SINCE 1979

LEADTEAM

A Subsidiary of Deans Group

*Exceed Technology · Leading quality*

# LTM BALLSCREWS

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## LTM BALLSCREWS


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LTM BALLSCREWS

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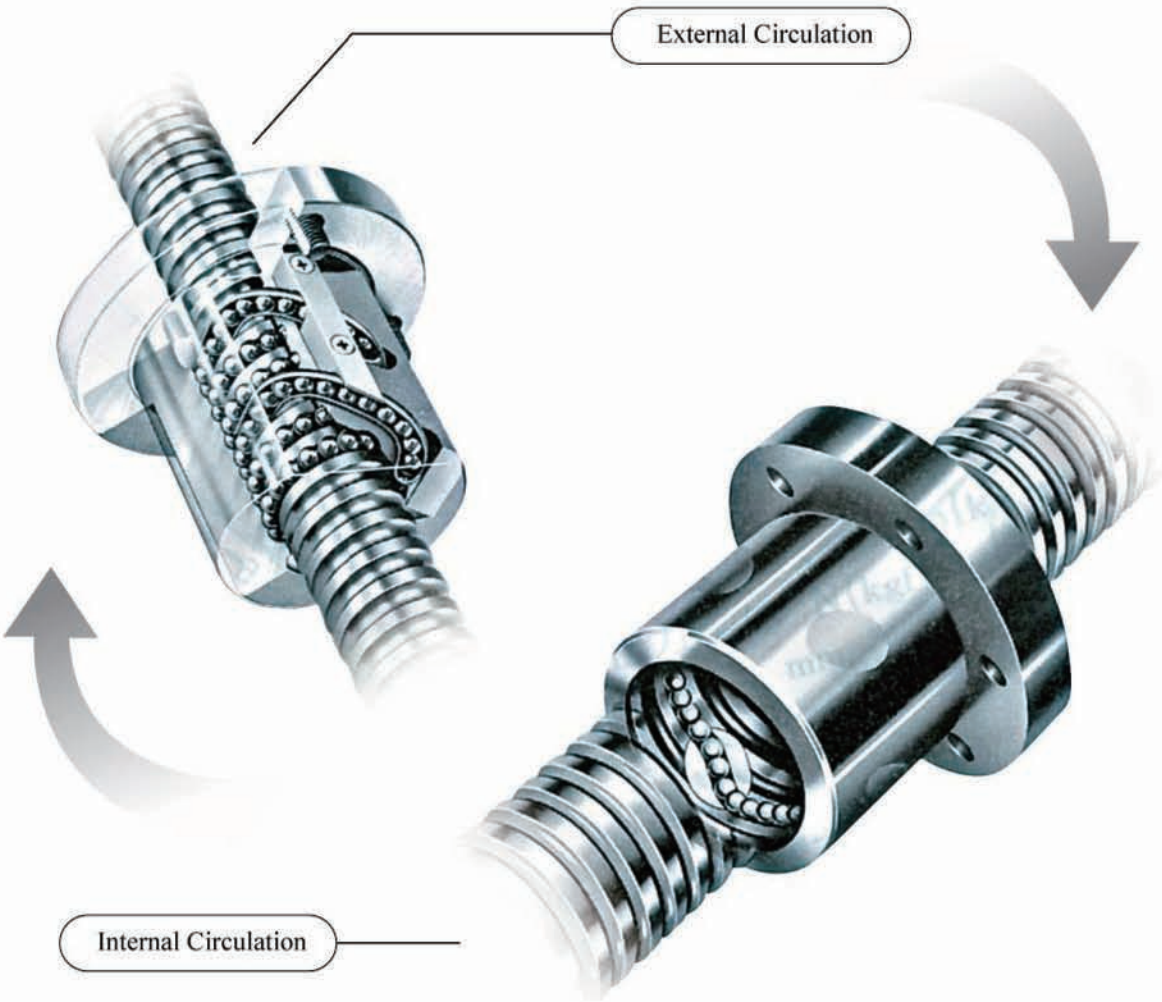
# Circulation Types

Basically, Leadteam has 3 kinds of recirculations in design

1.External Circulation Type: A tube is used to circulate balls. The tube scoops balls from the screw shaft passing through the return tube to their original position.

2.Internal Circulation Type: The deflector changes the route of ball movement as a result ball override the tread crest and return to original position thus maintaining perpetual motion.



# 3.Endcap Circulation Type：

### Accessories

Included: Screw, Nut, Ball, and Both Endcaps

### Turns

Ball enters the tangential direction of the nut thread, through axial hole back to the other endcap into the screw thread.

### High Smoothness

Due to the ball reflow in and out by the tangential direction, Leadteam uses longer patented design guidance path can come up with the best smoothness

### Silent

The single loop endcap reduces collision and loop is covered by nut to reduce the noise effectively.

### Endcap strcuture Stable and Durable

High strength, larger type and double screw patented design can effectively stable endcap, reduce vibration loosening, and the usage of reinforced plastic to increase the wear resistance.

### Load

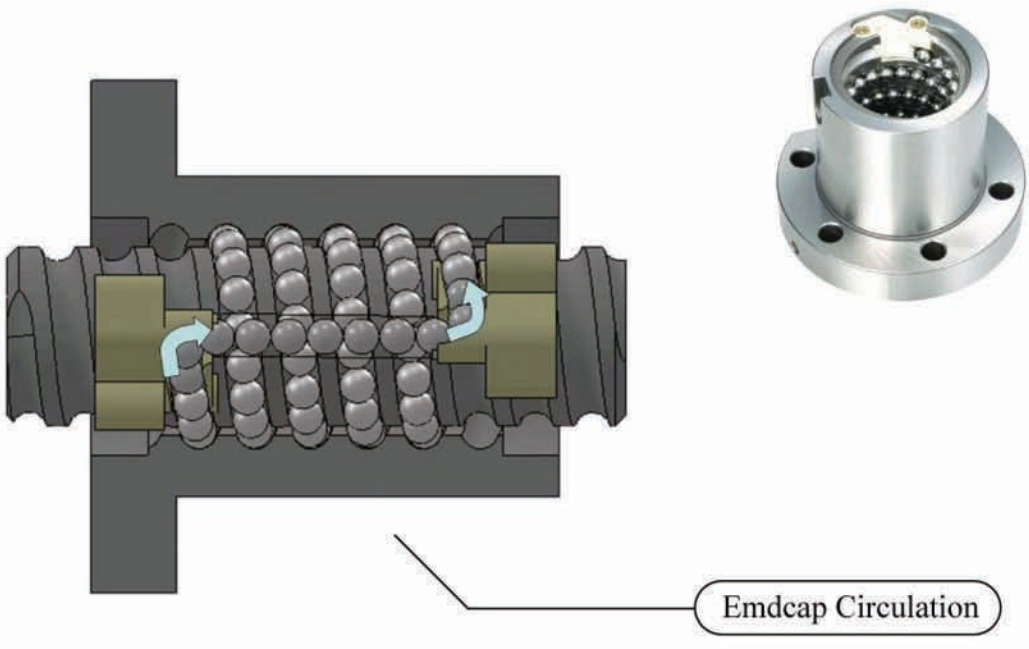
Same nut length can add more balls to endure larger loads.

### Space

The Nut OD and length are shortening, so the volume can be reduced and the weight can be lighter.

### Applications

CNC Machine Tool/ Machinery, Cars, Electronic, and Medical Automatic Production equipment.



# Ball Nut Selection

RSI : Single Round, Internal Nut

RDI : Double Round, Internal Nut

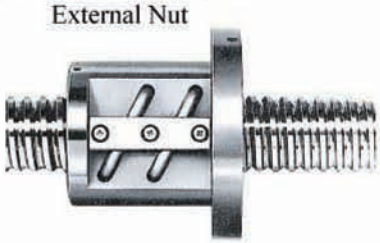
FSI : Single Flange, Internal Nut

FDI : Double Flange, Internal Nut

FSE: Flange Single Endcap

FDE: Flange Double Endcap

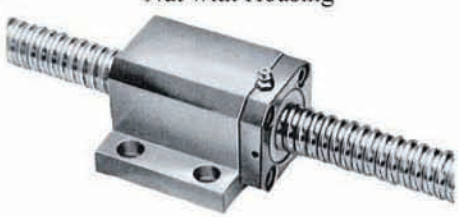
FSW : Single Flange, External Nut



DFI : Double Flange, Internal Nut

FDH : Double Flange Nut with Housing

FRH : Flange Cylindrical Nut with Housing



# External Type Nomenclature

$$\frac{R80}{1} \times \frac{20B3}{2} \times \frac{FDW}{3} \times \frac{6000}{4} \times \frac{7000}{5} \times \frac{C5}{6}$$

| | |
|---|---|
| **1 Screw Denote** | A : Direction of Turn R : Right Hand<br>L : Left Hand<br>RL : Right and Left Hand on same screw<br>B : Screw Shaft OD: 16. 20. 25. 28. 32. 36. 40. 45. 50. 55. 63. 80. 100 |
| **2 Lead and Turns** | A : Lead Metric : 4. 5. 6. 8. 10. 12. 16. 20 ...<br>Inch : 5.08/5TPI ; 6.35/4TPI ; 12.7/2TPI...<br>B : Circuits : A. Per Circulate Has 1.5 Turns of Balls<br>B. Per Circulate Has 2.5 Turns of Balls<br>C. Per Circulate Has 3.5 Turns of Balls<br>C : Number of Tubes Expressed By 1,2,3 |
| **3 Nut Shape** | A : F : Flange Type<br>R : Round Type<br>S : Square Type<br>G : Nut with Gear<br>B : S : Single Nut<br>D : Double Nut<br>C : W: Tubes Within Nut Body<br>V : Tubes above Nut Body |
| **4 Thread Length** | Unit : mm |
| **5 Overall Length** | Unit : mm |
| **6 Accuracy Grade** | Expressed by $e_{300}$<br>C1 : 0.005 C2 : 0.007 C3 : 0.008 C4 : 0.012<br>C5 : 0.018 C6 : 0.023 C7 : 0.50 C10 : 0.120 |
| **7 Suitable for Use** | Economical<br>Mass Production<br>High Lead<br>Two Starts<br>Larger external diameter of lead/Screw Shaft |

## Model Number Coding

# Internal Type Nomenclature

$$\frac{R80}{1} \times \frac{20T4}{2} \times \frac{FDI}{3} \times \frac{6000}{4} \times \frac{7000}{5} \times \frac{C5}{6}$$

| | |
|---|---|
| **1 Screw Denote** | A : Direction of Turn R : Right Hand<br>L : Left Hand<br>RL : Right and Left Hand on same screw<br>B : Screw Shaft OD: 16. 20. 25. 28. 32. 36. 40. 45. 50. 55. 63. 80. 100 |
| **2 Lead and Turns** | A : Lead Metric: 4. 5. 6. 8. 10. 12. 16. 20 ...<br>Inch : 5.08/5TPI ; 6.35/4TPI ; 12.7/2TPI<br>B : Circuits : T3 3Turns of Balls per Nut<br>T4 4Turns of Balls per Nut<br>T5 5Turns of Balls per Nut<br>T6 6Turns of Balls per Nut |
| **3 Nut Shape** | A : F : Flange Type<br>R : Round Type<br>S : Square Type<br>G : Nut with Gear<br>B : S : Single Nut<br>D : Double Nut<br>C : I : Internal Deflector Nut |
| **4 Thread Length** | Unit : mm |
| **5 Overall Length** | Unit : mm |
| **6 Accuracy Grade** | Expressed by $e_{300}$<br>C1 : 0.005 C2 : 0.007 C3 : 0.008 C4 : 0.012<br>C5 : 0.018 C6 : 0.023 C7 : 0.50 C10 : 0.120 |
| **7 Suitable for Use** | Compact<br>Miniature Screw |

## Endcap Type Nomenclature

$$\frac{R63}{1} \times \frac{10T4}{2} \times \frac{FDE}{3} \times \frac{6000}{4} \times \frac{7000}{5} \times \frac{C5}{6}$$

| | |
|---|---|
| **1 Screw Denote** | A : Direction of Turn R : Right Hand<br>L : Left Hand<br>RL : Right and Left Hand on same screw<br>B : Screw Shaft OD: 16. 20. 25. 32. 40. 45. 50. 63... |
| **2 Lead and Turns** | A : Lead Metric: 5. 10. 12...<br>Inch : 5.08/5TPI ; 6.35/4TPI ; 12.7/2TPI<br>B : Circuits : T4 4Turns of Balls per Nut<br>T5 5Turns of Balls per Nut |
| **3 Nut Shape** | A : F : Flange Type<br>B : S : Single Nut<br>D : Double Nut<br>C : E : Endcap |
| **4 Thread Length** | Unit : mm |
| **5 Overall Length** | Unit : mm |
| **6 Accuracy Grade** | Expressed by $e_{300}$<br>C1 : 0.005 C2 : 0.007 C3 : 0.008 C4 : 0.012<br>C5 : 0.018 C6 : 0.023 C7 : 0.50 C10 : 0.120 |
| **7 Suitable for Use** | All transmission machinery devices and equipments. |

# Installation and Maintenance

1 While the ballscrew exits factory, it should be cleaned and lubricated, in order to prevent rust eclipse. The thread groove which can't have any sharp iron scraps or dirty matters entering the nut should be attention to inspect. After all, the ballscrew should be installed into the machine.

2 Selecting appropriate grade ballscrew to meet the design requirements, high precision grade ballscrews are used in high position accuracy, smooth running. And long service life, like CNC machine tools or precision measurement equipment. On other hand, commercial grade or rolled ballscrews are used in less accuracy or low end machine, like traditional or industrial machine.

3 To maximize the lifetime of ballscrew, good lubrication is required. We suggest using the higher EP lubricant. Oil mist bath or drip feeds are acceptable at any time into the nut.

4 Be caution. While installing the ballscrews into the machine, the nut or the return tube can't be knocked. Don't make the ballnut run off the screw shaft, the bullnut might be damaged if it falls off the shaft.

5 Please select suitable shaft to fit. ($\alpha$=60°) angular bearings is suitable on CNC machine. Therefore, it can reduce the gap while installing.

6 An overrun stopper should be considered at the end to prevent the nut from over traveling, due to the malfunction or human error.

7 Dust and foreign matter that enter the ballscrew may cause accelerated wear and breakage. Therefore installing the protection cover to the ballscrew, rpevent foreign matters or iron chips from entering the nut and the screw thread groove.

# Precaution for Designing

1 When you choose to use internal type of ballscrew, one end of the ball thread must be cut through to the end surface. The adjacent diameter close to end jounal must be 0.5~1.0 mm less the thread root diameter. This will be more convenience of installing balls into nuts and shafts.

2 The screw shaft is hardened by MF induction(HRC58-62). On the both ends of thread there are two teeth of thread of which hardness are slightly low the degree of hardness. While designing the effective stroke of the travel length, please considerate this phenomenon.

3 While designing ballscrew, should avoid radial load or moment as possible as it can. If radial load or moment is applted to the ballscrew, it is adversely affects ballscrew function and turn down life. It is especially important to eliminate misalignment or tilt between the screw shaft supported porton and the nut, or it could cause malfunction and reduce the life.

4 Over preload will increase the torque of machine running. it will generate heat and turn down life. On the other hand, less preload will increase backlash and turn down rigidity. LTM suggests that preload do not exceed 8% of the rated basic dynamic load ($10^6$Revs) in CNC machine tools. Please fill in the technical date sheel. If you have any questions, please contact our technology dept. We will suggest you the best preload value.

## Material and Heat Treatment

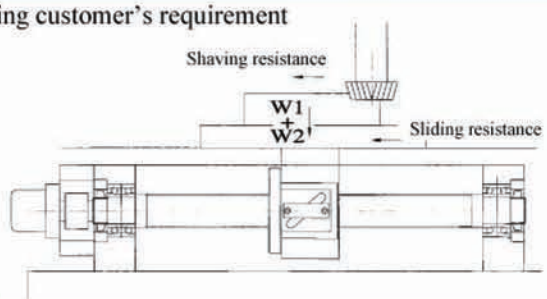
| Item | AISI | JIS | DIN | BSI | Heat Treatment | Hardness |
|---|---|---|---|---|---|---|
| Shaft | 4150H | SCM450H | 50CrMo4 | EN19C | MF Induction | HRC 58-62 |
| Nut | 8620H | SNCM220H | 20NiCrMo2 | EN36 | Carburizing | HRC 58-62 |
| Ball | 52100 | SUJ2 | 100Cr6 | EN31 | Hardening | HRC 62-65 |

# Design Case Explanation

Before selecting size of ballscrews, confirming the inspecting test usage of condition is must. Then, to decide its specification based on this condition. Considering: A. Load of machine, B. stroke, C. torque, D. positioning accuracy, E.misplaced F. stiffness, G.turns, H. screw OD.

## Design calculation process

Using customer's requirement




### 1 Creating processing condition

(a) Assuming lifetime of the machineH(hr)

H= [ ] x [ ] x [ ] x [ ]

| processing time hour/day | processing time day/year | expecting lifetime year | processing time ratio |
|---|---|---|---|

(b) Processing condition

| Condition / Type | Rate/speed | Shaving | Obj. Resis. | Time Ratio |
|---|---|---|---|---|
| Max Feed | rpm | kgf | kgf | % |
| Light Load | | | | |
| Medium Load | | | | |
| Heavy Load | | | | |

(C) Positioning accuracy

Determined by the motor resolution of level $e_{2\pi}$ . $e_{300}$

(D) Misplaced

Positioning accuracy error caused by the forward-reverse must consider the stiffness system of screw, nut, bearing, and nut block.

$$\frac{\text{Misplaced amount}}{2} \geqq \text{One-way system of institutions all variants volume}$$

## Instance of calculation

1.Workbench weight 300kg
2.Work piece weight 400kg
3.Turns needed 700mm
4.Max. feed 10M/mm
5.Min. feed 10$\mu$M/PULSE
6.Motor(MAX1000RPM)
7.Sliding resistance(Resistance coefficient $\mu$=0.05~0.15)
8.Processing time ratio
9.Accuracy test

### 1 Creating processing condition

(a) Assuming lifetime of the machineH(hr)

**H=12hr x 250day x 10years x 0.6**

**working ratio =18000hr**

(b) Processing condition

| Condition / Type | Rate/speed | Shaving | Obj. Resis. | Time Ratio |
|---|---|---|---|---|
| Max Feed | 1000 | 0 | 70 | 10 |
| Light Load | 600 | 50 | 70 | 50 |
| Medium Load | 200 | 100 | 70 | 30 |
| Heavy Load | 100 | 200 | 70 | 10 |

Axial force= Shaving force+ (workbench weight)x friction resistance

Workbench resistance(Fa)=(300+400)x0.1=70kgf

| Design calculation process | Instance of calculation |
|---|---|
| **2** Calculating turns | **2** Calculating turns |
| (assuming ballscrew is connected with motor directly)<br>$L \geqq \frac{\text{Max feed (m/min)} \times 1000}{\text{Motor Max. speed (rpm)}}$ | $L \geqq \frac{10 \times 1000}{1000} = 10\text{mm}$<br>Feed ratio $= \frac{10\text{mm}}{1000\text{pulse}} = 0.01\text{mm/pulse}$<br>Choosing encorder of 1000pulse/rpm encorder |
| **3** Calculating revolution per minute Nm(rpm) | **3** Calculating revolution per minute Nm(rpm) |
| $Nm = \frac{n_1t_1+n_2t_2+n_3t_3....n_nt_n}{t_1+t_2+t_3....t_n}$<br>$n_1, n_2, n_3, n_4 \cdots$ speed (rpm)<br>$t_1, t_2, t_3, t_n \cdots$ time ratio (%)<br>$t_1+t_2+t_3+t_n \ldots = 100$ | $Nm = \frac{1000 \times 10+600 \times 50+200 \times 30+100 \times 10}{100}$<br>$= \frac{4.7 \times 10^4}{100}$<br>$=470\text{rpm}$ |
| **4** Calculating average load Fm(kgf) | **4** Calculating average load Fm(kgf) |
| $Fm = \left(\frac{F_1^3 n_1t_1+F_2^3 n_2t_2+....F_n^3 n_nt_n}{n_1+n_2t_2+n_3t_3...n_nt_n}\right)^{\frac{1}{3}}$ | $Fm = \left(\frac{70^3 \times 1000 \times 10+120^3 \times 600 \times 50+170^3 \times 200 \times 30+270^3 \times 100 \times 10}{1000 \times 10+600 \times 50+200 \times 30+100 \times 10}\right)^{\frac{1}{3}}$<br>$=130\text{kgf}$ |
| **5** Calculating risk | **5** Calculating risk |
| $n_{max} \leqq f\frac{dr}{L^2} \times 10^{-7}\text{mm}$<br>$dr \geqq \frac{n_{max} L^2}{f} \times 10^{-7}\text{mm}$<br>Support-Support f=9.7<br>Fixed-Support f=15.1<br>Fixed-Fixed f=21.9<br>Fixed-Free f=3.4 | $n_{max} \leqq f\frac{dr}{L^2} \times 10^{-7}\text{mm}$<br>$dr \geqq \frac{n_{max} L^2}{f} \times 10^{-7}\text{mm}$<br>$= \frac{1000 \times 970^2}{21.9} \times 10^{-7} = 4.3\text{mm}$ |
| **6** Calculating DN value | **6** Calculating DN value |
| $DN \leqq \frac{100000}{n_{max}}$ | $DN \leqq \frac{100000}{n_{max}}$<br>$DN \leqq \frac{100000}{1000} = 100\text{mm}$ |

