can offer variety of choices, based on its combination of Stepping Motor type (2-phase or 5-phase) and Ball Screw type (refer to TableP-1, TableP-2).

In addition, we can provide Resin (plastic Nut) Lead Screw type as customized product, please ask KSS representative if necessary.

Table P-1 : Combination of Ball Screw and Stepping Motor

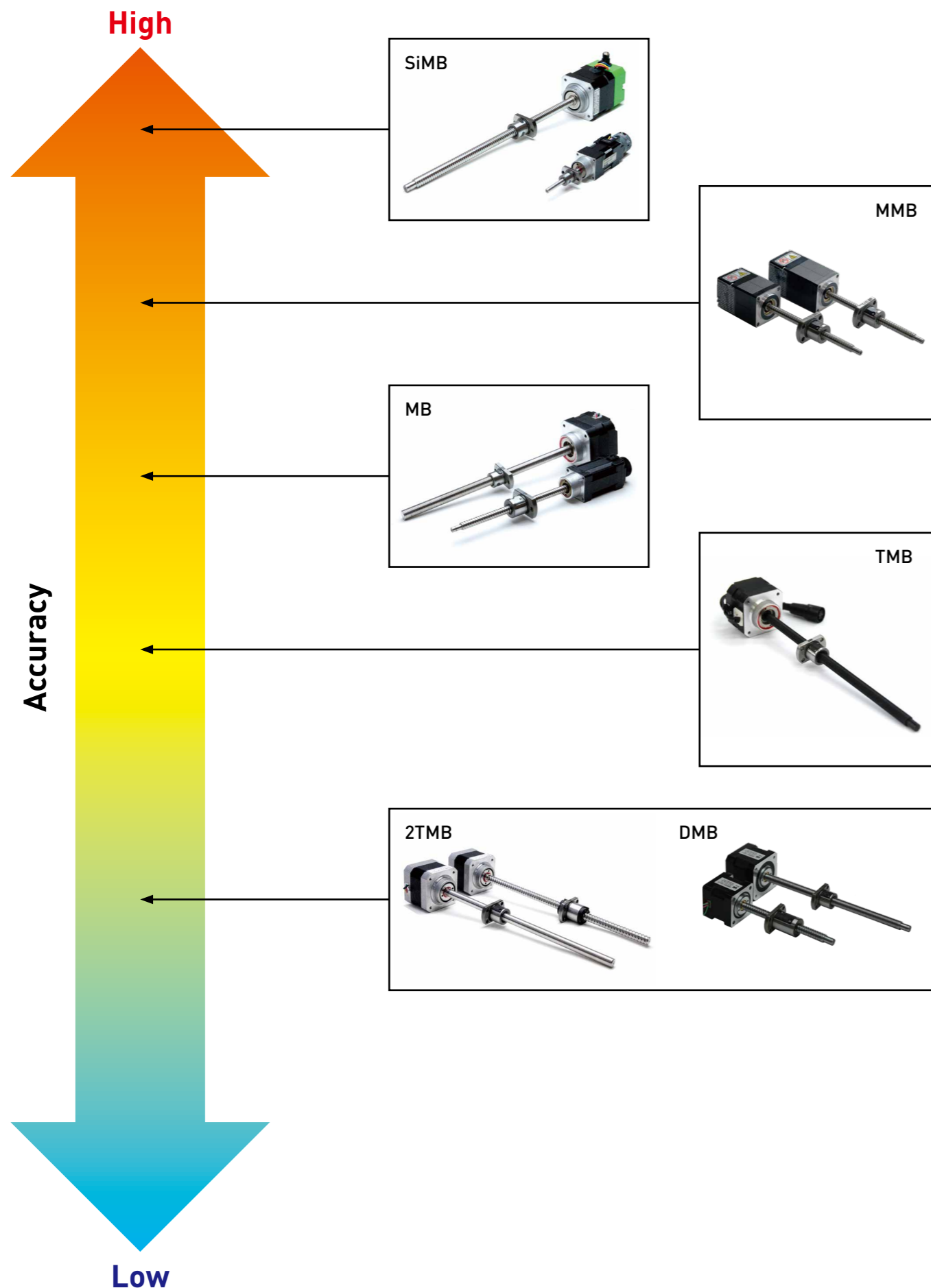
Type	Ball Screw type		Stepping Motor		Additional Function
	Precision type	Rolled type	2-phase	5-phase	
DMB		○ JIS Ct7 equivalent	○		
2TMB		○ JIS Ct7 equivalent	○		
TMB		○ JIS Ct7		○	
MB	○ JIS C3			○	
MMB		○ JIS Ct7 equivalent	○		Encoder / Driver / Controller
SiMB	○ JIS C3		○		Encoder / Memory chip

