NOVIN Ball Bearing
www.novinballbearing.com

FD-AL铝塑直线轴承
FD-AL LINEAR BEARINGS

产品介绍 Product introduction

FD-AL铝塑直线轴承是我公司研制出来的一种新型自润滑滑动轴承，其尺寸精度与传统的滚珠直线轴承完全相同，在多种场合可取代滚珠直线轴承。与传统的滚珠直线轴承相比有以下优点:

■具有自润滑性，可在无油或少油工作环境下长期工作。

■传统滚珠直线轴承与轴之间是点接触，在使用过程中易产生轴划伤现象，从而导致整个系统失效，而FD-AL轴承与轴之间是面接触，在使用时不会产生轴划伤现象，其使用寿命可延长3至5倍。

■由于FD-AL铝塑直线轴承运行时与轴是面接触，因而相同尺寸的FD-AL轴承的承载能力大，约为滚珠直线轴承的4~20倍，有助于设计人员在设计时减小设备体积，降低设备成本。

■ 由于运行时是面接触，所以运行时更加平稳，振动小，噪音小。

■ FD-AL轴承外表面经过阳极氧化处理，能耐腐蚀,可在水中或弱酸、弱碱环境中长期使用。

■FD-AL轴承内径面为聚四氟乙烯塑料，是一种软性材料，对微小硬质点有嵌入性，所以对轴承的密封性要求不高，可降低由于考虑密封而带来的成本增加。

■由于与轴接触的材料为聚四氟乙烯塑料，所以在装配时对轴的硬度、材质要求较低,可节省设计成本。

■FD-AL铝塑直线轴承可适应的运动方式有轴向运动、转动、摇摆运动、轴向运动和转动的混合运动等。

■此产品我公司已获得国家专利。产品广泛应用于锻压机械、精密磨床等场合。

FD-AL linear bearing is a kind of newly-developed self-lubricant sliding bearing. The size of FD-AL linear bearing is the same as that for the linear ball bearing and could supersede the linear ball bearings in many cases and applications. And it has below advantages compared to the traditional ball linear bearings:

■ Self-lubricating capability which could ensure a good performance under environment without oil or with little oil lubrication.

■ For the traditional ball linear bearings, they join with the mating shafting by ball points, the shafting maybe gall, so it will cause system failed. The FD-AL Linear bearing join with the shafting by whole surface when running, it will not damage shafting, the life of the shafting can longer 3~5 times.

■ For the FD-AL Linear bearing joins with the shafting by whole surface when running, it could endure higher load than the traditional linear bearings with same dimension, about 4~20 times higher than the ball linear bearings. It could help to reduce the dimension of machine and reduce the equipment cost.

■ It also has the advantages of low librations and low noise for it could move more steadily.

■For the shell of FD-AL Linear bearing is treated by anodized which could resist corrosion and function as well in water or under weak acid or alkaline environment.

■ The I.D of the bearing is PTFE, a kind of soft plastic which has the capability of embeddability for slight hard particles. So it has not much high requirement for the sealing on the bearing and could reduce the cost for that.

■ For the bearing material mate with the shafting is PTFE, it has not high requirement on the hardness and material of the shafting which could reduce the cost of designing.

■ The bearing could be provides both linear, oscillating, rotary, or any combination of motions.

■ It has widely application on punch machinery and precise grinding machine and so on.

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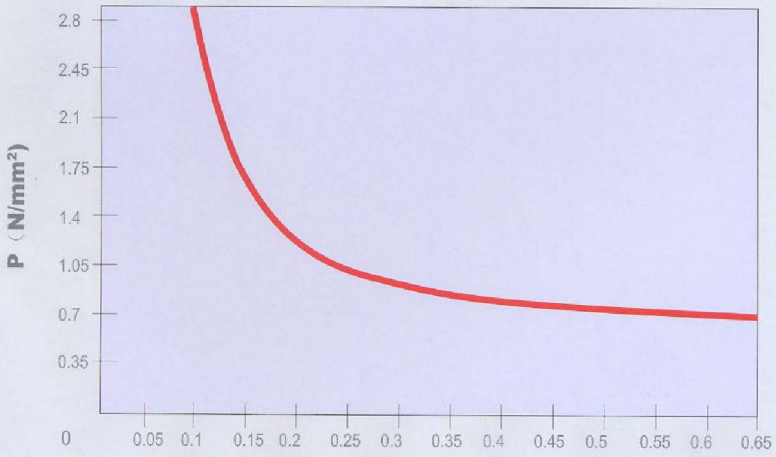
产品性能 Product characteristics

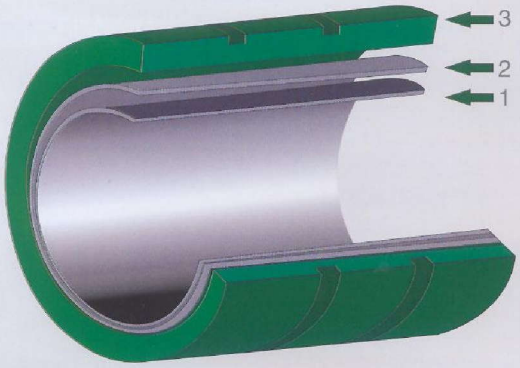
最高承载/Load limit	20N/mm^2
最高滑动速度/Sliding speed limit	2m/s
极限PV值/PV Data limit	1.5N/mm^2 × m/s
使用温度范围/Temperature adopted	−100 ~ 250℃
摩擦因数/Friction Coef.	0.03 ~ 0.2

