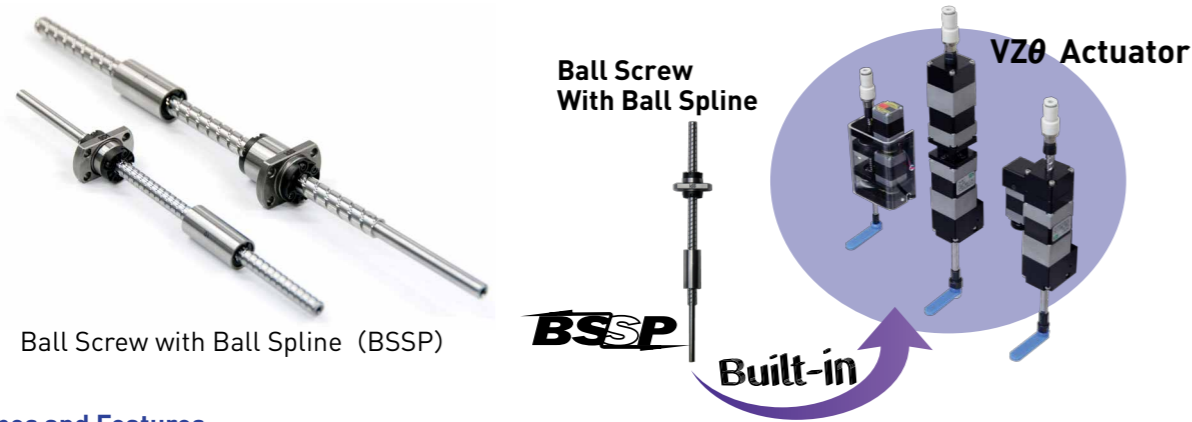


# Multi-Functional VZ $\theta$ Actuator

## VZ $\theta$ Series

The brand new products which applied the KSS miniature Ball Screw with Ball Spline (BSSP), and realized three functions, linear motion(Z), rotary motion( $\theta$ ), and vacuum(V), with one product.



### Types and Features

KSS provides 3-types of multi-functional VZ $\theta$  Actuator, which are Direct Drive type, Hybrid Drive type, and Belt-Drive type. It is possible to select one of them according to your specifications or application.



