

Load Rating

Load direction	Vertical load		Lateral load	
Type	Three-Row type	Four-Row type	Three-Row type	Four-Row type
Schematic				
Basic dynamic load rating - Ca (N)	$Ca = (2P \times (\frac{R}{2} - 1))^{\frac{1}{3B}} \times (\frac{R}{2})^{\frac{3}{4}} \times C1$ <p>* R/2 : Effective number of rollers, take the rounded number (EX : 5/2=2.5 , take 2)</p>		$Ca = (2P \times (\frac{R}{2} - 1))^{\frac{1}{3B}} \times (\frac{R}{2})^{\frac{3}{4}} \times 2^{\frac{7}{9}} \times C1$ <p>* R/2 : Effective number of rollers, take the rounded number (EX : 5/2=2.5 , take 2)</p>	
Basic Static load rating - Ca0 (N)	Ca0=R×C0		Ca0=R×C0	
Allowable load-Fa0 (N)	Fa0=R×F0		Fa0=R×F0	

P: Inter-pitch dimensions of cylindrical rollers (mm)

R: The number of cylindrical rollers incorporated in a roller cage

C1: Basic dynamic load rating per cylindrical roller (N)

C0: Basic static load rating per cylindrical roller (N)

F0: Allowable load per cylindrical roller (N)

Ex : Calculate LGC3A180R25 basic load rating

From specification table (Information of Roller Cage)

Inter-pitch dimensions of cylindrical rollers : P = 5 mm

The number of cylindrical rollers incorporated in a roller cage : R = 25

Basic dynamic load rating per cylindrical roller : C1 = 640 N

Basic static load rating per cylindrical roller : C0 = 610N

Allowable load per cylindrical roller: F0=203N

Effective roller numbers : R/2 = 12.5, take 12

Take these parameters into calculation, we can get

For upward and downward load : Basic dynamic load rating Ca = 4,701.88 N;

Basic Static load rating Ca0 = 15,250 N;

Allowable load Fa0 = 5,075 N;

For Lateral load : Basic dynamic load rating Ca = 8,061.31 N;

Basic Static load rating Ca0 = 15,250 N;

Allowable load Fa0 = 5,075 N.

Static Safety Factor(S₀)

Crossed roller way may suffer an unexpected external force when it is stationary or in operation due to the inertia caused by vibrations and impact or start and stop. It is necessary to consider a static safety factor against such a working load.

$$S_0 = C_{a0} / F$$

Load Condition	S ₀
Normal Load	1.0~1.3
Load with Impacts or Vibrations	2.0~3.0

S₀: Static safety factor

C_{a0}: Basic static load rating (kN)

F: Calculated working load (kN)

Nominal Life(L)

When the basic dynamic load rating has been obtained, the rated lives of crossed roller way are obtained using the following equations.

$$L = \left(\frac{f_T}{f_w} \cdot \frac{C_a}{F} \right)^{\frac{10}{3}} \times 100$$

L: Nominal life (km)

C_a: Basic dynamic load rating (kN)

F: Calculated working load (kN)

f_T: Temperature factor (Reference to Temperature Factor Chart)

f_w: Load factor (Reference to Load Factor Table)

Calculating the Service Life Time(L_h)

When the nominal life (L) has been obtained, if the stroke length and the number of reciprocations per minute are constant, the service life time is obtained using the following equation.

$$L_h = \frac{L \times 10^6}{2 \times e_s \times m \times 60}$$

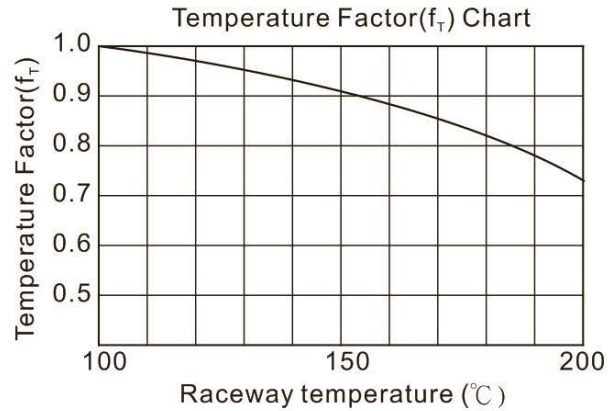
L_h: Service life time (h)

l_s: Stroke length (mm)

m: Number of reciprocations per minute (min⁻¹)

Temperature Factor(f_T)

If the environmental temperature exceeds 100°C, take the adverse effect of the high temperature into account by multiplying the basic load ratings by the temperature factor.



