

FUYU

High-precision and stable linear motion

Features

Low rolling friction resistance, high stability; Small launching friction, and good following function; Big interface area, small elastic deformation, more effective moving vehicle, which can achieve the movement of high rigidity and high load; Flexible structure design, convenient installation and use.



CROSS-BALL GUIDE

© Compositions

FUYU Crossing Roller Guideway is composed by 2pcs guideways which have V shape raceways, rolling cages, cylindrical rollers and so on. The cylindrical rollers which intersect each other are moving on V shape rolling surface repeatedly; it can bear the loads from all directions, and achieve the high-precision and smooth linear movement.

PRECCSE CROSSING ROLLER GUIDEWAY SETS

精密交叉滚柱导轨副

》 The Rated Lifespan of the Crossing Roller Guideway

交叉滚柱导轨副的额定寿命

○ Lifespan Calculation

$$L = 50 \left(\frac{f_t}{f_w} \cdot \frac{C}{P_c} \right)^{10/3} \text{ (Km)}$$

Remarks: L: Rated Lifespan; f_t: Temperature Coefficient;
f_w: Load Coefficient; C: Rated Kinetic Load;
P_c: Load Calculation; When the working temperature °C ≤ 100, f_t=1; f_w: Load Coefficient

○ 额定寿命的计算

$$L = 50 \left(\frac{f_t}{f_w} \cdot \frac{C}{P_c} \right)^{10/3} \text{ (Km)}$$

式中: L—额定寿命 f_t—温度系数 f_w—载荷系数
C—额定动载荷 P_c—计算载荷
温度系数f_t: 当工作温度 °C ≤ 100时, f_t=1 载荷系数f_w

工作条件 Working Condition	无外部冲击或震动的低速运动场合, 速度 小于15m/min When in the situation of low speed, without external attacks and shocks, the speed will be lower than 15m/min.	无明显冲击或震动的中速运动场合, 速度 小于15-30m/min When in the situation of moderate speed, with out obvious attacks and shocks, the speed will be lower than 15-30m/min.
f _w	1~1.5	1.5~2.0

○ Lifespan Period Calculation

$$L_h = \frac{L \times 10^3}{2 \times l \times n \times 60} \text{ (h)}$$

Remarks: L_h: Lifespan Period; L: Rated Lifespan; l: Stroke
Length; n: Round-trip Times per Minute