Table P-2 : Combination of Ball Screw and Stepping Motor

Unit:mm

Shaft Nominal dia.	Lead	0.5	1	2	4	5	6	10	12
	4	MB	DMB TMB MB SiMB	DMB					
5						DMB TMB			
6			DMB TMB MB	DMB TMB MB MMB			TMB	DMB	
8			DMB TMB 2TMB MB SiMB	DMB TMB 2TMB MB SiMB		DMB TMB 2TMB SiMB		DMB	TMB 2TMB

Linear Actuator (External type) provides various types of combination for Ball Screw and Motor ranging from high precision to multi-purpose type depending on the customer requirement.



**[DMB Series]**



Ct7 class Rolled Ball Screw is installed into 2-phase Stepping Motor for multi-purpose use. Variety of Motor size and Ball Screw lead are available.

**[2TMB Series]**



Ct7 class Rolled Ball Screw is installed into 2-phase Stepping Motor for multi-purpose use. Variety of Ball Screw lead are available.

**[TMB Series]**



This series is all-round performance drive unit with Rolled Ball Screw and 5-Phase Stepping Motor. Ct7 class Rolled Ball Screw is built in this series.

**[MB Series]**



This series is high performance, high accurate positioning drive unit with Precision Ball Screw and 5-Phase Stepping Motor. C3 class Precision Ball Screws are adopted for this series.

**[MMB Series]**



Rolled Ball Screw with All-in-One Motor (Encoder, Servo driver and Controller) is to realize high performance and significant saving in wiring. Providing smooth drive and closed loop operation.

**[SiMB Series]**



This series have high accurate positioning, ultra smooth drive, torque control drive and closed loop operation by using Precision Ball Screw with C3 accuracy and Si-Servo Motor.

## ● Recommended Driver

KSS provides recommended Stepping Motor Driver as an option for Linear Actuator in order to make it easy to use.

### KR-A5CC

This Driver is for 5-phase Stepping Motor operated by DC24V power supply. It has automatic current reduction circuits. You can choose full-step or half step function.



### KR-A55MC

Micro-Step Driver for 5-phase Stepping Motor with DC24V power supply. 16 step angle types can be set up to 250 divisions.



### KR-A535M

Micro-Step Driver for 5-phase Stepping Motor, which can be used with AC100~220V power supply. 16 step angle types can be set up to 250 divisions.



### SD4015B3

This is recommended for Motor model 08E2004 of DMB series. It has automatic current down function and Micro-step function with 8-step angle.



### SD4030B3

This is recommended for 2 phase stepping Motor Linear Actuator.  
(Motor model: Other than 08E2004)  
It has automatic current down function and Micro-step function with 8-step angle.



### ● Extension Cable

Extension Cable between Linear Actuator Captive type or Non-Captive type, and KSS recommended Stepping Motor Driver.

Please designate Cable length and Connector type in accordance with the example below.

Please note that one side of Extension Cable is cut end only (no connector).