Load Factor (f_w)

In general, reciprocating machines tend to involve vibrations or impact during operation. It is extremely difficult to accurately determine vibrations generated during high-speed operation and impact during frequent start and stop. Therefore, when the actual load applied to model LGC cannot be obtained, or when speed and vibrations have a significant influence, divide the basic load rating (Ca or Ca0), by the corresponding empirically load factor in the following table.

Load Factor Table		
Vibrations/Impact	Speed (V)	f _w
Faint	V ≤ 0.25 m/s	1 ~ 1.2
Weak	0.25 < V ≤ 1 m/s	1.2 ~ 1.5

Stroke

When the work platform of crossed roller way moving towards, the roller cage will move about half the travel distance of the work platform in the same direction at the same time. And the distance from the center of load and the center of roller cage would be change during motion. Therefore, in order to maintain the stability and accuracy of the crossed roller way, please follow the instructions in Cross Reference Table for Max. stroke & Roller Numbers.

EX : Roller diameter is 6 mm, High-accuracy grade, the length of rails are 300mm and 200mm, and the required working stroke length is 50mm.

According to the specification (Cross Reference Table for Max. Stroke & Roller Numbers), The admissible numbers of roller are 16 and 19 with the shortest length of rails in 200 mm. Then, the maximum stroke length, 118 mm and 64 mm, are both longer than working stroke length which is

50mm. → Satisfying user requirement.

Mounting Screw

Tightening torque for fixing screw

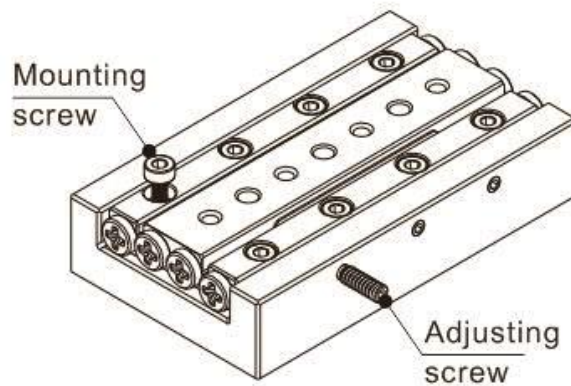
Identification number	Bolt size	Tightening torque(N.m)
LGC1	M1.4X0.3PX6L	0.14
LGC2	M2.0X0.4PX8L	0.40
LGC3	M3.0X0.5PX9.5L	1.40
LGC4	M4.0X0.7PX16L	3.20
LGC6	M5.0X0.8PX20L	6.60

※High strength screw is preferred.

Adjusting Screw

Tightening torque for fixing screw

Identification number	Bolt size	Tightening torque(N.m)
LGC1	M2	0.008
LGC2	M3	0.012
LGC3	M4	0.05
LGC4	M4	0.08
LGC6	M5	0.2



Precautions on use

1. Operating careful:

Take care not to drop the crossed roller way. Doing so may cause damages on the rolling surfaces. In this way, it will affect the accuracy, or even unable to work smoothly.

2. Adjustment:

Using the product with insufficient accuracy of the mounting surface or before adjusting the preload will cause the motion accuracy of the product to drop and will have a negative influence upon product life and accuracy. Make sure to assemble, install, and adjust the product with care. It is essential to give preload on the Crossed Roller Way products in order to assure rigidity and accuracy. However, excess preload causes damage on the raceways and roller cage. On installation, please follow the installation procedure and recommended torque.

3. Use as a Set:

The accuracy of the rails has been matched within each set. Note that the accuracy will be affected when the rails of different sets are combined.

4. Allowable Load:

The allowable load is a load under which the sum of elastic deformations of the rolling element and the raceway in the contact area subject to the maximum contact stress is small enough to guarantee smooth rolling movement. When very smooth and highly accurate linear motion is required, make sure to use the product within the allowable load.

5. Cage Slippage:

The roller cage can slip under high speed motion, vertical application, unbalanced-loading, and vibrating conditions. It is advised that the stroke be set with sufficient margin and an excessive preload should be avoided.