Direct Drive type



Hybrid Drive type



Belt Drive type

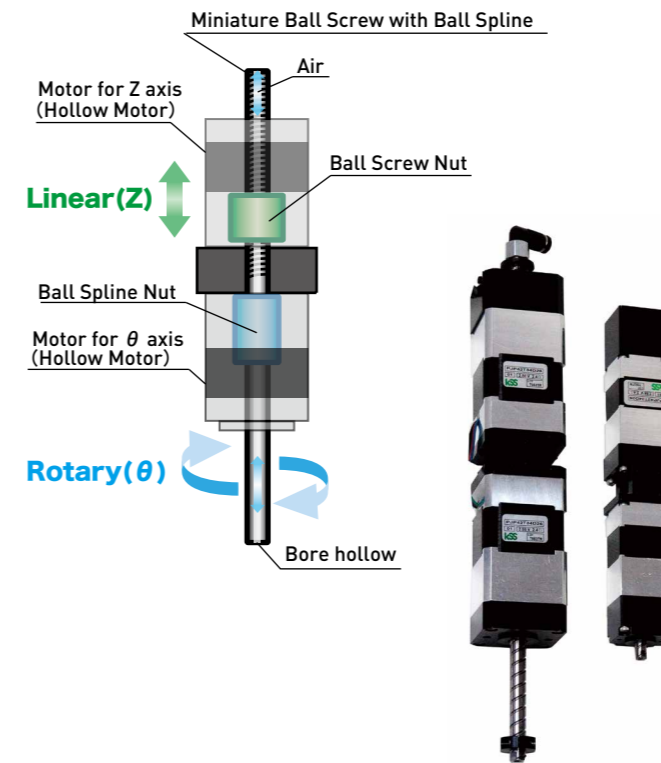
### Specifications

Model	Shaft dia. (mm)	Lead (mm)	Travel (mm)	Max. Speed(Z) (mm/sec)	Max. speed( $\theta$ ) (rev/sec)	Thrust Force (N)	Max. Permissible Moment (kg·m <sup>2</sup> )
Direct Drive type	$\phi 6$	6	50	72	3	7	$0.15 \times 10^{-4}$
		10		120	3	5	
	$\phi 8$	5	50	100	3	50	$0.15 \times 10^{-3}$
		10		200	3	25	
Hybrid Drive type	$\phi 6$	10	50	200	3	5	$0.15 \times 10^{-4}$
Belt-Drive type	$\phi 4$	4	50	80	3	5	$0.9 \times 10^{-5}$
	$\phi 6$	10	50, 100	200	3	10	$0.5 \times 10^{-4}$
	$\phi 8$	10	150	200	3	10	$0.5 \times 10^{-4}$

### Structures

#### [Direct Drive type]

Slim form is realized by driving a Ball Screw and a Ball Spline Nut directly built in a Hollow Motor.



#### -Principle of operation-

##### Linear motion (Z)

Linear motion by driving a Z-axis Motor and rotating the Ball Screw Nut. At this time, the Ball Spline Nut plays a role of anti-rotating device and slide guide of a Screw Shaft.

##### Rotation ( $\theta$ )

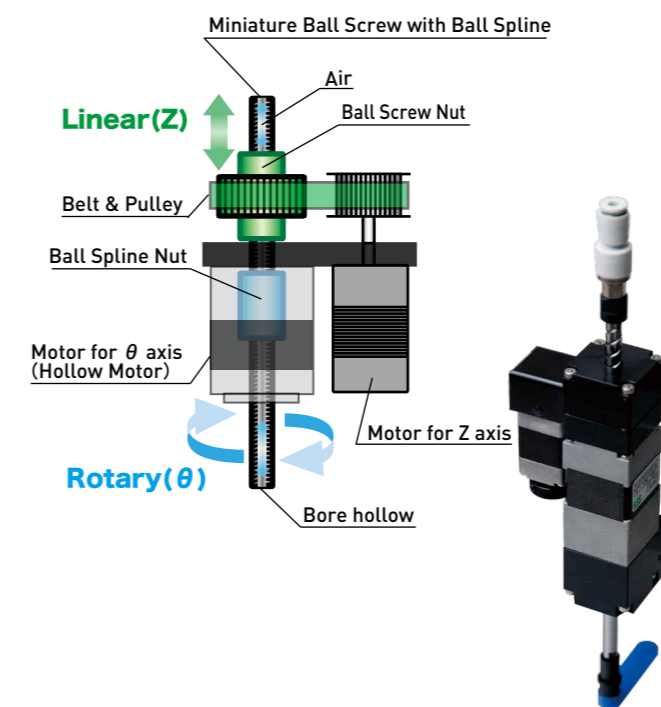
Turn the Ball Screw Nut and Ball Spline Nut at the same time, same speed and direction, the Shaft rotates without moving up & down.

##### Vacuum

Bore Hollow can be multi uses. For example vacuum and blow function.

#### [Hybrid Drive type]

Combination of the Hollow Motor and Normal Motor gives dramatically short length of Actuator Body.



#### -Principle of operation-

##### Linear motion (Z)

For linear motion, drive the Ball Screw Nut by Z-axis Motor through the Belt. In this case, Ball Spline Nut plays a role of slide guide & anti-rotating device.