**EC**   **R**   **-**   **2**   **-**   **E(6)**  
 ①   ②   ③   ④

① Extension Cable

② Cable type

R : Robot cable type

③ Cable length (m)

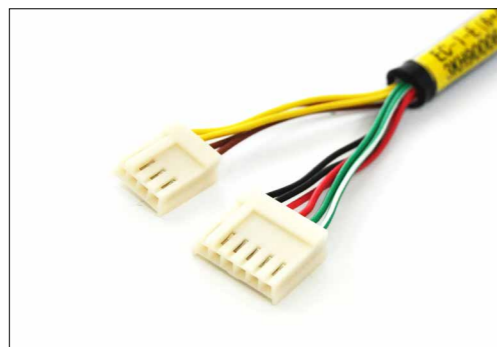
④ Connector type at both end

N : No connector (Cut only)

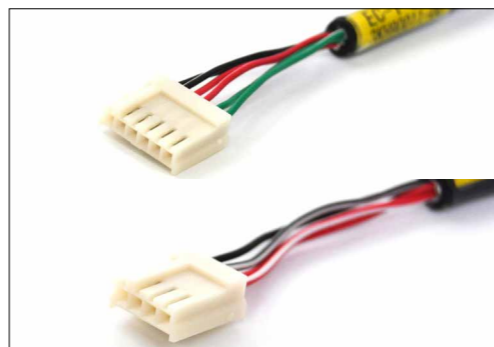
E(6) : El connector 6-pins

E(4) : El connector 4-pins

E(6+4) : El connector 6+4-pins



E(6+4) : El connector 6+4-pins  
(TE Connectivity)



E(6) : El connector 6-pins  
E(4) : El connector 4-pins  
(TE Connectivity)

### ● Linear Actuator Connection diagram

Describe the connection diagram between the KSS Linear Actuator and the recommended driver.

Please check the combination of the Linear Actuator and the driver, then wire according to diagrams as shown below.

Type	Series	Recommended Driver	Output current	Connection diagram
External	DMB (Motor Model : 08E2004)	SD4015B3	0.25 ~ 1.5A/phase	Fig. P-3
	DMB (Motor Model : Other than 08E2004)	SD4030B3	0.5 ~ 3A/phase	Fig. P-4
	2TMB	SD4030B3	0.5 ~ 3A/phase	Fig. P-5
	MB / TMB	KR-A5CC	0.1 ~ 0.9A/phase	Fig. P-6
		KR-A55MC	0.4 ~ 1.4A/phase	Fig. P-7
		KR-A535M	0.4 ~ 1.4A/phase	Fig. P-8
Captive Non-Captive	DDAAR / DDACL	SD4030B3	0.5 ~ 3A/phase	Fig. P-9

## External type

### ■Applicable Product series

DMB series (Motor model : 08E2004)

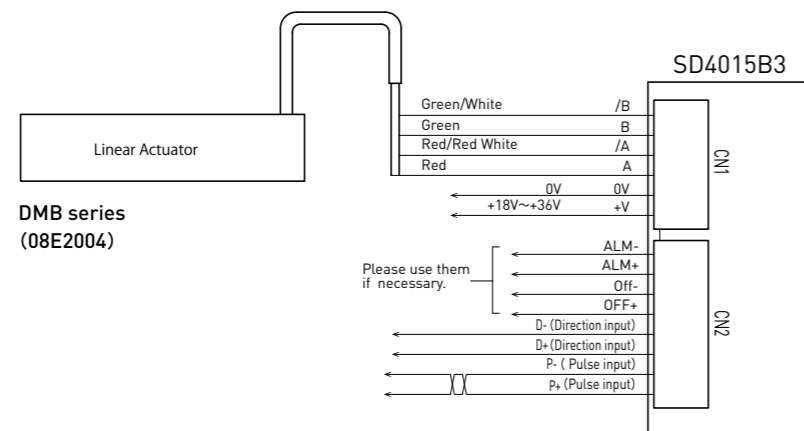
### ■Recommended Driver

SD4015B3 : 2-phase Microstep Driver

\*\*Output current : 0.25~1.5A/Phase

### ※Caution

- The factory setting of SD4015B3 is 1A.
- Please be sure to perform a current set up of Driver based on Motor Rated current before use.
- For the details about current setup, please download the manual from KSS web site.