○ 寿命时间的计算

$$L_h = \frac{L \times 10^3}{2 \times l \times n \times 60} \text{ (h)}$$

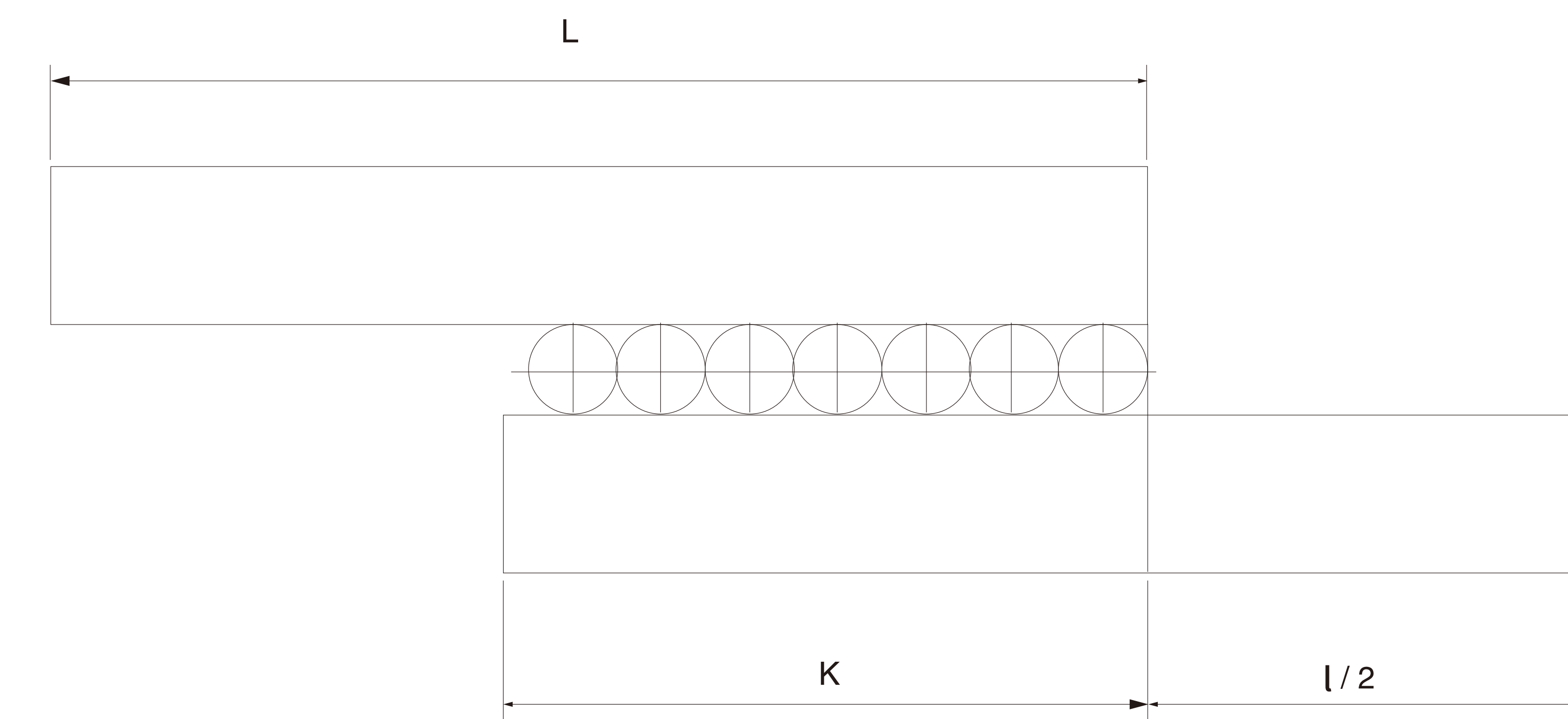
式中: L_h—寿命时间 L—额定寿命 l—行程长度
n—每分钟往复次数

》 Load Calculation

载荷计算

○ The Stroke Length and Roller Numbers

○ 行程长度及滚柱数量



Guideway Length Calculation:

- The guideway length is not less than 1.5 times of the stroke: $L \geq 1.5l$
- Cage's Length: $K \leq L - l/2$
Remarks: K: Cage's Length(mm)
- Calculation of Roller Numbers: $n = (K - 2a) / f + 1$
Remarks: n: Roller Numbers (the decimal part is ignored).
a: End to End Distance of the Cage f: Space between Rollers

导轨长度计算

- 导轨的长度不小于行程的1.5倍: $L \geq 1.5l$
式中: L—导轨长度(mm); l—运行行程长度(mm)