##### Rotation ( $\theta$ )

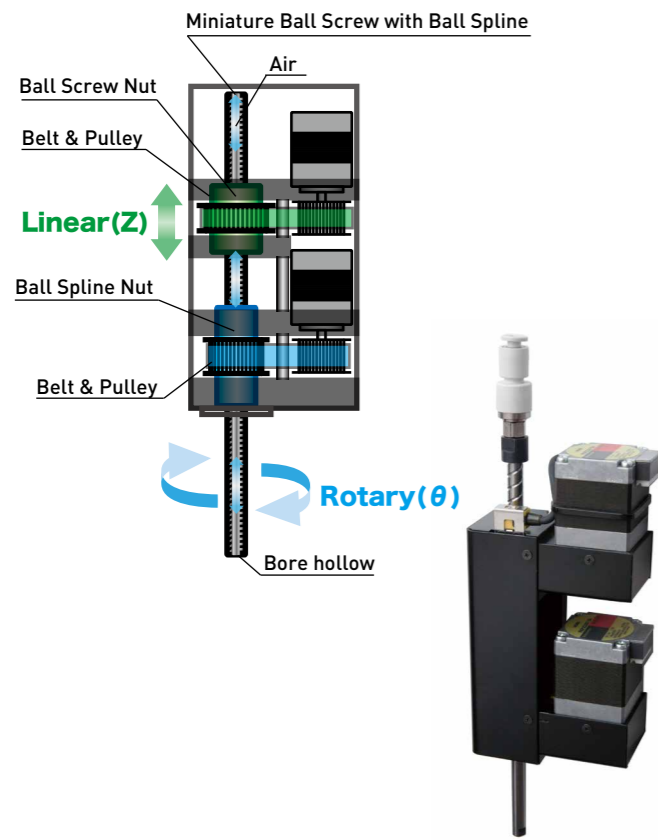
Turn the Ball Screw Nut and Ball Spline Nut at the same time, same speed and direction, the Shaft rotates without moving up & down.

##### Vacuum

Bore Hollow can be multi uses. For example vacuum and blow function.

**[Belt Drive type]**

Wide variety of Motor can be set on this Actuator.  
This means various options are available based on Motor Specifications.



**-Principle of operation-**

**Linear motion (Z)**

For linear motion, drive the Ball Screw Nut by Z-axis Motor through the Belt. In this case, Ball Spline Nut plays a role of slide guide & anti-rotating device.

**Rotation (θ)**

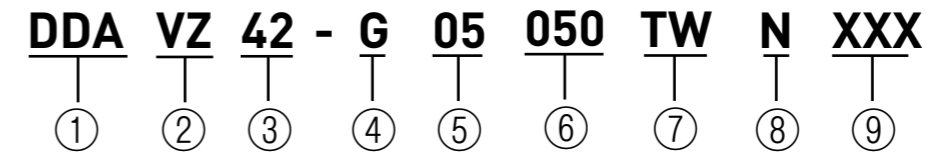
Turn the Ball Screw Nut and Ball Spline Nut at the same time, same speed and direction, the Shaft rotates without moving up & down.

**Vacuum**

Bore Hollow can be multi uses.  
For example vacuum and blow function.

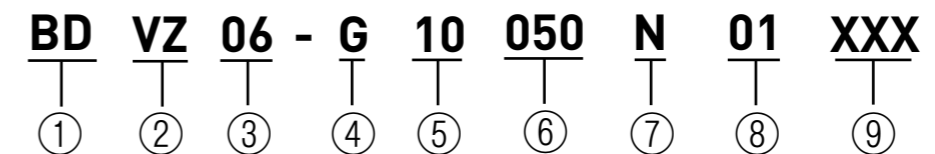
**Model number notation**

**[Direct Drive type / Hybrid Drive type]**



- ①Series No.  
DDA : Direct Drive Actuator Series
- ②Actuator type  
Z : Zθ (Z-theta) Actuator  
VZ : VZθ (VZ-theta) Actuator
- ③Motor size  
42 : □42 Stepping Motor  
28 : □28 Stepping Motor
- ④Lead Screw / Ball Screw type  
G : Precision Ball Screw+Ball Spline
- ⑤Lead / Pitch (mm) : 05 means 5mm
- ⑥Travel(mm) : 050 means 50mm
- ⑦Structure type  
TW : Direct Drive  
HB : Hybrid Drive
- ⑧Connector type  
N : No connector(Bare)  
E : EI connector(Tyco Electronics)
- ⑨Extra notation

**[Belt Drive type]**

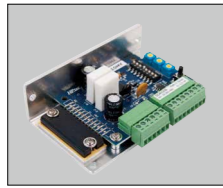


- ①Series No.  
BD : Belt Drive Actuator Series
- ②Actuator type  
Z : Zθ (Z-theta) Actuator  
VZ : VZθ (VZ-theta) Actuator
- ③Shaft Nominal diameter : 06 means 6mm
- ④Lead Screw / Ball Screw type  
G : Precision Ball Screw+Ball Spline
- ⑤Lead / Pitch (mm) : 10 means 10mm
- ⑥Travel(mm) : 050 means 50mm
- ⑦Connector type  
N : No connector(Bare)  
E : EI connector(Tyco Electronics)
- ⑧Motor type  
01 : □20 2-phase Stepping Motor  
02 : □28 2-phase Stepping Motor
- ⑨Extra notation

●Option

KSS provides Standard Stepping Motor Driver and Extension Cable for VZθ Actuators in order to make it easy to use.