[Fig.P-3]

### ■Applicable Product series

DMB series (Motor model : Other than 08E2004)

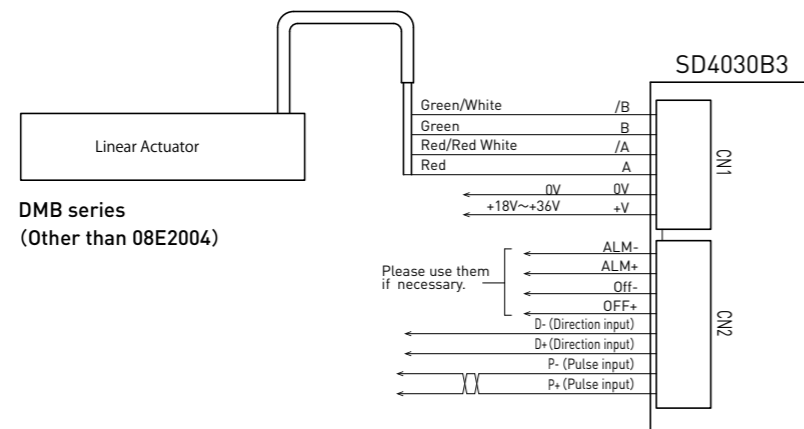
### ■Recommended Driver

SD4030B3 : 2-phase Microstep Driver

\*\*Output current : 0.5~3A/Phase

### ※Caution

- The factory setting of SD4030B3 is 2A.
- Please be sure to perform a current set up of Driver based on Motor Rated current before use.
- For the details about current setup, please download the manual from KSS web site.



[Fig.P-4]

### ■Applicable Product series

2TMB series

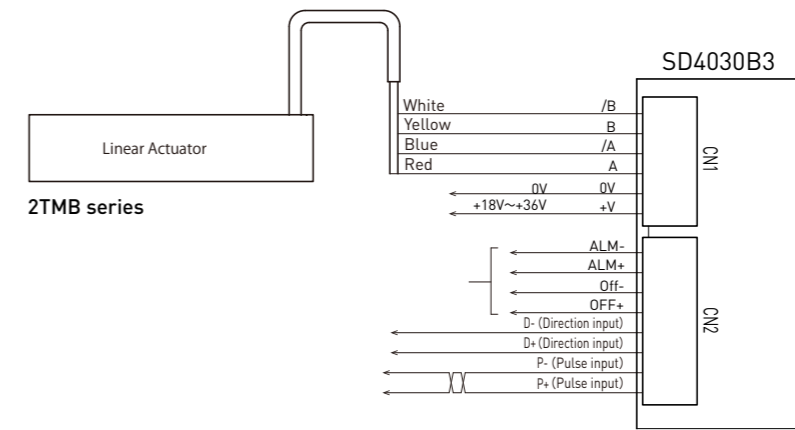
### ■Recommended Driver

SD4030B3 : 2-phase Microstep Driver

\*\*Output current : 0.5~3A/Phase

### ※Caution

- The factory setting of SD4030B3 is 2A.
- Please be sure to perform a current set up of Driver based on Motor Rated current before use.
- For the details about current setup, please download the manual from KSS web site.



[Fig.P-5]