产品PV曲线图 Product PV characteristics



无润滑 Dry Running

产品构造及特点 Structure and features



1、内衬材料：PTFE填充增强材料

是以PTFE为主要原料，填充铜粉等耐磨材料，经模具压制烧结车削而成，具有强度高、摩擦系数低、耐磨损、自润滑、抗冲击、细小硬质点嵌入性好，不损伤轴等优点。厚度0.5~1.0mm

2、 胶粘层：高分子胶粘材料

是以高分子耐热耐蚀胶水为主要材料，具有粘结强度高，不易剥落，无毒环保等优点，最高耐温达250℃

3、外套基体：6061-T6铝合金

是以6061铝合金经热处理加工而成，外表面经过阳极氧化处理，具有强度高、重量轻、耐腐蚀等优点。

1、Lining material: PTFE filled with anti-friction material

The main material is PTFE , filled with bronze powder and other anti-friction material. Then it is shaped by mould pressing, sintering and machining. It has such advantages as: high intensity, low friction coefficient. Good wear resistance, self lubrication and good capability for compact on them. And also it has capability of embeddability for protecting the shaft. The thickness of the lining layer is 0.5~1.0mm.

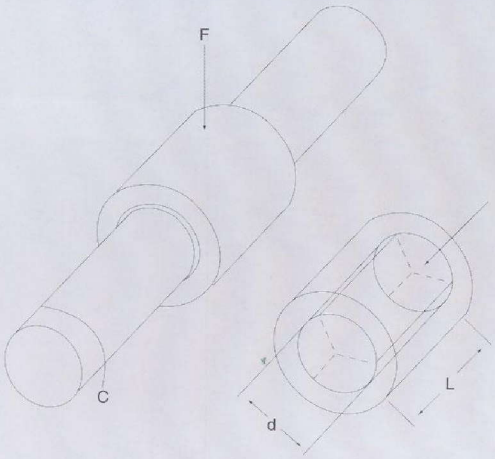
2、 Bonding agent: macromolecule stickiness material

Main material is heat-resistant and corrosion-resistant macromolecule glue water. It has advantages of high bonding, no poisonous for environmental protection. It can continuous work in 250℃.

3、Shell: 6061-T6 aluminum alloy

The Shell of FD-AL bearing is 6061 aluminum alloy being heat-treated; the surface of it is treated by anodized with the advantages of high intensity, low weight, and anti-corrosion characters.

承载压力的计算 Calculation of Load P



F：轴承工作压力（working load） 单位（unit）：N
A：轴承投影面积（the projected area of the bearing）
单位（unit）：mm^2
d：轴承内径（I.D. of bearing） 单位（unit）：mm
L：轴承高度（Length of Bearing） 单位（unit）：mm
P：轴承承载（Dynamic Load） 单位（unit）：N/mm^2
轴承工作载荷计算（Calculation of Load P）：

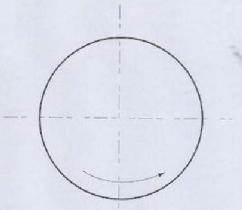
$$P=\frac{F}{A}=\frac{F}{d\times L}$$

工作速度的计算 Calculation of Speed V

①连续转动Continuous Rotation

d：轴承内径（I.D. of bearing） 单位（unit）：mm
C：转速（rotate speed） 单位（unit）：r/min
V：线速度（Speed） 单位（unit）：m/s
速度计算Calculation of Speed V：

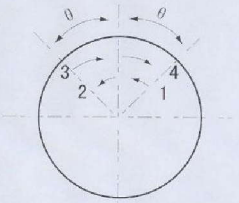
$$V=\frac{\pi\times d\times c}{60\times 1000}$$



②摇摆运动（Oscillating Movement）

d：轴承内径（I.D. of bearing） 单位（unit）：mm
C：转速（rotate speed） 单位（unit）：cycle/min
θ：摆动角度
V：线速度（Speed） 单位（unit）：m/s
速度计算Calculation of Speed V：

$$V=\frac{\pi\times d\times 4\theta\times c}{60\times 1000\times 360}$$



③直线运动（Liner movement）

S：行程（Distance） 单位(unit)：mm
C：转速（rotate Speed） 单位(unit)：cycle/min
V：线速度（Speed） 单位(unit)：m/s
速度计算Calculation of Speed V：

$$V=\frac{2\times C\times S}{60\times 1000}$$

PV值的计算 Calculation of PV

PV=P×V

FD-AL铝塑直线轴承与滚珠直线轴承比较
The comparison between FD-AL linear bearing and ball linear bearing

