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# Medium Torque Type Ball Spline

Models LT, LF, LT-X and LF-X

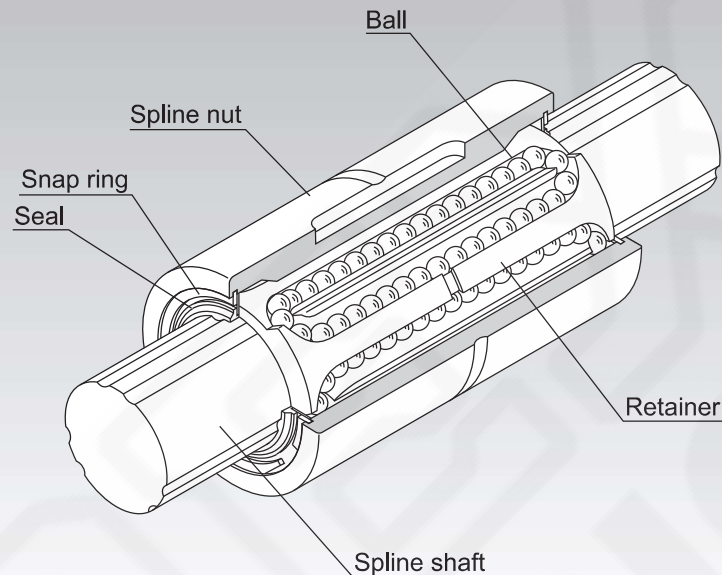


Fig.1 Structure of Medium Torque Type Ball Spline Model LT

<b>Point of Selection</b>	<b>A3-6</b>
<b>Point of Design</b>	<b>A3-117</b>
<b>Options</b>	<b>A3-120</b>
<b>Model No.</b>	<b>A3-122</b>
<b>Precautions on Use</b>	<b>A3-123</b>
<b>Accessories for Lubrication</b>	<b>A24-1</b>
<b>Mounting Procedure and Maintenance</b>	<b>B3-31</b>
Cross-sectional Characteristics of the Spline Shaft	<b>A3-17</b>
Equivalent factor	<b>A3-27</b>
Clearance in the Rotation Direction	<b>A3-30</b>
Accuracy Standards	<b>A3-34</b>
Maximum Manufacturing Length by Accuracy	<b>A3-115</b>

## Structure and Features

With the medium torque type Ball Spline, the spline shaft has two to three crests on the circumference, and along both sides of each crest, two rows of balls (four or six rows in total) are arranged to hold the crest so that a reasonable preload is applied.

The rows of balls are held in a special resin retainer incorporated in the spline nut so that they smoothly roll and circulate. With this design, balls will not fall even if the nut is removed from the spline shaft.

### [Large Load Capacity]

The raceways are formed into circular-arc grooves approximate to the ball curvature and ensure angular contact. Thus, this model has a large load capacity in the radial and torque directions.

### [No Angular Backlash]

Two rows of balls facing one another hold a crest, formed on the circumference of the spline nut, at a contact angle of  $20^\circ$  to provide a preload in an angular-contact structure. This eliminates an angular backlash in the rotational direction and increases the rigidity.

### [High Rigidity]

Since the contact angle is large and an appropriate preload is given, high rigidity against torque and moment is achieved.

### [Ball Retaining Type]

Use of a retainer prevents the balls from falling even if the spline shaft is pulled out of the spline nut. (except for models LT4 and 5)

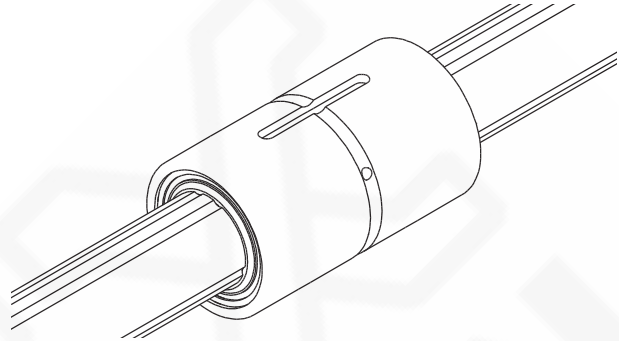
## Types and Features

### [Types of Spline Nuts]

#### Cylindrical Type Ball Spline Model LT

Specification Table⇒ **A3-78**

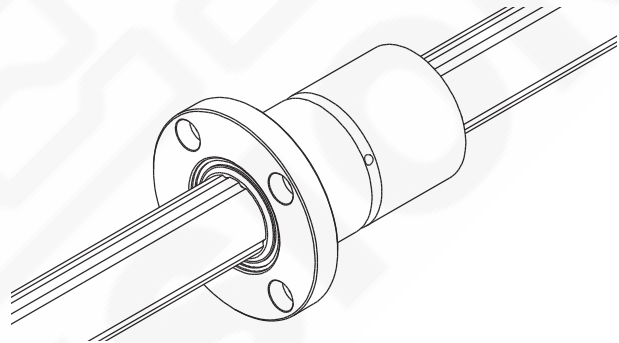
The most compact type with a straight cylindrical spline nut. When transmitting a torque, a key is driven into the body.



