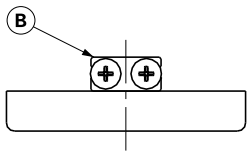
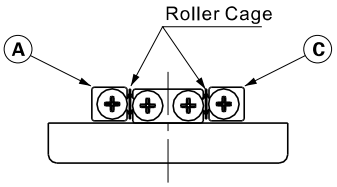
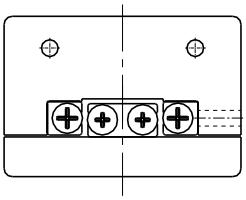
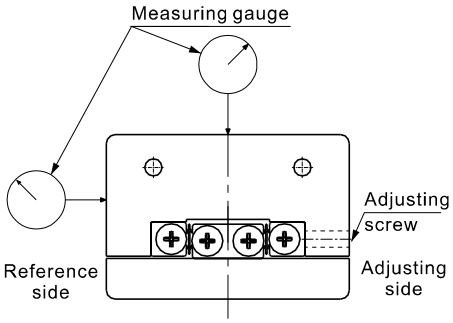
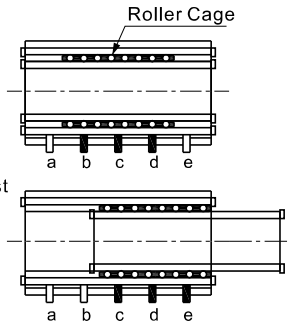
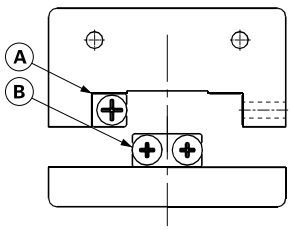
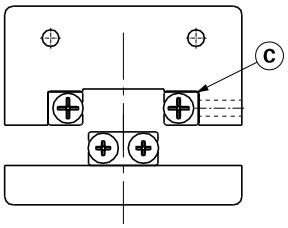
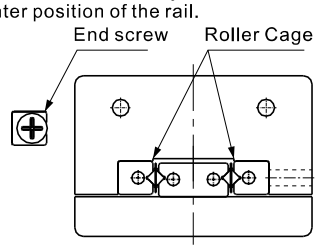
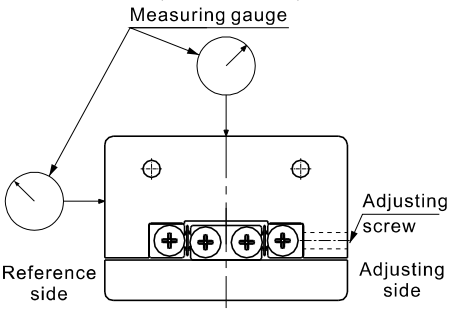
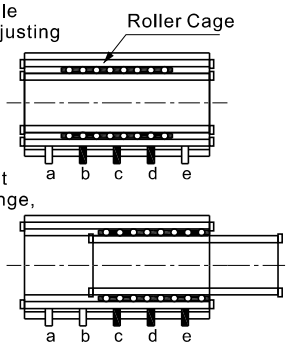
Installation Illustration

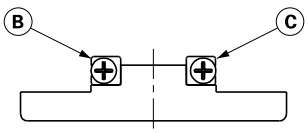
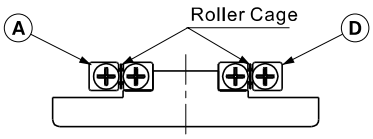
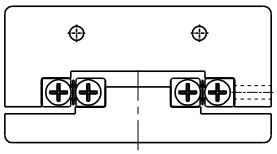
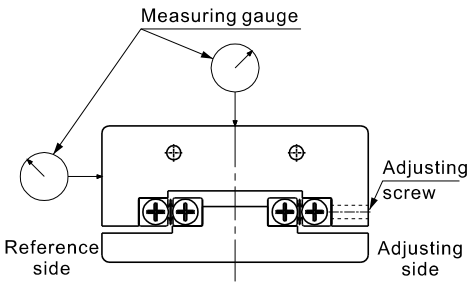
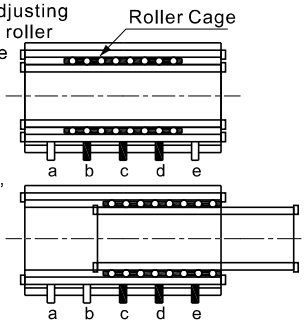
Three-row type--Installation method 1