- 保持架长度: $K \leq L - l/2$
式中: k—保持架长度(mm)
- 滚柱数计算: $n = (K - 2a) / f + 1$
式中: n—滚柱数量 (忽略小数), a—保持架端距,
f—滚柱间距

◎ Load Calculation

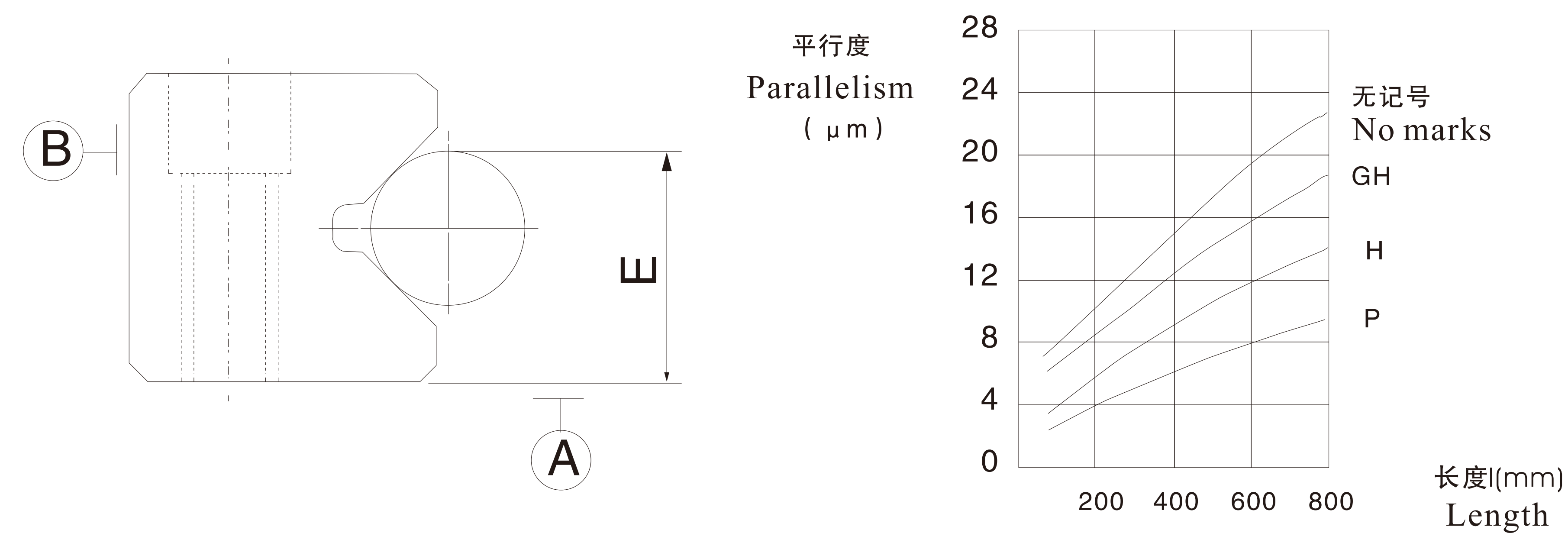
◎ 载荷计算

载荷方向 Load Direction	正向载荷 Positive Load	侧向载荷 Lateral Load
额定动载荷C Rated Kinetic Load C	$C = (\frac{n}{2})^{3/4} C_1$	$C = (\frac{n}{2})^{3/4} 2^{7/9} C_1$
额定静载荷C ₀ Rated Static Load C ₀	$C_0 = (\frac{n}{2}) C_{01}$	$C_0 = 2 \times (\frac{n}{2}) C_{01}$

Remarks: C: Rated Kinetic Load (KN); C₀: Rated Static Load (KN);
C₁: Rated Kinetic Load of each roller(KN);
C₀₁: Rated Static Load of Each Roller (KN); n: Roller Numbers; n/2:
Roller Numbers (the decimal part is ignored).