# Design Case Explanation

| Design calculation process | Instance of calculation |
|---|---|
| **7** Dynamic load rating Cd(kgf) | **7** Dynamic load rating Cd(kgf) |
| $Cd \geqq (60NmLt)^{1/3} Fm \cdot fd \times 10^{-2}$ (kgf)<br>fd No impact, smooth opertation 1.0~1.2<br>Normal operation 1.2~1.5<br>With impact and vibration 1.5~3.0 | $Cd \geqq (60 \times 470 \times 18000)^{1/3} \times 130 \times 1.2 \times 10^{-2}$ (kgf)<br>$Cd \geqq 1245$ kgf |
| **8** Selection of screw OD. (Combination of point 5. 6. 7) | |
| DN≦ Screw pitch circle Dia dr≧ Screw inner Dia.<br>Selected ballscrew OD. 32mm Lead 10mm | |
| **9** Selecting nut type | **9** Selecting nut type |
| C > Cd<br>C Basic dynamic load rating > Cd dynamic load rating | According to data sheet 32x10T4<br>C=3850 kgf Cd=1245 kgf<br>C > Cd |
| **10** Choosing screw installation distance | **10** Choosing screw installation distance |
| Thread length= Max. stroke+ nut length+ safety distance<br>Total length= installation clearance+ shoulder length (provided by customers) | 700+158+2x56=970mm |

**11** Focusing on required misplace amount, setting ball screw system (nut, screw, and supporting bearing) the key elements of misplace amount is 20 $\mu$ m×0.8=16 $\mu$ m to review elastic deformation of ball screw system key elements at this time. $\triangle L \leqq 8\ \mu m$

| | |
|---|---|
| **12** Stiffness of screw: Ks | **12** Stiffness of screw: Ks |
| Elastic deformation : $\triangle Ls$<br>$Ks = \frac{\pi\ dr^2 \cdot E}{Ls} \times 10^{-3}$ (kgf/ $\mu$ m)<br>$\triangle Ls = \frac{Fa}{Ks} = \frac{Fa \cdot L}{\pi\ dr^2 \cdot E} \times 10^{3}$ ( $\mu$ m)<br>Fa: Sliding resistance dr. Inner Dia. Of screw<br>E: Young's modulus $2.1 \times 10^{4}$ kgf/mm$^2$ | Elastic deformation : $\triangle Ls$<br>$Ks = \frac{\pi\ 26.9^2 \times 2.1 \times 10^{4}}{970} \times 10^{-3} = 49.2$ (kgf/ $\mu$ m)<br>$\triangle Ls = \frac{70 \times 970}{\pi\ 26.9^2 \times 2.1 \times 10^{4}} \times 10^{3} = 0.7$ ( $\mu$ m) |
| **13** Stiffness of nut : Kn | **13** Stiffness of nut : Kn |
| Elastic deformation : $\triangle L_N$<br>Using 1/3 of the max. shaft direction load as preload<br>$Fao = \frac{F\ max}{3}$ (kgf)<br>$K_N = 0.8 \times K \left(\frac{Fao}{0.1C}\right)^{\frac{1}{3}}$<br>$\triangle L_N = \frac{Fa}{K_N}$ | Elastic deformation : $\triangle L_N$<br>$Fao = \frac{F\ max}{3}$ (kgf) $= \frac{270}{3} = 90$ (kgf)<br>$K_N = 0.8 \times 88 \left(\frac{90}{0.1 \times 3850}\right)^{1/3} = 43$ (kgf/ $\mu$ m)<br>$\triangle L_N = \frac{70}{43} = 1.6$ ( $\mu$ m)<br>K= 88 (checking data sheet) |

| Design calculation process | Instance of calculation |
|---|---|
| **14** Stiffness of supporting bearing(Elastic deformation:$\triangle L_B$)<br>$\triangle L_B=\frac{F_a}{2K_B}$<br>$K_B$=Bearing stiffness | **14** Stiffness of supporting bearing(Elastic deformation:$\triangle L_B$)<br>$\triangle L_B=\frac{70}{2x100}=0.35(\mu m)$ |

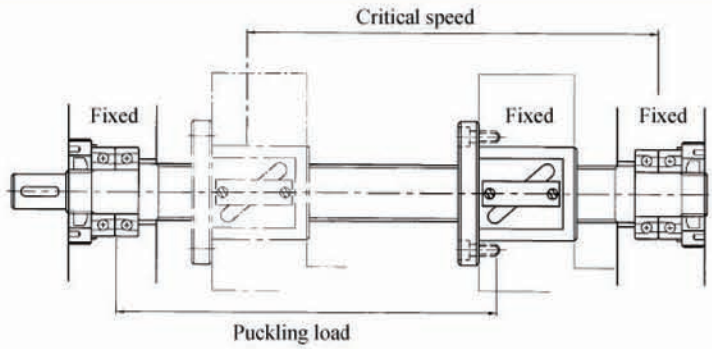
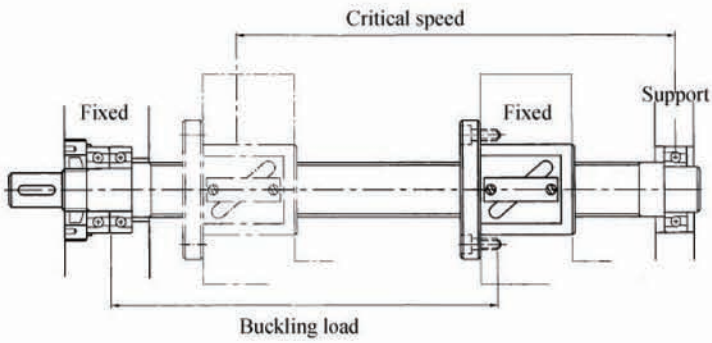
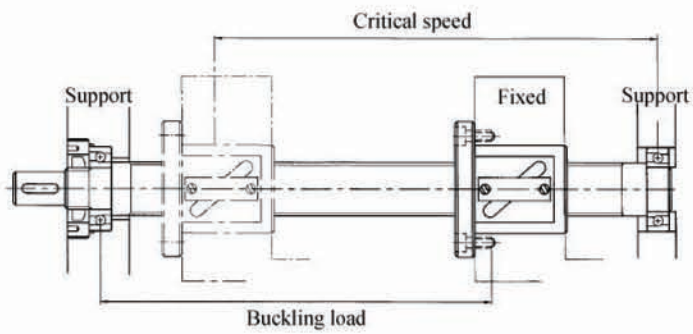
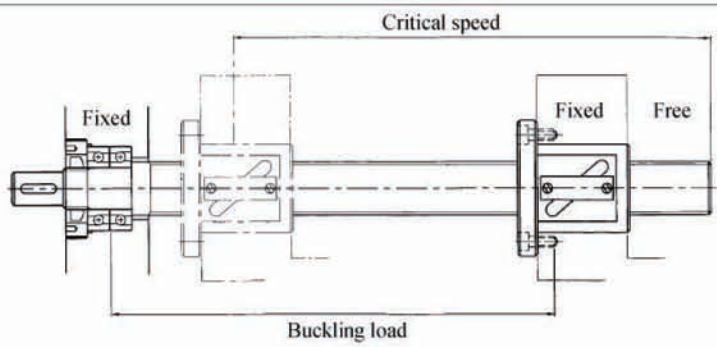
**15** Combination of point 10. 11. 12. 13. misplaced amount should smaller than 8 $\mu$ m

$\triangle L_S+\triangle L_N+\triangle L_B=0.7\ \mu m+1.6\ \mu m+0.35\ \mu m=2.65\ \mu m \leqq 8\ \mu m$

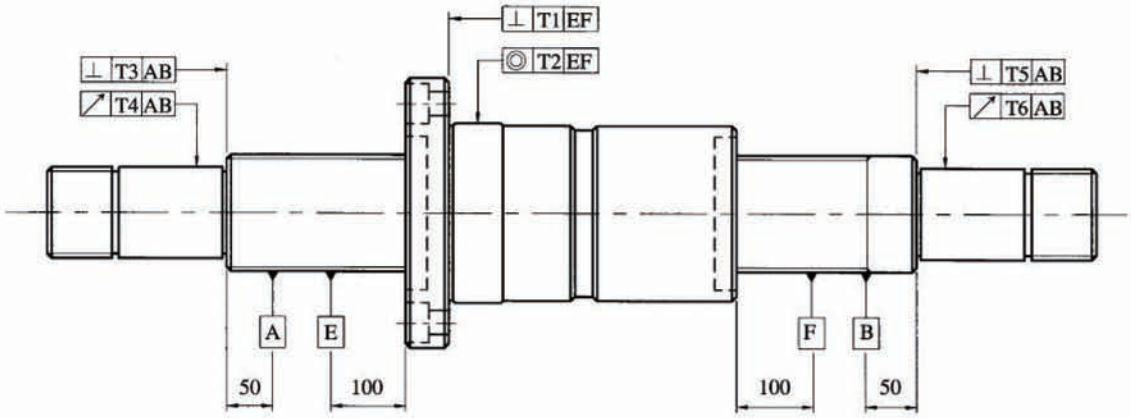
| | |
|---|---|
| **16** Inspecting thermal displacement : $\triangle \ell$ (mm)<br>$\triangle \ell=\rho\theta L$<br>$\rho$ : Coefficient of expansion $11.7x10^{-6}$mm/M℃<br>$\theta$ : Temp. rised ℃<br>L : Thread length | **16** Inspecting thermal displacement : $\triangle \ell$ (mm)<br>Usually the temperature rise under normal operation of the machine is 2~5 ℃, If temp. rised more than 3℃, the thermal displacement will be<br>$\triangle \ell=11.7x10^{-6}x3x700$<br>}}} $=0.024$mm |
| **17** Pre pulling force: F(kgf)<br>$F=\frac{\triangle \ell x E x \pi dr^2}{4L}$ kgf | **17** Pre pulling force: F(kgf)<br>$F=\frac{0.024 \times 2.1 \times 10^4 x \pi 26.9^2}{4x700}$ kgf<br>$=410$kgf |
| **18** Preload amount : Tp(kg-cm)<br>$Tp=K\frac{Fao \cdot \ell}{2\pi}$ (kg-cm)<br>K=0.1~0.3<br>$\ell$: Lead cm | **18** Preload amount : Tp(kg-cm)<br>$Tp=K\frac{Fao \cdot \ell}{2\pi}$ (kg-cm)<br>$K=0.3x\frac{90 x1}{2\pi}$<br>$=4.3$kg-cm |
| **19** Expecting lifetime<br>$Lt=(\frac{C}{fd \cdot Fm})^3 x10^6 x \frac{1}{60 \cdot Nm}$ hr | **19** Expecting lifetime<br>$Lt=(\frac{3850}{1.2 \cdot 130})^3 x10^6 x \frac{1}{60 \cdot 470}$ hr<br>$=533000$hr$\geqq 18000$hr |

# Ballscrew Mounting Methods

The Typical Four Kinds Mounting Methods in Machine Tool Applications Are Shown Below.

| Mounting Methods | Application |
|---|---|
| A   | ◎ High Rotation<br>◎ High Rigidity<br>**F-F** |
| B   | ◎ Medium Rotation<br>◎ Medium Rigidity<br>**F-S** |
| C   | ◎ General Mounting<br>◎ Medium Rotation<br>**S-S** |
| D   | ◎ Low Rotation<br>◎ Shorter Shaft<br>**F-O** |

# Accuracy of The Ballscrew Geometrical



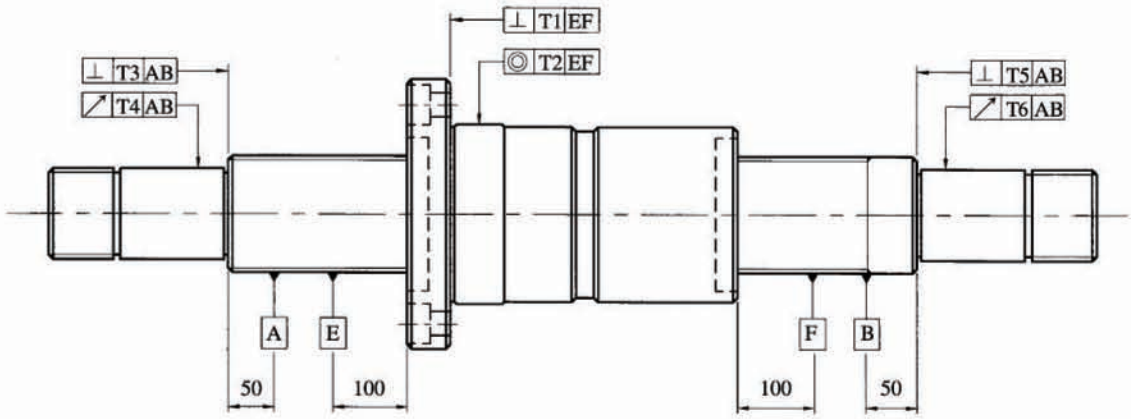

**T1 Perpendicularity of the Flange Mounting Surface to the Screw Shaft.** unit : μm

| Nut.OD. (mm) / Acc. Grade | | C1 | C2 | C3 | C4 | C5 | C6 |
|---|---|---|---|---|---|---|---|
| Over | To (incl.) | | | | | | |
| - | 18 | 6 | 7 | 8 | 9 | 10 | 11 |
| 18 | 30 | 6 | 7 | 8 | 9 | 10 | 12 |
| 30 | 50 | 7 | 7 | 8 | 10 | 11 | 13 |
| 50 | 80 | 8 | 9 | 10 | 11 | 13 | 15 |
| 80 | 120 | 9 | 10 | 12 | 13 | 15 | 17 |
| 120 | 150 | 10 | 11 | 13 | 14 | 17 | 20 |
| 150 | 180 | 11 | 12 | 14 | 15 | 18 | 23 |
| 180 | 250 | 12 | 13 | 15 | 16 | 20 | 27 |

**T2 Radial Run-Out of the Nut Circumference in Respect to the Screw Shaft.** unit : μm

| Nut.OD. (mm) / Acc. Grade | | C1 | C2 | C3 | C4 | C5 | C6 |
|---|---|---|---|---|---|---|---|
| Over | To (incl.) | | | | | | |
| - | 18 | 6 | 7 | 9 | 10 | 12 | 15 |
| 18 | 30 | 7 | 8 | 10 | 11 | 12 | 16 |
| 30 | 50 | 8 | 10 | 12 | 13 | 15 | 18 |
| 50 | 80 | 10 | 12 | 15 | 14 | 19 | 23 |
| 80 | 120 | 12 | 14 | 16 | 17 | 27 | 29 |
| 120 | 150 | 13 | 17 | 18 | 19 | 30 | 34 |
| 150 | 180 | 16 | 21 | 22 | 23 | 34 | 40 |
| 180 | 250 | 18 | 25 | 25 | 25 | 38 | 45 |

# Accuracy of The Ballscrew Geometrical




## T3.T5 Perpendicularity of the Screw Shaft Bearing Portion End Face to the Shaft Axis.

unit : μm

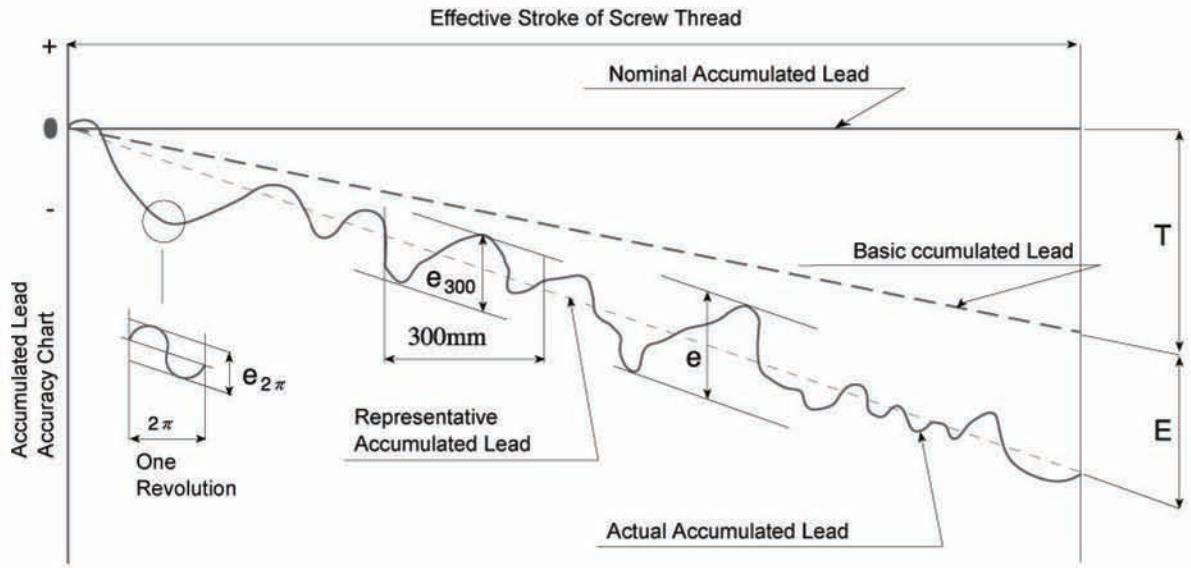
| Shaft.OD. (mm) / Acc. Grade | | C1 | C2 | C3 | C4 | C5 | C6 |
|---|---|---|---|---|---|---|---|
| Over | To (incl.) | | | | | | |
| - | 8 | 3 | 4 | 5 | 6 | 8 | 10 |
| 8 | 12 | 3 | 4 | 5 | 6 | 8 | 10 |
| 12 | 20 | 3 | 4 | 5 | 6 | 8 | 10 |
| 20 | 32 | 3 | 4 | 6 | 7 | 9 | 11 |
| 32 | 50 | 3 | 5 | 6 | 7 | 10 | 12 |
| 50 | 80 | 4 | 5 | 6 | 8 | 13 | 15 |
| 80 | 125 | 4 | 5 | 7 | 9 | 13 | 15 |

## T4.T6 Radial Run-Out of the Circumference of the Screw Shaft in Respect to its Bearing Portion

unit : μm

| Shaft.OD.(mm) / Acc. Grade | | C1 | C2 | C3 | C4 | C5 | C6 |
|---|---|---|---|---|---|---|---|
| Over | To (incl.) | | | | | | |
| - | 8 | 5 | 6 | 8 | 9 | 10 | 12 |
| 8 | 12 | 5 | 6 | 8 | 9 | 11 | 13 |
| 12 | 20 | 6 | 7 | 9 | 10 | 12 | 15 |
| 20 | 32 | 7 | 8 | 10 | 11 | 13 | 16 |
| 32 | 50 | 8 | 10 | 12 | 13 | 15 | 18 |
| 50 | 80 | 9 | 11 | 13 | 14 | 17 | 21 |
| 80 | 125 | 10 | 13 | 15 | 16 | 20 | 25 |

# Laser, Lead Accuracy Chart




## Defination

| | | |
|---|---|---|
| T±E | Representative Accumulated Lead | This Is The Straight Line Represent The Actual Accumulated Lead. Derived By Min. Square Root Method From The Actual Leaser Measured Datum. |
| a | Actual Accumulated Lead | This Is The Actual Lead Error Record Measured By Laser. |
| T | Basic Accumulated Lead (T) | Within Effective Stroke Of Screw Thread. The Designer Should Consider The Heat Generation. The Elastic Deformation During Rotation In Advance. Mondify The Nominal Accumulated Lead, Pass The Modification Value (T). To The Ballscrew Maker. The Experimental T Value (mm/m) CNC Lathe X AXIS (-0.10-0.20) CNC Machining X. Y AXIS (-0.10-0.20) Z AXIS (-0.10-0.15) Center Z AXIS (-0.15-0.25) |
| E | Representative Accumulated Lead Error (E) | The Allowable Tolerance Between Representative Accumulated Lead And Basic Accumulated Lead. |
| e | Lead Variation (e) | The Max. Variation Within The Effective Stroke Of Screw Thread. |
| $e_{300}$ | 300mm Variation $< e_{300} >$ | The Max. Lead Variation Of random 300mm Within Effective Stroke. |
| $e_{2\pi}$ | Single Pitch Variation $<e_{2\pi}>$ | The Max. Lead Variation Of Random One Revolution |

# Laser, Lead Accuracy Chart

## Variation per300mm of Thread Length and per Turn of the Screw Shaft

Unit : μm

| Accuracy | C0 | C1 | C2 | C3 | C4 | C5 |
|---|---|---|---|---|---|---|
| $e_{300}$ | 3.5 | 5 | 7 | 8 | 12 | 18 |
| $e_{2\pi}$ | 2.5 | 4 | 5 | 6 | 7 | 8 |

## Lead Accuracy of Screw Shaft

Unit : μm

| Accuracy | | C0 | | C1 | | C2 | | C3 | | C4 | | C5 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| item / Thread Length | | ±E | e | ±E | e | ±E | e | ±E | e | ±E | e | ±E | e |
| over | to(incl.) | | | | | | | | | | | | |
| - | 315 | 4 | 3.5 | 6 | 5 | 8 | 7 | 12 | 8 | 16 | 12 | 23 | 18 |
| 315 | 400 | 5 | 3.5 | 7 | 5 | 9 | 7 | 13 | 10 | 18 | 14 | 25 | 20 |
| 400 | 500 | 6 | 4 | 8 | 5 | 10 | 7 | 15 | 10 | 20 | 14 | 27 | 20 |
| 500 | 630 | 6 | 4 | 9 | 6 | 11 | 8 | 16 | 12 | 22 | 16 | 30 | 23 |
| 630 | 800 | 7 | 5 | 10 | 7 | 13 | 9 | 18 | 13 | 25 | 18 | 35 | 25 |
| 800 | 1000 | 8 | 6 | 11 | 8 | 15 | 10 | 21 | 15 | 29 | 20 | 40 | 27 |
| 1000 | 1250 | 9 | 6 | 13 | 9 | 18 | 11 | 24 | 16 | 34 | 22 | 46 | 30 |
| 1250 | 1600 | 11 | 7 | 15 | 10 | 21 | 13 | 29 | 18 | 40 | 25 | 54 | 35 |
| 1600 | 2000 | | | 18 | 11 | 25 | 15 | 35 | 21 | 48 | 29 | 65 | 40 |
| 2000 | 2500 | | | 22 | 13 | 30 | 18 | 41 | 24 | 57 | 34 | 77 | 46 |
| 2500 | 3150 | | | 26 | 15 | 36 | 21 | 50 | 29 | 69 | 40 | 93 | 54 |
| 3150 | 4000 | | | 30 | 18 | 44 | 25 | 60 | 35 | 85 | 48 | 115 | 65 |
| 4000 | 5000 | | | | | 52 | 30 | 72 | 41 | 76 | 49 | 140 | 77 |
| 5000 | 6300 | | | | | 65 | 36 | 90 | 50 | 100 | 60 | 170 | 93 |
| 6300 | 8000 | | | | | | | 110 | 60 | 125 | 75 | 210 | 115 |