项目 Item	FD-AL 铝塑直线轴承 FD-AL linear bearing	滚珠直线轴承 Ball linear bearing
承载 Load	能承受较大载荷 Capable for higher load	能承受较轻载荷 Capable for lighter load
速度 Speed	低速或中速 Low and middle speed	可高、中速运动 Middle and high speed
摩擦因数 Friction Coef.	0.03~0.2	0.002~0.003
噪音 Noise	运动时几乎无噪音 Nearly no noise when running	运动时会产生噪音 Noises will be caused during the running
润滑 Lubrication condition	有无润滑皆可 With lubrication or without lubrication	需要润滑 Lubrication needed
密封 Sealing	有无密封均可 With Sealing or without Sealing	需要密封 Sealing needed
耐蚀性 Anti-corrosion	好 Good	不好 Bad
抗冲击性 Anti-compact	好 Good	不好 Bad
互换性 Exchange ability	在使用条件许可的情况下，可与滚珠直线轴承互换 Can replace the ball linear bearings in some case	在使用条件许可的情况下，可与FD-AL铝塑直线轴承互换 Can replace the FD-AL linear bearings in some case
运动方式 Moving way	直线、回转、摇摆或组合运动方式 Linear,oscillating,rotary, or any combination of motions	直线运动 Linear motion
轴的要求 Requirements on the shaft	有无热处理均可 Heat treatment or not heat treatment	需热处理 HRC62 ±2 Heat treatment HRC62 ±2
可加工性 Machining	内径可加工 Can machine inner diameter	不能加工 Can not machine

润 滑 Lubrication

为降低轴承的摩擦因数，提高轴承的使用寿命，在轴承的运动过程中，可对轴承进行适度润滑，润滑油的选择见下表:

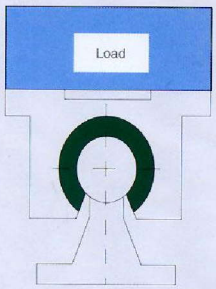
In order to lower the friction coef. and improve the life of the bearing, we could lubricate the bearing properly with the grease as follow:

推荐使用的润滑油 Recommended lubrication	避免使用的润滑油 Avoid lubrication
轻量级润滑油 Light oil	WD-40
三合一润滑油 3-in-1 oil	PTFE 喷雾剂 PTFE sprays
导轨润滑油 Way lube oil	氟碳涂层 Fluorocarbons
石油脂 Petroleum grease	硅油、硅脂 Silicon oil or grease

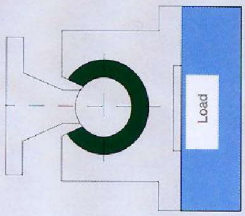
轴承承载 Load

公司目前生产的标准FD－AL铝塑直线轴承有五种，详见尺寸规格表（P11~P15），并可按顾客的特殊要求进行定制，其中开口型轴承最大可承载压力与受力部位的关系如下图。

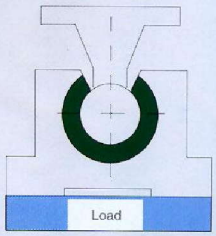
Five different types of standard FD-AL Linear bearing could be supplied at present, see detailed dimensions in(P11-P15),and also we could design according to requirements of the customers. For the relations between the load limit of the "Fo-Al k" bearing and the loaded point on it, please see the below chart.



100%Pmax



70%Pmax

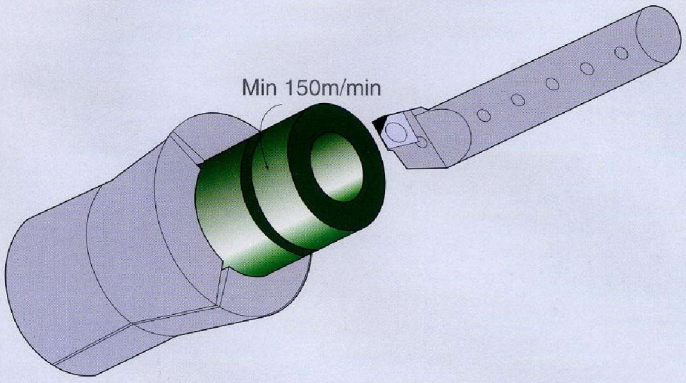


40%Pmax

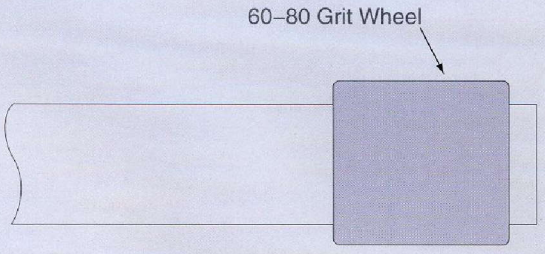
加 工 Machining The Bearings

轴承装入座孔后为了得到与轴更加精密的配合间隙，可对轴承内径进行加工。常用的加工方法有两种：
When the bearing is assembled into the housing, in order to get a better clearance between the bearing and shaft, the bore of the bearing could be further processed. There are two ways:

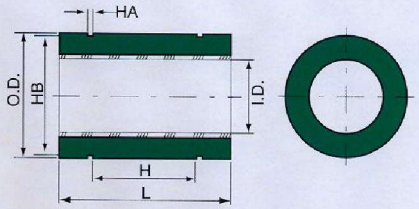
1、采用锋利车刀在高速车床上对内径进行车削加工，推荐的车刀如下图
To machine the I.D. on high speed lathe, the tool recommended is as follow:



2、采用内圆磨床磨削内径，推荐的磨具如下图
To grind the I.D. with bore grinding machine. The tool recommended is as follow:

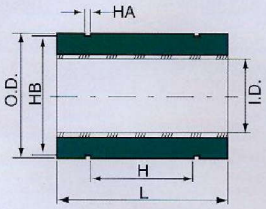


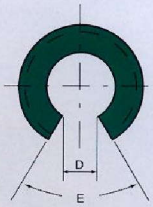
FD-AL



代号 Part NO.	d	D	外径O.D. (h6)	内径I.D. (F8)	座孔Housing (F8)	轴Shaft (f7)	L	H	HA	HB	最高承载 Max Static Load(N)
FD-AL06	6	12	12 $^{0}_{-0.011}$	6 $^{+0.028}_{+0.01}$	12 $^{+0.043}_{+0.016}$	6 $^{-0.01}_{-0.022}$	19 $^{0}_{-0.2}$	11.3	1.15	11.5	2280
FD-AL08	8	15	15 $^{0}_{-0.011}$	8 $^{+0.035}_{+0.013}$	15 $^{+0.043}_{+0.016}$	8 $^{-0.013}_{-0.028}$	24 $^{0}_{-0.2}$	15.2	1.15	14.3	3840
FD-AL10	10	19	19 $^{0}_{-0.013}$	10 $^{+0.035}_{+0.013}$	19 $^{+0.053}_{+0.02}$	10 $^{-0.013}_{-0.028}$	29 $^{0}_{-0.2}$	19.3	1.35	18	5800
FD-AL12	12	21	21 $^{0}_{-0.013}$	12 $^{+0.043}_{+0.016}$	21 $^{+0.053}_{+0.02}$	12 $^{-0.016}_{-0.034}$	30 $^{0}_{-0.2}$	20.3	1.35	20	7200
FD-AL13	13	23	23 $^{0}_{-0.013}$	13 $^{+0.043}_{+0.016}$	23 $^{+0.053}_{+0.02}$	13 $^{-0.016}_{-0.034}$	32 $^{0}_{-0.2}$	20.3	1.35	22	8320
FD-AL16	16	28	28 $^{0}_{-0.013}$	16 $^{+0.043}_{+0.016}$	28 $^{+0.053}_{+0.02}$	16 $^{-0.016}_{-0.034}$	37 $^{0}_{-0.2}$	23.2	1.65	26.6	11840
FD-AL20	20	32	32 $^{0}_{-0.016}$	20 $^{+0.053}_{+0.02}$	32 $^{+0.064}_{+0.025}$	20 $^{-0.02}_{-0.041}$	42 $^{0}_{-0.2}$	27.2	1.65	30.3	16800
FD-AL25	25	40	40 $^{0}_{-0.016}$	25 $^{+0.053}_{+0.02}$	40 $^{+0.064}_{+0.025}$	25 $^{-0.02}_{-0.041}$	59 $^{0}_{-0.3}$	37.2	1.85	38	29500
FD-AL30	30	45	45 $^{0}_{-0.016}$	30 $^{+0.053}_{+0.02}$	45 $^{+0.064}_{+0.025}$	30 $^{-0.02}_{-0.041}$	64 $^{0}_{-0.3}$	40.7	1.85	42.5	38400
FD-AL35	35	52	52 $^{0}_{-0.019}$	35 $^{+0.064}_{+0.025}$	52 $^{+0.076}_{+0.03}$	35 $^{-0.025}_{-0.05}$	70 $^{0}_{-0.3}$	44.8	2.2	49	49000
FD-AL38	38	57	57 $^{0}_{-0.019}$	38 $^{+0.064}_{+0.025}$	57 $^{+0.076}_{+0.03}$	38 $^{-0.025}_{-0.05}$	76 $^{0}_{-0.3}$	54.3	2.2	54.5	57760
FD-AL40	40	60	60 $^{0}_{-0.019}$	40 $^{+0.064}_{+0.025}$	60 $^{+0.076}_{+0.03}$	40 $^{-0.025}_{-0.05}$	80 $^{0}_{-0.3}$	56.1	2.2	57	64000
FD-AL50	50	80	80 $^{0}_{-0.019}$	50 $^{+0.064}_{+0.025}$	80 $^{+0.076}_{+0.03}$	50 $^{-0.025}_{-0.05}$	100 $^{0}_{-0.3}$	68.6	2.7	76.5	100000
FD-AL60	60	90	90 $^{0}_{-0.022}$	60 $^{+0.076}_{+0.03}$	90 $^{+0.09}_{+0.036}$	60 $^{-0.03}_{-0.06}$	110 $^{0}_{-0.3}$	78.7	3.15	86.5	132000
FD-AL80	80	120	120 $^{0}_{-0.022}$	80 $^{+0.076}_{+0.03}$	120 $^{+0.09}_{+0.036}$	80 $^{-0.03}_{-0.06}$	140 $^{0}_{-0.4}$	97.2	4.15	116	224000
FD-AL100	100	150	150 $^{0}_{-0.025}$	100 $^{+0.09}_{+0.036}$	150 $^{+0.106}_{+0.043}$	100 $^{-0.036}_{-0.071}$	175 $^{0}_{-0.4}$	117.2	4.15	145	350000
FD-AL120	120	180	180 $^{0}_{-0.025}$	120 $^{+0.09}_{+0.036}$	180 $^{+0.106}_{+0.043}$	120 $^{-0.036}_{-0.071}$	200 $^{0}_{-0.4}$	150.3	4.15	175	480000
FD-AL150	150	210	210 $^{0}_{-0.029}$	150 $^{+0.106}_{+0.043}$	210 $^{+0.122}_{+0.05}$	150 $^{-0.043}_{-0.083}$	240 $^{0}_{-0.4}$	160.3	5.15	204	720000