### ■Applicable Product series

MB series

TMB series

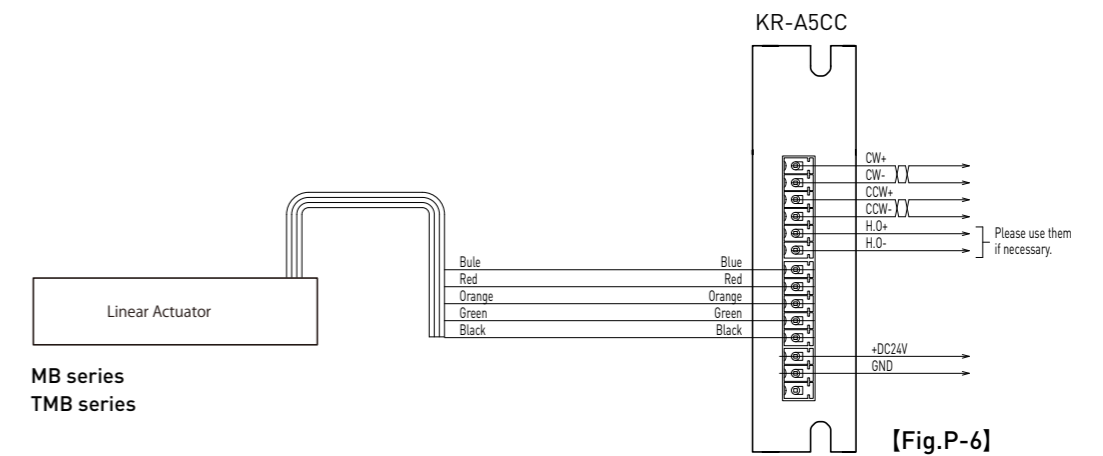
### ■Recommended Driver

KR-A5CC : 5-phase Stepping Motor Driver

\*\*Output current : 0.1~0.9A/Phase

### ※Caution

- The factory setting of KR-A5CC is 0.35A.
- Please be sure to perform a current set up of Driver based on Motor Rated current before use.



[Fig.P-6]

■Applicable Product series

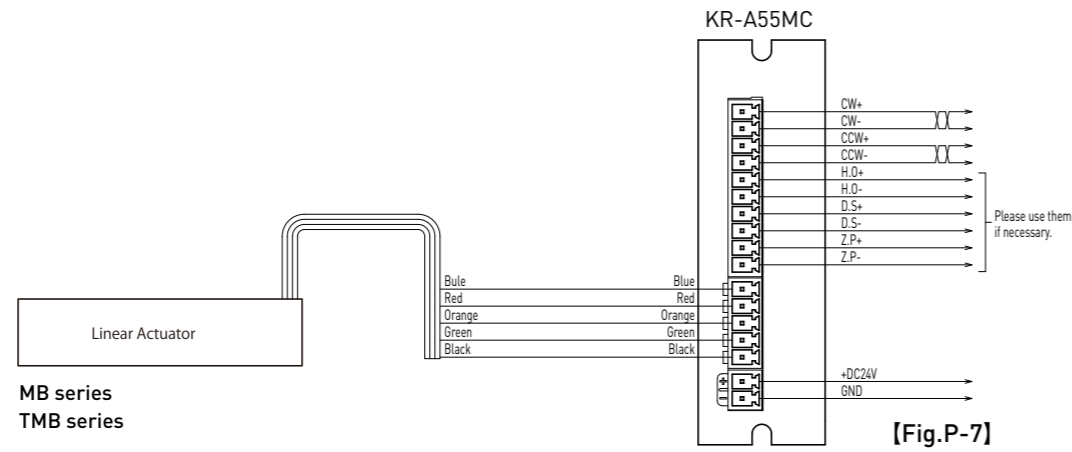
- MB series
- TMB series

■Recommended Driver

- KR-A55MC : 5-phase Microstep Driver
- \*\*Output current : 0.4~1.4A/Phase

※Caution

- The factory setting of KR-A55MC is 0.75A
- Please be sure to perform a current set up of Driver based on Motor Rated current before use.