## Permissible Range for the Preload Drag Torgne

| Basic Drag Torque Kgf-cm | | Thread Length≤4000mm | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Slender Ratio ≤ 40 | | | | | 40 < Slender Ratio < 60 | | | | |
| over | to(incl.) | C0 | C1 | C2 | C3 | C5 | C0 | C1 | C2 | C3 | C5 |
| - | 1.0 | ±35 % | ±40 % | ±55 % | ±60 % | ±60 % | ±45 % | ±45 % | ±65 % | ±70 % | ±70 % |
| 1.0 | 2.0 | ±35 % | ±40 % | ±45 % | ±55 % | ±60 % | ±45 % | ±45 % | ±55 % | ±65 % | ±70 % |
| 2.0 | 4.0 | ±35 % | ±40 % | ±45 % | ±50 % | ±55 % | ±45 % | ±45 % | ±55 % | ±60 % | ±65 % |
| 4.0 | 6.0 | ±25 % | ±30 % | ±35 % | ±40 % | ±45 % | ±38 % | ±38 % | ±45 % | ±45 % | ±50 % |
| 6.0 | 10 | ±20 % | ±25 % | ±30 % | ±30 % | ±35 % | ±30 % | ±30 % | ±35 % | ±35 % | ±40 % |
| 10 | 25 | ±15 % | ±20 % | ±25 % | ±25 % | ±30 % | ±25 % | ±25 % | ±30 % | ±30 % | ±35 % |
| 25 | 63 | ±10 % | ±15 % | ±20 % | ±20 % | ±25 % | ±20 % | ±20 % | ±25 % | ±25 % | ±30 % |
| 63 | 100 | | | ±10 % | ±15 % | ±20 % | | | ±20 % | ±20 % | ±25 % |

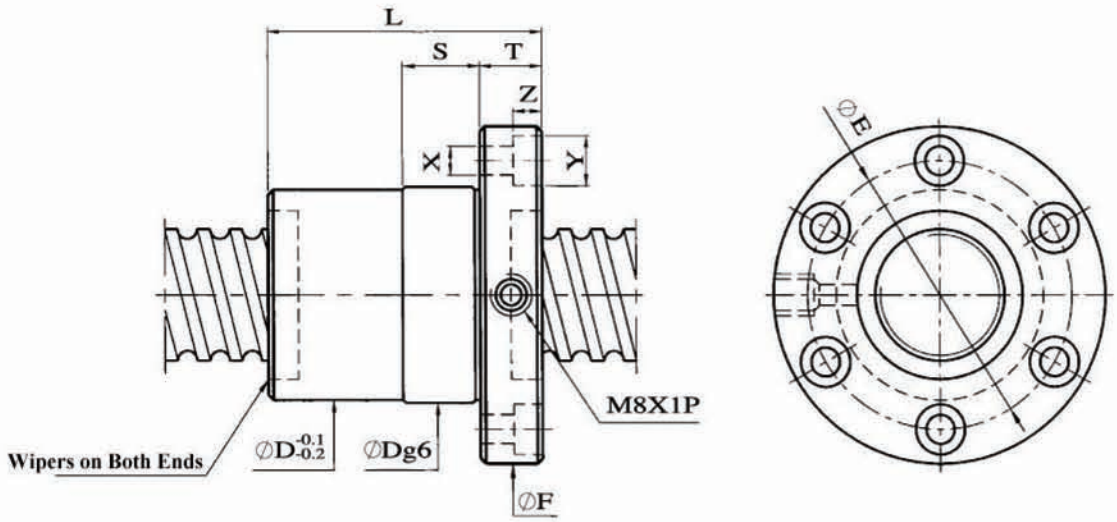
**Slender Ratio = Thread Length / Screw Shaft OD.**

## Accuracy Grades of Ballscrew and their Application

| Grade \ kinds | CNC Machine Tool | | | | | | | | | | | | Traditional Machine Tool | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CNC Lathe | | Machining Center | | Jig Borer M / C | | Wire Cutter | | Grinder M / C | | Milling M / C | | EDM | | Drilling M / C | | Wood M / C | Milling Borer | | EDM | | Special Purpose | Laser M / C | |
| Axis | X | Z | XY | Z | XY | Z | XY | UV | X | Z | XY | Z | XY | Z | XY | Z | XYZ | XY | Z | XY | Z | XYZ | XY | Z |
| C0 | | | | | ○ | ○ | | | ○ | | | | | | | | | | | | | | | |
| C1 | | | | | ○ | ○ | ○ | ○ | ○ | ○ | | | | | | | | | | | | | | |
| C2 | ○ | | ○ | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | | | | | | | | | | | |
| C3 | ○ | ○ | ○ | ○ | | | ○ | ○ | | ○ | ○ | ○ | ○ | ○ | | | | | | | | | ○ | ○ |
| C4 | ○ | ○ | ○ | ○ | | | | ○ | | | ○ | ○ | ○ | ○ | ○ | | | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| C5 | ○ | ○ | ○ | ○ | | | | | | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| C6 | | ○ | | ○ | | | | | | | | ○ | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| C7 | | | | | | | | | | | | | | | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | |
| C10 | | | | | | | | | | | | | | | | | ○ | | | | | | | |

FSI

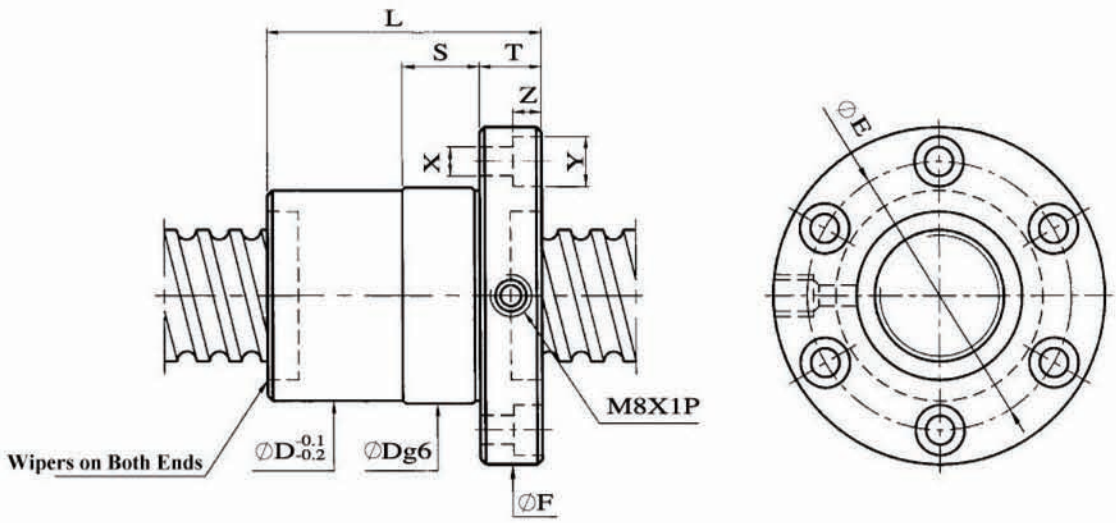
# FSI Type (Single · Internal Nut)




Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | Flamge | | | Bolt | | | Compact Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | F | T | E | X | Y | Z | S |
| 16 | 5 | 3.175 | 4 | 1010 | 2200 | 11 | 30 | 50 | 49 | 10 | 39 | 4.5 | 8 | 4.5 | 12 |
| 20 | 5 | 3.175 | 4 | 1320 | 3000 | 26 | 34 | 53 | 57 | 12 | 45 | 5.5 | 9.5 | 5.5 | 12 |
| | 6 | 3.969 | 4 | 1640 | 3500 | 26 | 34 | 61 | 57 | 12 | 45 | 5.5 | 9.5 | 5.5 | 12 |
| 25 | 5 | 3.175 | 3 | 1210 | 2340 | 25 | 40 | 46 | 64 | 12 | 51 | 5.5 | 9.5 | 5.5 | 15 |
| | | | 4 | 1550 | 4100 | 33 | | 53 | | | | | | | |
| | 6 | 3.969 | 3 | 1540 | 2790 | 25 | 40 | 53 | 64 | 12 | 51 | 5.5 | 9.5 | 5.5 | 15 |
| | | | 4 | 1970 | 4800 | 32 | | 61 | | | | | | | |
| | 10 | 4.763 | 3 | 1650 | 3270 | 25 | 40 | 64 | 64 | 12 | 51 | 5.5 | 9.5 | 5.5 | 15 |
| 32 | 5 | 3.175 | 4 | 1810 | 5500 | 41 | 48 | 53 | 74 | 12 | 60 | 6.6 | 11 | 6.5 | 15 |
| | | | 6 | 2570 | 8300 | 60 | | 63 | | | | | | | |
| | 6 | 3.969 | 4 | 2390 | 6700 | 42 | 48 | 61 | 74 | 12 | 60 | 6.6 | 11 | 6.5 | 15 |
| | 8 | 4.763 | 4 | 2880 | 7400 | 40 | 50 | 76 | 84 | 15 | 66 | 9 | 14 | 8.5 | 15 |
| | 10 | 6.350 | 3 | 3000 | 6700 | 30 | 56 | 80 | 88 | 16 | 72 | 9 | 14 | 8.5 | 15 |
| | | | 4 | 3850 | 9000 | 40 | | 90 | | | | | | | |
| 40 | 5 | 3.175 | 4 | 2060 | 7100 | 50 | 55 | 56 | 90 | 16 | 72 | 9 | 14 | 8.5 | 20 |
| | | | 6 | 2920 | 7990 | 74 | | 66 | | | | | | | |
| | 6 | 3.969 | 4 | 2700 | 8600 | 50 | 56 | 65 | 90 | 16 | 72 | 9 | 14 | 8.5 | 20 |
| | 10 | 6.350 | 3 | 3600 | 9200 | 38 | 65 | 83 | 106 | 18 | 84 | 11 | 17.5 | 11 | 20 |
| | | | 4 | 4610 | 12300 | 50 | | 93 | | | | | | | |

# FSI Type (Single · Internal Nut)

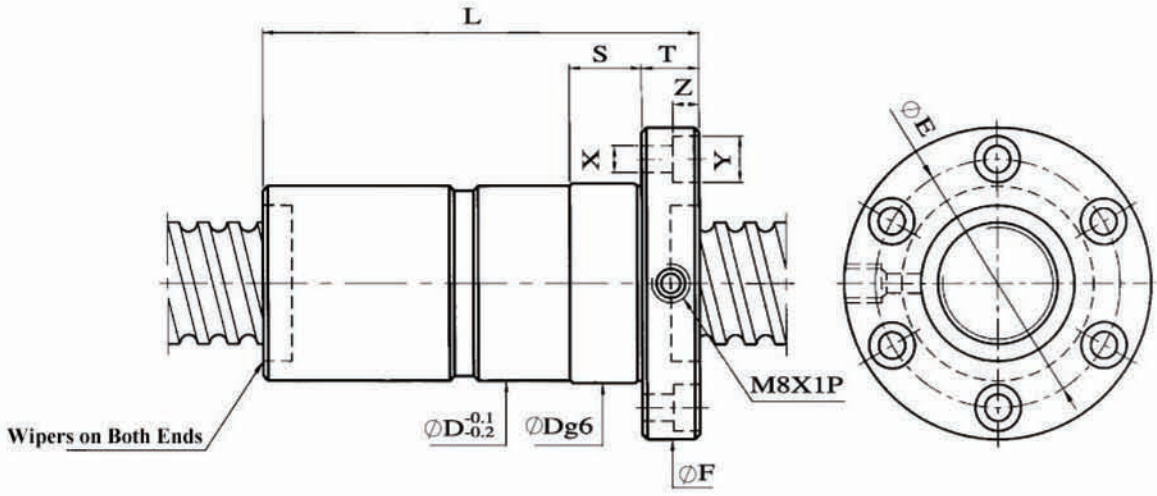



Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | Flamge | | | Bolt | | | Compact Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | F | T | E | X | Y | Z | S |
| 50 | 5 | 3.175 | 4 | 2320 | 9200 | 61 | 75 | 56 | 110 | 16 | 92 | 9 | 14 | 8.5 | 15 |
| | | | 6 | 3290 | 13800 | 89 | | 66 | | | | | | | |
| | 10 | 6.350 | 4 | 5400 | 16400 | 62 | 75 | 93 | 116 | 18 | 94 | 11 | 17.5 | 11 | 20 |
| | | | 6 | 7660 | 24600 | 92 | | 112 | | | | | | | |
| | 12 | 7.938 | 4 | 6890 | 19200 | 62 | 75 | 111 | 121 | 22 | 97 | 14 | 20 | 13 | 20 |
| | 20 | 7.938 | 3 | 4570 | 11200 | 47 | 75 | 146 | 121 | 28 | 97 | 14 | 20 | 13 | 25 |
| 63 | 10 | 6.350 | 4 | 6330 | 22200 | 78 | 88 | 95 | 134 | 20 | 110 | 14 | 20 | 13 | 20 |
| | | | 6 | 8970 | 33000 | 115 | | 114 | | | | | | | |
| | 12 | 7.938 | 4 | 8060 | 25700 | 77 | 90 | 111 | 136 | 22 | 112 | 14 | 20 | 13 | 20 |
| | | | 6 | 11430 | 38500 | 113 | | 136 | | | | | | | |
| | 20 | 9.525 | 3 | 8540 | 23700 | 75 | 95 | 146 | 153 | 28 | 123 | 18 | 26 | 17.5 | 25 |
| 80 | 10 | 6.350 | 4 | 7180 | 28700 | 95 | 105 | 97 | 152 | 22 | 127 | 14 | 20 | 13 | 20 |
| | | | 6 | 13380 | 52000 | 140 | | 116 | | | | | | | |
| | 12 | 7.935 | 4 | 7550 | 25900 | 96 | 110 | 111 | 156 | 22 | 132 | 14 | 20 | 13 | 20 |
| | | | 6 | 13380 | 52000 | 142 | | 136 | | | | | | | |
| | 20 | 9.525 | 3 | 9360 | 3050 | 125 | 115 | 146 | 173 | 28 | 143 | 18 | 26 | 17.5 | 25 |
| | | | 4 | 11980 | 40700 | 175 | | 168 | | | | | | | |
| 100 | 10 | 6.350 | 6 | 9920 | 47190 | 170 | 125 | 118 | 171 | 22 | 147 | 14 | 20 | 13 | 20 |
| | 12 | 7.938 | 6 | 11835 | 49750 | 174 | 130 | 142 | 188 | 28 | 158 | 18 | 26 | 17.5 | 25 |
| | 20 | 9.525 | 4 | 14985 | 58520 | 153 | 135 | 172 | 205 | 32 | 169 | 22 | 32 | 21.5 | 30 |

FDI

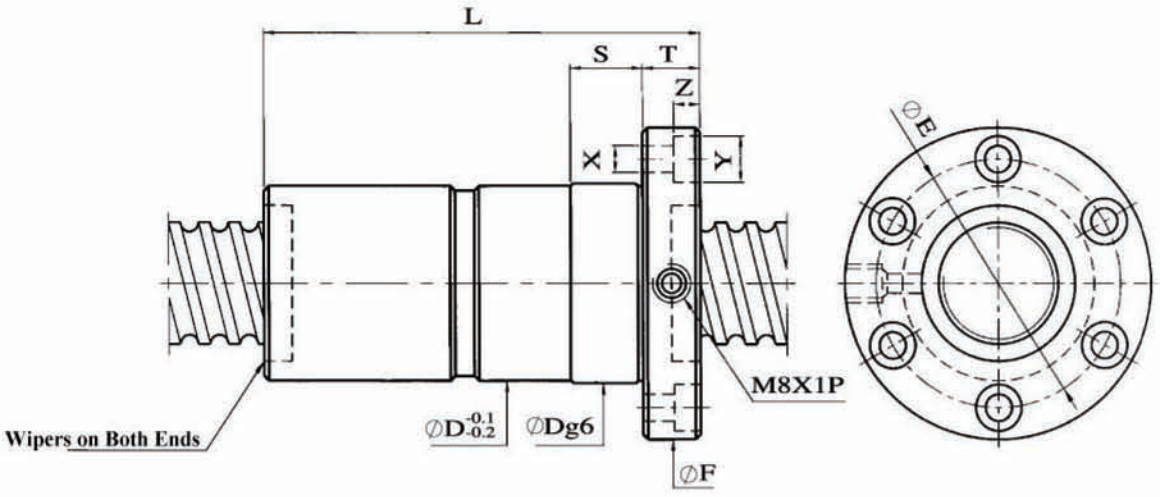
# FDI Type (Double · Internal Nut)




Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | Flamge | | | Bolt | | | Compact Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | F | T | E | X | Y | Z | S |
| 20 | 5 | 3.175 | 4 | 1320 | 3000 | 52 | 34 | 92 | 57 | 12 | 45 | 5.5 | 9.5 | 5.5 | 12 |
| | 6 | 3.969 | 4 | 1640 | 3500 | 51 | 34 | 109 | 57 | 12 | 45 | 5.5 | 9.5 | 5.5 | 12 |
| 25 | 5 | 3.175 | 3 | 1210 | 2340 | 49 | 40 | 82 | 64 | 12 | 51 | 5.5 | 9.5 | 5.5 | 15 |
| | | | 4 | 1550 | 4100 | 64 | | 92 | | | | | | | |
| | 6 | 3.969 | 3 | 1540 | 2790 | 48 | 40 | 93 | 64 | 12 | 51 | 5.5 | 9.5 | 5.5 | 15 |
| | | | 4 | 1970 | 4800 | 64 | | 109 | | | | | | | |
| | 10 | 4.763 | 3 | 1650 | 3270 | 49 | 40 | 140 | 64 | 12 | 51 | 5.5 | 9.5 | 5.5 | 15 |
| 32 | 5 | 3.175 | 3 | 1410 | 4100 | 61 | 48 | 82 | 74 | 12 | 60 | 6.6 | 11 | 6.5 | 15 |
| | | | 4 | 1810 | 5500 | 80 | | 92 | | | | | | | |
| | | | 6 | 2570 | 8300 | 118 | | 112 | | | | | | | |
| | 6 | 3.969 | 4 | 2390 | 6700 | 82 | 48 | 109 | 74 | 12 | 60 | 6.6 | 11 | 6.5 | 15 |
| | 8 | 4.763 | 4 | 2880 | 7400 | 79 | 50 | 134 | 84 | 15 | 66 | 9 | 14 | 8.5 | 15 |
| | 10 | 6.350 | 3 | 3000 | 6700 | 60 | 56 | 138 | 88 | 16 | 72 | 9 | 14 | 8.5 | 15 |
| | | | 4 | 3850 | 9000 | 88 | | 158 | | | | | | | |
| 40 | 5 | 3.175 | 4 | 2060 | 7100 | 98 | 55 | 96 | 90 | 16 | 72 | 9 | 14 | 8.5 | 20 |
| | | | 6 | 2920 | 10700 | 144 | | 116 | | | | | | | |
| | 6 | 3.969 | 4 | 2700 | 8600 | 99 | 56 | 113 | 90 | 16 | 72 | 9 | 14 | 8.5 | 20 |
| | | | 6 | 3840 | 13000 | 146 | | 137 | | | | | | | |
| | 10 | 6.350 | 3 | 3600 | 9200 | 75 | 65 | 140 | 106 | 18 | 84 | 11 | 17.5 | 11 | 20 |
| | | | 4 | 4610 | 12300 | 99 | | 160 | | | | | | | |

# FDI Type (Double · Internal Nut)



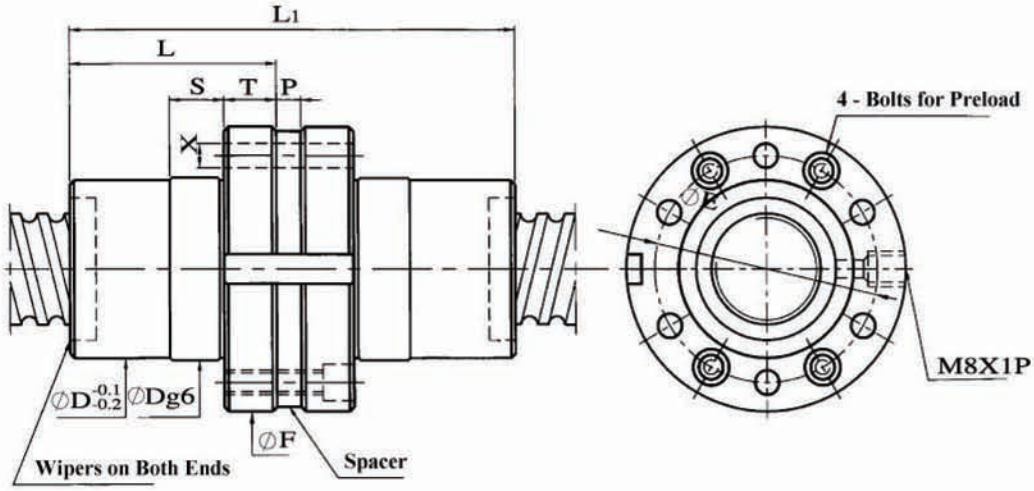

Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | Flamge | | | Bolt | | | Compact Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | F | T | E | X | Y | Z | S |
| 50 | 5 | 3.175 | 4 | 2320 | 9200 | 119 | 75 | 96 | 110 | 16 | 92 | 9 | 14 | 8.5 | 15 |
| | 10 | 6.350 | 4 | 5400 | 16400 | 122 | 75 | 160 | 116 | 18 | 94 | 11 | 17.5 | 11 | 20 |
| | | | 6 | 7660 | 24600 | 180 | | 202 | | | | | | | |
| | 12 | 7.938 | 4 | 6890 | 19200 | 122 | 75 | 195 | 121 | 22 | 97 | 14 | 20 | 13 | 20 |
| | 20 | 7.938 | 3 | 4570 | 11200 | 92 | 75 | 253 | 121 | 28 | 97 | 14 | 20 | 13 | 20 |
| 63 | 10 | 6.350 | 4 | 6330 | 22200 | 154 | 88 | 162 | 134 | 20 | 110 | 14 | 20 | 13 | 20 |
| | | | 6 | 8970 | 33300 | 226 | | 204 | | | | | | | |
| | 12 | 7.938 | 4 | 8060 | 25700 | 151 | 90 | 195 | 136 | 22 | 112 | 14 | 20 | 13 | 20 |
| | | | 6 | 11430 | 38500 | 222 | | 248 | | | | | | | |
| | 20 | 9.525 | 3 | 8540 | 23700 | 147 | 95 | 253 | 153 | 28 | 123 | 18 | 26 | 17.5 | 25 |
| 80 | 10 | 6.350 | 4 | 7180 | 28700 | 187 | 105 | 164 | 152 | 22 | 127 | 14 | 20 | 13 | 20 |
| | | | 6 | 10170 | 43100 | 275 | | 206 | | | | | | | |
| | 12 | 7.938 | 4 | 7550 | 25900 | 189 | 110 | 195 | 156 | 22 | 132 | 14 | 20 | 13 | 20 |
| | | | 6 | 13380 | 52000 | 278 | | 206 | | | | | | | |
| | 20 | 9.525 | 3 | 9360 | 30500 | 187 | 115 | 253 | 173 | 28 | 143 | 18 | 26 | 17.5 | 25 |
| | | | 4 | 11980 | 40700 | 246 | | 297 | | | | | | | |
| 100 | 10 | 6.350 | 6 | 9920 | 47190 | 310 | 125 | 214 | 171 | 22 | 147 | 14 | 20 | 13 | 20 |
| | 12 | 7.938 | 6 | 11835 | 49750 | 341 | 130 | 254 | 188 | 28 | 158 | 18 | 26 | 17.5 | 25 |
| | 20 | 9.525 | 4 | 14985 | 58520 | 325 | 135 | 301 | 172 | 32 | 169 | 22 | 32 | 21.5 | 30 |