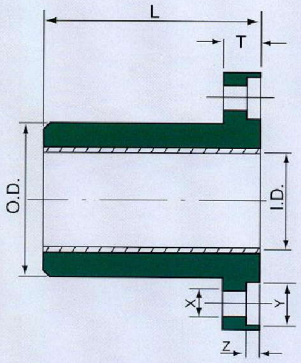
FD-AL K

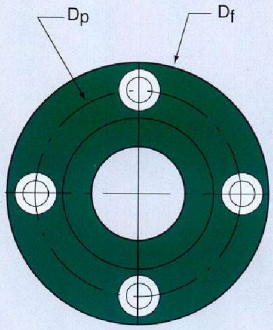




代号 Part NO.	d	D	外径O.D. (h6)	内径I.D. (F8)	座孔Housing (F8)	轴Shaft (f7)	L	H	HA	HB	D	E	最高承载 Max Static Load(N)
FD-AL06K	6	12	12 $^{-0.011}$	6 $^{+0.028}_{+0.01}$	12 $^{+0.043}_{+0.016}$	6 $^{-0.01}_{-0.022}$	19 $^{-0.2}$	11.3	1.15	11.5	3.8	60°	2280
FD-AL08K	8	15	15 $^{-0.011}$	8 $^{+0.035}_{+0.013}$	15 $^{+0.043}_{+0.016}$	8 $^{-0.013}_{-0.028}$	24 $^{-0.2}$	15.2	1.15	14.3	5.1	60°	3840
FD-AL10K	10	19	19 $^{-0.013}$	10 $^{+0.035}_{+0.013}$	19 $^{+0.053}_{+0.02}$	10 $^{-0.013}_{-0.028}$	29 $^{-0.2}$	19.3	1.35	18	7	80°	5800
FD-AL12K	12	21	21 $^{-0.013}$	12 $^{+0.043}_{+0.016}$	21 $^{+0.053}_{+0.02}$	12 $^{-0.016}_{-0.034}$	30 $^{-0.2}$	20.3	1.35	20	8	80°	7200
FD-AL13K	13	23	23 $^{-0.013}$	13 $^{+0.043}_{+0.016}$	23 $^{+0.053}_{+0.02}$	13 $^{-0.016}_{-0.034}$	32 $^{-0.2}$	20.3	1.35	22	9	80°	8320
FD-AL16K	16	28	28 $^{-0.013}$	16 $^{+0.043}_{+0.016}$	28 $^{+0.053}_{+0.02}$	16 $^{-0.016}_{-0.034}$	37 $^{-0.2}$	23.2	1.65	26.6	11	80°	11840
FD-AL20K	20	32	32 $^{-0.016}$	20 $^{+0.053}_{+0.02}$	32 $^{+0.064}_{+0.025}$	20 $^{-0.02}_{-0.041}$	42 $^{-0.2}$	27.2	1.65	30.3	11	60°	16800
FD-AL25K	25	40	40 $^{-0.016}$	25 $^{+0.053}_{+0.02}$	40 $^{+0.064}_{+0.025}$	25 $^{-0.02}_{-0.041}$	59 $^{-0.3}$	37.2	1.85	38	12	50°	29500
FD-AL30K	30	45	45 $^{-0.016}$	30 $^{+0.053}_{+0.02}$	45 $^{+0.064}_{+0.025}$	30 $^{-0.02}_{-0.041}$	64 $^{-0.3}$	40.7	1.85	42.5	15	50°	38400
FD-AL35K	35	52	52 $^{-0.019}$	35 $^{+0.064}_{+0.025}$	52 $^{+0.076}_{+0.03}$	35 $^{-0.025}_{-0.05}$	70 $^{-0.3}$	44.8	2.2	49	17	50°	49000
FD-AL38K	38	57	57 $^{-0.019}$	38 $^{+0.064}_{+0.025}$	57 $^{+0.076}_{+0.03}$	38 $^{-0.025}_{-0.05}$	76 $^{-0.3}$	54.3	2.2	54.5	18	50°	57760
FD-AL40K	40	60	60 $^{-0.019}$	40 $^{+0.064}_{+0.025}$	60 $^{+0.076}_{+0.03}$	40 $^{-0.025}_{-0.05}$	80 $^{-0.3}$	56.1	2.2	57	20	50°	64000
FD-AL50K	50	80	80 $^{-0.019}$	50 $^{+0.064}_{+0.025}$	80 $^{+0.076}_{+0.03}$	50 $^{-0.025}_{-0.05}$	100 $^{-0.3}$	68.6	2.7	76.5	25	50°	100000
FD-AL60K	60	90	90 $^{-0.022}$	60 $^{+0.076}_{+0.03}$	90 $^{+0.09}_{+0.036}$	60 $^{-0.03}_{-0.06}$	110 $^{-0.3}$	78.7	3.15	86.5	30	50°	132000
FD-AL80K	80	120	120 $^{-0.022}$	80 $^{+0.076}_{+0.03}$	120 $^{+0.09}_{+0.036}$	80 $^{-0.03}_{-0.06}$	140 $^{-0.4}$	97.2	4.15	116	40	50°	224000
FD-AL100K	100	150	150 $^{-0.025}$	100 $^{+0.09}_{+0.036}$	150 $^{+0.106}_{+0.043}$	100 $^{-0.036}_{-0.071}$	175 $^{-0.4}$	117.2	4.15	145	50	50°	350000
FD-AL120K	120	180	180 $^{-0.025}$	120 $^{+0.09}_{+0.036}$	180 $^{+0.106}_{+0.043}$	120 $^{-0.036}_{-0.071}$	200 $^{-0.4}$	150.3	4.15	175	85	80°	480000
FD-AL150K	150	210	210 $^{-0.029}$	150 $^{+0.106}_{+0.043}$	210 $^{+0.122}_{+0.05}$	150 $^{-0.043}_{-0.083}$	240 $^{-0.4}$	160.3	5.15	204	105	80°	720000