表中: C—额定动载荷(KN) C₀—额定静载荷(KN)
C₁—每个滚柱的额定动载荷(KN)
C₀₁—每个滚柱的额定静载荷(KN)
n—滚柱数 n/2—滚柱数 (忽略小数)

▷ Precision Choice
精度的选择



精度等级 Precision Grades	普通级 General	普高级 General High	高级 High	精密级 Precision
项目 Items	无记号 Nomarks	GH	H	p
导轨面对基准A、B的平行度 The Parallelism of Guideway Surface to Benchmark A & B.	按上右图规定 According to the right diagram above			
高度E尺寸误差 Dimension Inaccuracy of Height E	± 0.02	± 0.02	± 0.02	± 0.01
高度E相互配对差 Mutual Matching Difference of Height E	0.02	0.02	0.01	0.01

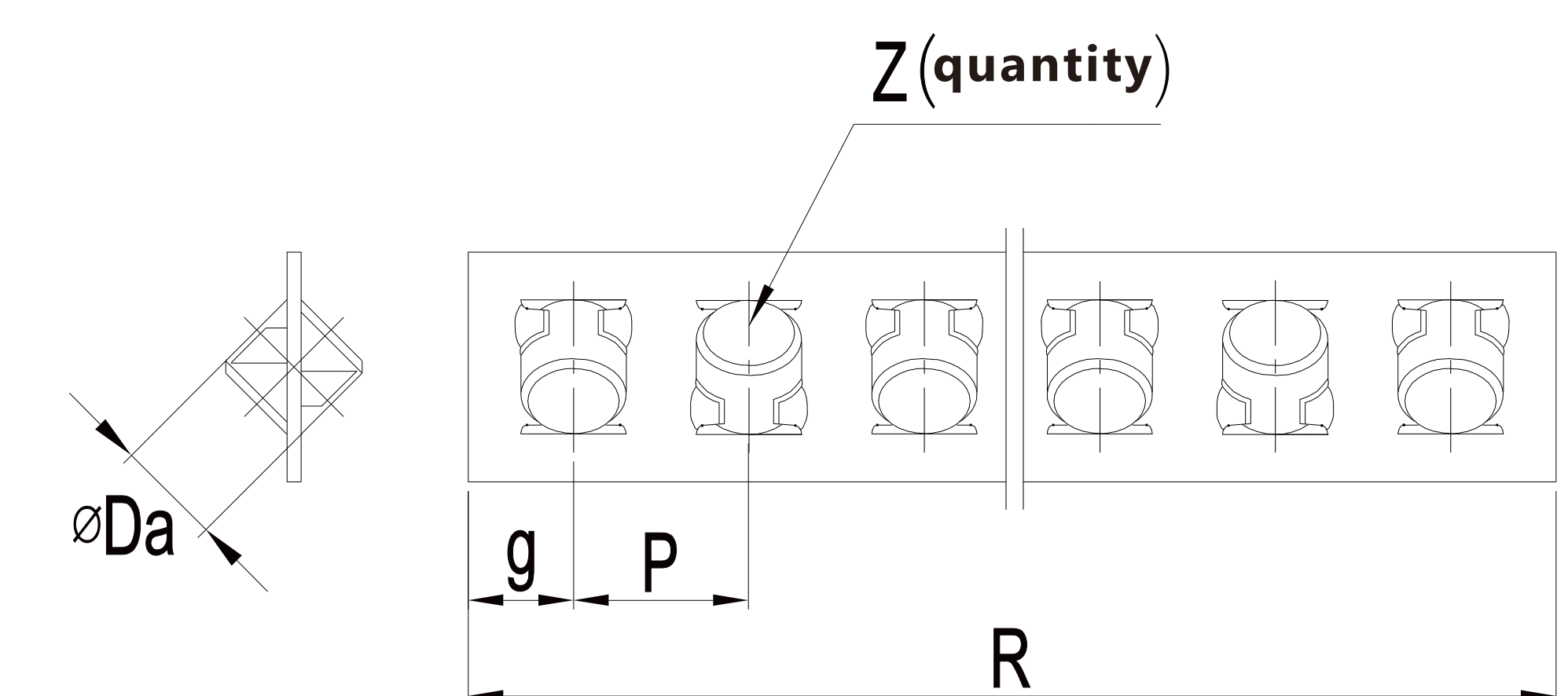
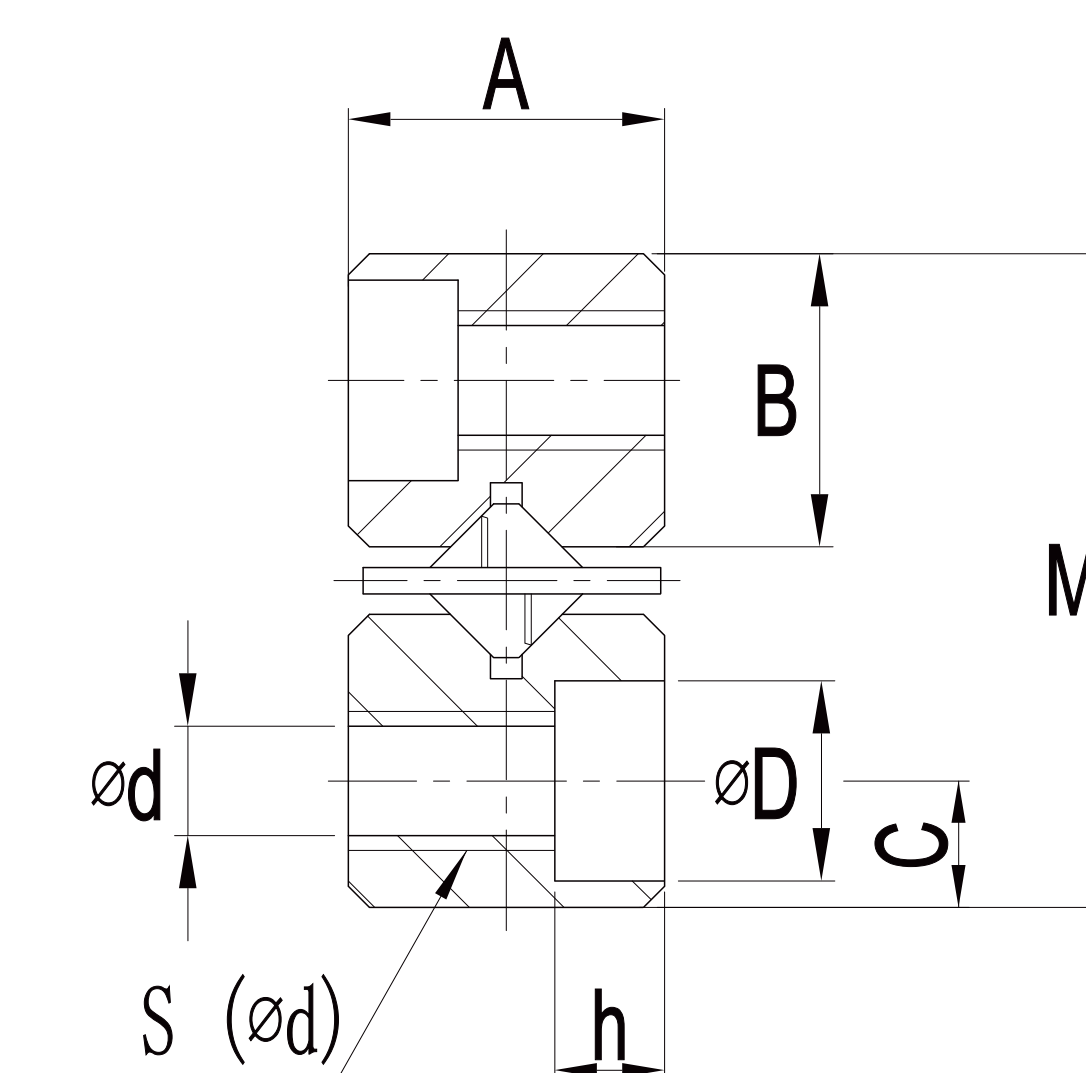
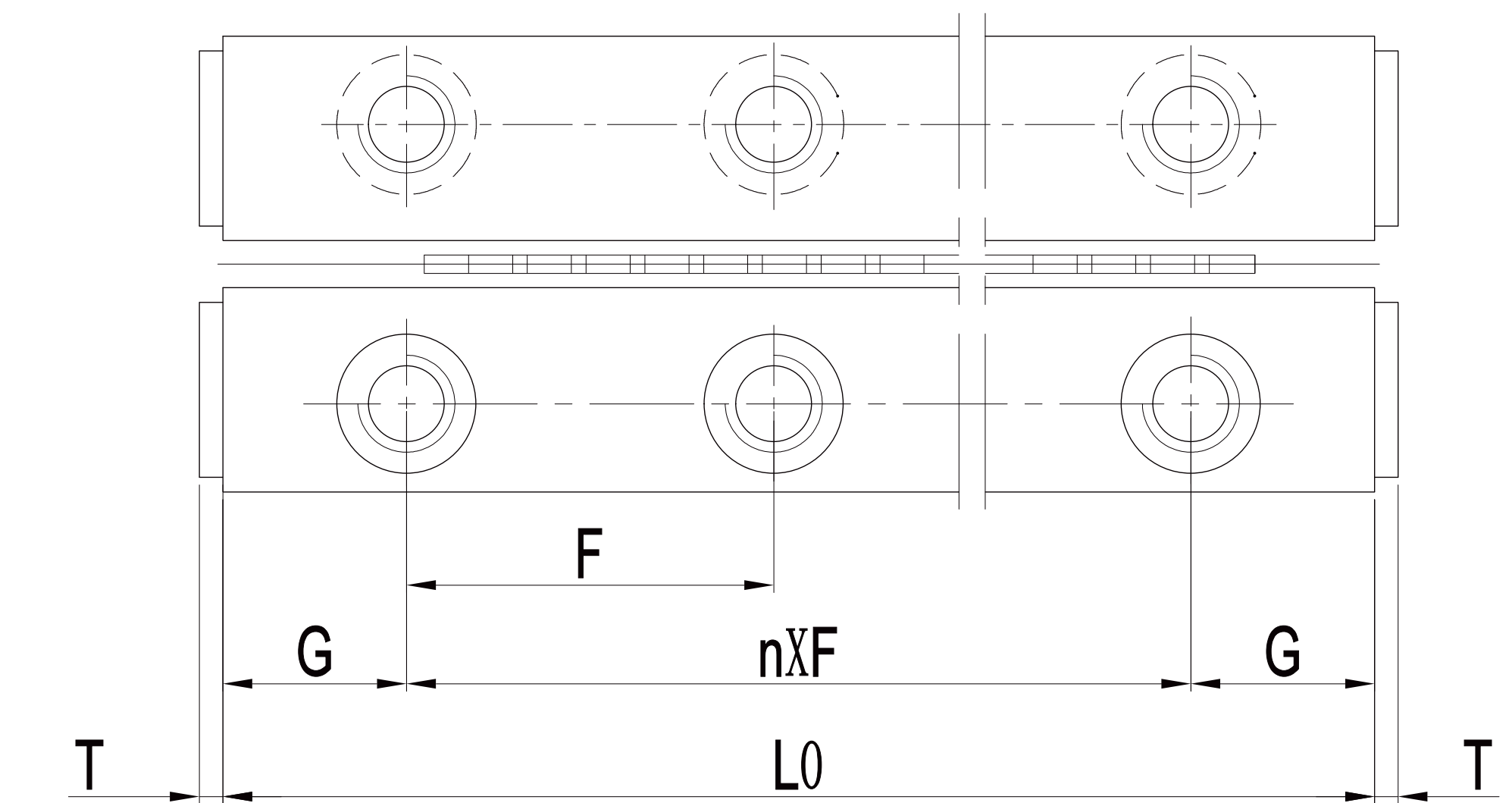
注: 1. E= 1/2名义高度+滚柱半径;
2. 高度相互配对是指同一台面上床身所需使用的4根导轨, 标注同一出厂编号。
Remarks: 1. E= 1/2 Nominal Height+ Radius of Roller;
2. The Mutual Matching of the Height refers to 4pcs guide rails which used by lathe bed in the same platform.