#### Flanged Type Ball Spline Model LF

Specification Table⇒ **A3-80**

The spline nut can be attached to the housing via the flange, making assembly simple. It is optimal for locations where the housing may be deformed if a keyway is machined on its surface, and where the housing width is small.



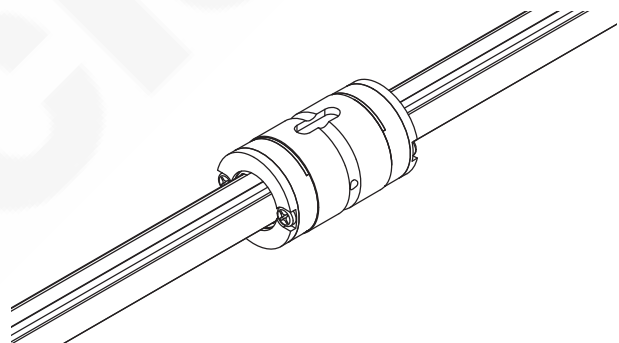
#### Model LT-X Miniature Ball Spline

Specification Table⇒ **A3-82**

The nut is more compact than that of the current Model LT thanks to the new circulating pathways.

The outer diameter of the nut is the same as that of the linear bushing.

The Model LT-XL is suitable for moment loads, torque, and overhung loads that exceed those tolerated by the Model LT-X.



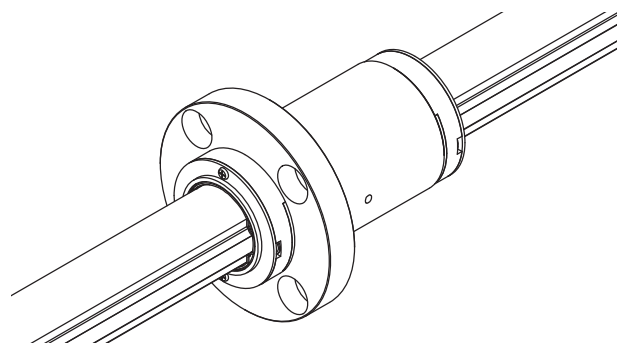
#### Model LF-X Miniature Ball Spline

Specification Table⇒ **A3-84**

The nut is more compact than that of the current Model LF thanks to the new circulating pathways.

The outer diameter of the nut is the same as that of the linear bushing.

The Model LF-XL is suitable for moment loads, torque, and overhung loads that exceed those tolerated by the Model LF-X.



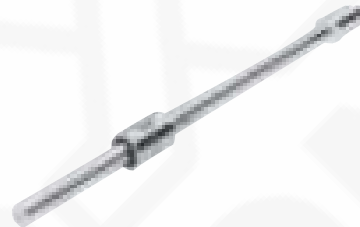
## [Types of Spline Shafts]

**Precision Solid Spline Shaft (Standard Type)**

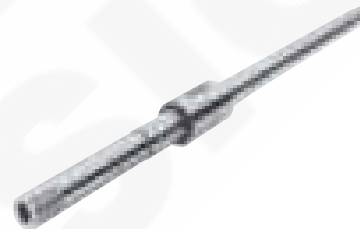
The raceway of the spline shaft is precision ground. It is used in combination with a spline nut.

**Special Spline Shaft**

THK manufactures a spline shaft with thicker ends or thicker middle area through special processing at your request.

**Hollow Spline Shaft (Type K)**

A drawn, hollow spline shaft is available for requirements such as piping, wiring, air-vent and weight reduction.



Thick

**Hollow Spline Shaft (Type N)**

A drawn, hollow spline shaft is available for requirements such as piping, wiring, air-vent and weight reduction.



Thin

**Housing Inner-diameter Tolerance**

When fitting the spline nut to the housing, transition fit is normally recommended. If the accuracy of the Ball Spline does not need to be very high, clearance fitting is also acceptable.

Table1 Housing Inner-diameter Tolerance

Housing Inner-diameter Tolerance	General conditions	H7
	When clearance needs to be small	J6