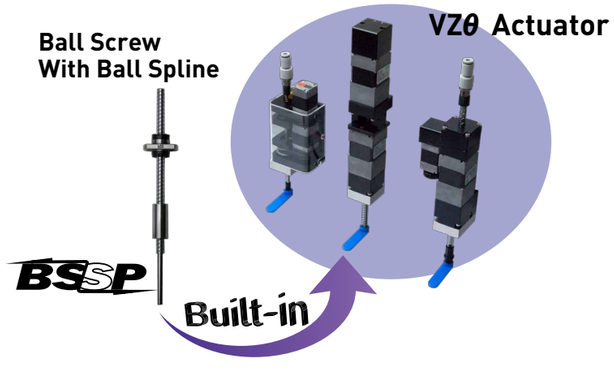
VZθ Actuator

VZθ 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(θ), and vacuum(V), with one product.

Ball Screw with Ball Spline (BSSP)



●Types and Features

KSS provides 3-types of VZθ Actuator, which are Direct Drive type, Hybrid Drive type, and Belt-Drive type including high speed type. It is possible to select one of them according to your specifications or application.

Direct Drive type

Hybrid Drive type

Belt Drive type

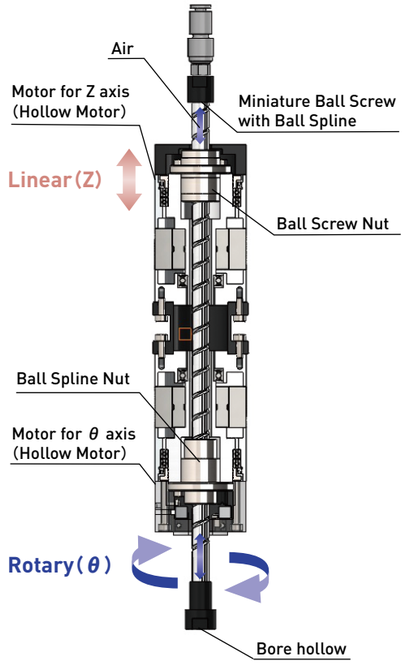
●Specifications

Model	Shaft dia. (mm)	Lead (mm)	Travel (mm)	Max. Speed(Z) (mm/sec)	Max. speed(θ) (rev/sec)	Thrust Force (N)	Max. Permissible Moment ($kg \cdot m^2$)
Direct Drive type	φ6	10	50	120	3	5	0.15×10^{-4}
	φ8	10	50	200	3	25	0.15×10^{-3}
Hybrid Drive type	φ6	10	60	200	3	5	0.15×10^{-4}
Belt-Drive type	φ4	4	60	80	3	5	0.8×10^{-5}
	φ6	10	60,120	200	3	10	0.4×10^{-4}
	φ8	10	120	200	3	15	0.1×10^{-3}
Belt-Drive High speed type	φ6	10	80	500	25	3	0.15×10^{-4}

●Structures

【Direct Drive type】

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



-Principle of operation-

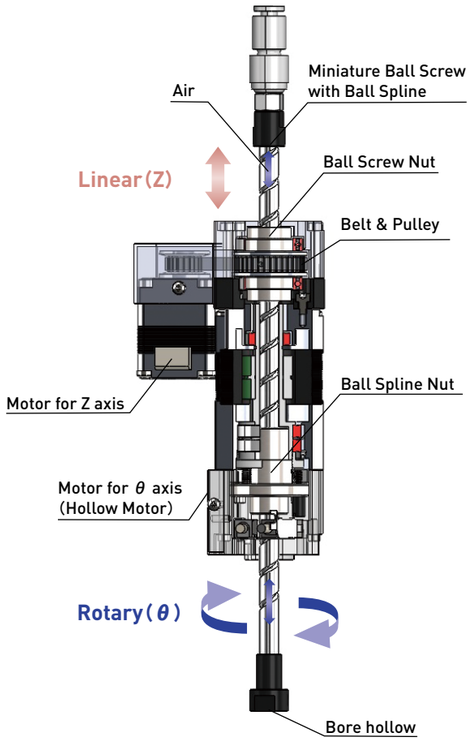
Linear motion (Z)
Linear motion by driving a Z-axis Motor and rotating the Ball Screw Nut. At this time, the Ball Spline Nut plays a role of anti-rotating device and slide guide of a Screw Shaft.