Step 1	Step 2	Step 3
Lock the mounting screws on rail B with the recommended torque. 	Place the roller cage and rail A and C. 	Hold the rails to avoid moving, and temporarily fix the rail A and C after putting the slide table. Move the slide table back and forth to the end and adjust the roller cage to the center position of the rail. 
Step 4	**Step 5**	**Step 6**
Fix the measuring gauges to the top surface center and side surface (reference side) of the slide table. 	Move the slide table and tighten the adjusting screws within the roller range. Repeat the movement until the value of the measuring gauge drops to the lowest and keeps no change, then tighten the adjusting screws a~e with correct torque. 	Tighten the rail A and C completely, then perform the same steps as tightening the adjusting screws, move the slide table and tighten the mounting screws within the roller range with recommended torque.

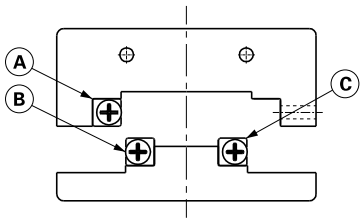
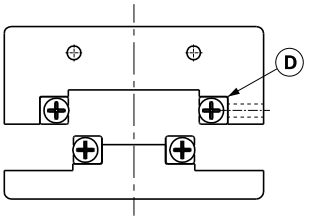
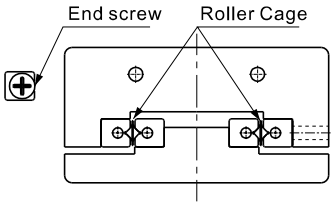
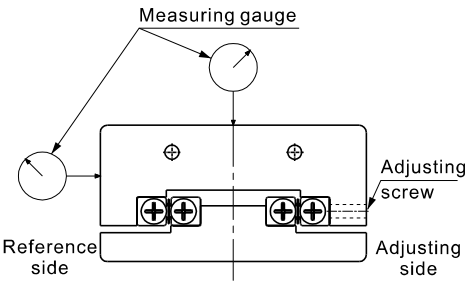
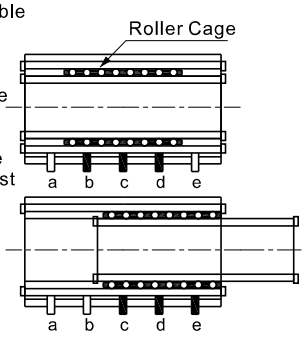
Three-row type--Installation method 2

Step 1	Step 2	Step 3
Lock the mounting screws on rail A and B with the recommended torque. 	Temporarily fix the rail C at the adjusting side. 	Removing the end screws on one side and insert the roller cage, then mount back the removed end screws and tighten. Move the slide table back and forth to the end and adjust the roller cage to the center position of the rail. 
Step 4	**Step 5**	**Step 6**
Fix the measuring gauges to the top surface center and side surface (reference side) of the slide table. 	Move the slide table and tighten the adjusting screws within the roller range. Repeat the movement until the value of the measuring gauge drops to the lowest and keeps no change, then tighten the adjusting screws a~e with correct torque. 	Tighten the rail C completely, then perform the same steps as tightening the adjusting screws, move the slide table and tighten the mounting screws within the roller range with recommended torque.