[Stepping Motor Driver]



※Caution

- The factory setting of SD4030B2 is 2A.
- Please be sure to perform a current setup of Driver based on Motor Rated current before use.
- Please confirm the operation manual attached to a Driver about current setup.

[Extension Cable]

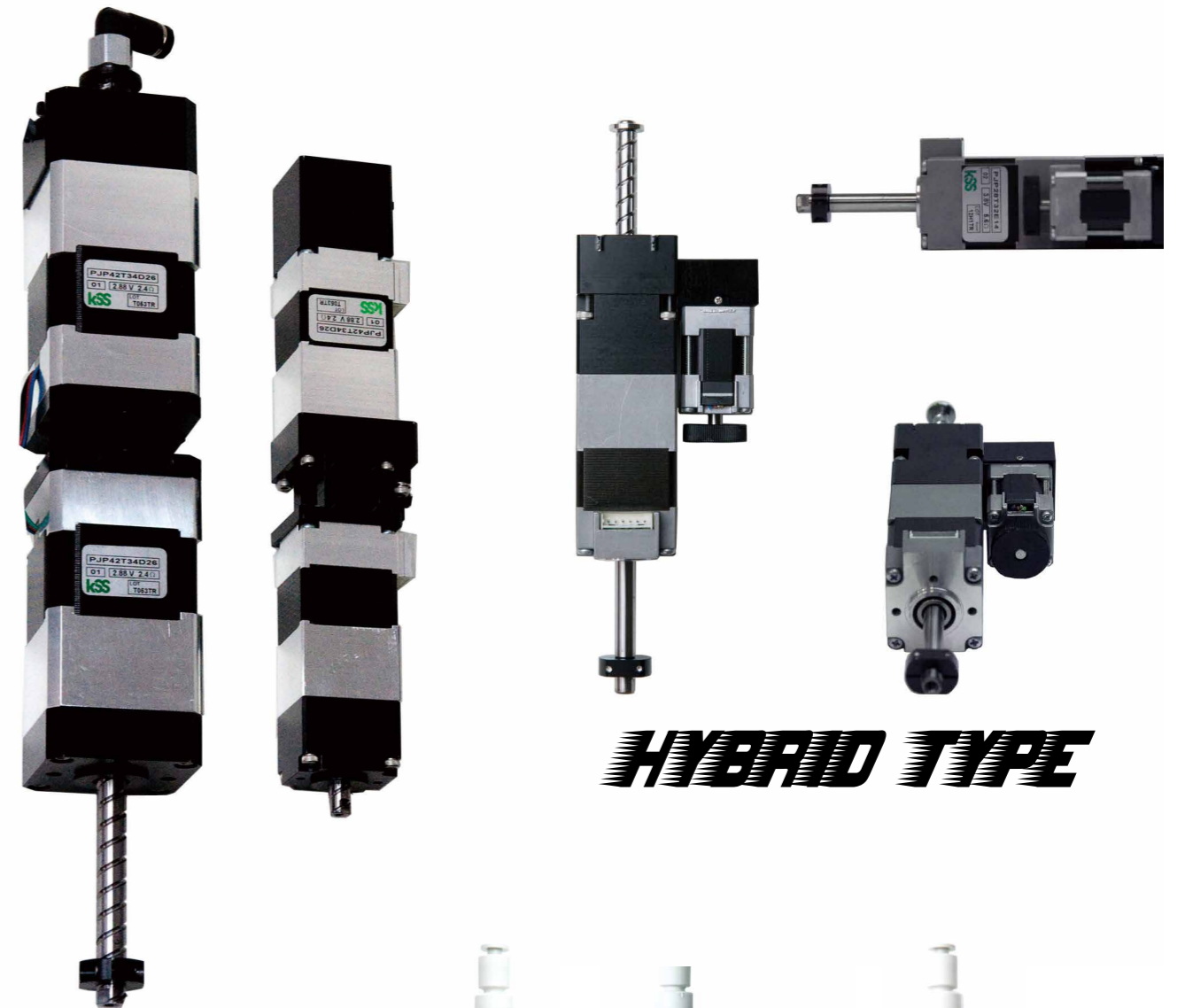
Extension Cable between VZθ Actuators and KSS recommended Stepping Motor Driver.  
Please designate Cable length and Connector type in accordance with the example below.  
Please note that one side of Extension Cable is cut end only (no connector).