DFI Type Nut

DFI

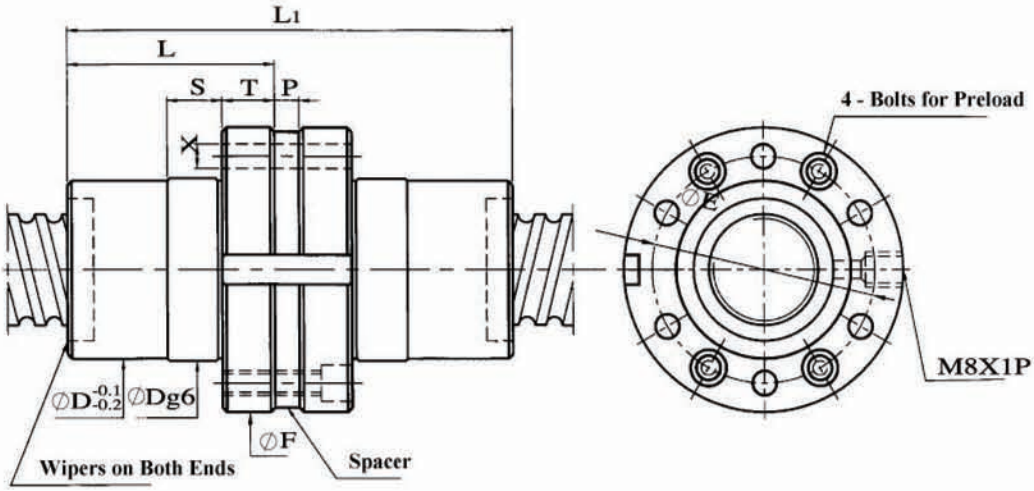
# DFI Type (Double · Internal Nut)




Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | | | Flamge | | | Bolt | Compact Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | P | L1 | F | T | E | X | S |
| 16 | 5 | 3.175 | 4 | 1080 | 2050 | 46 | 30 | 50 | 8 | 108 | 49 | 10 | 39 | 4.5 | 12 |
| 20 | 5 | 3.175 | 4 | 1130 | 2380 | 52 | 34 | 53 | 8 | 114 | 57 | 12 | 45 | 5.5 | 12 |
| | 6 | 3.969 | 4 | 1450 | 2800 | 51 | 34 | 61 | 7 | 129 | 57 | 12 | 45 | 5.5 | 12 |
| 25 | 5 | 3.175 | 3 | 1000 | 2340 | 49 | 40 | 46 | 8 | 100 | 64 | 12 | 51 | 5.5 | 15 |
| | | | 4 | 1280 | 3110 | 64 | | 53 | | 114 | | | | | |
| | 6 | 3.969 | 3 | 1310 | 2790 | 48 | 40 | 53 | 7 | 113 | 64 | 12 | 51 | 5.5 | 15 |
| | | | 4 | 1680 | 3720 | 64 | | 61 | | 129 | | | | | |
| | 10 | 4.763 | 3 | 1520 | 3120 | 53 | 40 | 64 | 5 | 133 | 64 | 12 | 51 | 5.5 | 15 |
| 32 | 5 | 3.175 | 4 | 1450 | 4150 | 80 | 48 | 53 | 6 | 112 | 74 | 12 | 60 | 6.6 | 15 |
| | | | 6 | 2060 | 6220 | 118 | | 63 | | 132 | | | | | |
| | 6 | 3.969 | 4 | 1960 | 5090 | 82 | 48 | 61 | 5 | 127 | 74 | 12 | 66 | 6.6 | 15 |
| | 8 | 4.763 | 4 | 2390 | 5690 | 79 | 50 | 76 | 5 | 157 | 84 | 15 | 60 | 9 | 15 |
| | 10 | 6.350 | 3 | 2640 | 5380 | 60 | 55 | 80 | 5 | 165 | 88 | 16 | 72 | 9 | 15 |
| | | | 4 | 3390 | 7170 | 79 | | 90 | | 185 | | | | | |
| 40 | 5 | 3.175 | 4 | 1610 | 5330 | 98 | 56 | 56 | 5 | 117 | 90 | 16 | 72 | 9 | 20 |
| | | | 6 | 2290 | 7990 | 144 | | 66 | | 137 | | | | | |
| | 6 | 3.969 | 4 | 2170 | 6480 | 99 | 56 | 65 | 5 | 135 | 90 | 16 | 72 | 9 | 20 |
| | 10 | 6.350 | 3 | 3060 | 7140 | 75 | 65 | 83 | 9 | 175 | 106 | 18 | 84 | 11 | 20 |

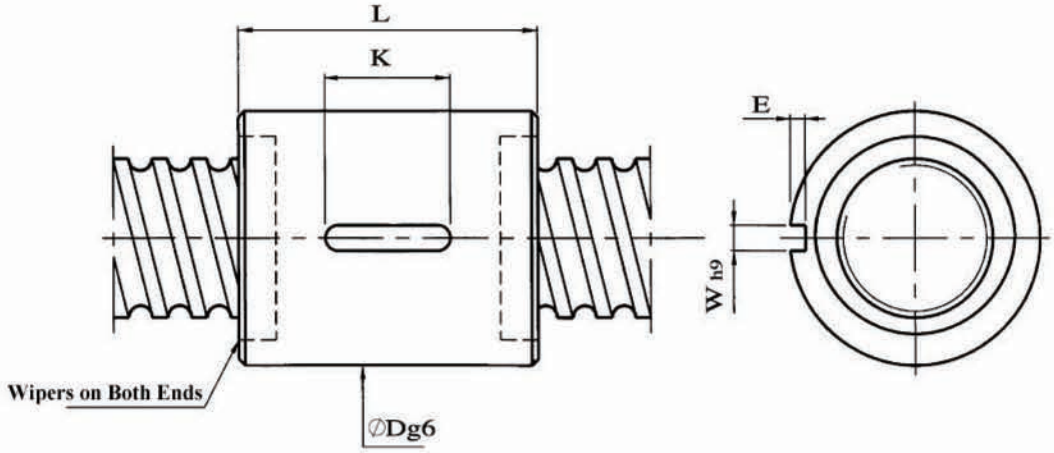
# DFI Type (Double · Internal Nut)




Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | | | Flamge | | | Bolt | Compact Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | P | L1 | F | T | E | X | S |
| 40 | 10 | 6.350 | 4 | 3910 | 9520 | 99 | 65 | 93 | 9 | 195 | 106 | 18 | 84 | 11 | 20 |
| 50 | 5 | 3.175 | 4 | 1780 | 6810 | 119 | 75 | 56 | 5 | 117 | 110 | 16 | 92 | 9 | 15 |
| | | | 6 | 2530 | 10200 | 175 | | 66 | | 137 | | | | | |
| | 10 | 6.350 | 4 | 4450 | 12500 | 122 | 75 | 93 | 9 | 195 | 116 | 18 | 94 | 11 | 20 |
| | | | 6 | 6300 | 18700 | 180 | | 112 | 7 | 231 | | | | | |
| | 12 | 7.938 | 4 | 5850 | 14900 | 122 | 75 | 111 | 5 | 227 | 121 | 22 | 97 | 14 | 20 |
| | 20 | 7.938 | 3 | 8250 | 19700 | 143 | 75 | 146 | 5 | 297 | 121 | 28 | 97 | 14 | 25 |
| 63 | 10 | 6.350 | 4 | 5070 | 16600 | 154 | 88 | 95 | 11 | 201 | 134 | 20 | 110 | 14 | 20 |
| | | | 6 | 7190 | 24900 | 226 | | 114 | 9 | 237 | | | | | |
| | 12 | 7.938 | 4 | 6630 | 19500 | 151 | 90 | 111 | 8 | 230 | 136 | 22 | 112 | 14 | 20 |
| | | | 6 | 9400 | 29200 | 222 | | 136 | | 280 | | | | | |
| | 20 | 9.525 | 3 | 10200 | 37600 | 265 | 95 | 146 | 7 | 299 | 153 | 28 | 123 | 18 | 25 |
| 80 | 10 | 6.350 | 4 | 5620 | 21300 | 187 | 105 | 97 | 11 | 205 | 152 | 22 | 127 | 14 | 20 |
| | | | 6 | 7960 | 32000 | 275 | | 116 | 9 | 241 | | | | | |
| | 12 | 7.938 | 4 | 10700 | 38900 | 278 | 110 | 111 | 8 | 230 | 156 | 22 | 132 | 14 | 20 |
| | | | 6 | 18220 | 63220 | 216 | | 136 | | 280 | | | | | |
| | 20 | 9.525 | 3 | 12600 | 42600 | 246 | 115 | 146 | 9 | 301 | 173 | 28 | 143 | 18 | 25 |
| | | | 4 | 18900 | 63900 | 369 | | 168 | 10 | 346 | | | | | |

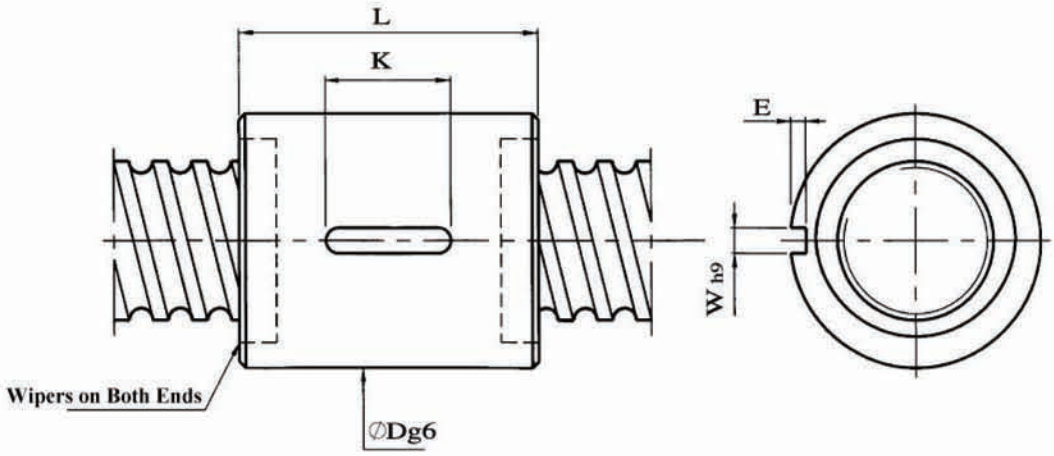
# RSI Type (Single · Internal Nut)




Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | Keyway | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | K | W | E |
| 20 | 5 | 3.175 | 4 | 1320 | 3000 | 26 | 34 | 48 | 20 | 4 | 2.5 |
| | 6 | 3.969 | 4 | 1640 | 3500 | 26 | 34 | 56 | 25 | 4 | 2.5 |
| 25 | 5 | 3.175 | 3 | 1210 | 2340 | 25 | 40 | 41 | 20 | 4 | 2.5 |
| | | | 4 | 1550 | 4100 | 33 | | 48 | 20 | | |
| | 6 | 3.969 | 3 | 1540 | 2790 | 26 | 40 | 48 | 20 | 4 | 2.5 |
| | | | 4 | 1970 | 4800 | 32 | | 56 | 25 | | |
| 32 | 5 | 3.175 | 4 | 1810 | 5500 | 41 | 48 | 48 | 20 | 4 | 2.5 |
| | | | 6 | 2570 | 8300 | 60 | | 61 | 25 | | |
| | 6 | 3.969 | 4 | 2390 | 6700 | 42 | 48 | 56 | 25 | 4 | 2.5 |
| | 8 | 4.763 | 4 | 2880 | 7400 | 40 | 50 | 70 | 25 | 5 | 3.0 |
| | 10 | 6.350 | 3 | 3000 | 6700 | 30 | 56 | 68 | 25 | 6 | 3.5 |
| | | | 4 | 3850 | 9000 | 40 | | 79 | 32 | | |
| 40 | 5 | 3.175 | 4 | 2060 | 7100 | 50 | 55 | 48 | 20 | 4 | 2.5 |
| | | | 6 | 2920 | 10700 | 74 | | 61 | 25 | | |
| | 6 | 3.969 | 4 | 2700 | 8600 | 50 | 56 | 56 | 25 | 5 | 3.0 |
| | 8 | 4.763 | 4 | 3430 | 10100 | 51 | 60 | 70 | 25 | 5 | 3.0 |
| | 10 | 6.350 | 3 | 3600 | 10100 | 38 | 65 | 68 | 25 | 6 | 3.5 |
| | | | 4 | 4610 | 12300 | 50 | | 79 | 32 | | |

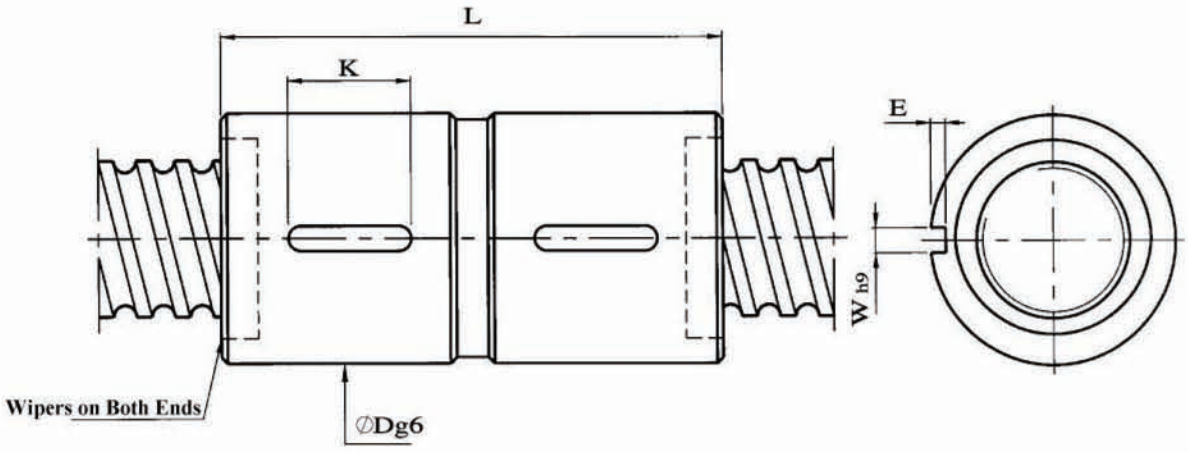
# RSI Type (Single · Internal Nut)




Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | Keyway | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | K | W | E |
| 50 | 5 | 3.175 | 4 | 2320 | 9200 | 61 | 75 | 48 | 20 | 6 | 3.5 |
| | | | 6 | 3290 | 13800 | 89 | | 61 | 25 | | |
| | 10 | 6.350 | 4 | 5400 | 16400 | 62 | 75 | 79 | 32 | 6 | 3.5 |
| | | | 6 | 7660 | 24600 | 92 | | 102 | 40 | | |
| | 12 | 7.938 | 3 | 5380 | 14400 | 47 | 75 | 82 | 32 | 6 | 3.5 |
| | | | 4 | 6890 | 19200 | 62 | | 95 | 40 | | |
| 63 | 10 | 6.350 | 4 | 6330 | 22200 | 75 | 88 | 79 | 32 | 8 | 4.5 |
| | | | 6 | 8970 | 33300 | 110 | | 102 | 40 | | |
| | 12 | 7.938 | 4 | 8060 | 25700 | 77 | 90 | 95 | 40 | 8 | 4.5 |
| | | | 6 | 11430 | 38500 | 113 | | 123 | 50 | | |
| 80 | 10 | 6.350 | 4 | 13380 | 52000 | 95 | 105 | 79 | 32 | 8 | 4.5 |
| | | | 6 | 10170 | 43100 | 140 | | 102 | 40 | | |
| | 12 | 7.938 | 4 | 9440 | 34600 | 96 | 110 | 95 | 40 | 8 | 4.5 |
| | | | 6 | 13380 | 52000 | 142 | | 123 | 50 | | |
| | 16 | 9.525 | 3 | 9360 | 30500 | 87 | 115 | 106 | 40 | 10 | 5.5 |
| | | | 4 | 11980 | 40700 | 110 | | 124 | 50 | | |
| | 20 | 9.525 | 3 | 9360 | 30500 | 95 | 115 | 126 | 50 | 10 | 5.5 |
| | | | 4 | 11980 | 40700 | 125 | | 149 | 63 | | |

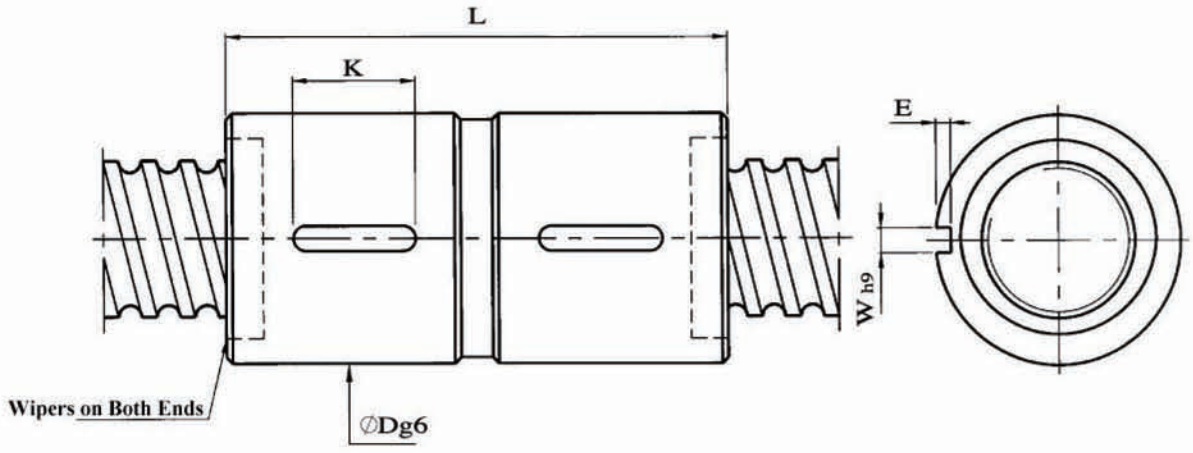
# RDI Type (Double · Internal Nut)




Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | Keyway | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | K | W | E |
| 20 | 5 | 3.175 | 4 | 1320 | 3000 | 52 | 34 | 85 | 20 | 4 | 2.5 |
| | 6 | 3.969 | 4 | 1640 | 3500 | 51 | 34 | 103 | 25 | 4 | 2.5 |
| 25 | 5 | 3.175 | 3 | 1210 | 2340 | 49 | 40 | 75 | 20 | 4 | 2.5 |
| | | | 4 | 1550 | 4100 | 64 | | 85 | 20 | | |
| | 6 | 3.969 | 3 | 1540 | 2790 | 48 | 40 | 87 | 20 | 4 | 2.5 |
| | | | 4 | 1970 | 4800 | 64 | | 103 | 25 | | |
| 32 | 5 | 3.175 | 4 | 1810 | 5500 | 80 | 48 | 85 | 20 | 4 | 2.5 |
| | | | 6 | 2570 | 8300 | 118 | | 105 | 25 | | |
| | 6 | 3.969 | 4 | 2390 | 6700 | 82 | 48 | 103 | 25 | 4 | 2.5 |
| | 8 | 4.763 | 4 | 2880 | 7400 | 79 | 50 | 127 | 25 | 5 | 3.0 |
| | 10 | 6.350 | 3 | 3000 | 6700 | 60 | 56 | 135 | 25 | 6 | 3.5 |
| | | | 4 | 3850 | 9000 | 79 | | 155 | 32 | | |
| 40 | 5 | 3.175 | 4 | 2060 | 7100 | 98 | 55 | 85 | 20 | 4 | 2.5 |
| | | | 6 | 2920 | 10700 | 144 | | 105 | 25 | | |
| | 6 | 3.969 | 4 | 2700 | 8600 | 99 | 56 | 103 | 25 | 5 | 3.0 |
| | 8 | 4.763 | 4 | 3430 | 10100 | 101 | 60 | 127 | 25 | 5 | 3.0 |
| | 10 | 6.350 | 3 | 3600 | 10100 | 75 | 65 | 135 | 25 | 6 | 3.5 |
| | | | 4 | 4610 | 12300 | 99 | | 155 | 32 | | |