Captive, Non-Captive type

■Applicable Product series

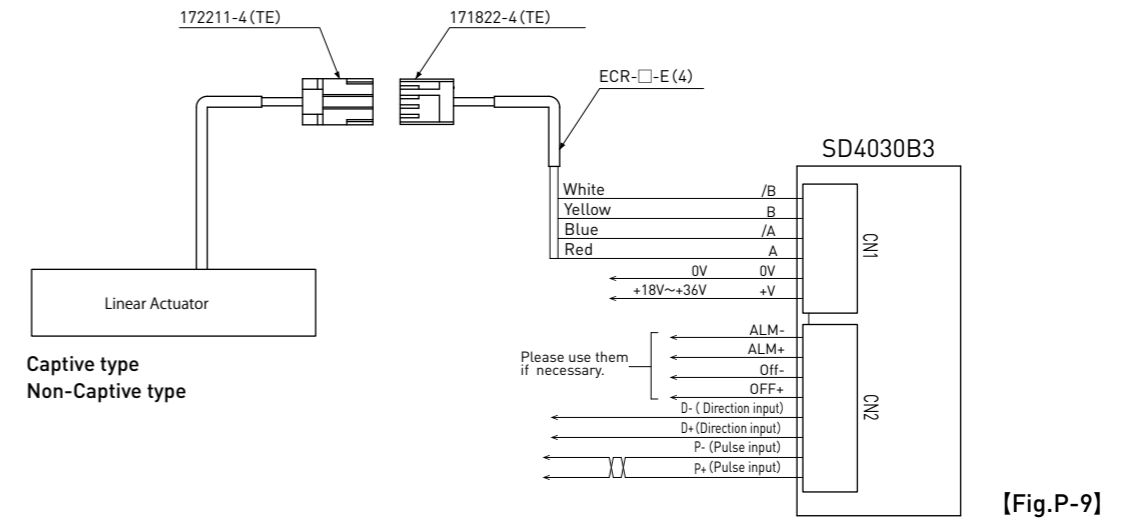
- Captive type, Non-Captive type

■Recommended Driver

- SD4030B3 : 2-phase Microstep Driver
- \*\*Output current : 0.5~3A/Phase

※Caution

- The factory setting of SD4030B3 is 2A.
- Please be sure to perform a current set up of Driver based on Motor Rated current before use.
- For the details about current setup, please download the manual from KSS web site.



■Applicable Product series

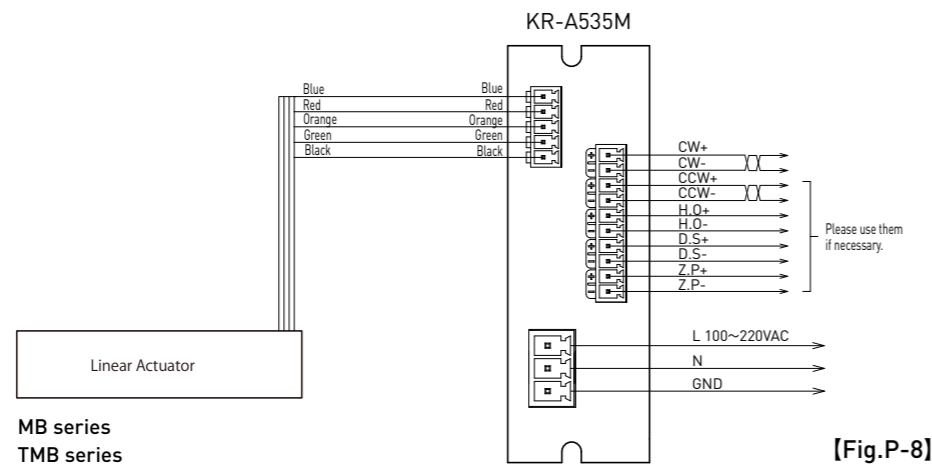
- MB series
- TMB series

■Recommended Driver

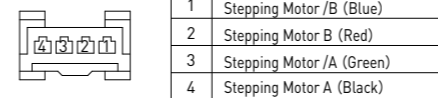
- KR-A535M : 5-phase Microstep Driver
- \*\*Output current : 0.4~1.4A/Phase

※Caution

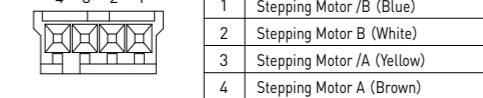
- The factory setting of KR-A535M is 0.75A
- Please be sure to perform a current set up of Driver based on Motor Rated current before use.