EC   R   —   2   —   E(4)  
①   ②   ③   ④

- ①Extension Cable
- ②Cable type  
R : Robot Cable
- ③Cable length (m)
- ④Connector type  
N : No connector  
E(4) : EI connector 4-pins

Note)EI connector by Tyco Electronics

**DIRECT DRIVE TYPE**

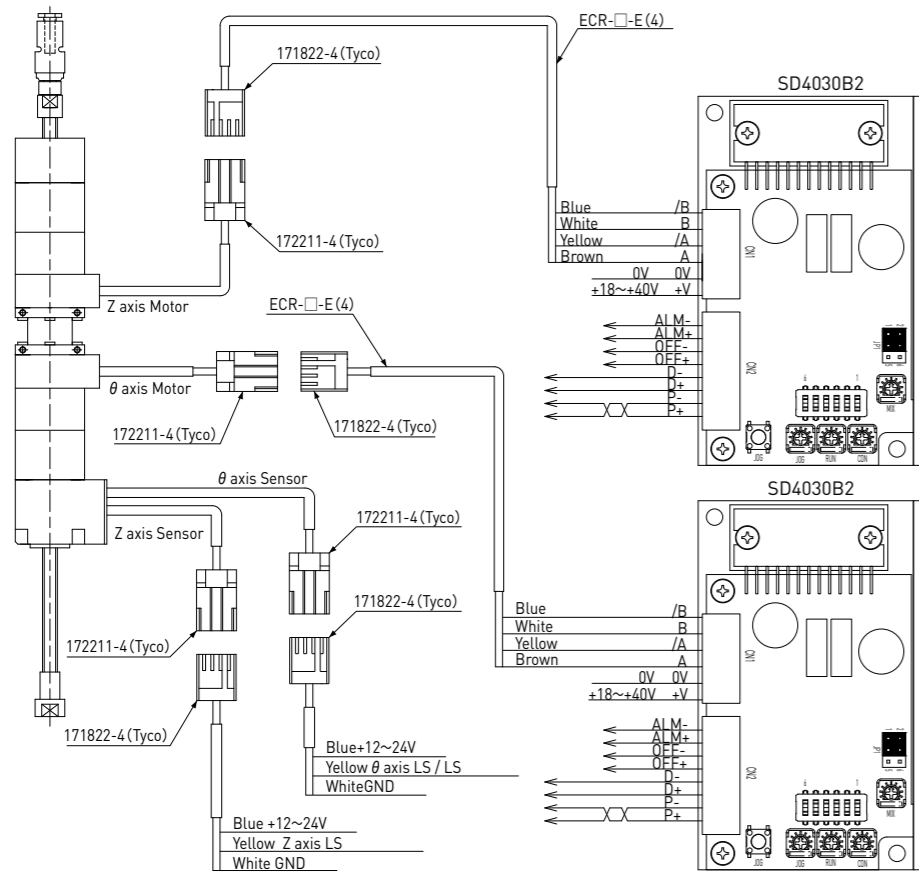


*Belt Drive type*



● Connection Diagram

□ 28 Direct Drive type



Motor cable 172211-4 (male)

1	Stepping Motor /B (Blue)
2	Stepping Motor B (Red)
3	Stepping Motor /A (Green)
4	Stepping Motor A (Black)

Motor Extension cable 171822-4 (female)

4	3	2	1
1	Stepping Motor /B (Blue)		
2	Stepping Motor B (White)		
3	Stepping Motor /A (Yellow)		
4	Stepping Motor A (Brown)		

