

# Stroke Rotary Cage

BG

**IKO Stroke Rotary Cage is a compact linear motion rolling guide with low sectional height. Steel balls having very small size variation in diameter are held in a retainer. Thus if they are assembled with a shaft and housing which are precisely finished to function as raceways, reciprocal linear motion as well as rotation can be achieved with high accuracy corresponding to the accuracy of the shaft and housing.**

## Superior high speed performance

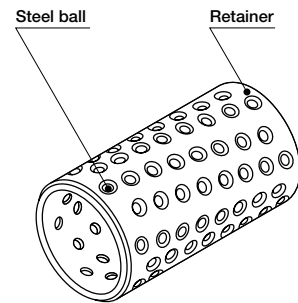
The retainers are highly rigid and light in weight with low inertia. So this series is suitable for high speed reciprocating linear motion.

## Long life

The steel balls held in the retainer are arranged in a spiral formation in order to prevent the steel balls tracing the same path. Rolling contact fatigue of the shaft and housing raceways is thereby minimized. Also, stable high accuracy can be assured for long periods of time.

## Large load rating and high rigidity

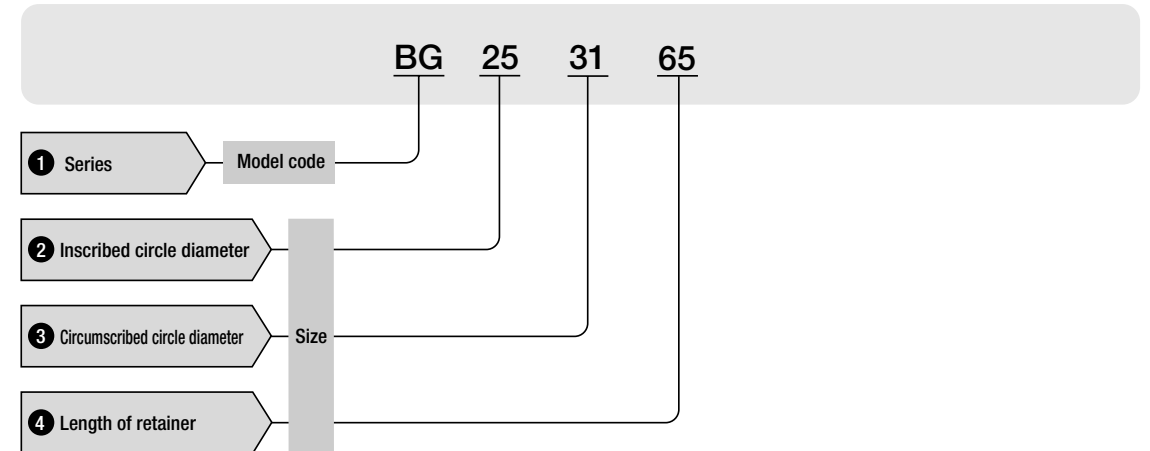
In the retainer, steel balls are incorporated as many as possible. So the load ratings are large and the rigidity is high with small elastic deformation even under fluctuating loads or localized edge loads.



Structure of Stroke Rotary Cage

## Identification number and specification

The identification number of Stroke Rotary Cage consists of a model code and a size. An example of identification number is shown below.



1 Series	BG
2 Incribed circle diameter	Indicate the inscribed circle diameter in mm.
3 Circumscribed circle diameter	Indicate the circumscribed circle diameter in mm.
4 Length of retainer	Indicate the length of retainer in mm.

## Load Rating

The load ratings of Stroke Rotary Cage are defined for radial load. Summarized descriptions of load ratings are given below. For details of load rating definitions and load calculations, see "General description".

### ● Basic dynamic load rating $C$

The basic dynamic load rating is defined as the constant radial load both in direction and magnitude under which a group of identical Stroke Rotary Cages are individually operated and 90% of the units in the group can rotate 1,000,000 revolutions free from material damage due to rolling contact fatigue.

### ● Basic static load rating $C_0$

The basic static load rating is defined as the static radial load that gives a prescribed constant contact stress at the center of the contact area between the rolling element and raceway receiving the maximum load.

## Fit

Stroke Rotary Cage is generally used with a minimal radial clearance. Recommended fits are shown in Table 1.

If Stroke Rotary Cage is used on the die-set guiding posts of press machines or on machines which require accurate operation, a preload is generally given. In this case, the dimensional accuracy of the shaft and housing bore is recommended as shown in Table 2. However, since excessive preload shortens the life of Stroke Rotary Cage, it is suggested that the lower limit of radial clearance is not smaller than the value shown in Table 3.

**Table 1 Fit in general**

Shaft	Housing bore
h5, h6	H6, H7

**Table 2 Dimensional accuracy of shaft and housing bore**  
unit :  $\mu\text{m}$

Nominal diameter mm	Shaft		Housing bore		
	h5		Nominal diameter mm	K5	
	high	low		high	low
19	0	-9	25	+1	-8
22	0	-9	28	+1	-8
25	0	-9	31	+2	-9
28	0	-9	36	+2	-9
32	0	-11	40	+2	-9
38	0	-11	48	+2	-9

**Table 3 Lower limit of radial clearance**  
unit :  $\mu\text{m}$

Nominal shaft diameter mm	Lower limit of radial clearance
19	-5
22	-5
25	-5
28	-7
32	-7
38	-7

## Allowable Limit of Speed

Stroke Rotary Cages can be operated in both linear and rotary directions at the same time. The allowable limit of speed when linear motion and rotation occur at the same time can be obtained from the following formula. Limiting values in general are shown in Table 4.

$$DN \geq D_{pw} n + 10S n_1 \dots \dots \dots (1)$$

- where,  $DN$ : Limit of speed (See Table 4.)  
 $n$ : Number of revolutions per minute, rpm  
 $n_1$ : Number of strokes per minute, cpm  
 $S$ : Stroke length, mm  
 $D_{pw}$ : Pitch circle diameter of balls, mm (  $D_{pw} = \frac{F_w + E_w}{2}$  )  
 $F_w$ : Inscribed circle diameter, mm  
 $E_w$ : Circumscribed circle diameter, mm

**Table 4 Limit of speed**

Lubrication	DN
Oil	600 000
Grease	300 000

This formula is applicable only when  $n_1 \leq 5000$  and  $S n_1 \leq 50000$ .