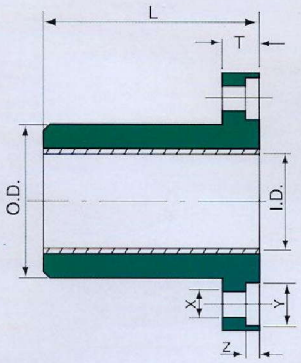
FD-AL FY

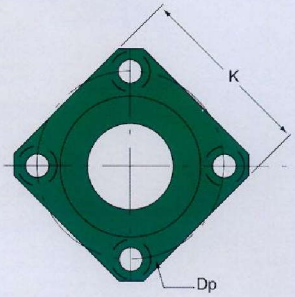




代号 Part NO.	d	D	外径O.D. (h7)	内径I.D. (F8)	座孔 Housing(F8)	轴Shaft (f7)	L	X	Y	Z	T	螺钉	D_p	D_f	最高承载 Max Static Load(N)
FD-AL06FY	6	12	$12^{-0.018}$	$6^{+0.028}_{+0.01}$	$12^{+0.043}_{+0.016}$	$6^{-0.01}_{-0.022}$	$19^{-0.2}$	3.5	6	3.1	8	M3	20	28	2280
FD-AL08FY	8	15	$15^{-0.018}$	$8^{+0.035}_{+0.013}$	$15^{+0.043}_{+0.016}$	$8^{-0.013}_{-0.028}$	$24^{-0.2}$	3.5	6	3.1	8	M3	24	32	3840
FD-AL10FY	10	19	$19^{-0.021}$	$10^{+0.035}_{+0.013}$	$19^{+0.053}_{+0.02}$	$10^{-0.013}_{-0.028}$	$29^{-0.2}$	4.5	7.5	4.1	9	M4	29	40	5800
FD-AL12FY	12	21	$21^{-0.021}$	$12^{+0.043}_{+0.016}$	$21^{+0.053}_{+0.02}$	$12^{-0.016}_{-0.034}$	$30^{-0.2}$	4.5	7.5	4.1	9	M4	32	42	7200
FD-AL13FY	13	23	$23^{-0.021}$	$13^{+0.043}_{+0.016}$	$23^{+0.053}_{+0.02}$	$13^{-0.016}_{-0.034}$	$32^{-0.2}$	4.5	7.5	4.1	9	M4	33	43	8320
FD-AL16FY	16	28	$28^{-0.021}$	$16^{+0.043}_{+0.016}$	$28^{+0.053}_{+0.02}$	$16^{-0.016}_{-0.034}$	$37^{-0.2}$	4.5	7.5	4.1	9	M4	38	48	11840
FD-AL20FY	20	32	$32^{-0.025}$	$20^{+0.053}_{+0.02}$	$32^{+0.064}_{+0.025}$	$20^{-0.02}_{-0.041}$	$42^{-0.2}$	5.5	9	5.1	11	M5	43	54	16800
FD-AL25FY	25	40	$40^{-0.025}$	$25^{+0.053}_{+0.02}$	$40^{+0.064}_{+0.025}$	$25^{-0.02}_{-0.041}$	$59^{-0.3}$	5.5	9	5.1	11	M5	51	62	29500
FD-AL30FY	30	45	$45^{-0.025}$	$30^{+0.053}_{+0.02}$	$45^{+0.064}_{+0.025}$	$30^{-0.02}_{-0.041}$	$64^{-0.3}$	6.6	11	6.1	14	M6	60	74	38400
FD-AL35FY	35	52	$52^{-0.03}$	$35^{+0.064}_{+0.025}$	$52^{+0.076}_{+0.03}$	$35^{-0.025}_{-0.05}$	$70^{-0.3}$	6.6	11	6.1	14	M6	67	82	49000
FD-AL40FY	40	60	$60^{-0.03}$	$40^{+0.064}_{+0.025}$	$60^{+0.076}_{+0.03}$	$40^{-0.025}_{-0.05}$	$80^{-0.3}$	9	14	8.1	18	M8	78	96	64000
FD-AL50FY	50	80	$80^{-0.03}$	$50^{+0.064}_{+0.025}$	$80^{+0.076}_{+0.03}$	$50^{-0.025}_{-0.05}$	$100^{-0.3}$	9	14	8.1	18	M8	98	116	100000
FD-AL60FY	60	90	$90^{-0.035}$	$60^{+0.076}_{+0.030}$	$90^{+0.090}_{+0.036}$	$60^{-0.030}_{-0.060}$	$110^{-0.4}$	11	17	11.1	24	M10	112	134	132000
FD-AL80FY	80	120	$120^{-0.035}$	$80^{+0.076}_{+0.03}$	$120^{+0.09}_{+0.036}$	$80^{-0.03}_{-0.06}$	$140^{-0.4}$	11	17	11.1	24	M10	142	164	224000

