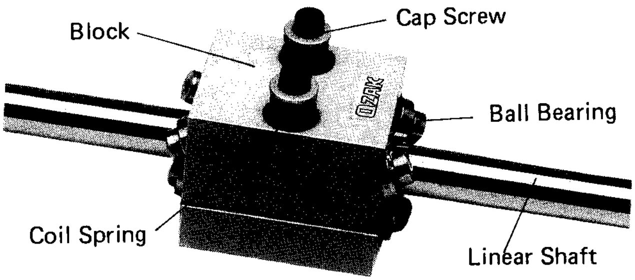
Construction



The SFS series features an aluminium block which is separated into two parts, an upper and a lower part. A group of three ball bearings is installed respectively on both ends of this block at an angle equivalent to the lead angle. This friction-drive feed screw allows a fitting adjustment between the block and linear shaft by either loosening or tightening both the coil spring and cap screw corresponding to the acting thrust load.

Precision

Table 158 : Adjustment Specs. Unit : mm

Backlach	0.025 or less
Lead Error	±0.038 or less per revolution

Because of the unit's friction-drive mechanism, the repeat positioning accuracy may change due to a possible slip caused by the variations of the acting thrust load magnitude, the inertia force, the lead size etc. For high-precision positioning accuracy, use the closed-loop control system.

Lubrication

Due to the use of a grease supplied bearing, this series does not require additional oil lubrication, however, rust-prevention oil must be periodically applied on the linear shaft.

Selection

Based on the following conditions, choose the best size unit from the SLS series.

1 Thrust Examination

1) Acting thrust load (F_W) determination
(For horizontal movement) $F = \mu W$ . . . . (7)
(For vertical movement) $F_W = \mu W + W$ . . . . (8)

2) Maximum thrust load (F_{max}) determination
$F_{max} = F_W + F_\alpha$ . . . . (9)
$F_\alpha = W\Delta V/gt$ . . . . (10)

3) Choose a proper size corresponding to the above F_{max} value from the F_α rated thrust load list on the following page.
Minimum size (determined) (a)

where

F_W	:	Acting thrust load	(kgf)
W	:	Total acting radial load	(kgf)
μ	:	Guide's friction factor	
V	:	Speed	(m/sec)
ΔV	:	Acceleration-deceleration speed difference (m/sec)	
g	:	Gravitational acceleration (9.8 m/sec^2)	
t	:	Acceleration-deceleration time	(sec)

2 Shaft Diameter Examination

1) Temporarily determine the lead value. Then use the following equations to obtain the rotational frequency and the speed.

$n = 60 \times V/\ell$ (rpm). . . . . (11)

$V = \ell \times n/60$ (m/sec) . . . . (12)

2) Shaft diameter determination
Use the Critical Speed ~ Installation Distance graph to determine the shaft diameter d.
Minimum Shaft Diameter (determined) (b)

3 Determine the unit's best suited size based on both (a) and (b).

Driving Torque

1) Load torque (T_1) determination

$$T_1 = F_W \cdot \ell / 2\pi \times 0.9 \quad (\text{kgf·m}) \qquad (13)$$

2) Acceleration torque (T_2) determination

$$T_2 = n \times \Sigma GD^2 / (375 \times t) \quad (\text{kgf·m}) \qquad (14)$$

3) Total load torque (T) determination

$$T = (T_1 + T_2) \times f \quad (\text{kgf·m}) \qquad (15)$$

where

- ΣGD^2 : Driving shaft-related aggregate GD^2 (kgf·m^2)
- f : Safety factor 1.2 ~ 1.5
- t : Acceleration-deceleration time (sec)

Rated Life

1) Rated life in terms of total number of revolutions

$$Ln = (C/F_{max})^3 \times 10^6 \quad (\text{rev}) \qquad (16)$$

2) Service life in hours

$$Lhr = Ln/(60 \times n) \quad (\text{hr}) \qquad (17)$$

3) Service life in travel distance

$$L_{km} = Ln \times \ell / 10^6 \quad (\text{km}) \qquad (18)$$

where

- C : Basic dynamic load rating (kgf)
- ℓ : Lead (mm)
- n : Rotation frequency (rpm)
- $F_{max} = F_W + F_\alpha$ (kgf)

Critical Speed

(Critical Speed) $N_C = \alpha \cdot 1.22 \times 10^7 \times \lambda^2 d / L^2$ (19)

where

- α : Safety factor = 0.8
- λ : Mounting factor
  - Supported ~ Supported $\lambda = \pi$
  - Fixed ~ Supported $\lambda = 3.927$
  - Fixed ~ Fixed $\lambda = 4.73$
- d : Shaft diameter (mm)
- L : Mounting distance (mm)

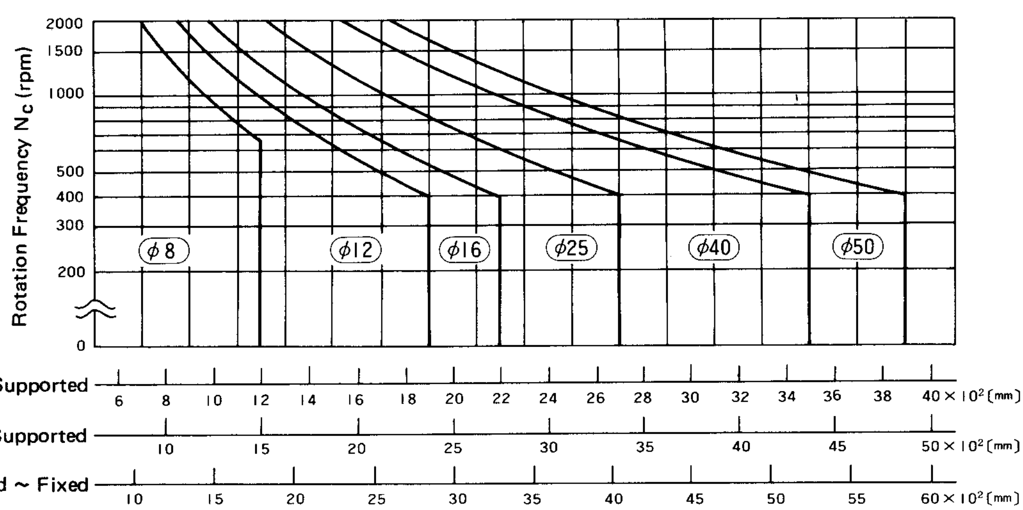


Fig. 42. Mounting Distance L (mm)

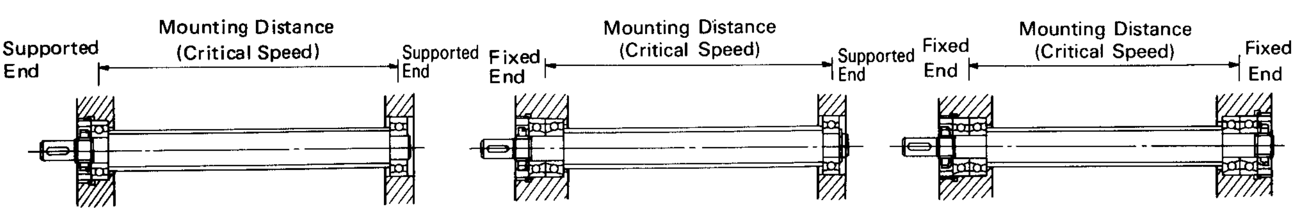


Fig. 43.