▷ Dimension Series
尺寸系列

Crossing Roller Guideway



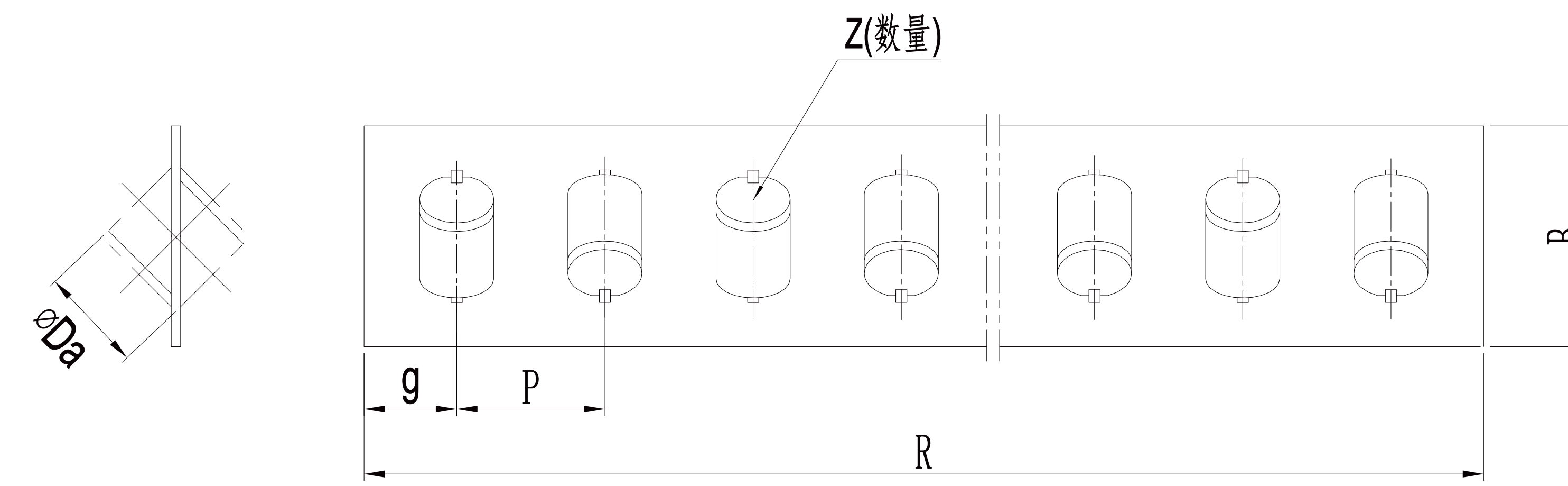
交叉滚柱导轨副



规格型号 Specification	最大行程 Max stroke	主要尺寸Main size																滚柱数量 Z Number Of rollers	容许压量 µm Allowable Load	基本额定负荷 (每个滚柱) Basic load Rating (each roller)		质量 (轨道) Kg/m Weight (Way)
		组合尺寸 Combination size			组装尺寸 Assembly size															Cz KN	CoZ KN	
		M	A	L0	n×F	G	B	C	S	d	D	h	T	Da	R	g	P					
FV18-20×5Z	12			20	1×10										14			5				
FV1-30×7Z	22			30	2×10										19			7				
FV1-40×10Z	27			40	3×10										26.5			10				
FV1-50×13Z	32	8.5	4	50	4×10	5	3.9	1.8	M2	1.65	3	1.4	1.6	1.5	34	2	2.5	13	-2	0.098	0.069	0.11
FV1-60×16Z	37			60	5×10										41.5			16				
FV1-70×19Z	42			70	6×10										49			19				
FV1-80×21Z	52			80	7×10										54			21				
FV12-30×5Z	18			30	1×15										21			5				
FV2-45×8Z	24			45	2×15										33			8				
FV2-60×11Z	30			60	3×15										45			11				
FV2-75×13Z	44			75	4×15										53			13				
FV2-90×16Z	50			90	5×15										65			16				
FV2-105×18Z	64	12	6	105	6×15	7.5	5.5	2.5	M3	2.55	4.4	2	1.5	2	73	2.5	4	18	-3	0.176	0.127	0.23
FV2-120×21Z	70			120	7×15										85			21				
FV2-135×23Z	84			135	8×15										93			23				
FV2-150×26Z	90			150	9×15										105			26				
FV2-165×29Z	96			165	10×15										117			29				
FV2-180×32Z	102			180	11×15										129			32				

Cages

保持架



规格 Specifications	尺寸 size	Da (mm)	g (mm)	P (mm)	B (mm)	C (KN)	C (KN)
FV1		1.5	1.5	2.5	3.8	0.107	0.118
FV2		2	2	4	5.6	0.263	0.274
FV3		3	2.5	5	7.6	0.545	0.597
FV4		4	5	7	10	1.05	1.16
FV6		6	6	10 (9)	14	2.06	2.41
FV9		9	9.5	14	21	5.904	6.74
FV12		12	10	20	25	12.15	13.77
FV15		15	14	25	34	19.62	22.32

Remarks: C : Rated Kinetic Load of Each Roller;

C : Rated Static Load of Each Roller.