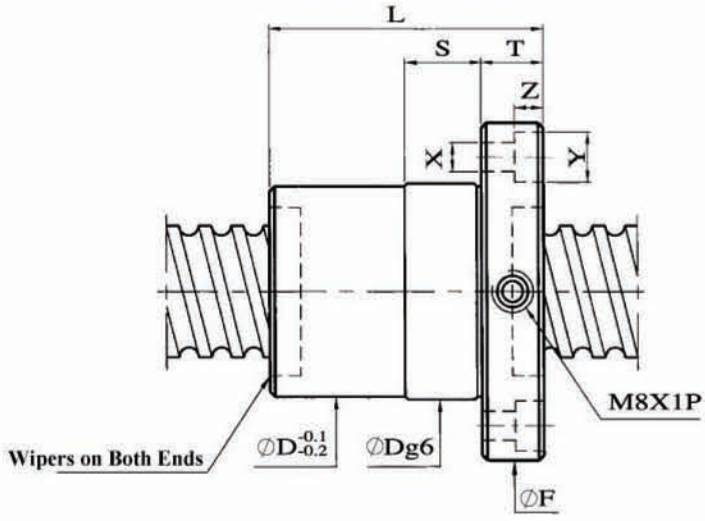
# RDI Type (Double · Internal Nut)

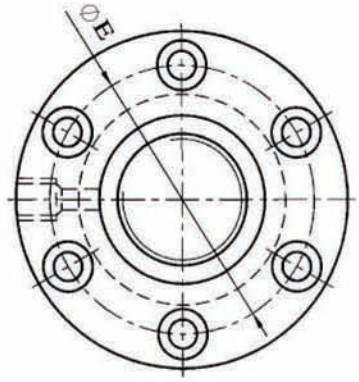



Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | Keyway | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | K | W | E |
| 50 | 5 | 3.175 | 4 | 2320 | 9200 | 119 | 65 | 85 | 20 | 4 | 2.5 |
| | | | 6 | 3290 | 13800 | 175 | | 105 | 25 | | |
| | 10 | 6.350 | 4 | 5400 | 16400 | 122 | 75 | 135 | 32 | 6 | 3.5 |
| | | | 6 | 7660 | 24600 | 180 | | 155 | 40 | | |
| | 12 | 7.938 | 3 | 5380 | 14400 | 92 | 75 | 161 | 32 | 6 | 3.5 |
| | | | 4 | 6890 | 19200 | 122 | | 185 | 40 | | |
| 63 | 10 | 6.350 | 4 | 6330 | 22200 | 154 | 88 | 160 | 32 | 8 | 4.5 |
| | | | 6 | 8970 | 33300 | 226 | | 202 | 40 | | |
| | 12 | 7.938 | 4 | 8060 | 25700 | 151 | 90 | 185 | 40 | 8 | 4.5 |
| | | | 6 | 11430 | 38500 | 222 | | 238 | 50 | | |
| 80 | 10 | 6.350 | 4 | 13380 | 52000 | 187 | 105 | 160 | 32 | 8 | 4.5 |
| | | | 6 | 10170 | 43100 | 275 | | 202 | 40 | | |
| | 12 | 7.938 | 4 | 9440 | 34600 | 189 | 110 | 185 | 40 | 8 | 4.5 |
| | | | 6 | 13380 | 52000 | 278 | | 238 | 50 | | |
| | 16 | 9.525 | 3 | 9360 | 30500 | 178 | 115 | 200 | 40 | 10 | 5.5 |
| | | | 4 | 11980 | 40700 | 235 | | 236 | 50 | | |
| | 20 | 9.525 | 3 | 9360 | 30500 | 187 | 115 | 245 | 50 | 10 | 5.5 |
| | | | 4 | 11980 | 40700 | 246 | | 289 | 63 | | |

# FSE Type (Endcap · Single Nut )

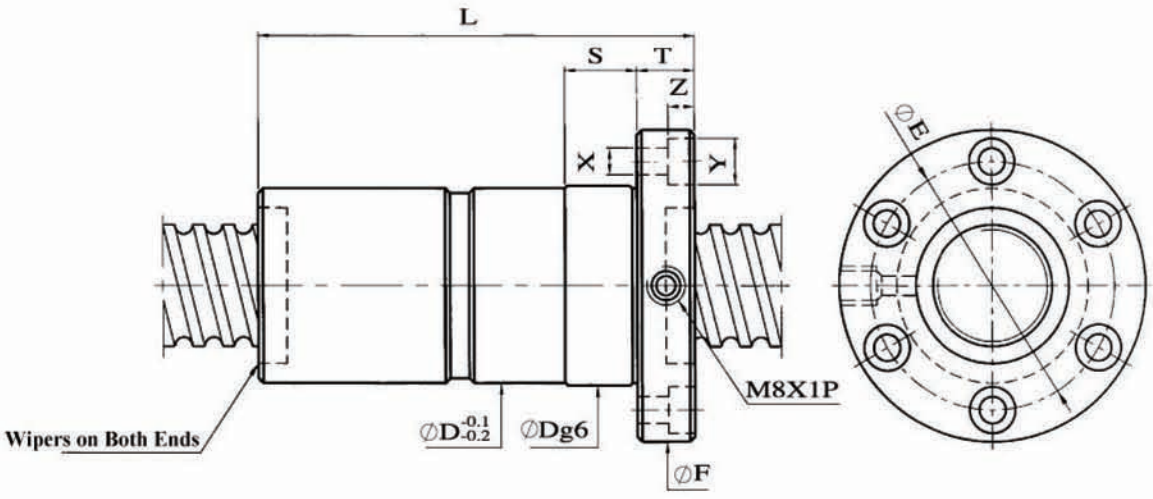



Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | Flamge | | | Bolt | | | Compact Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | F | T | E | X | Y | Z | |
| 16 | 5 | 3.175 | 4 | 1000 | 2300 | 13 | 30 | 42 | 51 | 10 | 39 | 5.5 | 9.5 | 5.5 | 12 |
| 20 | 5 | 3.175 | 4 | 1320 | 3000 | 45 | 36 | 42 | 60 | 12 | 47 | 5.5 | 9.5 | 5.5 | 12 |
| 25 | 5 | 3.175 | 4 | 1465 | 3780 | 52 | 40 | 41 | 64 | 12 | 51 | 5.5 | 9.5 | 5.5 | 12 |
| | 10 | | | 1000 | 2320 | 38 | | 62 | | | | | | | 15 |
| 32 | 5 | 3.175 | 4 | 1660 | 5015 | 58 | 48 | 41 | 72 | 12 | 59 | 5.5 | 9.5 | 5.5 | 12 |
| | 10 | 4.763 | | 3880 | 9150 | 85 | 56 | 68 | 88 | 18 | 72 | 9 | 14 | 8.5 | 15 |
| | | 6.350 | | 5820 | 12350 | 82 | 57 | 73 | 91 | 18 | 73 | 9 | 14 | 8.5 | 15 |
| | 12 | | | 5650 | 11500 | 82 | | 84 | | | | | | | |
| | 16 | | | 4435 | 11135 | 88 | | 102 | | | | | | | |
| 36 | 16 | 6.350 | 5 | 6010 | 16350 | 95 | 62 | 116 | 96 | 18 | 78 | 9 | 14 | 8.5 | 15 |
| 40 | 5 | 3.175 | 4 | 1775 | 6280 | 70 | 58 | 42 | 93 | 18 | 76 | 9 | 14 | 8.5 | 15 |
| | 8 | 4.763 | 5 | 4375 | 14270 | 102 | 60 | 65 | 93 | | 76 | | | | |
| | 10 | 6.350 | 4 | 5270 | 12560 | 82 | 65 | 66 | 106 | 18 | 85 | 11 | 17.5 | 11 | 20 |
| | 12 | | | 5255 | 15070 | 82 | | 84 | | | | | | | |
| 45 | 12 | 6.350 | 5 | 7125 | 21315 | 115 | 70 | 96 | 108 | 18 | 88 | 11 | 17.5 | 11 | 20 |
| | 16 | | | 7115 | 21300 | 115 | | 116 | | | | | | | |
| 50 | 10 | 6.350 | 5 | 7175 | 24725 | 121 | 75 | 85 | 116 | 18 | 94 | 11 | 17.5 | 11 | 20 |
| | 12 | | | 7150 | 24680 | 125 | | 94 | | | | | | | |
| 63 | 10 | 6.350 | 5 | 7915 | 29145 | 145 | 90 | 85 | 136 | 20 | 112 | 14 | 20 | 13 | 20 |
| | 12 | | 5 | 7930 | 29220 | 150 | | 94 | | | | | | | |
| | 16 | 9.525 | 5 | 11825 | 39270 | 172 | 100 | 118 | 146 | 22 | 122 | 14 | 20 | 13 | 25 |

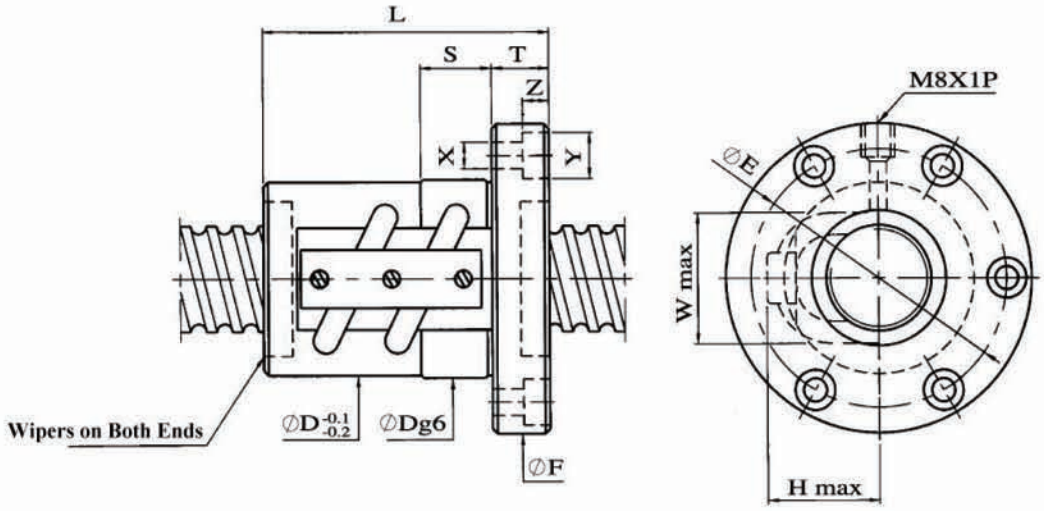
# FDE Type (Endcap · Double Nut )




Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | Flamge | | | Bolt | | | Compact Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | F | T | E | X | Y | Z | |
| 16 | 5 | 3.175 | 4 | 1000 | 2300 | 13 | 30 | 82 | 51 | 10 | 39 | 5.5 | 9.5 | 5.5 | 12 |
| 20 | 5 | 3.175 | 4 | 1320 | 3000 | 45 | 36 | 82 | 60 | 12 | 47 | 5.5 | 9.5 | 5.5 | 12 |
| 25 | 5 | 3.175 | 4 | 1465 | 3780 | 52 | 40 | 81 | 64 | 12 | 51 | 5.5 | 9.5 | 5.5 | 12 |
| | 10 | | | 1000 | 2320 | 38 | | 122 | | | | | | | 15 |
| 32 | 5 | 3.175 | 4 | 1660 | 5015 | 58 | 48 | 81 | 72 | 12 | 59 | 5.5 | 9.5 | 5.5 | 12 |
| | 10 | 4.763 | | 3880 | 9150 | 85 | 56 | 128 | 88 | 18 | 72 | 9 | 14 | 8.5 | 15 |
| | 10 | 6.350 | | 5820 | 12350 | 82 | 57 | 138 | 91 | 18 | 73 | 9 | 14 | 8.5 | 15 |
| | 12 | | | 5650 | 11500 | 82 | | 156 | | | | | | | |
| | 16 | | | 4435 | 11135 | 88 | | 190 | | | | | | | |
| 36 | 16 | 6.350 | 5 | 6010 | 16350 | 95 | 62 | 234 | 96 | 18 | 78 | 9 | 14 | 8.5 | 15 |
| 40 | 5 | 3.175 | 4 | 1775 | 6280 | 70 | 58 | 82 | 93 | 18 | 76 | 9 | 14 | 8.5 | 15 |
| | 8 | 4.763 | 5 | 4375 | 14270 | 102 | 60 | 128 | 93 | | 76 | | | | |
| | 10 | 6.350 | 4 | 5270 | 12560 | 82 | 65 | 126 | 106 | 18 | 85 | 11 | 17.5 | 11 | 20 |
| | 12 | | | 5255 | 15070 | 82 | | 156 | | | | | | | |
| 45 | 12 | 6.350 | 5 | 7125 | 21315 | 115 | 70 | 180 | 108 | 18 | 88 | 11 | 17.5 | 11 | 20 |
| | 16 | | | 7115 | 21300 | 115 | | 234 | | | | | | | |
| 50 | 10 | 6.350 | 5 | 7175 | 24725 | 121 | 75 | 160 | 116 | 18 | 94 | 11 | 17.5 | 11 | 20 |
| | 12 | | | 7150 | 24680 | 125 | | 178 | | | | | | | |
| 63 | 10 | 6.350 | 5 | 7915 | 29145 | 145 | 90 | 160 | 136 | 20 | 112 | 14 | 20 | 13 | 20 |
| | 12 | | 5 | 7930 | 29220 | 150 | | 178 | | | | | | | |
| | 16 | 9.525 | 5 | 11825 | 39270 | 172 | 100 | 236 | 146 | 22 | 122 | 14 | 20 | 13 | 25 |

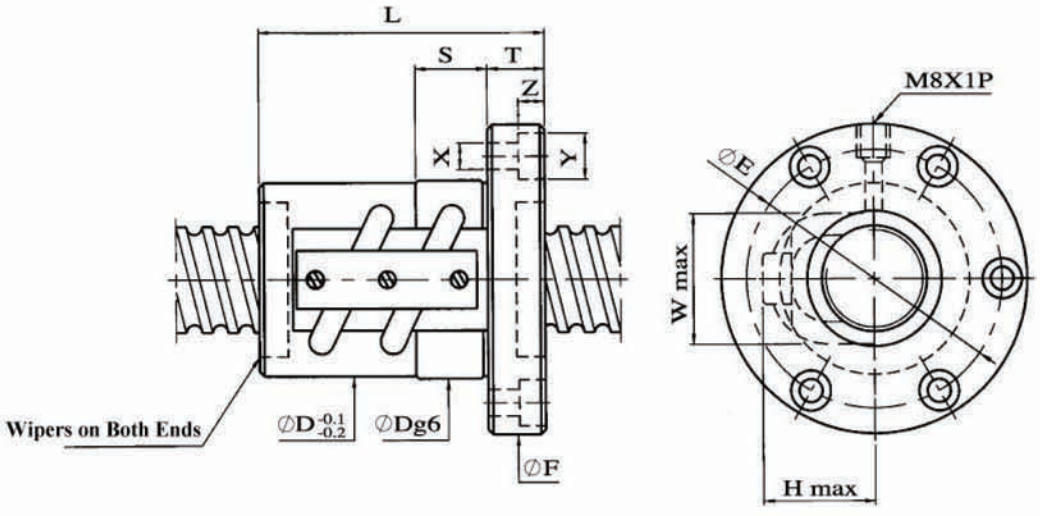
# FSV Type (Single · External Nut)




Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | | | Flamge | | | Bolt | | | Compact Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | W | H | F | T | E | X | Y | Z | S |
| 20 | 5 | 3.175 | 2.5x1 | 1045 | 2140 | 19 | 35 | 41 | 27 | 25 | 58 | 11 | 46 | 5.5 | 9.5 | 5.5 | 12 |
| | | | 2.5x2 | 1900 | 2890 | 38 | | 58 | | | | | | | | | |
| | 6 | 3.969 | 2.5x1 | 1365 | 2680 | 20 | 36 | 48 | 28 | 27 | 60 | 12 | 47 | 5.5 | 9.5 | 5.5 | 12 |
| 25 | 5 | 3.175 | 2.5x2 | 2150 | 4860 | 46 | 40 | 58 | 31 | 26 | 64 | 12 | 51 | 5.5 | 9.5 | 5.5 | 15 |
| | 6 | 3.969 | 2.5x2 | 2680 | 5740 | 46 | 42 | 66 | 32 | 28 | 68 | 12 | 55 | 5.5 | 9.5 | 5.5 | 15 |
| | 10 | 4.763 | 2.5x1 | 2030 | 4355 | 25 | 45 | 67 | 34 | 29 | 72 | 15 | 58 | 6.6 | 11 | 6.5 | 15 |
| 32 | 5 | 3.175 | 2.5x1 | 1040 | 2860 | 28 | 50 | 42 | 38 | 30 | 76 | 12 | 63 | 6.6 | 11 | 6.5 | 15 |
| | | | 2.5x2 | 2435 | 6230 | 55 | | 58 | | | | | | | | | |
| | 6 | 3.969 | 2.5x2 | 3250 | 7780 | 57 | 52 | 66 | 39 | 32 | 78 | 12 | 65 | 6.6 | 11 | 6.5 | 15 |
| | 8 | 4.763 | 2.5x2 | 4090 | 9340 | 58 | 54 | 82 | 40 | 33 | 88 | 15 | 70 | 9 | 14 | 8.5 | 15 |
| | 10 | 6.350 | 2.5x2 | 5780 | 12450 | 60 | 57 | 100 | 44 | 37 | 91 | 15 | 73 | 9 | 14 | 8.5 | 15 |
| | 12 | 6.350 | 2.5x1 | 2600 | 5510 | 31 | 57 | 81 | 44 | 37 | 91 | 18 | 73 | 9 | 14 | 8.5 | 20 |
| 40 | 5 | 3.175 | 2.5x2 | 2715 | 7780 | 66 | 58 | 62 | 46 | 34 | 92 | 15 | 72 | 9 | 14 | 8.5 | 20 |
| | 6 | 3.969 | 2.5x2 | 3645 | 9730 | 68 | 60 | 70 | 47 | 36 | 94 | 15 | 76 | 9 | 14 | 8.5 | 20 |
| | 8 | 4.763 | 2.5x2 | 4610 | 11680 | 69 | 62 | 82 | 48 | 38 | 96 | 15 | 78 | 9 | 14 | 8.5 | 20 |
| | 10 | 6.350 | 2.5x1 | 2920 | 6990 | 37 | 65 | 73 | 52 | 42 | 106 | 18 | 85 | 11 | 17.5 | 11 | 20 |
| | | | 2.5x2 | 6615 | 15570 | 72 | | 103 | | | | | | | | | |
| 50 | 6 | 3.969 | 2.5x2 | 4055 | 12160 | 81 | 70 | 70 | 57 | 43 | 106 | 15 | 88 | 9 | 14 | 8.5 | 16 |

# FSV Type (Single · External Nut)

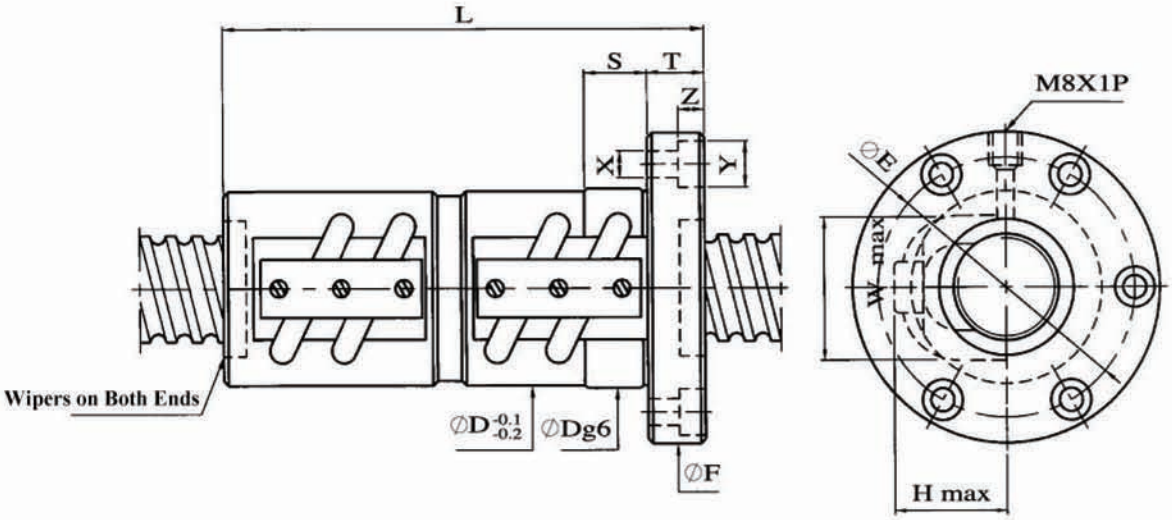



Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | | | Flamge | | | Bolt | | | Compact Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | W | H | F | T | E | X | Y | Z | S |
| 50 | 8 | 4.763 | 2.5x2 | 5160 | 14590 | 83 | 75 | 85 | 58 | 45 | 116 | 18 | 95 | 11 | 17.5 | 11 | 20 |
| | 10 | 6.350 | 2.5x2 | 7480 | 19460 | 87 | 78 | 103 | 62 | 48 | 119 | 18 | 98 | 11 | 17.5 | 11 | 20 |
| | | | 2.5x3 | 10570 | 27510 | 128 | | 133 | | | | | | | | | |
| | 12 | 7.938 | 2.5x1 | 5445 | 13400 | 46 | 82 | 87 | 64 | 52 | 130 | 22 | 105 | 14 | 20 | 13 | 20 |
| | | | 2.5x2 | 9885 | 24330 | 89 | | 123 | | | | | | | | | |
| 63 | 10 | 6.350 | 2.5x2 | 8425 | 24520 | 104 | 90 | 108 | 74 | 53 | 132 | 22 | 110 | 11 | 17.5 | 11 | 20 |
| | | | 2.5x3 | 11900 | 34660 | 153 | | 138 | | | | | | | | | |
| | 12 | 7.938 | 2.5x2 | 11230 | 30650 | 107 | 94 | 123 | 76 | 57 | 142 | 22 | 117 | 14 | 20 | 13 | 20 |
| | 16 | 9.525 | 2.5x2 | 14070 | 36680 | 141 | 100 | 158 | 78 | 62 | 150 | 28 | 123 | 14 | 20 | 13 | 25 |
| | 20 | 9.525 | 2.5x2 | 14070 | 36680 | 141 | 100 | 187 | 78 | 62 | 150 | 28 | 123 | 14 | 20 | 13 | 25 |
| 80 | 10 | 6.350 | 2.5x2 | 9420 | 31060 | 126 | 115 | 108 | 90 | 64 | 163 | 22 | 137 | 14 | 20 | 13 | 20 |
| | | | 2.5x3 | 13350 | 44010 | 186 | | 138 | | | | | | | | | |
| | 12 | 7.938 | 2.5x2 | 12650 | 38820 | 130 | 120 | 123 | 92 | 67 | 169 | 22 | 143 | 14 | 20 | 13 | 20 |
| | | | 2.5x3 | 17930 | 55020 | 192 | | 159 | | | | | | | | | |
| | 16 | 9.525 | 2.5x2 | 16020 | 46580 | 171 | 125 | 158 | 94 | 70 | 186 | 28 | 154 | 18 | 26 | 17.5 | 25 |
| | | | 2.5x3 | 22700 | 66020 | 252 | | 206 | | | | | | | | | |
| | 20 | 9.525 | 2.5x2 | 16020 | 46580 | 171 | 125 | 187 | 94 | 70 | 186 | 28 | 154 | 18 | 26 | 17.5 | 25 |
| | | | 2.5x3 | 22700 | 66020 | 252 | | 247 | | | | | | | | | |