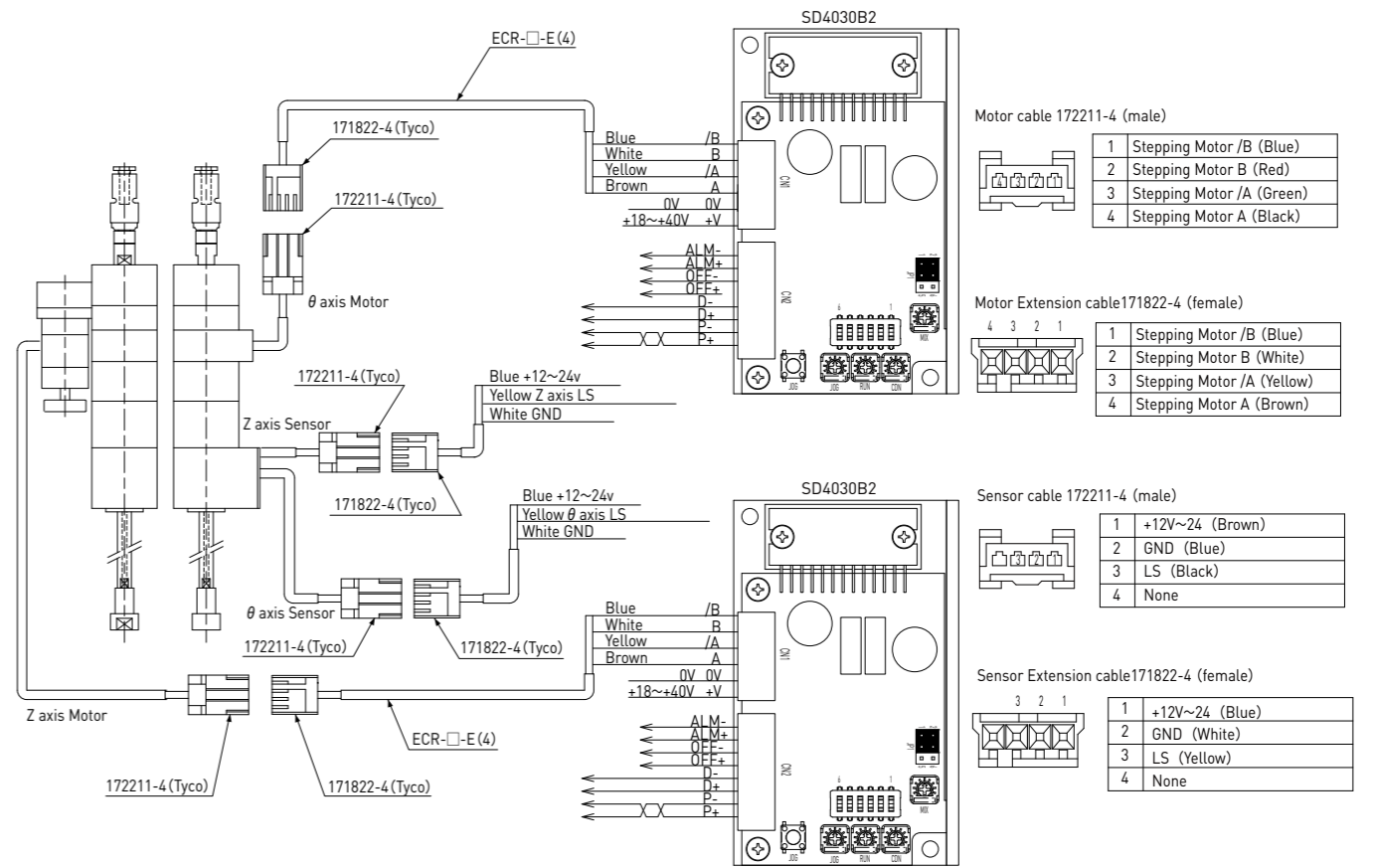
Sensor cable 172211-4 (male)

1	+12V~24 (Brown)
2	GND (Blue)
3	LS (Black)
4	None

Sensor Extension cable 171822-4 (female)

3	2	1
1	+12V~24 (Blue)	
2	GND (White)	
3	LS (Yellow)	
4	None	

[Hybrid Drive type]



Motor cable 172211-4 (male)

1	Stepping Motor /B (Blue)
2	Stepping Motor B (Red)
3	Stepping Motor /A (Green)
4	Stepping Motor A (Black)

Motor Extension cable 171822-4 (female)

4	3	2	1
1	Stepping Motor /B (Blue)		
2	Stepping Motor B (White)		
3	Stepping Motor /A (Yellow)		
4	Stepping Motor A (Brown)		