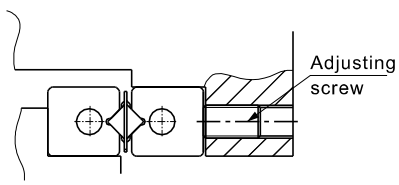
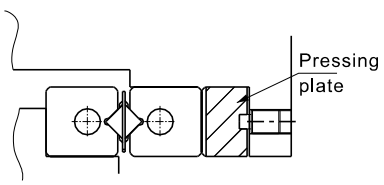
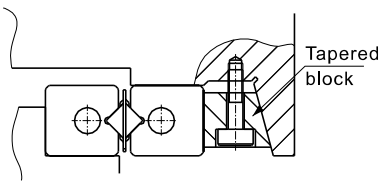
Four-row type--Installation method 1

Step 1	Step 2	Step 3
Lock the mounting screws on rail B and C with the recommended torque. 	Place the roller cage and rail A and D. 	Hold the rails to avoid moving, and temporarily fix the rail A and D after putting the slide table. Move the slide table back and forth to the end and adjust the roller cage to the center position of the rail. 
Step 4	**Step 5**	**Step 6**
Fix the measuring gauges to the top surface center and side surface (reference side) of the slide table. 	Move the slide table and tighten the adjusting screws within the roller range. Repeat the movement until the value of the measuring gauge drops to the lowest and keeps no change, then tighten the adjusting screws a~e with correct torque. 	Tighten the rail A and D completely, then perform the same steps as tightening the adjusting screws, move the slide table and tighten the mounting screws within the roller range with recommended torque.

Four-row type--Installation method 2

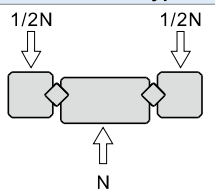
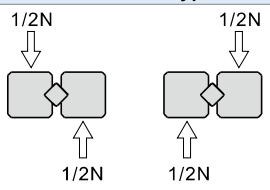
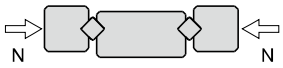
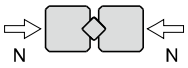
Step 1	Step 2	Step 3
Lock the mounting screws on rail A, B and C with the recommended torque. 	Temporarily fix the rail D at the adjusting side. 	Removing the end screws on one side and insert the roller cage, then mount back the removed end screws and tighten. Move the slide table back and forth to the end and adjust the roller cage to the center position of the rail. 
Step 4	**Step 5**	**Step 6**
Fix the measuring gauges to the top surface center and side surface (reference side) of the slide table. 	Move the slide table and tighten the adjusting screws within the roller range. Repeat the movement until the value of the measuring gauge drops to the lowest and keeps no change, then tighten the adjusting screws a~e with correct torque. 	Tighten the rail D completely, then perform the same steps as tightening the adjusting screws, move the slide table and tighten the mounting screws within the roller range with recommended torque.

Clearance adjustment

Application	Usually, the adjusting screw is used to push the rail on the adjusting side to adjust the clearance	When rigidity and precision are required, pressing plate is recommended to adjust the clearance.	When high rigidity and high precision are particularly required, tapered block is recommended to adjust the clearance.
Diagram			

User Manual

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 - C_a (N)	$C_a=\{2P\times(\frac{R}{2}-1)\}^{\frac{1}{36}}\times(\frac{R}{2})^{\frac{3}{4}}\times C_1$ * Effective roller number R/2: round off to integer (EX : 5/2=2.5 , take 2)		$C_a=\{2P\times(\frac{R}{2}-1)\}^{\frac{1}{36}}\times(\frac{R}{2})^{\frac{3}{4}}\times 2^{\frac{7}{9}}\times C_1$ *Effective roller number R/2: round off to integer (EX : 5/2=2.5 , take 2)	
Basic Static load rating - C_{a0} (N)	$C_{a0}=R\times C_0$		$C_{a0}=R\times C_0$	
Allowable load-F_{a0} (N)	$F_{a0}=R\times F_0$		$F_{a0}=R\times F_0$	

P: Pitch of roller cage (mm)
R: The number of cylindrical rollers incorporated in a roller cage
C_1: Basic dynamic load rating per cylindrical roller (N)
C_0: Basic static load rating per cylindrical roller (N)
F_0: Allowable load per cylindrical roller (N)