FDV

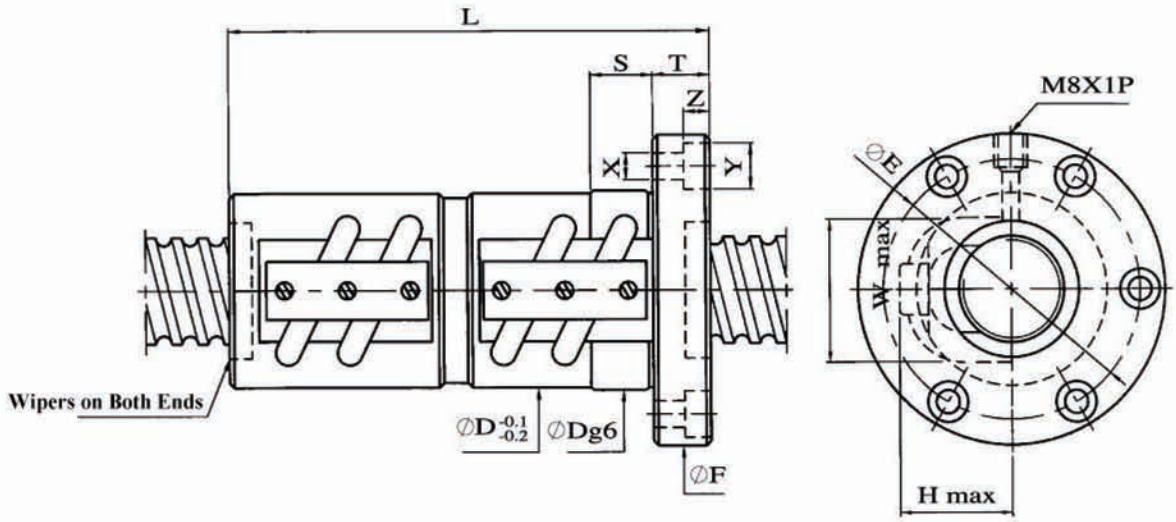
# FDV Type (Double · External Nut)




Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | | | Flamge | | | Bolt | | | Compact Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | W | H | F | T | E | X | Y | Z | S |
| 20 | 5 | 3.175 | 2.5x1 | 1045 | 2140 | 38 | 35 | 76 | 27 | 25 | 58 | 11 | 46 | 5.5 | 9.5 | 5.5 | 12 |
| | | | 2.5x2 | 1900 | 3890 | 74 | | 106 | | | | | | | | | |
| 25 | 5 | 3.175 | 2.5x1 | 1180 | 2680 | 46 | 40 | 76 | 31 | 26 | 64 | 12 | 51 | 5.5 | 9.5 | 5.5 | 15 |
| | | | 2.5x2 | 2150 | 4860 | 89 | | 106 | | | | | | | | | |
| | 6 | 3.969 | 2.5x2 | 2680 | 5740 | 91 | 42 | 123 | 32 | 28 | 68 | 12 | 55 | 5.5 | 9.5 | 5.5 | 15 |
| | 10 | 4.763 | 2.5x1 | 1560 | 3350 | 48 | 45 | 128 | 34 | 29 | 72 | 15 | 58 | 6.6 | 11 | 6.5 | 15 |
| 32 | 5 | 3.175 | 2.5x1 | 1345 | 3430 | 56 | 50 | 76 | 38 | 30 | 76 | 12 | 63 | 6.6 | 11 | 6.5 | 15 |
| | | | 2.5x2 | 2345 | 6230 | 108 | | 116 | | | | | | | | | |
| | 6 | 3.969 | 2.5x1 | 1790 | 4290 | 57 | 52 | 88 | 39 | 32 | 78 | 12 | 65 | 6.6 | 11 | 6.5 | 15 |
| | | | 2.5x2 | 3250 | 7780 | 111 | | 123 | | | | | | | | | |
| | 8 | 4.763 | 2.5x1 | 2250 | 5140 | 58 | 54 | 106 | 40 | 33 | 88 | 15 | 70 | 9 | 14 | 8.5 | 16 |
| | | | 2.5x2 | 4090 | 9340 | 113 | | 154 | | | | | | | | | |
| | 10 | 6.350 | 2.5x1 | 3215 | 6860 | 60 | 57 | 130 | 44 | 37 | 91 | 15 | 73 | 9 | 14 | 8.5 | 20 |
| | | | 2.5x2 | 5780 | 12450 | 117 | | 190 | | | | | | | | | |
| 40 | 5 | 3.175 | 2.5x1 | 1495 | 4290 | 67 | 58 | 84 | 46 | 34 | 92 | 15 | 72 | 9 | 14 | 8.5 | 18 |
| | | | 2.5x2 | 2715 | 7780 | 130 | | 110 | | | | | | | | | |
| | 6 | 3.969 | 2.5x2 | 3645 | 9730 | 134 | 60 | 128 | 47 | 36 | 94 | 16 | 76 | 9 | 14 | 8.5 | 20 |
| | 8 | 4.763 | 2.5x2 | 4610 | 11680 | 135 | 62 | 155 | 48 | 38 | 96 | 16 | 78 | 9 | 14 | 8.5 | 20 |

# FDV Type (Double · External Nut)



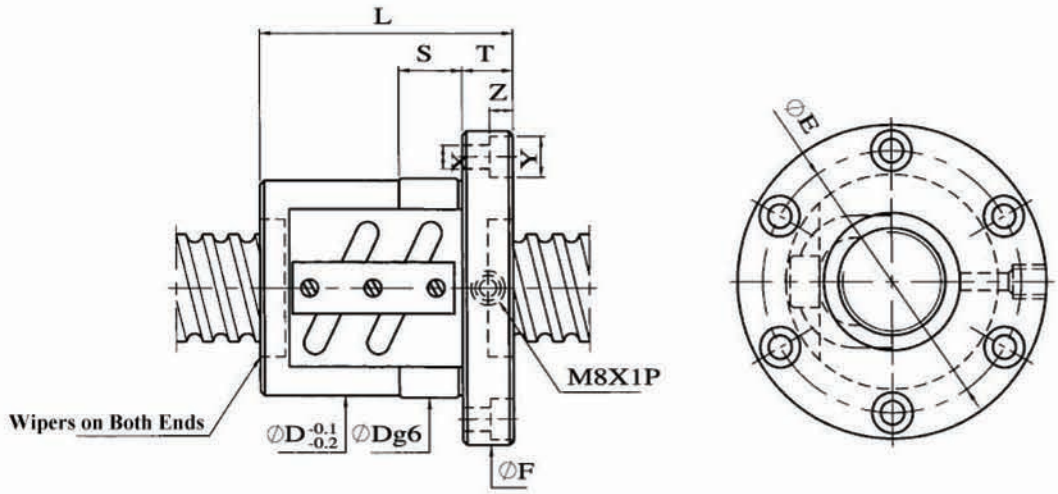

Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | | | Flamge | | | Bolt | | | Compact Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | W | H | F | T | E | X | Y | Z | S |
| 40 | 10 | 6.350 | 2.5x1 | 3645 | 8580 | 73 | 65 | 133 | 52 | 42 | 106 | 18 | 85 | 11 | 17.5 | 11 | 20 |
| | | | 2.5x2 | 6615 | 15570 | 141 | | 192 | | | | | | | | | |
| 50 | 6 | 3.969 | 2.5x2 | 4055 | 12160 | 159 | 72 | 128 | 57 | 43 | 106 | 15 | 88 | 9 | 14 | 8.5 | 16 |
| | | | 2.5x3 | 5730 | 17190 | 234 | | 164 | | | | | | | | | |
| | 8 | 4.763 | 2.5x2 | 5160 | 14590 | 163 | 75 | 158 | 58 | 45 | 116 | 18 | 95 | 11 | 17.5 | 11 | 20 |
| | 10 | 6.350 | 2.5x2 | 7480 | 19460 | 171 | 78 | 193 | 62 | 48 | 119 | 18 | 98 | 11 | 17.5 | 11 | 20 |
| | | | 2.5x3 | 10570 | 27510 | 251 | | 253 | | | | | | | | | |
| 63 | 10 | 6.350 | 2.5x2 | 8425 | 24520 | 204 | 90 | 198 | 74 | 53 | 132 | 22 | 110 | 11 | 17.5 | 11 | 20 |
| | | | 2.5x3 | 9130 | 33900 | 301 | | 258 | | | | | | | | | |
| | 12 | 7.938 | 2.5x2 | 11230 | 30650 | 210 | 97 | 232 | 76 | 57 | 142 | 22 | 117 | 14 | 20 | 13 | 20 |
| | 16 | 9.525 | 2.5x2 | 14070 | 36680 | 276 | 100 | 302 | 78 | 62 | 150 | 22 | 123 | 14 | 20 | 13 | 20 |
| | 20 | 9.525 | 2.5x2 | 14070 | 36680 | 276 | 100 | 347 | 78 | 62 | 150 | 22 | 123 | 14 | 20 | 13 | 20 |
| 80 | 10 | 6.350 | 2.5x2 | 9420 | 31060 | 248 | 114 | 198 | 90 | 64 | 162 | 22 | 137 | 14 | 20 | 13 | 20 |
| | | | 2.5x3 | 13350 | 44010 | 266 | | 258 | | | | | | | | | |
| | 12 | 7.938 | 2.5x2 | 12650 | 38820 | 255 | 120 | 232 | 92 | 67 | 168 | 22 | 143 | 14 | 20 | 13 | 20 |
| | | | 2.5x3 | 17930 | 55020 | 376 | | 304 | | | | | | | | | |
| | 16 | 9.525 | 2.5x2 | 16020 | 46580 | 336 | 124 | 302 | 94 | 70 | 186 | 28 | 154 | 18 | 26 | 17.5 | 25 |
| | 20 | 9.525 | 2.5x2 | 16020 | 46580 | 336 | 124 | 347 | 94 | 70 | 186 | 28 | 154 | 18 | 26 | 17.5 | 25 |

FSW Type Nut

FSW

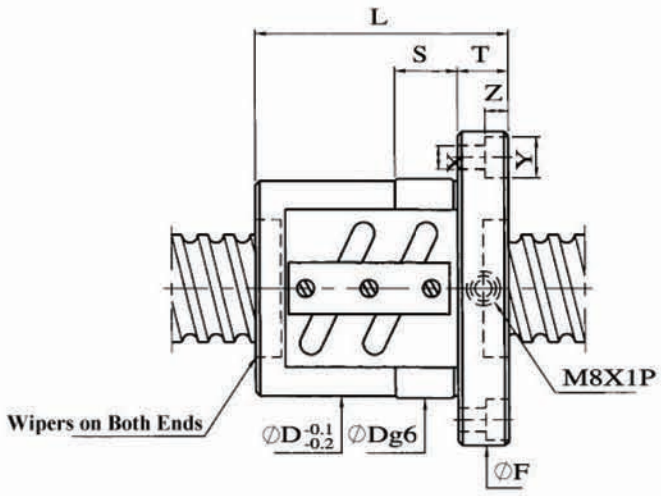
# FSW Type (Single · External Nut)

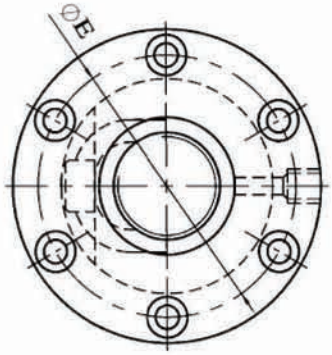



Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | Flamge | | | Bolt | | | Compact Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | F | T | E | X | Y | Z | S |
| 16 | 5 | 3.175 | 2.5x2 | 1750 | 2190 | 31 | 40 | 58 | 63 | 10 | 51 | 4.5 | 8 | 4.5 | 12 |
| 20 | 4 | 2.381 | 2.5x2 | 1140 | 2070 | 31 | 40 | 48 | 63 | 11 | 51 | 5.5 | 9.5 | 5.5 | 12 |
| | 5 | 3.175 | 2.5x1 | 1045 | 2140 | 19 | 44 | 41 | 67 | 11 | 55 | 5.5 | 9.5 | 5.5 | 12 |
| | | | 2.5x2 | 1900 | 3890 | 38 | | 58 | | | | | | | |
| | 6 | 3.969 | 2.5x1 | 1365 | 2680 | 20 | 48 | 48 | 72 | 12 | 59 | 5.5 | 9.5 | 5.5 | 12 |
| 25 | 4 | 2.381 | 2.5x2 | 1290 | 2350 | 38 | 46 | 49 | 69 | 12 | 57 | 5.5 | 9.5 | 5.5 | 15 |
| | 5 | 3.175 | 2.5x2 | 2150 | 4860 | 46 | 50 | 58 | 73 | 12 | 61 | 5.5 | 9.5 | 5.5 | 15 |
| | 6 | 3.969 | 2.5x2 | 2680 | 5740 | 46 | 53 | 66 | 76 | 12 | 64 | 5.5 | 9.5 | 5.5 | 15 |
| | 10 | 4.763 | 2.5x1 | 2030 | 4355 | 25 | 58 | 67 | 85 | 15 | 71 | 6.6 | 11 | 6.5 | 15 |
| 28 | 5 | 3.175 | 2.5x2 | 2290 | 5500 | 50 | 55 | 58 | 85 | 12 | 69 | 6.6 | 11 | 6.5 | 15 |
| | 6 | 3.175 | 2.5x2 | 2290 | 5500 | 50 | 55 | 66 | 85 | 12 | 69 | 6.6 | 11 | 6.5 | 15 |
| 32 | 5 | 3.175 | 2.5x1 | 1040 | 2860 | 28 | 58 | 42 | 85 | 12 | 71 | 6.6 | 11 | 6.5 | 15 |
| | | | 2.5x2 | 2435 | 6230 | 55 | | 58 | | | | | | | |
| | 6 | 3.969 | 2.5x2 | 3250 | 7780 | 57 | 62 | 66 | 89 | 12 | 75 | 6.6 | 11 | 6.5 | 15 |
| | 8 | 4.763 | 2.5x2 | 4090 | 9340 | 58 | 66 | 82 | 100 | 15 | 82 | 9 | 14 | 8.5 | 15 |
| | 10 | 6.350 | 2.5x1 | 2600 | 5510 | 31 | 74 | 70 | 108 | 15 | 90 | 9 | 14 | 8.5 | 15 |
| | | | 2.5x2 | 5780 | 12450 | 60 | | 100 | | | | | | | |
| | 12 | 6.350 | 2.5x1 | 2600 | 5510 | 31 | 74 | 81 | 108 | 18 | 90 | 9 | 14 | 8.5 | 20 |

# FSW Type (Single · External Nut)



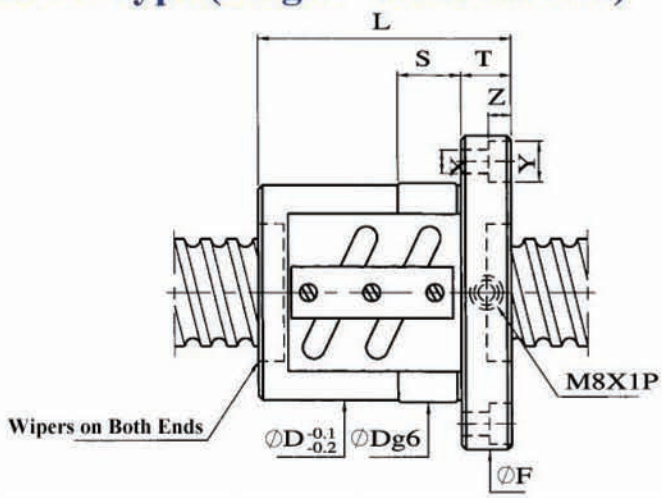

Unit : mm

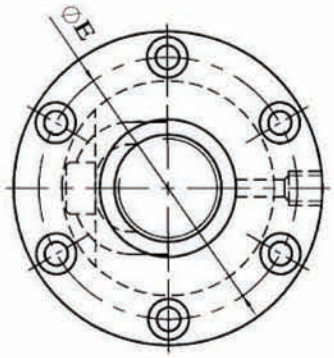
| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | Flamge | | | Bolt | | | Compact Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | F | T | E | X | Y | Z | S |
| 36 | 5 | 3.175 | 2.5x2 | 2530 | 7010 | 61 | 65 | 62 | 100 | 15 | 82 | 9 | 14 | 8.5 | 18 |
| | 6 | 3.969 | 2.5x2 | 3440 | 8700 | 63 | 65 | 70 | 100 | 15 | 82 | 9 | 14 | 8.5 | 18 |
| | 8 | 4.763 | 2.5x2 | 4350 | 10510 | 65 | 70 | 82 | 110 | 15 | 92 | 9 | 14 | 8.5 | 18 |
| | 10 | 6.350 | 2.5x2 | 6190 | 14050 | 66 | 70 | 103 | 120 | 18 | 98 | 11 | 17.5 | 11 | 20 |
| 40 | 5 | 3.175 | 2.5x1 | 1140 | 3600 | 34 | 67 | 45 | 101 | 15 | 83 | 9 | 14 | 8.5 | 20 |
| | | | 2.5x2 | 2715 | 7780 | 66 | | 62 | | | | | | | |
| | 6 | 3.969 | 2.5x2 | 3645 | 9730 | 68 | 70 | 70 | 104 | 15 | 86 | 9 | 14 | 8.5 | 20 |
| | 8 | 4.763 | 2.5x2 | 4610 | 11680 | 69 | 74 | 82 | 108 | 15 | 90 | 9 | 14 | 8.5 | 20 |
| | 10 | 6.350 | 2.5x1 | 2920 | 6990 | 37 | 82 | 73 | 124 | 18 | 102 | 11 | 17.5 | 11 | 20 |
| | | | 2.5x2 | 6615 | 15570 | 72 | | 103 | | | | | | | |
| | 12 | 7.938 | 2.5x1 | 3430 | 7910 | 38 | 86 | 83 | 128 | 18 | 106 | 11 | 17.5 | 11 | 20 |
| | | | 2.5x2 | 8750 | 20500 | 74 | | 119 | | | | | | | |
| 45 | 10 | 6.350 | 2.5x2 | 5530 | 15800 | 78 | 88 | 103 | 132 | 18 | 110 | 11 | 17.5 | 11 | 20 |
| | 12 | 7.938 | 2.5x2 | 6540 | 18100 | 81 | 90 | 119 | 132 | 18 | 110 | 11 | 17.5 | 11 | 20 |
| 50 | 6 | 3.969 | 2.5x2 | 4055 | 12160 | 81 | 84 | 70 | 118 | 15 | 100 | 9 | 14 | 8.5 | 16 |
| | 8 | 4.763 | 2.5x2 | 5160 | 14590 | 83 | 87 | 85 | 128 | 18 | 107 | 11 | 17.5 | 11 | 20 |
| | 10 | 6.350 | 2.5x2 | 7480 | 19460 | 87 | 93 | 103 | 135 | 18 | 113 | 11 | 17.5 | 11 | 20 |
| | | | 2.5x3 | 10570 | 27510 | 128 | | 133 | | | | | | | |