表中：C -每个滚柱的额定动载荷；

C -每个滚柱的额定静载荷。

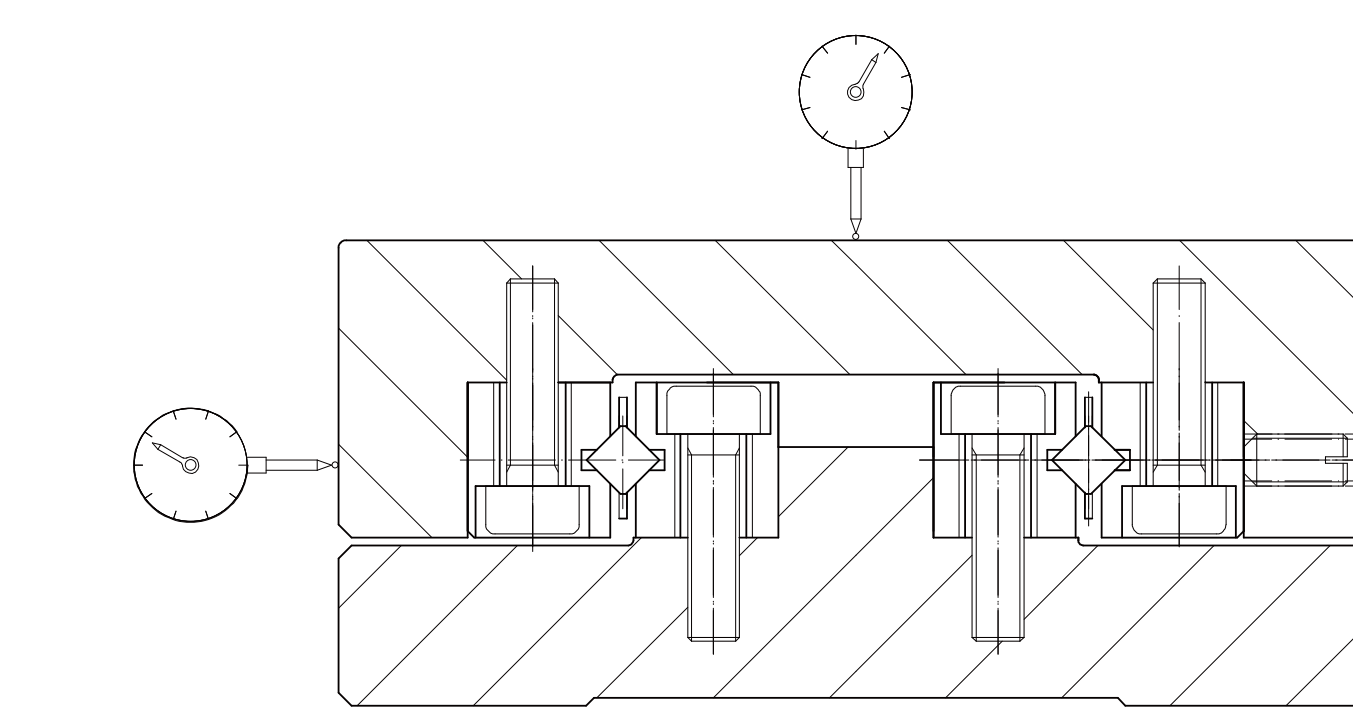
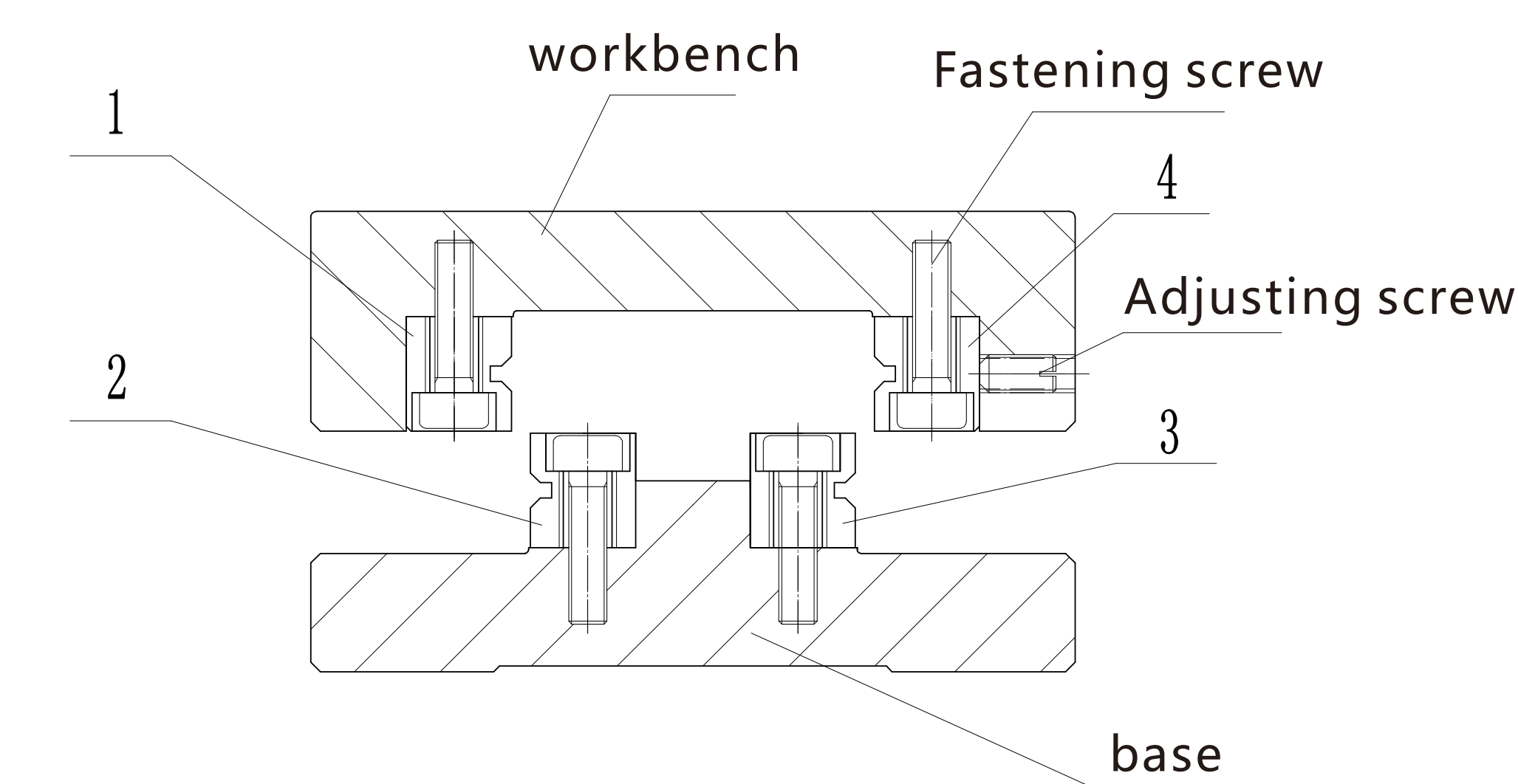
Installation Instructions for Cross Roller Guide

交叉滚柱导轨副安装说明

1. Before installation, check and clean the burr and dirt on the workbench and base mounting surface. Be careful not to mix foreign matters during assembly.