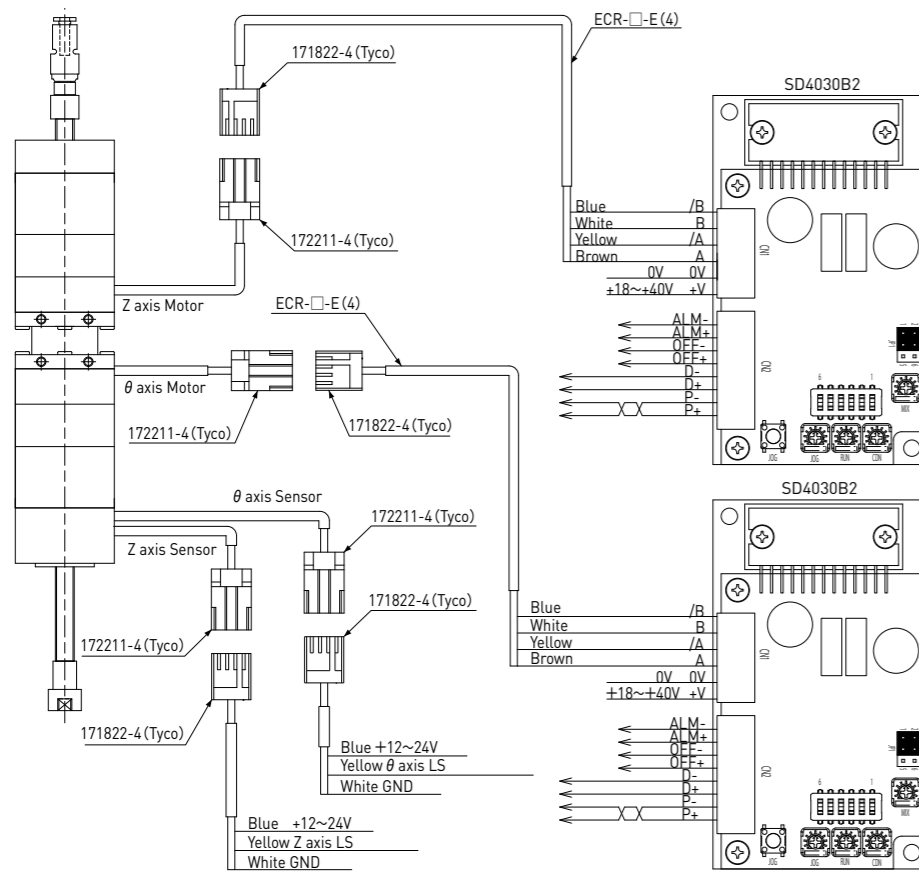
Sensor cable 172211-4 (male)

1	+12V~24 (Brown)
2	GND (Blue)
3	LS (Black)
4	None

Sensor Extension cable 171822-4 (female)

3	2	1
1	+12V~24 (Blue)	
2	GND (White)	
3	LS (Yellow)	
4	None	

□ 42 Direct Drive type



Motor cable 172211-4 (male)

1	Stepping Motor /B (Blue)
2	Stepping Motor B (Red)
3	Stepping Motor /A (Green)
4	Stepping Motor A (Black)

Motor Extension cable 171822-4 (female)

4	3	2	1
1	Stepping Motor /B (Blue)		
2	Stepping Motor B (White)		
3	Stepping Motor /A (Yellow)		
4	Stepping Motor A (Brown)		