Motor cable 172211-4 (male)



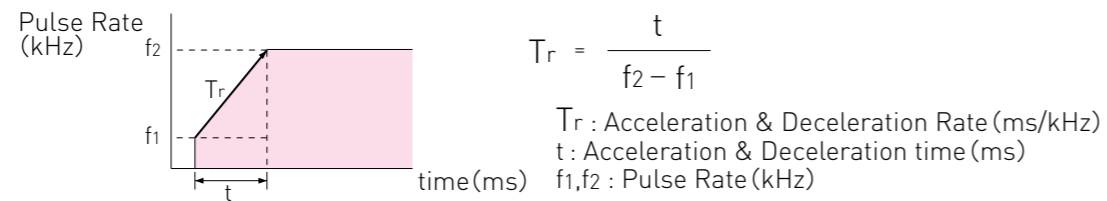
Motor Extension cable 171822-4 (female)



## ●Precaution of handling and operating

### ★Precaution for operating

1. Before use, please read instruction manuals and follow the precautions below.  
The instruction manuals are available on KSS web site.
2. Do not hit or drop the Shaft, do not apply Axial load exceeding specifications or Radial load, it may cause malfunction.
3. Before use, please check that the product has no defect, and product is the same as your order.
4. Do not disassemble each component, dust may get inside the product. It may deteriorate accuracy.
5. Please prevent contamination from dust or swarf. Dust or swarf may cause damage to Ball Screw, which lead to deteriorating the function.
6. Motor is not designed to resist water oil. Item cannot be used in direct exposure of water or oil, or environment such as oil bath.
7. Lubrication is required under the Ball Screw operation. Lubricant condition should be checked every 2 to 3 months. If Grease is contaminated, remove old Grease and replace with new one.
8. Do not use the Actuator exceeding our specifications in Load or Speed.
9. Care must be taken not to apply Radial load or Moment load directly on Ball Screw.  
This will lead to shorten the Ball Screw life remarkably. In addition, misalignment between Ball Screw and other components will lead to deterioration of function, such as accuracy, life and so on.
10. Allowing Ball Screw Nut to over-run may result in malfunctioning due to Balls escaping, damage to recirculation parts, and indentation on the raceways. Continued use in this state will lead to rapid wear and damage to recirculation parts. Therefore Ball Screw Nut must never be allowed to over-run. If over-running occurs, contact KSS for an inspection with charge.
11. Acceleration & Deceleration rate should be followed by recommended number described in each series. Do not use Linear Actuator under our recommended Acceleration & Deceleration Rate.



12. Do not hold the Motor lead wire. Motor lead wire is for fixation, do not use the Motor lead wire as movabilities.
13. Keep away from Magnetic memory device.
14. The Motor torque and speed characteristics may vary from the specifications, depending on the load conditions or Driver used.
15. The Motor has a resonant point within the specifications. Please avoid the resonant point when in use.

### ★Precaution for safety

1. If abnormal odor, noise, smoke, overheating, or vibration occurs, stop operation immediately and turn the power off.
2. Do not use the Actuator exceeding rated current.
3. Check and confirm the polarity of the power supply in prior to activate the Motor.
4. The Motor may overheat depending on the load condition or Driver used.  
Make sure that the Motor surface temperature does not exceed 80°C when in use.
5. Check the wire connection type, Drive system, and phase sequence.  
Inappropriate connection leads to malfunction.
6. A ground connection must be used.
7. Do not bend, pull or pinch the Motor lead wire.
8. Do not touch moving parts during operation.
9. Disconnect from the Controller before performing dielectric withstanding voltage test of the Motor or megger test.
10. Please switch off the Driver, when inspection or maintenance.

### ★Operating environment

1. Operating environment should be 0~40°C in temperature and 20~80%RH in humidity.  
Do not use the Actuator under dew condensation, corrosive gas or inflammable gas environment.
2. Do not use the Actuator under strong electric field, strong magnetic field.
3. Please prevent from swarf, oil mist, cutting fluid, water/moisture, salt spray, organic solvent and other contamination.
4. The Actuator cannot be used under the vibration, impact, vacuum, and other special environment.

### ★Precaution for External type

- ※Since External type is the product which integrated the Motor Shaft and the Screw Shaft, repair is not possible, if either Motor or Ball Screw is damaged.