**Multi-Functional VZθ Actuator**

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.

**Types and Features**
KSS provides 3-types of multi-functional VZθ 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.

**Specifications**

<table>
<thead>
<tr>
<th>Model</th>
<th>Shaft dia (mm)</th>
<th>Load (mm)</th>
<th>Travel (mm)</th>
<th>Max. Speed (Z) (mm/sec)</th>
<th>Max. Speed (θ) (rev/sec)</th>
<th>Thrust Force (N)</th>
<th>Max. Permissible Moment (kg m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Drive type</td>
<td>6</td>
<td>50</td>
<td>72</td>
<td>3</td>
<td>7</td>
<td>0.15 x 10^-3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td></td>
<td>120</td>
<td>3</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>50</td>
<td>100</td>
<td>3</td>
<td>50</td>
<td>0.15 x 10^-3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td></td>
<td>200</td>
<td>3</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hybrid Drive type</td>
<td>6</td>
<td>10</td>
<td>50</td>
<td>200</td>
<td>3</td>
<td>5</td>
<td>0.15 x 10^-3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>50</td>
<td>80</td>
<td>3</td>
<td>5</td>
<td>0.9 x 10^-4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>10, 100</td>
<td>200</td>
<td>3</td>
<td>10</td>
<td>0.5 x 10^-4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>150</td>
<td>200</td>
<td>3</td>
<td>10</td>
<td>0.5 x 10^-4</td>
<td></td>
</tr>
</tbody>
</table>

**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 (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.

**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 (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]

-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.
**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).

![Extension Cable Diagram](image)

<table>
<thead>
<tr>
<th>EC</th>
<th>R</th>
<th>2</th>
<th>E(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

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

Note) EI connector by Tyco Electronics

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**Direct Drive Type**

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**Hybrid Type**

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**Belt Drive type**
Multi-Functional VZθ Actuator

[Connection Diagram]

[28 Direct Drive type]

[Hybrid Drive type]

[42 Direct Drive type]

[Belt Drive type]