2. Pair guide rails 2 and 3 with the same mark (A or B), and install the base plane close to both sides of the base boss according to the base plane. With the help of tools, ensure that the two guide rails are installed side by side in parallel. Use a torque wrench to tighten the screws one by one. The screws shall be tightened with equal torque in multiple steps according to the standard torque, starting from the middle and starting from the cross to both ends. The final detection accuracy meets the requirements of product

3. The other pair of guide rails 1 is placed close to the installation base surface of the workbench. With the help of tools, ensure that the guide rails are parallel to the installation side. Also use a torque wrench to tighten the screws one by one. The screws should be tightened with equal torque in several steps according to the standard torque, starting from the middle and starting from the cross to both ends.



Installation diagram of cross ball guide pair

4. Temporarily fix the guide rail 4 on the adjustment side on the workbench.

5. Install the base and workbench according to the position relationship shown in Figure 1, and insert the roller cage from the end. At this time, if the cage cannot be inserted without clearance, move the guide rail 4 on the adjustment side to the adjustment screw side and insert it. Adjust the position of guide rail 4, push the workbench left and right, and ensure that the cage returns to the middle of the stroke.

6. Install retaining screws at both ends of the guide rail.

7. Under special circumstances, the long guide rail is equipped with a short guide rail, or the limit block is located at an unequal position in the middle of the guide rail. The assembly ensures that the centerline of the roller cage and the middle position of the required stroke need to coincide, and the centerline of the short guide rail and the centerline of the cage need to coincide.

1、安装前检查并清理工作台，底座安装基面的毛刺和污垢等。注意在组装过程中不要混入异物。

2、配对同一标记（A或B）导轨2和3，按基准面紧靠底座凸台两侧安装基面，借助工具，确保两导轨平行安装侧面。用力矩扳手逐个拧螺钉，螺钉紧固需要按标准扭矩分多次逐步等力矩紧固，从中间开始按交叉顺序向两端。最终检测精度符合产品行走直线度要求。

3、另一配对导轨1紧靠放置在工作台安装基面上，借助工具，确保导轨平行安装侧面。同样用力矩扳手逐个拧螺钉，螺钉紧固需要按标准扭矩分多次逐步等力矩紧固，从中间开始按交叉顺序向两端。

4、将调整侧的导轨4暂时固定在工作台上。

5、将底座与工作台按图1所示位置关系进行安装，滚柱保持架由端部插入。这时，保持架没有间隙插不进去时，可将调整侧的导轨4往调整螺钉侧挪动后插入。调整导轨4位置，左右推动工作台，确保保持架归位行程中间位置。

6、在导轨两端部安装挡头螺丝。

7、存在特殊情况，长配短导轨，或限位块在导轨中间不等分位置，装配确保滚柱保持架中线和要求行程的中间位置需要重合，短导轨中线和保持架中线位置需要重合。

8. Adjusting guide rail 4 requires two steps: Pre-adjust and slightly tighten the fastening screws, push the workbench to the left and right, and evenly tighten the adjusting screws within the range of rollers with a torque wrench. The adjustment shall be made in several times and gradually adjusted with equal torque. Finally, fine adjustment, move the workbench left and right, and adjust the torque by 1/2 with

8、调整导轨4，要求分预调整和精调整两步。预调整轻微拧紧紧固螺钉，左右推动工作台，用扭矩扳手均等地拧紧有滚子的范围内的调整螺钉，调整分多次，等力矩逐步调整。最后精调整，左右移动工作台，扭力扳手调小扭矩1/2再次调整多次。

9. Finally, Fastening screws from the middle to both ends in a cross sequence, and adjust the bolts in equal torque for several times.

9、最后紧固螺钉，从中间开始按交叉顺序向两端拧紧，等扭矩分多次调整。

Note: When installing several workbenches, measure the tightening torque or sliding resistance of the first set of adjusting screws. If the tightening torque or sliding resistance of the second set is the same, then approximately the same

注：安装数个工作台时，测定第1台的调整螺钉的拧紧扭矩或滑动阻力，如果使第2台以后的拧紧扭矩或滑动阻力相同的话，那么就能施加大致相同的预压。

Recommended tightening torque of adjusting screw Unit: N.m

调整螺钉的推荐紧固扭矩 单位：N.m

型号 model	尺寸 size	紧固扭矩 Tightening torque
V1	M2	0.008
V2	M3	0.012
V3	M4	0.05
V4	M4	0.08
V6	M5	0.20
V9	M6	0.40
V12	M6	0.80

型号 model	紧固扭矩 Tightening torque
M2	0.4
M3	1.4
M4	3.2
M5	6.6
M6	11.2
M8	27.6
M10	55.0

(Figure 2) (图2)

(Figure 3) (Use alloy steel screws)

(图3) (使用合金钢制螺钉)