Rotary Motion (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 (V)
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-

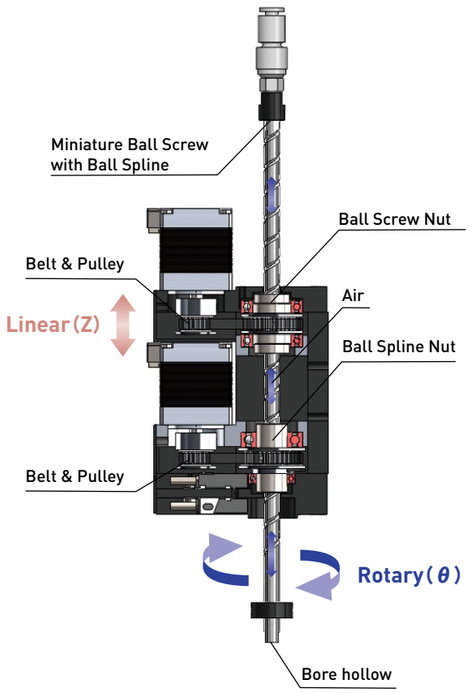
Linear motion (Z)
For linear motion, drive the Ball Screw Nut by Z-axis Motor through the Belt & Pulley. In this case, Ball Spline Nut plays a role of slide guide & anti-rotating device.

Rotary Motion (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 (V)
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 & Pulley. In this case, Ball Spline Nut plays a role of slide guide & anti-rotating device.

Rotary Motion (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 (V)
Bore Hollow can be multi uses.
For example vacuum and blow function.

●Model number notation
【Direct Type / Hybird Drive type】

DD VZ 42 - G 05 - 050 N XXX
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①Series No.
DD : Direct Drive type
HD : Hybrid Drive type
②Actuator type
VZ : VZθ (VZ-theta) Actuator
③Motor size
42 : NEMA 17 Stepping Motor
28 : NEMA 11 Stepping Motor
④Lead Screw / Ball Screw type
G : Precision Ball Screw+Ball Spline
⑤Lead / Pitch (mm) : 05 means 5mm
⑥Travel(mm) : 050 means 50mm
⑦Connector type
N : No connector(Bare)
E : EI connector(TE Connectivity)
⑧Extra notation

【Belt Drive type】

BD VZ 06 - G 10 - 050 N 01 XXX
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

①Series No.
BD : Belt Drive Actuator Series
②Actuator type
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 (TE Connectivity)
⑧Motor type
01 : NEMA 10 Stepping Motor
02 : NEMA 11 Stepping Motor
03 : NEMA 14 Stepping Motor
⑨Extra notation

【High Speed Belt Drive type】

The model number nomination is as follows for High Speed Belt Drive type or custom design products which specifications and dimension significantly change from Catalogue.

DD 28 - G 100 100 N2 K 2 E - B
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

①Actuator type
DD : Direct Drive Actuator Series
HD : Hybrid Drive Actuator Series
BD : Belt Drive Actuator Series
②Motor Frame size
25 : NEMA 10 28 : NEMA 11
35 : NEMA 14 42 : NEMA 17
③Lead Screw / Ball Screw type
G : Precision Ball Screw
④Lead / Pitch (mm) : 100 means 10mm
⑤Travel (mm) : 100 means 100mm
⑥Motor type
N2 : 2-phase stepping motor
N5 : 5-phase stepping motor
NE : Stepping motor with Encoder
NS : Servo motor
⑦Sensor type
F : Photo-Micro L : Limit Switch
K : Proximity Z : Magnetic
⑧Number of Sensor
1 : 1 sensor 2 : 2 sensors
⑨Connector type
H : HIROSE
E : EI (TE Connectivity)
N : No connector (Bare)
⑩Option
B : Electro Magnetic Brake
C : for Clean room V : Vacuum
( ) : Motor position represented by degree

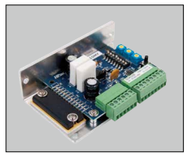
●Attachment

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

【Stepping Motor Driver】

SD4030B3

This is recommended Driver for 2-phase stepping Motor.
It has Micro-Step function with 8-step angle.(page V108)



※Caution

- The factory setting of SD4030B3 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 endge only (Bare).