## Precautions for Use

① Stroke Rotary Cage is used with a shaft and housing bore as raceway surfaces. Recommended surface hardness and roughness of the shaft and housing are shown in Table 5, and also recommended minimum effective hardening depth of the raceway is shown in Table 6.

**Table 5 Surface hardness and roughness of raceways**

Item	Recommended value	Remarks
Surface hardness	58~64HRC	When the raceway hardness is less than the necessary hardness, multiply load ratings by the hardness factor.
Surface roughness	0.2 $\mu\text{mRa}$ or better (0.8 $\mu\text{mRy}$ or better)	When the required accuracy is not severe, a surface roughness of about 0.8 $\mu\text{mRa}$ (3.2 $\mu\text{mRy}$ ) is adequate.

**Table 6 Minimum effective hardening depth**  
unit : mm

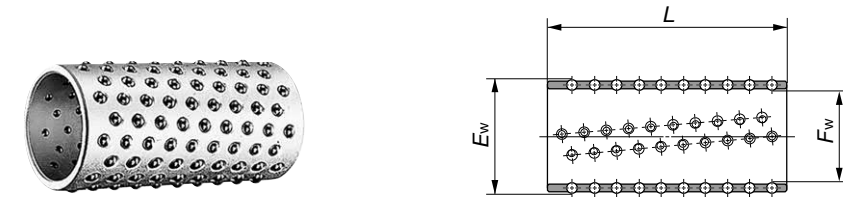
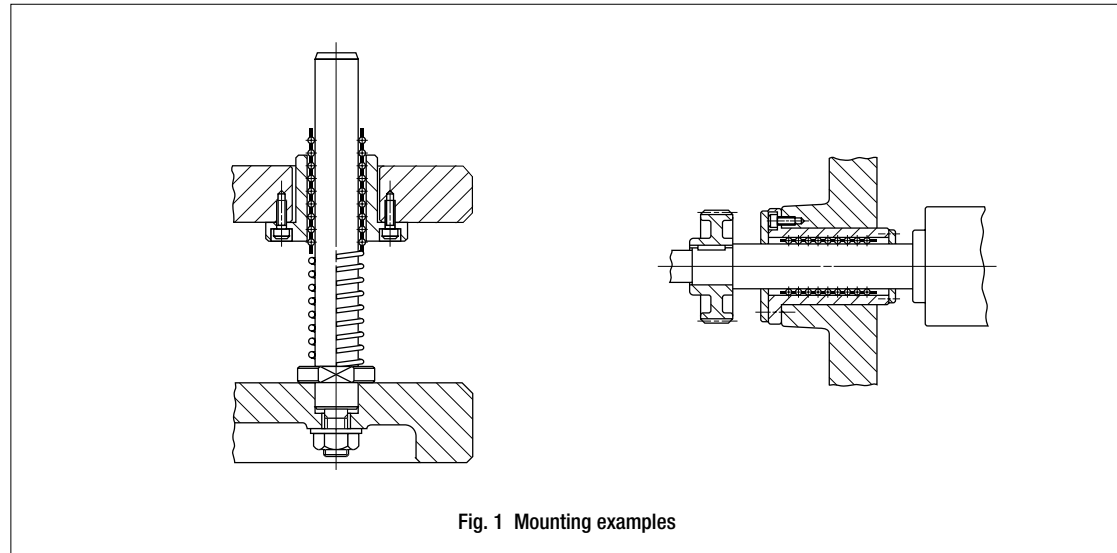
Shaft or housing bore diameter	Recommended minimum effective hardening depth	
	over	incl.
—	28	0.8
28	50	1.0

② Stroke Rotary Cage can be used with oil or grease lubrication. A good quality lithium-soap base grease is recommended for grease lubrication.

③ When Stroke Rotary Cage is operated in a linear direction and some of the steel balls escape the housing raceway, it is recommended that the housing bore ends should be slightly tapered so that the balls enter or exit smoothly.

## Precautions for Mounting

- 1 First, assemble Stroke Rotary Cage into a housing. Then gradually and gently insert a shaft into a bore. During assembly, keep the shaft parallel to the axis of Stroke Rotary Cage and avoid giving impact on the steel balls.
- 2 When Stroke Rotary Cage is used in a preloaded condition, position the ball cage at the regular position in the axial direction. A convenient way for positioning is to shift the position of the ball cage prior to the assembly to the inserting direction for the distance of 1/2 of the inserting distance of the shaft.



Shaft diameter mm	Model number	Mass (Ref.) g	Nominal dimensions mm			Basic dynamic load rating C N	Basic static load rating C <sub>0</sub> N
			F <sub>w</sub>	E <sub>w</sub>	L		
19	BG 192555	33	19	25	55	2 330	2 600
22	BG 222860	40	22	28	60	2 490	2 950
25	BG 253165	48	25	31	65	2 660	3 390
28	BG 283670	76	28	36	70	3 830	4 660
32	BG 324075	93	32	40	75	4 480	6 030
38	BG 384880	162	38	48	80	6 750	9 390

Remark : The values of basic dynamic load rating and basic static load rating are the values when the steel balls assembled in a retainer do not escape from the raceways and the applied load is equally distributed on the balls.