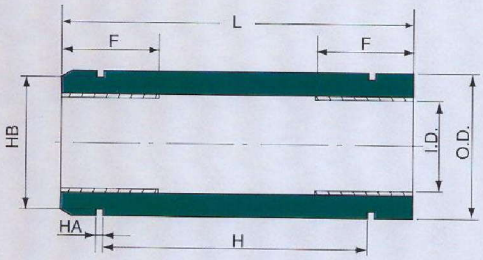
FD-AL FF

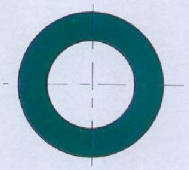




代号 Part NO.	d	D	外径O.D. (h7)	内径I.D. (F8)	座孔 Housing(F8)	轴Shaft (f7)	L	X	Y	Z	T	螺钉	Dp	K	最高承载 Max Static Load(N)
FD-AL06FF	6	12	12 $^{0}_{-0.018}$	6 $^{+0.028}_{+0.01}$	12 $^{+0.043}_{+0.016}$	6 $^{-0.01}_{-0.022}$	19 $^{0}_{-0.2}$	3.5	6	3.1	8	M3	20	22	2280
FD-AL08FF	8	15	15 $^{0}_{-0.018}$	8 $^{+0.035}_{+0.013}$	15 $^{+0.043}_{+0.016}$	8 $^{-0.013}_{-0.028}$	24 $^{0}_{-0.2}$	3.5	6	3.1	8	M3	24	25	3840
FD-AL10FF	10	19	19 $^{0}_{-0.021}$	10 $^{+0.035}_{+0.013}$	19 $^{+0.053}_{+0.02}$	10 $^{-0.013}_{-0.028}$	29 $^{0}_{-0.2}$	4.5	7.5	4.1	9	M4	29	30	5800
FD-AL12FF	12	21	21 $^{0}_{-0.021}$	12 $^{+0.043}_{+0.016}$	21 $^{+0.053}_{+0.02}$	12 $^{-0.016}_{-0.034}$	30 $^{0}_{-0.2}$	4.5	7.5	4.1	9	M4	32	32	7200
FD-AL13FF	13	23	23 $^{0}_{-0.021}$	13 $^{+0.043}_{+0.016}$	23 $^{+0.053}_{+0.02}$	13 $^{-0.016}_{-0.034}$	32 $^{0}_{-0.2}$	4.5	7.5	4.1	9	M4	33	34	8320
FD-AL16FF	16	28	28 $^{0}_{-0.021}$	16 $^{+0.043}_{+0.016}$	28 $^{+0.053}_{+0.02}$	16 $^{-0.016}_{-0.034}$	37 $^{0}_{-0.2}$	4.5	7.5	4.1	9	M4	38	37	11840
FD-AL20FF	20	32	32 $^{0}_{-0.025}$	20 $^{+0.053}_{+0.02}$	32 $^{+0.064}_{+0.025}$	20 $^{-0.02}_{-0.041}$	42 $^{0}_{-0.2}$	5.5	9	5.1	11	M5	43	42	16800
FD-AL25FF	25	40	40 $^{0}_{-0.025}$	25 $^{+0.053}_{+0.02}$	40 $^{+0.064}_{+0.025}$	25 $^{-0.02}_{-0.041}$	59 $^{0}_{-0.3}$	5.5	9	5.1	11	M5	51	50	29500
FD-AL30FF	30	45	45 $^{0}_{-0.025}$	30 $^{+0.053}_{+0.02}$	45 $^{+0.064}_{+0.025}$	30 $^{-0.02}_{-0.041}$	64 $^{0}_{-0.3}$	6.6	11	6.1	14	M6	60	58	38400
FD-AL35FF	35	52	52 $^{0}_{-0.03}$	35 $^{+0.064}_{+0.025}$	52 $^{+0.076}_{+0.03}$	35 $^{-0.025}_{-0.05}$	70 $^{0}_{-0.3}$	6.6	11	6.1	14	M6	67	64	49000
FD-AL40FF	40	60	60 $^{0}_{-0.03}$	40 $^{+0.064}_{+0.025}$	60 $^{+0.076}_{+0.03}$	40 $^{-0.025}_{-0.05}$	80 $^{0}_{-0.3}$	9	14	8.1	18	M8	78	75	64000
FD-AL50FF	50	80	80 $^{0}_{-0.03}$	50 $^{+0.064}_{+0.025}$	80 $^{+0.076}_{+0.03}$	50 $^{-0.025}_{-0.05}$	100 $^{0}_{-0.3}$	9	14	8.1	18	M8	98	92	100000
FD-AL60FF	60	90	90 $^{0}_{-0.035}$	60 $^{+0.076}_{+0.030}$	90 $^{+0.090}_{+0.036}$	60 $^{-0.030}_{-0.060}$	110 $^{0}_{-0.4}$	11	17	11.1	24	M10	112	106	132000
FD-AL80FF	80	120	120 $^{0}_{-0.035}$	80 $^{+0.076}_{+0.03}$	120 $^{+0.09}_{+0.036}$	80 $^{-0.03}_{-0.06}$	140 $^{0}_{-0.4}$	11	17	11.1	24	M10	142	136	224000