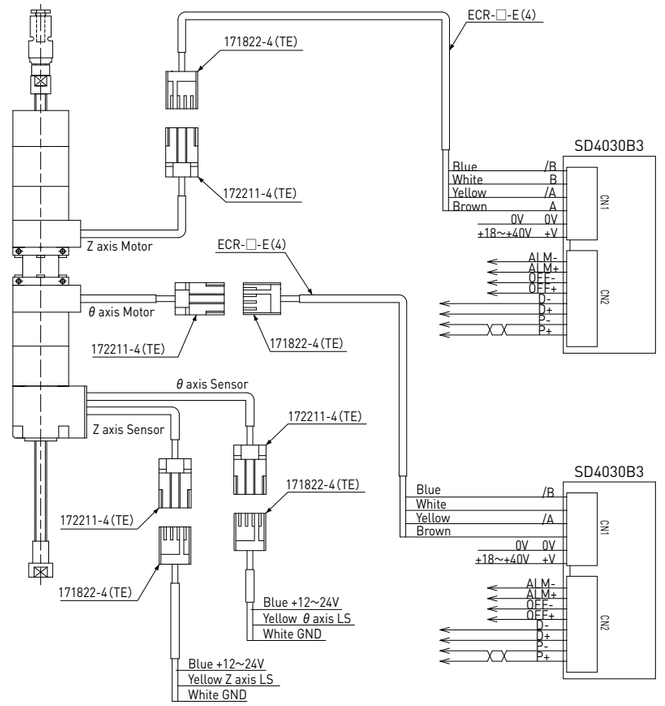
EC ① R ② — 2 ③ — E(4) ④

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

Actuator
VZ θ Actuator

●Connection Diagram

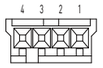
【□28 / NEMA11 Direct Drive type】



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 cable171822-4 (female)

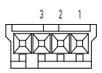


1	Stepping Motor /B (Blue)
2	Stepping Motor B (White)
3	Stepping Motor /A (Yellow)
4	Stepping Motor A (Brown)

Sensor cable 172211-4 (male)

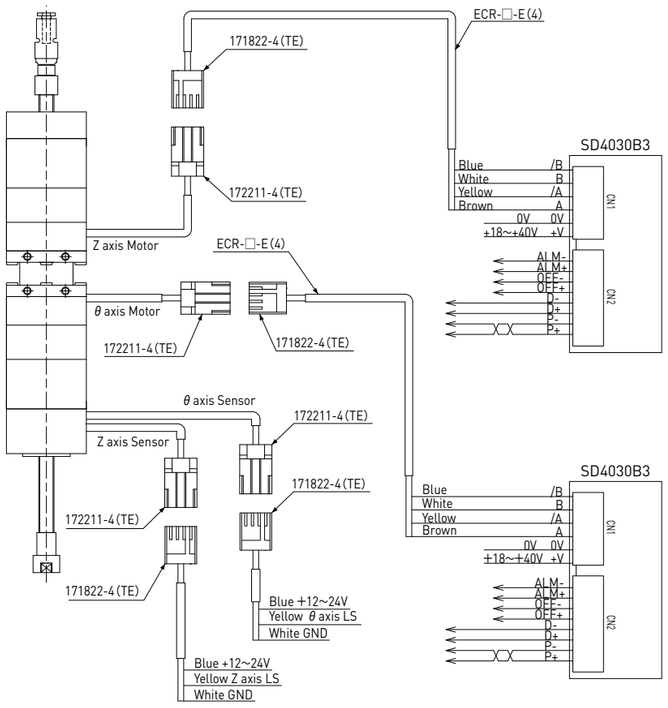
1	+12V~24 (Brown)
2	GND (Blue)
3	LS (Black)
4	None

Sensor Extension cable171822-4 (female)



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

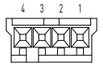
【□42 / NEMA17 Direct Drive type】



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 cable171822-4 (female)

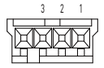


1	Stepping Motor /B (Blue)
2	Stepping Motor B (White)
3	Stepping Motor /A (Yellow)
4	Stepping Motor A (Brown)

Sensor cable 172211-4 (male)