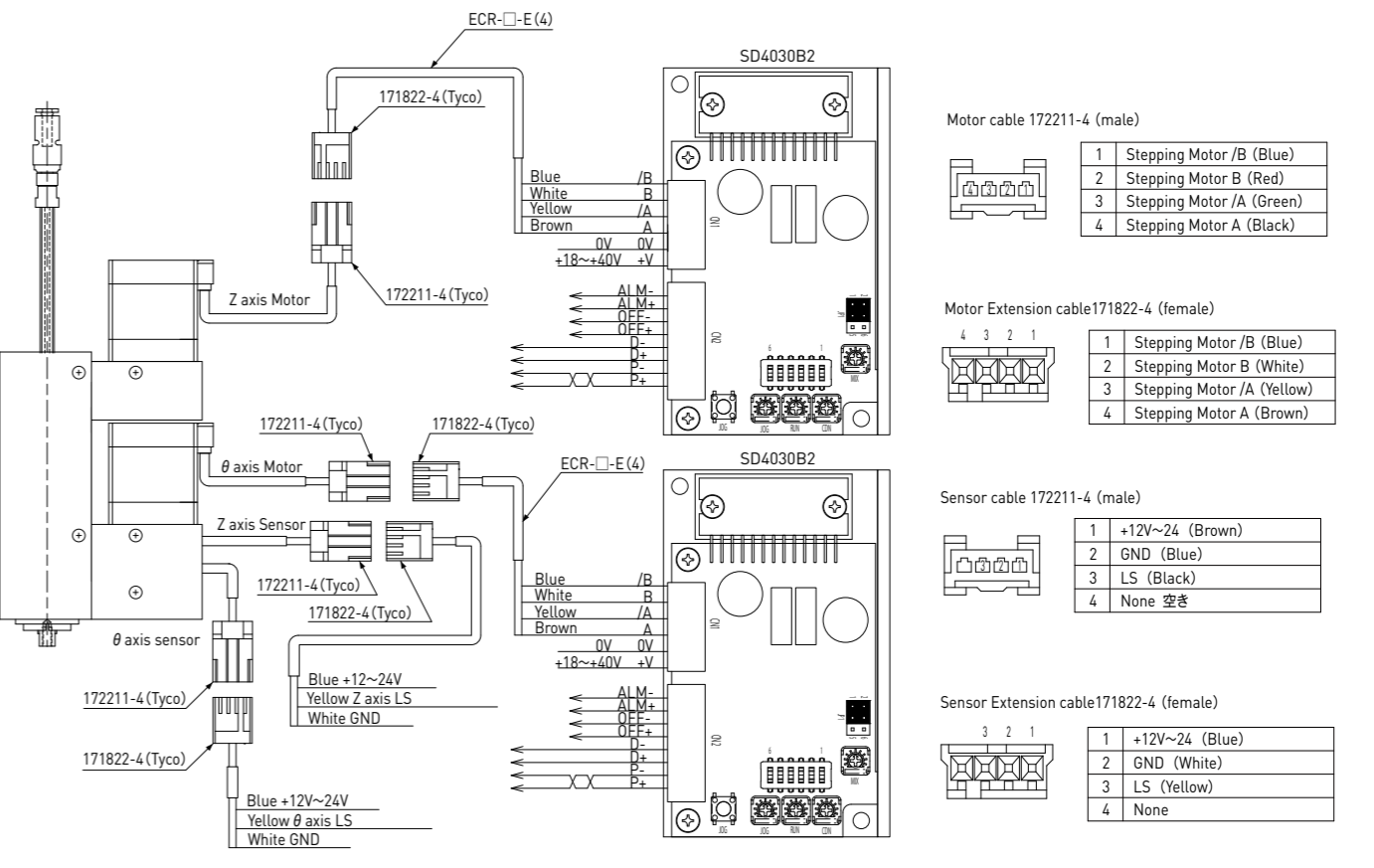
Sensor cable 172211-4 (male)

1	+12V~24 (Brown)
2	GND (Blue)
3	LS (Black)
4	None

Sensor Extension cable 171822-4 (female)

3	2	1
1	+12V~24 (Blue)	
2	GND (White)	
3	LS (Yellow)	
4	None	

[Belt Drive type]



Motor cable 172211-4 (male)

1	Stepping Motor /B (Blue)
2	Stepping Motor B (Red)
3	Stepping Motor /A (Green)
4	Stepping Motor A (Black)

Motor Extension cable 171822-4 (female)

4	3	2	1
1	Stepping Motor /B (Blue)		
2	Stepping Motor B (White)		
3	Stepping Motor /A (Yellow)		
4	Stepping Motor A (Brown)		

Sensor cable 172211-4 (male)

1	+12V~24 (Brown)
2	GND (Blue)
3	LS (Black)
4	None 空き

Sensor Extension cable 171822-4 (female)

3	2	1
1	+12V~24 (Blue)	
2	GND (White)	
3	LS (Yellow)	
4	None	