FSW Type Nut

FSW

# FSW Type (Single · External Nut)

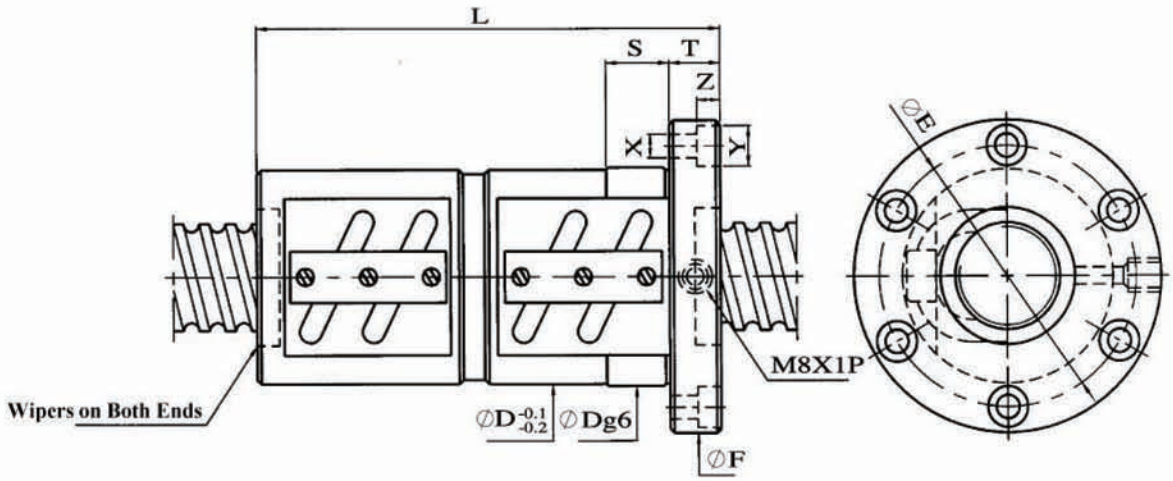



Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | Flamge | | | Bolt | | | Compact Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | F | T | E | X | Y | Z | S |
| 50 | 12 | 7.938 | 2.5x1 | 5445 | 13400 | 46 | 100 | 87 | 146 | 22 | 122 | 14 | 20 | 13 | 20 |
| | | | 2.5x2 | 9885 | 24330 | 89 | | 123 | | | | | | | |
| 63 | 10 | 6.350 | 2.5x2 | 8425 | 24520 | 104 | 108 | 108 | 154 | 22 | 130 | 14 | 20 | 13 | 20 |
| | | | 2.5x3 | 11900 | 34660 | 153 | | 138 | | | | | | | |
| | 12 | 7.938 | 2.5x1 | 4830 | 13900 | 55 | 115 | 87 | 161 | 22 | 137 | 14 | 20 | 13 | 20 |
| | | | 2.5x2 | 11230 | 30650 | 107 | | 123 | | | | | | | |
| | 16 | 9.525 | 2.5x1 | 8110 | 23200 | 73 | 122 | 110 | 180 | 28 | 150 | 18 | 26 | 17.5 | 25 |
| | | | 2.5x2 | 14070 | 36680 | 141 | | 158 | | | | | | | |
| | 20 | 9.525 | 2.5x1 | 8110 | 23200 | 73 | 122 | 127 | 180 | 28 | 150 | 18 | 26 | 17.5 | 25 |
| | | | 2.5x2 | 14070 | 36680 | 141 | | 187 | | | | | | | |
| 80 | 10 | 6.350 | 2.5x2 | 9420 | 31060 | 126 | 130 | 108 | 176 | 22 | 152 | 14 | 20 | 13 | 20 |
| | | | 2.5x3 | 13350 | 44010 | 186 | | 138 | | | | | | | |
| | 12 | 7.938 | 2.5x2 | 12650 | 38820 | 130 | 136 | 123 | 182 | 22 | 158 | 14 | 20 | 13 | 20 |
| | | | 2.5x3 | 17930 | 55020 | 192 | | 159 | | | | | | | |
| | 16 | 9.525 | 2.5x2 | 16020 | 46580 | 171 | 143 | 158 | 204 | 28 | 172 | 18 | 26 | 17.5 | 25 |
| | | | 2.5x3 | 22700 | 66020 | 252 | | 206 | | | | | | | |
| | 20 | 9.525 | 2.5x2 | 16020 | 46580 | 171 | 143 | 187 | 204 | 28 | 172 | 18 | 26 | 17.5 | 25 |
| | | | 2.5x3 | 22700 | 66020 | 252 | | 247 | | | | | | | |
| 100 | 12 | 7.938 | 2.5x2 | 10730 | 44790 | 156 | 160 | 129 | 220 | 28 | 188 | 18 | 26 | 17.5 | 25 |
| | | | 2.5x3 | 15225 | 67195 | 229 | | 165 | | | | | | | 30 |
| | 16 | 9.525 | 2.5x2 | 18060 | 74760 | 203 | 170 | 162 | 243 | 32 | 205 | 22 | 32 | 21.5 | 30 |
| | | | 2.5x3 | 25540 | 112315 | 303 | | 210 | | | | | | | 30 |
| | 20 | 9.525 | 2.5x2 | 18060 | 74760 | 203 | 170 | 191 | 243 | 32 | 205 | 22 | 32 | 21.5 | 30 |
| | | | 2.5x3 | 25540 | 112315 | 303 | | 251 | | | | | | | 30 |

# FDW Type (Double · External Nut)



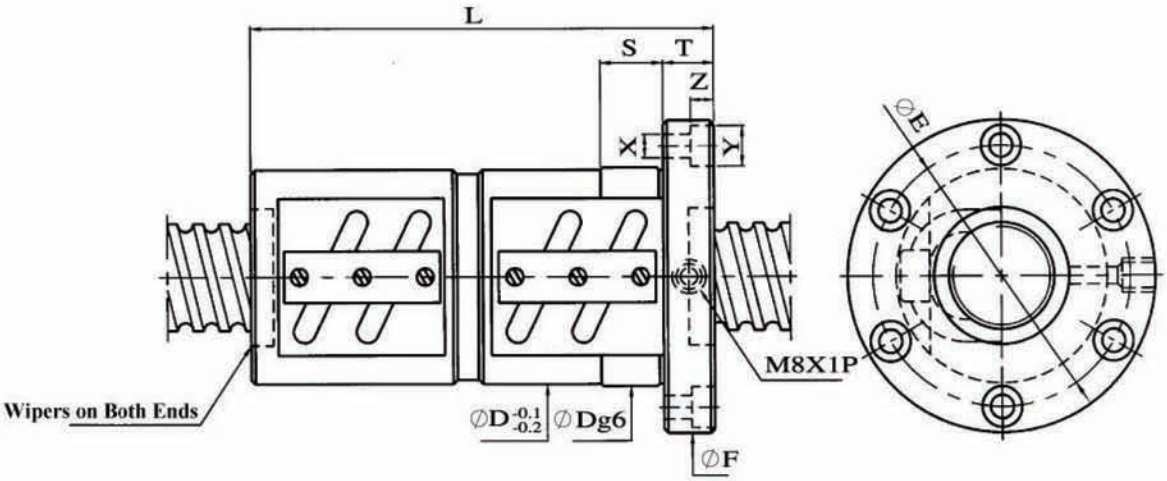

Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | Flamge | | | Bolt | | | Compact Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | F | T | E | X | Y | Z | S |
| 16 | 5 | 3.175 | 2.5x2 | 1750 | 2190 | 61 | 40 | 106 | 60 | 10 | 50 | 4.5 | 8 | 4.5 | 12 |
| 20 | 4 | 2.381 | 2.5x2 | 1140 | 2070 | 62 | 40 | 93 | 63 | 11 | 51 | 5.5 | 9.5 | 5.5 | 12 |
| | 5 | 3.175 | 2.5x1 | 1045 | 2140 | 38 | 44 | 76 | 67 | 11 | 55 | 5.5 | 9.5 | 5.5 | 12 |
| | | | 2.5x2 | 1900 | 3890 | 74 | | 106 | | | | | | | |
| | 6 | 3.969 | 2.5x1 | 1750 | 3430 | 39 | 48 | 88 | 72 | 12 | 59 | 5.5 | 9.5 | 5.5 | 12 |
| 25 | 4 | 2.381 | 2.5x2 | 1140 | 2070 | 75 | 46 | 93 | 69 | 12 | 57 | 5.5 | 9.5 | 5.5 | 15 |
| | 5 | 3.175 | 2.5x1 | 1180 | 2680 | 46 | 50 | 76 | 73 | 12 | 61 | 5.5 | 9.5 | 5.5 | 15 |
| | | | 2.5x2 | 2150 | 4860 | 89 | | 106 | | | | | | | |
| | 6 | 3.969 | 2.5x2 | 2680 | 5740 | 91 | 53 | 123 | 76 | 12 | 64 | 5.5 | 9.5 | 5.5 | 15 |
| | 10 | 4.763 | 2.5x1 | 1560 | 3350 | 48 | 58 | 128 | 85 | 15 | 71 | 6.6 | 11 | 6.5 | 15 |
| 28 | 5 | 3.175 | 2.5x2 | 2290 | 5500 | 98 | 55 | 106 | 85 | 12 | 69 | 6.6 | 11 | 6.5 | 15 |
| | 6 | 3.175 | 2.5x2 | 2290 | 5500 | 98 | 55 | 123 | 85 | 12 | 69 | 6.6 | 11 | 6.5 | 15 |
| 32 | 5 | 3.175 | 2.5x1 | 1345 | 3430 | 56 | 58 | 76 | 85 | 12 | 71 | 6.6 | 11 | 6.5 | 15 |
| | | | 2.5x2 | 2345 | 6230 | 108 | | 106 | | | | | | | |
| | 6 | 3.969 | 2.5x1 | 1790 | 4290 | 57 | 62 | 88 | 89 | 12 | 75 | 6.6 | 11 | 6.5 | 15 |
| | | | 2.5x2 | 3250 | 7780 | 111 | | 123 | | | | | | | |
| | 8 | 4.763 | 2.5x1 | 2250 | 5140 | 58 | 66 | 106 | 100 | 15 | 82 | 9 | 14 | 8.5 | 15 |
| | | | 2.5x2 | 4090 | 9340 | 1130 | | 154 | | | | | | | |

FDW Type Nut

FDW

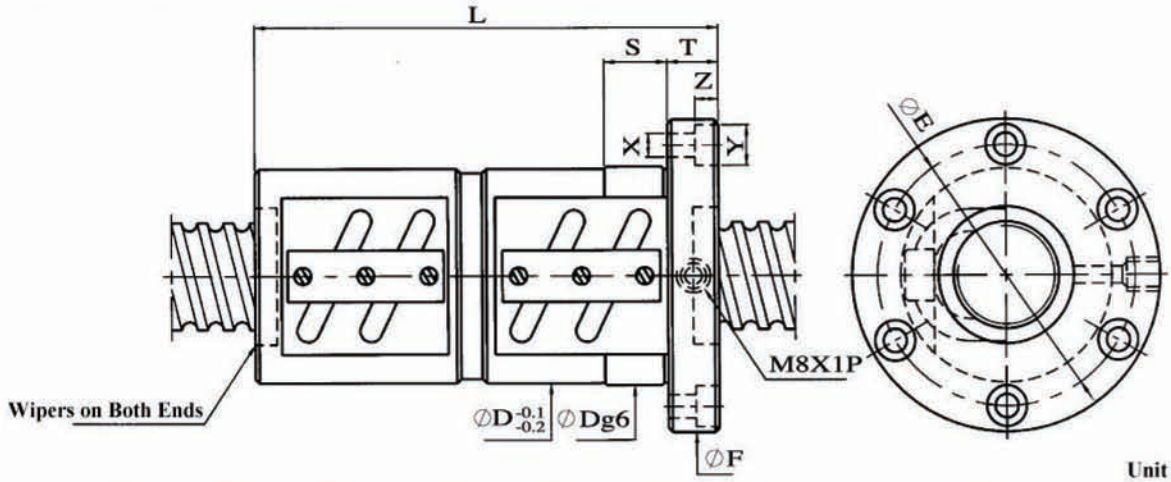
# FDW Type (Double · External Nut)




Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | Flamge | | | Bolt | | | Compact Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | F | T | E | X | Y | Z | S |
| 32 | 10 | 6.350 | 2.5x1 | 3215 | 6860 | 60 | 74 | 130 | 108 | 15 | 90 | 9 | 14 | 8.5 | 15 |
| | | | 2.5x2 | 5780 | 12450 | 117 | | 190 | | | | | | | |
| | 12 | 6.350 | 2.5x1 | 2600 | 5510 | 60 | 74 | 153 | 108 | 18 | 90 | 9 | 14 | 8.5 | 20 |
| 36 | 5 | 3.175 | 2.5x2 | 2530 | 7010 | 119 | 65 | 110 | 100 | 15 | 82 | 9 | 14 | 8.5 | 18 |
| | 6 | 3.969 | 2.5x2 | 3440 | 8700 | 123 | 65 | 126 | 100 | 15 | 82 | 9 | 14 | 8.5 | 18 |
| | 8 | 4.763 | 2.5x2 | 4350 | 10510 | 126 | 70 | 154 | 110 | 15 | 92 | 9 | 14 | 8.5 | 18 |
| | 10 | 6.350 | 2.5x2 | 6190 | 14050 | 129 | 75 | 193 | 120 | 18 | 98 | 11 | 17.5 | 11 | 20 |
| 40 | 5 | 3.175 | 2.5x1 | 1495 | 4290 | 67 | 67 | 84 | 101 | 15 | 83 | 9 | 14 | 8.5 | 20 |
| | | | 2.5x2 | 2715 | 7780 | 130 | | 110 | | | | | | | |
| | 6 | 3.969 | 2.5x2 | 3645 | 9730 | 134 | 70 | 128 | 104 | 15 | 86 | 9 | 14 | 8.5 | 20 |
| | 8 | 4.763 | 2.5x1 | 2540 | 6430 | 70 | 74 | 107 | 108 | 15 | 90 | 9 | 14 | 8.5 | 20 |
| | | | 2.5x2 | 4610 | 11680 | 135 | | 155 | | | | | | | |
| | 10 | 6.350 | 2.5x1 | 3645 | 8580 | 73 | 82 | 133 | 124 | 18 | 102 | 11 | 17.5 | 11 | 20 |
| | | | 2.5x2 | 6615 | 15570 | 141 | | 193 | | | | | | | |
| | 12 | 7.938 | 2.5x1 | 3430 | 7910 | 75 | 86 | 153 | 128 | 18 | 106 | 11 | 17.5 | 11 | 20 |
| | | | 2.5x2 | 8750 | 20500 | 144 | | 227 | | | | | | | |
| 50 | 6 | 3.969 | 2.5x2 | 4055 | 12160 | 159 | 84 | 128 | 118 | 15 | 100 | 9 | 14 | 8.5 | 16 |
| | | | 2.5x2 | 5730 | 17190 | 234 | | 164 | | | | | | | |

# FDW Type (Double · External Nut)



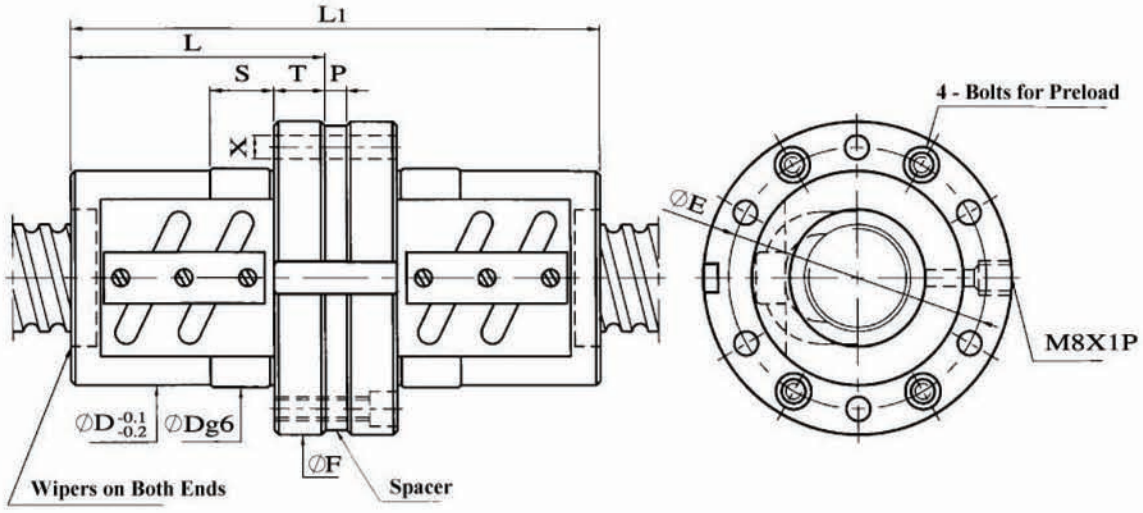

Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | Flamge | | | Bolt | | | Compact Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | F | T | E | X | Y | Z | S |
| 50 | 8 | 4.763 | 2.5x2 | 5160 | 14590 | 163 | 87 | 158 | 128 | 18 | 107 | 11 | 17.5 | 11 | 20 |
| | 10 | 6.350 | 2.5x2 | 7480 | 19460 | 171 | 93 | 193 | 135 | 18 | 113 | 11 | 17.5 | 11 | 20 |
| | | | 2.5x3 | 8340 | 20700 | 251 | | 253 | | | | | | | |
| | 12 | 7.938 | 2.5x2 | 9885 | 24330 | 174 | 100 | 232 | 146 | 22 | 122 | 14 | 20 | 13 | 20 |
| 63 | 10 | 6.350 | 2.5x2 | 8425 | 24520 | 204 | 108 | 198 | 154 | 22 | 130 | 14 | 20 | 13 | 20 |
| | | | 2.5x3 | 9130 | 33900 | 301 | | 258 | | | | | | | |
| | 12 | 7.938 | 2.5x1 | 4830 | 13900 | 108 | 115 | 160 | 161 | 22 | 137 | 14 | 20 | 13 | 20 |
| | | | 2.5x2 | 11230 | 30650 | 210 | | 232 | | | | | | | |
| | 16 | 9.525 | 2.5x2 | 14070 | 36680 | 276 | 122 | 302 | 180 | 28 | 150 | 18 | 26 | 17.5 | 25 |
| | 20 | 9.525 | 2.5x2 | 14070 | 36680 | 276 | 122 | 347 | 180 | 28 | 150 | 18 | 26 | 17.5 | 25 |
| 80 | 10 | 6.350 | 2.5x2 | 9420 | 31060 | 248 | 130 | 198 | 176 | 22 | 152 | 14 | 20 | 13 | 20 |
| | | | 2.5x3 | 13350 | 44010 | 266 | | 258 | | | | | | | |
| | 12 | 7.938 | 2.5x2 | 12650 | 38820 | 255 | 136 | 232 | 182 | 22 | 158 | 14 | 20 | 13 | 20 |
| | | | 2.5x3 | 17930 | 55020 | 376 | | 304 | | | | | | | |
| | 16 | 9.525 | 2.5x2 | 16020 | 46580 | 336 | 143 | 302 | 204 | 28 | 172 | 18 | 26 | 17.5 | 25 |
| | | | 2.5x3 | 22700 | 66020 | 494 | | 398 | | | | | | | |
| | 20 | 9.525 | 2.5x2 | 16020 | 46580 | 336 | 143 | 347 | 204 | 28 | 172 | 18 | 26 | 17.5 | 25 |
| | | | 2.5x3 | 22700 | 66020 | 494 | | 467 | | | | | | | |
| 100 | 12 | 7.938 | 2.5x2 | 10730 | 44790 | 303 | 160 | 237 | 220 | 28 | 188 | 18 | 26 | 17.5 | 25 |
| | | | 2.5x3 | 15225 | 67195 | 429 | | 309 | | | | | | | 25 |
| | 16 | 9.525 | 2.5x2 | 18060 | 74760 | 401 | 170 | 306 | 243 | 32 | 205 | 22 | 32 | 21.5 | 30 |
| | | | 2.5x3 | 25540 | 112315 | 593 | | 402 | | | | | | | 30 |
| | 20 | 9.525 | 2.5x2 | 18060 | 74760 | 401 | 170 | 351 | 243 | 32 | 205 | 22 | 32 | 21.5 | 30 |
| | | | 2.5x3 | 25540 | 112315 | 593 | | 471 | | | | | | | 30 |

DFW Type Nut

DFW

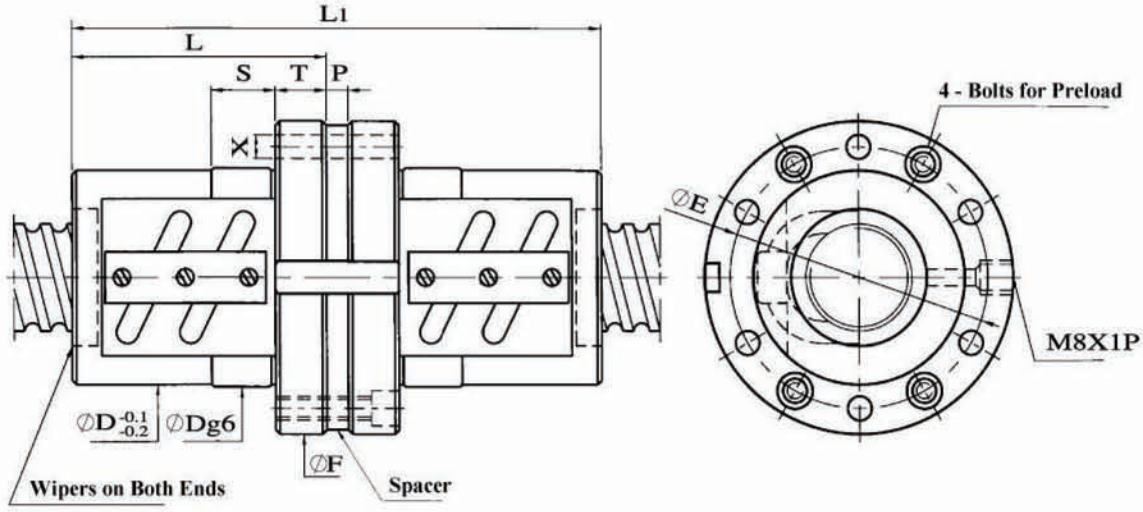
# DFW Type (Double · External Nut)




Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | | | Flamge | | | Bolt | Compact Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | P | L1 | F | T | E | X | S |
| 20 | 4 | 2.381 | 2.5x2 | 875 | 2190 | 62 | 40 | 48 | 3 | 99 | 63 | 11 | 51 | 5.5 | 12 |
| | 5 | 3.175 | 2.5x1 | 840 | 1750 | 38 | 44 | 41 | 5 | 87 | 67 | 11 | 55 | 5.5 | 12 |
| | | | 2.5x2 | 1520 | 3500 | 74 | | 58 | | 121 | | | | | |
| | 6 | 3.969 | 2.5x1 | 1120 | 2150 | 39 | 48 | 48 | 7 | 103 | 72 | 12 | 59 | 5.5 | 12 |
| 25 | 4 | 2.381 | 2.5x2 | 975 | 2780 | 75 | 46 | 49 | 4 | 102 | 69 | 12 | 57 | 5.5 | 15 |
| | 5 | 3.175 | 2.5x2 | 1690 | 4460 | 89 | 50 | 58 | 6 | 122 | 73 | 12 | 61 | 5.5 | 15 |
| | 6 | 3.969 | 2.5x2 | 2280 | 5460 | 91 | 53 | 66 | 7 | 139 | 76 | 12 | 64 | 5.5 | 15 |
| | 10 | 4.763 | 2.5x1 | 1610 | 3260 | 48 | 58 | 67 | 11 | 145 | 85 | 15 | 71 | 6.6 | 15 |
| 28 | 5 | 3.175 | 2.5x2 | 1810 | 5100 | 91 | 55 | 58 | 6 | 122 | 85 | 12 | 69 | 6.6 | 15 |
| | 6 | 3.175 | 2.5x2 | 1810 | 5100 | 93 | 55 | 66 | 7 | 139 | 85 | 12 | 69 | 6.6 | 15 |
| 32 | 5 | 3.175 | 2.5x2 | 1880 | 5720 | 108 | 58 | 58 | 4 | 120 | 85 | 12 | 71 | 6.6 | 15 |
| | 6 | 3.969 | 2.5x2 | 2520 | 7080 | 111 | 62 | 66 | 5 | 137 | 89 | 12 | 75 | 6.6 | 15 |
| | 8 | 4.763 | 2.5x2 | 3230 | 8360 | 113 | 66 | 82 | 9 | 173 | 100 | 15 | 82 | 9 | 15 |
| | 10 | 6.350 | 2.5x2 | 4720 | 11000 | 117 | 74 | 100 | 8 | 208 | 108 | 15 | 90 | 9 | 15 |
| 40 | 5 | 3.175 | 2.5x2 | 2060 | 7200 | 130 | 67 | 62 | 8 | 132 | 101 | 15 | 83 | 9 | 20 |
| | 6 | 3.969 | 2.5x2 | 2810 | 8930 | 134 | 70 | 70 | 5 | 145 | 104 | 15 | 86 | 9 | 20 |
| | 8 | 4.763 | 2.5x2 | 3550 | 10500 | 135 | 74 | 82 | 9 | 173 | 108 | 15 | 90 | 9 | 20 |
| | 10 | 6.350 | 2.5x2 | 5300 | 1400 | 141 | 82 | 103 | 12 | 218 | 124 | 18 | 102 | 11 | 20 |

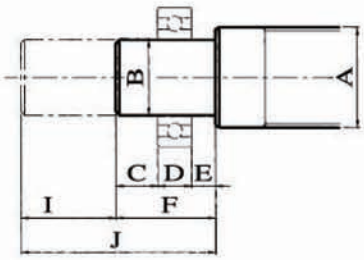
# DFW Type (Double · External Nut)



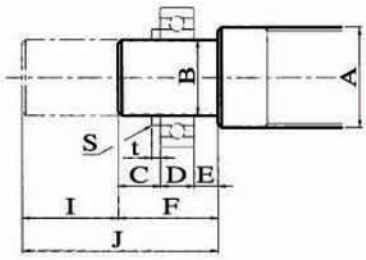

Unit : mm

| Dimension | | Ball Dia | Turns | Dynamic Load C $10^6$ Revs. Kgf | Static Load Co Kgf | Stiffness Kgf/um | Nut | | | | Flamge | | | Bolt | Compact Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Dia. | Lead | | | | | | Dg6 | L | P | L1 | F | T | E | X | S |
| 40 | 12 | 7.938 | 2.5x2 | 6220 | 15800 | 144 | 86 | 119 | 12 | 250 | 128 | 18 | 106 | 11 | 20 |
| 50 | 6 | 3.969 | 2.5x2 | 3080 | 11100 | 159 | 84 | 70 | 9 | 149 | 118 | 15 | 100 | 9 | 16 |
| | | | 2.5x3 | 4370 | 16700 | 234 | | 93 | | 195 | | | | | |
| | 8 | 4.763 | 2.5x2 | 3950 | 13400 | 163 | 87 | 85 | 11 | 181 | 128 | 18 | 107 | 11 | 20 |
| | | | 2.5x3 | 5600 | 20000 | 240 | | 112 | | 229 | | | | | |
| | 10 | 6.350 | 2.5x2 | 5890 | 17800 | 171 | 93 | 103 | 12 | 218 | 135 | 18 | 113 | 11 | 20 |
| | | | 2.5x3 | 8340 | 16700 | 251 | | 133 | | 278 | | | | | |
| | 12 | 7.938 | 2.5x1 | 4360 | 10900 | 90 | 100 | 87 | 14 | 188 | 146 | 22 | 122 | 14 | 20 |
| | | | 2.5x2 | 7920 | 21900 | 174 | | 123 | | 260 | | | | | |
| 63 | 10 | 6.350 | 2.5x2 | 6440 | 22600 | 204 | 108 | 108 | 14 | 230 | 154 | 22 | 130 | 14 | 20 |
| | | | 2.5x3 | 9130 | 33900 | 301 | | 138 | | 290 | | | | | |
| | 12 | 7.938 | 2.5x2 | 8770 | 27900 | 210 | 115 | 123 | 14 | 262 | 161 | 22 | 137 | 14 | 20 |
| | 16 | 9.525 | 2.5x2 | 14700 | 46400 | 276 | 122 | 158 | 10 | 326 | 180 | 28 | 150 | 18 | 25 |
| | 20 | 9.525 | 2.5x2 | 14700 | 46400 | 276 | 122 | 187 | 10 | 384 | 180 | 28 | 150 | 18 | 25 |
| 80 | 10 | 6.350 | 2.5x2 | 7180 | 28800 | 248 | 130 | 108 | 14 | 232 | 176 | 28 | 152 | 14 | 20 |
| | 12 | 7.938 | 2.5x2 | 9790 | 35700 | 255 | 136 | 123 | 14 | 260 | 182 | 22 | 159 | 14 | 20 |
| | 16 | 9.525 | 2.5x2 | 16600 | 59400 | 336 | 143 | 158 | 10 | 326 | 204 | 22 | 172 | 18 | 25 |
| | 20 | 9.525 | 2.5x2 | 16600 | 59400 | 336 | 143 | 187 | 10 | 384 | 204 | 28 | 172 | 18 | 25 |

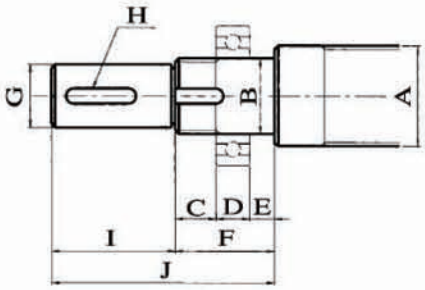
# Standard Configulation of End Journals




TYPE 1




TYPE 2




TYPE 3

TYPE 1 **Unit : mm**

| A SCREW SHAFT OD. | B | C | D | E | F | DRIVER END I | J |
|---|---|---|---|---|---|---|---|
| 6 | 4 | 3 | 5 | 4 | 12 | 10 | 22 |
| 8 | 6 | 3 | 6 | 5 | 14 | 12 | 26 |
| 10 | 8 | 3 | 8 | 6 | 17 | 16 | 33 |
| 12 | 10 | 3 | 9 | 7 | 19 | - | 19 |
| 16 | 12 | 3 | 10 | 8 | 21 | - | 21 |
| 20 | 15 | 3 | 11 | - | 14 | - | 14 |
| 25 | 17 | 3 | 12 | - | 15 | - | 15 |

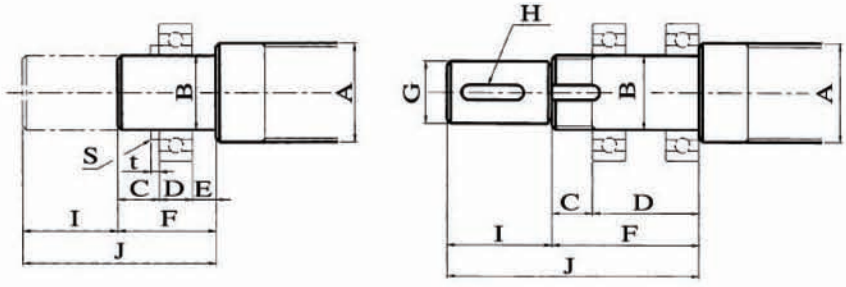
TYPE 2 **Unit : mm**

| A SCREW SHAFT OD. | B | C | C RING (4)(5) | | D | E | F | DRIVER END I | J |
|---|---|---|---|---|---|---|---|---|---|
| | | | NO. | T | | | | | |
| 6 | 4 | 3 | 4 | - | 5 | 4 | 12 | 10 | 22 |
| 8 | 6 | 3 | 6 | - | 6 | 5 | 14 | 12 | 26 |
| 10 | 8 | 3 | 8 | - | 8 | 6 | 17 | 16 | 33 |
| 12 | 10 | 3 | 10 | - | 9 | 7 | 19 | - | 19 |
| 16 | 12 | 3 | 12 | - | 10 | 8 | 21 | - | 21 |
| 20 | 15 | 3 | 15 | - | 11 | - | 14 | - | 14 |
| 25 | 17 | 3 | 17 | - | 12 | - | 15 | - | 15 |
| 32 | 20 | 4 | 20 | 1.20 | 14 | - | 18 | - | 18 |
| 40 | 30 | 5 | 30 | 1.50 | 16 | - | 21 | - | 21 |
| 50 | 35 | 5 | 35 | 1.50 | 21 | - | 26 | - | 26 |
| 63 | 45 | 5 | 45 | 1.75 | 25 | - | 30 | - | 30 |
| 80 | 60 | 5 | 60 | 2.00 | 31 | - | 36 | - | 36 |

TYPE 3 **Unit : mm**

| A SCREW SHAFT OD. | B | C | D | E | F | G | H(6) | DRIVER END I | J |
|---|---|---|---|---|---|---|---|---|---|
| 12 | 10 | 9 | 9 | 7 | 25 | 8 | 2X1.2 | 16 | 41 |
| 16 | 12 | 9 | 10 | 8 | 27 | 10 | 3X1.8 | 20 | 47 |
| 20 | 15 | 11 | 11 | - | 22 | 12 | 4X2.5 | 25 | 47 |
| 25 | 17 | 11 | 12 | - | 23 | 14 | 5X3 | 25 | 48 |
| 32 | 20 | 13 | 14 | - | 27 | 16 | 5X3 | 28 | 55 |
| 40 | 30 | 18 | 16 | - | 34 | 25 | 8X4 | 42 | 76 |
| 50 | 35 | 21 | 21 | - | 42 | 30 | 8X4 | 58 | 100 |
| 63 | 45 | 27 | 25 | - | 52 | 40 | 12X5 | 82 | 134 |
| 80 | 60 | 36 | 31 | - | 67 | 55 | 16X6 | 82 | 146 |
| 100 | 75 | 45 | 37 | - | 82 | 70 | 20X7.5 | 105 | 187 |
| 125 | 90 | 54 | 43 | - | 97 | 80 | 22X9 | 130 | 227 |

# Standard Configulation of End Journals




TYPE 4 TYPE 5

TYPE 4

Unit : mm

| A SCREW SHAFT OD. | B | C | D | E | F | G | H(6) | DRIVER END I | J |
|---|---|---|---|---|---|---|---|---|---|
| 12 | 10 | 9 | 18 | 7 | 34 | 8 | 2X1.2 | 16 | 50 |
| 16 | 12 | 9 | 20 | 8 | 37 | 10 | 3X1.8 | 20 | 57 |
| 20 | 15 | 11 | 22 | - | 33 | 12 | 4X2.5 | 25 | 58 |
| 25 | 17 | 11 | 24 | - | 35 | 14 | 5X3 | 25 | 60 |
| 32 | 20 | 13 | 28 | - | 41 | 16 | 5X3 | 28 | 69 |
| 40 | 30 | 18 | 32 | - | 50 | 25 | 8X4 | 42 | 92 |
| 50 | 35 | 21 | 42 | - | 63 | 30 | 8X4 | 58 | 121 |
| 63 | 45 | 27 | 50 | - | 77 | 40 | 12X5 | 82 | 159 |
| 80 | 60 | 36 | 62 | - | 98 | 55 | 16X6 | 82 | 180 |
| 100 | 75 | 45 | 74 | - | 119 | 70 | 20X7.5 | 105 | 224 |
| 125 | 90 | 54 | 86 | - | 140 | 80 | 22X9 | 130 | 270 |

TYPE 5

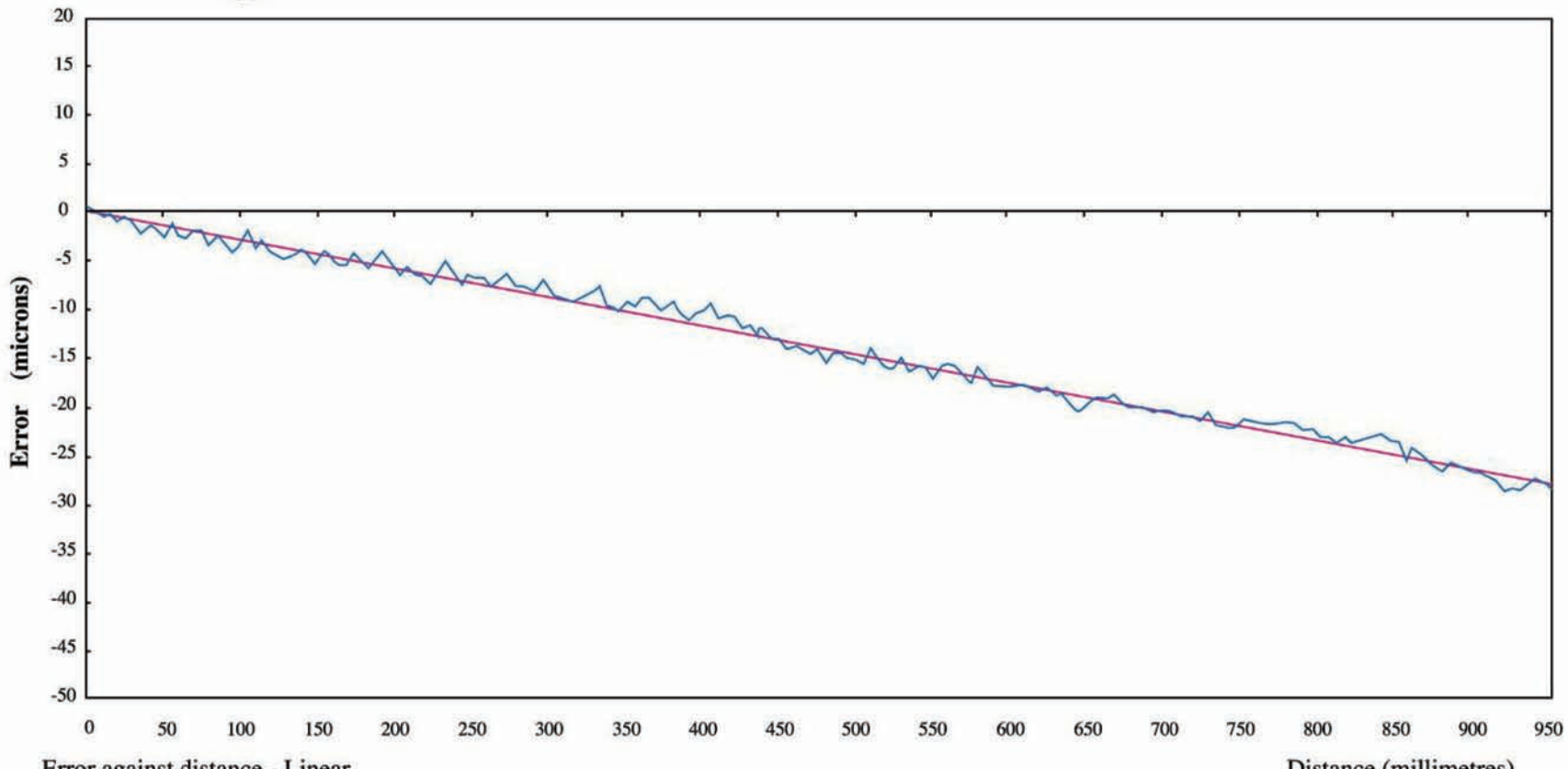
Unit : mm

| A SCREW SHAFT OD. | B | C | D | F | G | H(6) | DRIVER END I | J |
|---|---|---|---|---|---|---|---|---|
| 20 | 15 | 11 | 44 | 55 | 12 | 4x2.5 | 25 | 80 |
| 25 | 17 | 11 | 48 | 59 | 14 | 5x3 | 25 | 84 |
| 32 | 20 | 13 | 56 | 69 | 16 | 5x3 | 28 | 97 |
| 40 | 30 | 18 | 70 | 88 | 25 | 8x4 | 42 | 130 |
| 50 | 35 | 21 | 84 | 105 | 30 | 8x4 | 58 | 163 |
| 63 | 45 | 27 | 106 | 133 | 40 | 12x5 | 82 | 215 |
| 80 | 60 | 36 | 127 | 163 | 55 | 16x6 | 82 | 245 |
| 100 | 75 | 45 | 157 | 202 | 70 | 20x7.5 | 105 | 307 |
| 125 | 90 | 54 | 178 | 232 | 80 | 22x9 | 130 | 362 |

# LTM BALLSCREWS COMPANY

## LEAD ERROR CERTIFICATE

INSPECTED BY RENISHAW U.K. LASER SYSTEM




| | | |
|---|---|---|
| Serial No : 21073-1-3 | Cumulative representative lead T±E : -27.7 μ m | Accuracy grade : C1 |
| Date : 2012.03.30 | Total relative deviation e : 4.7 μ m | INSPECTOR |
| Trigger step :5 mm | Lead deviation in random 300mm $e_{300}$ : 4.2 μ m | |

SINCE 1979 LTM LEADTEAM A Subsidiary of Deams Group

# LTM BALLSCREWS CO.

## INSPECTION CERTIFICATE

CUSTOMER: 律德精密股份有限公司

PURCHASE ORDER: 566586

I.D. NUMBER: 99175- 1- 1

DRAWING NUMBER: 11600900

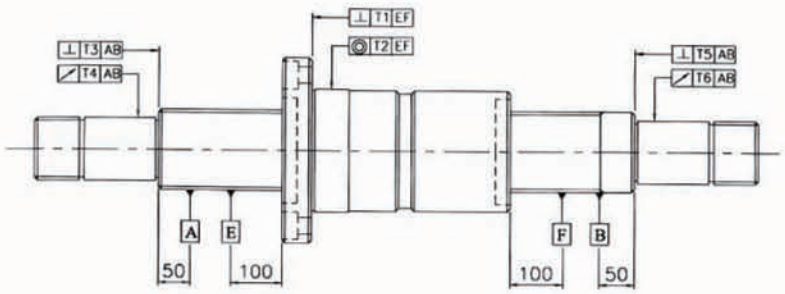
WE HEREBY CERTIFY THAT ACCURACY HEREIN DESCRIBED IS SATISFACTORY AND IN ACCORDANCE WITH THE SPECIFICATION

SPECIFICATION: R40×10B2×FDV×1329× 1617.50× 0.018/C5

Eric Yang

DATE: 2012/03/30

ERIC C.M. YANG / Q.C. MANAGER




| GEOMETRICAL | STANDARD | ACTUAL | DIMENSIONAL | STANDARD | ACTUAL |
|---|---|---|---|---|---|
| T1 | 0.013 | 0.008 | 1. | $\phi 30^{0}_{-0.011}$ | $\phi$30-0.008 |
| T2 | 0.019 | 0.012 | 2. | $\phi 30^{0}_{-0.011}$ | $\phi$30-0.010 |
| T3 | 0.010 | 0.002 | 3. | $\phi 25^{0}_{-0.013}$ | $\phi$25-0.005 |
| T4 | 0.015 | 0.009 | 4. | | |
| T5 | 0.010 | 0.003 | 5. | | |
| T6 | 0.015 | 0.007 | 6. | $\phi 65^{-0.010}_{-0.029}$ | $\phi$65-0.018 |

| INSPECTED BY RENISHAW U.K. LASER SYSTEM | ALLOWABLE | ACTUAL |
|---|---|---|
| REPRESENTATIVE ACCUMULATED LEAD T±E ($\mu$m) | -26±54 | -28 |
| LEAD VARIATION WITHIN EFFECTIVE STROKE e ($\mu$m) | 35 | 9 |
| THE LEAD VARIATION IN RANDOM 300 mm $e_{300}$ ($\mu$m) | 18 | 5 |
| PRELOAD TORQUE (WITHOUT WIPER) Tp (kgf-cm) | 5.95~11.05 | 5.9~8.0 |
| ACCURACY GRADE PER RELEASED ORDER | C5 | C2 |

文件編號:10-40-07

SINCE 1979
LTM LEADTEAM
A Subsidiary of Deans Group

# LTM BALLSCREWS CO.

## STRUCTURE & HARDNESS CERTIFICATE

CUSTOMER: 祚德精密股份有限公司

PURCHASE ORDER: 566586

DRAWING NUMBER: 11600900

SPECIFICATION: R40×10B2×FDV×1329×1617.50×0.018/C5

DATE: 2012/03/30

I.D. NUMBER : 99175-1-1

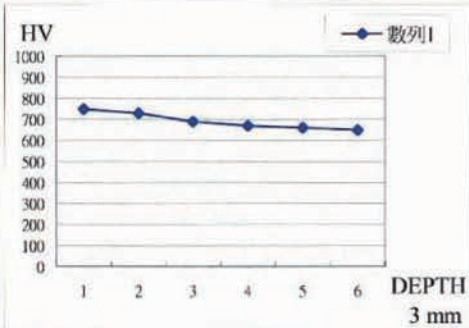
WE HEREBY CERTIFY THAT STRUCTURE PICTURE AND HARDNESS READINGS HEREIN DESCRIBED ARE SATISFACTORY AND IN ACCORDANCE WITH THE SPECIFICATION

*Eric Yang*

ERIC C.M.YANG / Q.C.MANAGER

THE LEFT PICTURE SHOWN THE MICRO-STRUCTURE OF THE PORTION THOSE ARE M-F INDUCTION HARDENED AND TEMPERED.

THE CORE OF THE SCREW BARS ARE PREHEATED (QUENCHED+TEMPERED).




HARDNESS / DEPTH DISTRIBUTION

| POINT | READINGS | POINT | READINGS |
|---|---|---|---|
| 1. | 750 | 4. | 670 |
| 2. | 730 | 5. | 660 |
| 3. | 690 | 6. | 650 |

**SINCE 1979**

文件編號：10-40-07