FD-AL L

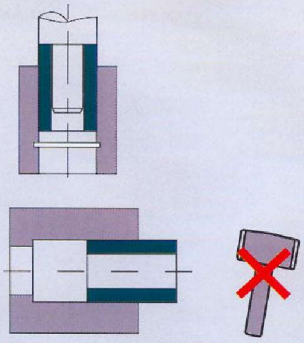


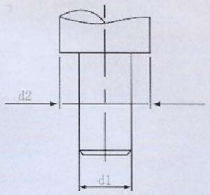


代号 Part NO.	d	D	外径O.D. (h7)	内径I.D. (F8)	座孔 Housing(F8)	轴Shaft (f7)	L	F	H	HA	HB	最高承载 Max Static Load(N)
FD-AL06L	6	12	12 $^{0}_{-0.018}$	6 $^{+0.028}_{+0.01}$	12 $^{+0.043}_{+0.016}$	6 $^{-0.01}_{-0.022}$	35 $^{0}_{-0.3}$	12	24.8	1.1	11.5	2880
FD-AL08L	8	15	15 $^{0}_{-0.018}$	8 $^{+0.035}_{+0.013}$	15 $^{+0.043}_{+0.016}$	8 $^{-0.013}_{-0.028}$	45 $^{0}_{-0.3}$	12	32.8	1.1	14.3	3840
FD-AL10L	10	19	19 $^{0}_{-0.021}$	10 $^{+0.035}_{+0.013}$	19 $^{+0.053}_{+0.02}$	10 $^{-0.013}_{-0.028}$	55 $^{0}_{-0.3}$	14	41.4	1.3	18	5600
FD-AL12L	12	21	21 $^{0}_{-0.021}$	12 $^{+0.043}_{+0.016}$	21 $^{+0.053}_{+0.02}$	12 $^{-0.016}_{-0.034}$	57 $^{0}_{-0.3}$	15	43.4	1.3	20	7200
FD-AL13L	13	23	23 $^{0}_{-0.021}$	13 $^{+0.043}_{+0.016}$	23 $^{+0.053}_{+0.02}$	13 $^{-0.016}_{-0.034}$	61 $^{0}_{-0.3}$	16	43.4	1.3	22	8320
FD-AL16L	16	28	28 $^{0}_{-0.021}$	16 $^{+0.043}_{+0.016}$	28 $^{+0.053}_{+0.02}$	16 $^{-0.016}_{-0.034}$	70 $^{0}_{-0.3}$	20	49.8	1.6	27	12800
FD-AL20L	20	32	32 $^{0}_{-0.025}$	20 $^{+0.053}_{+0.02}$	32 $^{+0.064}_{+0.025}$	20 $^{-0.02}_{-0.041}$	80 $^{0}_{-0.3}$	22	57.8	1.6	30.5	17600
FD-AL25L	25	40	40 $^{0}_{-0.025}$	25 $^{+0.053}_{+0.02}$	40 $^{+0.064}_{+0.025}$	25 $^{-0.02}_{-0.041}$	112 $^{0}_{-0.4}$	33	78.3	1.85	38	33000
FD-AL30L	30	45	45 $^{0}_{-0.025}$	30 $^{+0.053}_{+0.02}$	45 $^{+0.064}_{+0.025}$	30 $^{-0.02}_{-0.041}$	123 $^{0}_{-0.4}$	35	85.3	1.85	43	42000
FD-AL35L	35	52	52 $^{0}_{-0.03}$	35 $^{+0.064}_{+0.025}$	52 $^{+0.076}_{+0.03}$	35 $^{-0.025}_{-0.05}$	135 $^{0}_{-0.4}$	40	94.8	2.1	49	56000
FD-AL40L	40	60	60 $^{0}_{-0.03}$	40 $^{+0.064}_{+0.025}$	60 $^{+0.076}_{+0.03}$	40 $^{-0.025}_{-0.05}$	154 $^{0}_{-0.4}$	44	116.8	2.1	57	70400
FD-AL50L	50	80	80 $^{0}_{-0.03}$	50 $^{+0.064}_{+0.025}$	80 $^{+0.076}_{+0.03}$	50 $^{-0.025}_{-0.05}$	192 $^{0}_{-0.4}$	70	142.8	2.6	76.5	140000
FD-AL60L	60	90	90 $^{0}_{-0.035}$	60 $^{+0.076}_{+0.03}$	90 $^{+0.076}_{+0.036}$	60 $^{-0.03}_{-0.06}$	211 $^{0}_{-0.4}$	73	163.7	3.15	86.5	175200

产品的装配 Installation Notes

推荐的装配方法见下图
Recommended Installation method





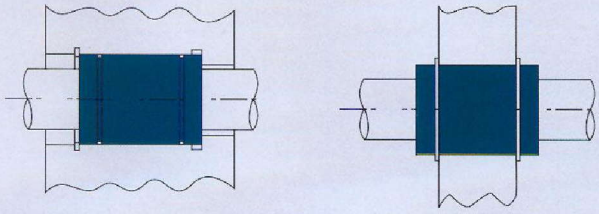
d2=O.D.-(0.3~1)
d1=I.D.-(0.3~1)

安装FD-AL直线轴承不需要非常牢固的轴向定位，但只是装入轴承座就算定位也不行。
标准型的安装
标准型直线轴承的安装实例见图
The instsllstion of the sl FD-AL linear bearings does not require very much fixing strength in axial direction, but holding just by driving in should be avoided.

Installation of the Standard Type

Installation examples for the standard type bearing are shown in Fig Fixing is executed with snaprings, set plates, etc.

快装卡环
Snap ring



开口型的安装
如图所示，开口型也可使用可调间隙的轴承座。
开口型通常用在轻预载条件下，应注意避免过大的预载。

Installation of the Open Type

As shown in fig the open type also uses a housing permitting clearance adjustment.The open type normally is used under a light preload.
Take care to avoid excessive preloads.