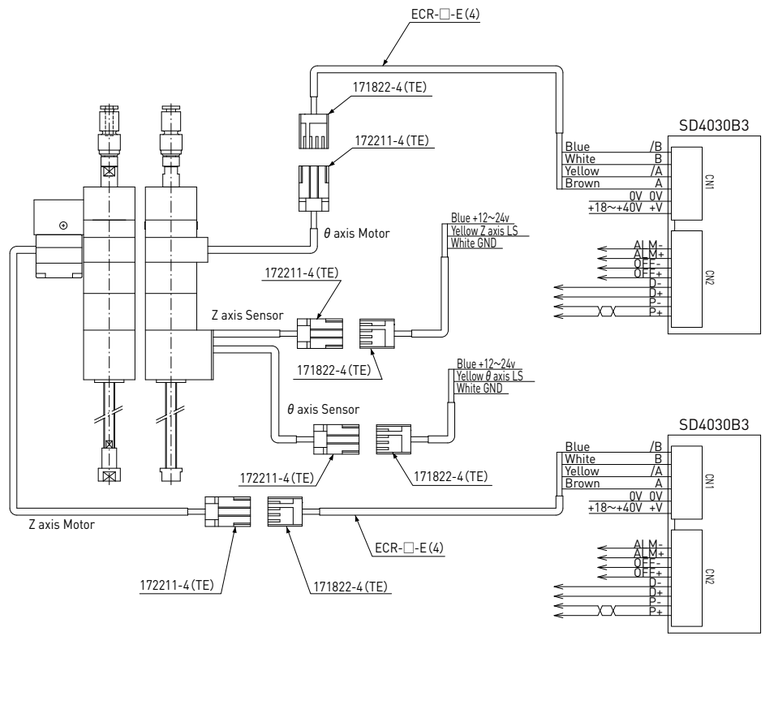
1	+12V~24 (Brown)
2	GND (Blue)
3	LS (Black)
4	None

Sensor Extension cable171822-4 (female)



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

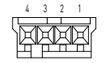
【Hybrid Drive type】



Z axis Motor cable 172211-4 (male)

1	Stepping Motor /B (Orange)
2	Stepping Motor B (Blue)
3	Stepping Motor /A (Yellow)
4	Stepping Motor A (Red)

Z axis Motor Extension cable171822-4 (female)

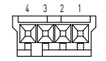


1	Stepping Motor /B (Blue)
2	Stepping Motor B (White)
3	Stepping Motor /A (Yellow)
4	Stepping Motor A (Brown)

θ axis 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)

θ axis Motor Extension cable 171822-4 (female)

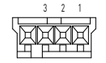


1	Stepping Motor /B (Blue)
2	Stepping Motor B (White)
3	Stepping Motor /A (Yellow)
4	Stepping Motor A (Brown)

Sensor cable 172211-4 (male)

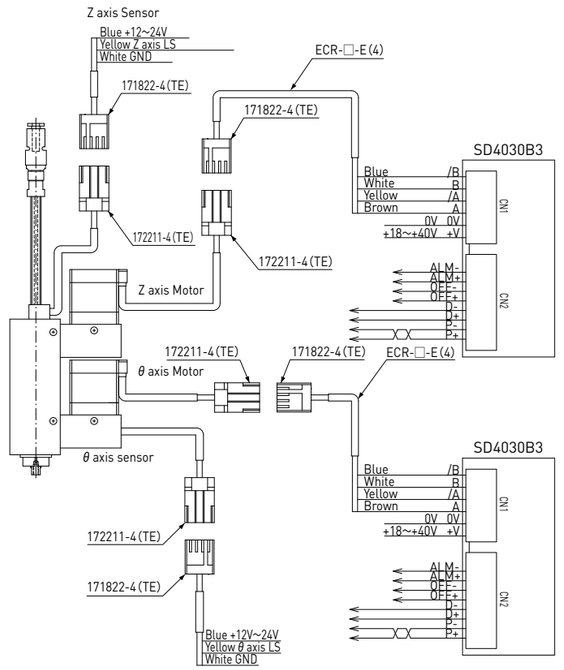
1	+12V~24 (Brown)
2	GND (Blue)
3	LS (Black)
4	None

Sensor Extension cable 171822-4 (female)



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

【Belt Drive type】



Motor cable 172211-4 (male)

		BDVZ04	BDVZ06/BDVZ08
1	Stepping Motor /B	Orange	Blue
2	Stepping Motor B	Blue	Red
3	Stepping Motor /A	Yellow	Green
4	Stepping Motor A	Red	Black

Motor Extension cable171822-4 (female)

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)

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