Ex : Calculate LGC3A180R25 basic load rating
From specification table(Informations of Roller Cage)
Pitch of roller cage :P=5mm
The number of cylindrical rollers incorporated in a roller cage : R = 25
Basic dynamic load rating per cylindrical roller : C_1 = 640 N
Basic static load rating per cylindrical roller : C_0 = 610N
Allowable load per cylindrical roller: F_0=203N
Effective roller number R/2 = 12.5, take 12
Take these parameters into calculation, we can get
For vertical load :Basic dynamic load rating C_a = 4,701.88 N;
Basic Static load rating C_{a0} = 15,250 N;
Allowable load F_{a0} = 5,075 N;
For Lateral load : Basic dynamic load rating C_a = 8,061.31 N;
Basic Static load rating C_{a0} = 15,250 N;
Allowable load F_{a0} = 5,075 N.

Static Safety Factor(f_s)

Inertia force caused by impact, sudden start or stop will exert unexpected force on crossed roller guide. Therefore, safety factor based on working condition needs to be put into consideration, see as follows:

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

$$f_s=\frac{C_{a0}}{F}$$

f_s: Static safety factor
C_{a0}: Basic static load rating (N)
F: Calculated working load (N)

Nominal Life(L)

Nominal life is calculated as follow:

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

L:Nominal life (km)
C_a:Basic dynamic load rating (N)
F:Calculated working load (N)
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)

Based on the calculated nominal life, the Service Life Time is obtained through the following equation as if the stroke length and the value of reciprocations per minutes remain constant.

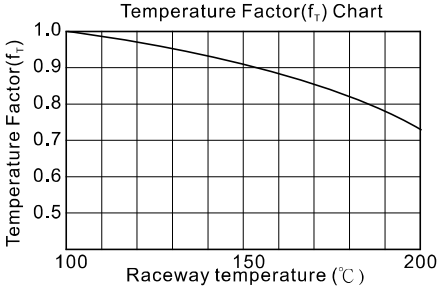
$$L_h=\frac{L\times 10^6}{2\times \ell_s\times m\times 60}$$

L_h:Service life time (h)
ℓ_s:Stroke length (mm)
m:Rounds per minute (min^{-1})

Temperature Factor(f_T)

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

Temperature Factor(f_T) Chart



Load Factor(f_w)

In general, reciprocating machines tend to involve vibrations or impact during operation. it is extremely difficult to accurately determine the impact caused by high-speed motion or frequent start and stop motion. However, the calibrated load can be expected by experience.The basic load rating(C_a or C_{a0}) divide by load factor(f_w) in the following table to calibrate from speed effect and vibrations.

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

Stroke

When moving, roller cage will move along with rail about half of its moving distance. Therefore, distance between center of loads and roller cage will vary with motion. In order to maintain accuracy, please conform to 'Cross Reference Table for Max. Stroke & Roller Numbers' table when deciding specs.
EX: Choose spec for a roller diameter 6 mm, high accuracy type and desiring length of rails are 300 and 200 mm, desiring moving distance is 50 mm.
Refer to 'Cross Reference Table for Max. Stroke & Roller Numbers' : roller diameter 6 mm with 200 mm as shortest rail, its roller numbers can be R16 or R19, and admissible moving distance is 118 and 64 mm respectively.
Both roller numbers can meet the required working distance 50mm.

Mounting Screw

Tightening torque for fixing screw

Spec	Screw 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

Adjusting Screw

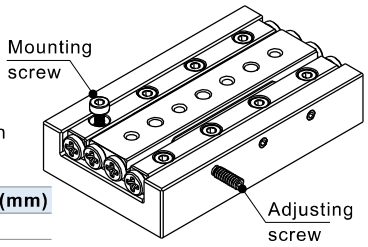
Tightening torque for fixing screw

Spec	Screw 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

Gap between adjusting screws

It must have more than 2 of adjusting screws even the rails are short.
When the rails are long, the gap between adjusting screws are recommended in the table below:

Spec	Gap between adjusting screws(mm)
LGC1	10
LGC2	15
LGC3	25
LGC4	40



※High strenth screw is preferred.

Allowable preload

Excessive preload will cause dents or shorten the lifetime, refer to the table below for allowable preload clearance. And check the amount of displacement of roller contact part while tightening the adjustment screw.

Spec	LGC1	LGC2	LGC3	LGC4
Allowable preload (um)	-2	-3	-4	-5

Precautions on dispensing

To avoid the screws from falling off by vibration, the screws thread can be dispensed before tightening.
However, glue should not spill onto the roller and its contact surface to avoid affecting the walking accuracy.

Precautions on lubrication

1.Linear guides have been treated with anti-rust oil in the factory. Before use, wipe the rail and treat with lubrication.
2.When adding grease, in order to avoid the sliding resistance caused by uneven oil film, run back and forth several times before operation.
3.Do not mix lubricating oil (grease)with different properties. Even if the thickeners of different grease are the same, they may affect each other due to different additives.
4.In special environments such as places with frequent vibration, clean rooms, vacuum, low temperature or high temperature, use grease that meets the specifications and environment.
5.Pay attention to that the consistency of the grease changes depending on the temperature, so the sliding resistance also changes.
6.After adding grease, excess grease may splash around during operation, so wipe excess grease before using it when necessary.
7.In order to avoid insufficient lubrication caused by grease loss, grease inspection and replenishment are required according to the frequency of use. The lubrication frequency varies depending on the use conditions and the environment, hence the lubrication frequency and replenishment should be set according to the actual operation.

Precautions on safety

1.In high-speed use or bearing bias load, vibration, etc., roller cage offset may occur (Note 1), to avoid excessive extrusion, the stroke must be reserved when using, it is recommended that the operating stroke is slightly less than the maximum stroke to avoid cage extrusion damage.
2.In order to obtain a high walking accuracy, it is recommended that therail mounting surface should be ground to reach the same level or higher level to the parallelism and flatness of the rail, and the rails should be installed correctly close to the mounting surface.
3.Be sure to remove the burrs, dents, dust, foreign objects, etc. of the rail mounting surface on the slide table and base, and pay attention to protection during assembly.When adjusting the preload, it is generally recommended to apply no or very small preload. Excessive preload can cause indentation damages and shorten the service life.

Precautions on use

1.Caution in handling
Dropping crossed roller way may cause damage on surface and further affect its accuracy, and even jerks during movement.

2. Adjustment
Fail to adjust the preload or mounting surfaces correctly will affect the product lifetime and accuracy. Make sure to assemble, install, and adjust the product with care. Appropriate preload will help with rigidity and accuracy; yet overloading the crossed roller way will result in damages and deformation. On installation, please follow the installation procedure and recommended torque.

3. Use as a Set
The accuracy of crossed roller guide is controlled as a set. Accuracy is not guaranteed when mixing parts from different sets.

4. Allowable Load
Definition of allowable load is the maximum loads applied on crossed roller to cause acceptable elastic deformation while maintain a smooth movement. When working condition requires high accuracy and smooth movement, be sure load applied on product is under allowable load.

5. Cage Slippage
The roller cage could slip under high speed motion, vertical use application, unbalanced load, and vibration conditions. Avoiding excessive loads is recommended. Meanwhile, using crossed roller within range of allowable stroke while applying safety factors will help avoid compression and damage.

6. Possible causes of cage offset
A.Vertical installation B.High speed or high acceleration application. C.Thermal deformation.
D.Structure rigidity or accuracy of the base or slide table are insufficient. E.Incorrect installation (the railsare not correctly aligned or have uneven preload)

7. Method of avoiding cage offset
During use, perform full-stroke movement multiple times to move the cage to the center position.
In vertical installation, the cage is affected by gravity and offset probability increases, hence the stroke must be reserved, if the situation is not improved, LRM/LSH series are recommended to use, in this case cage offset will not happen.