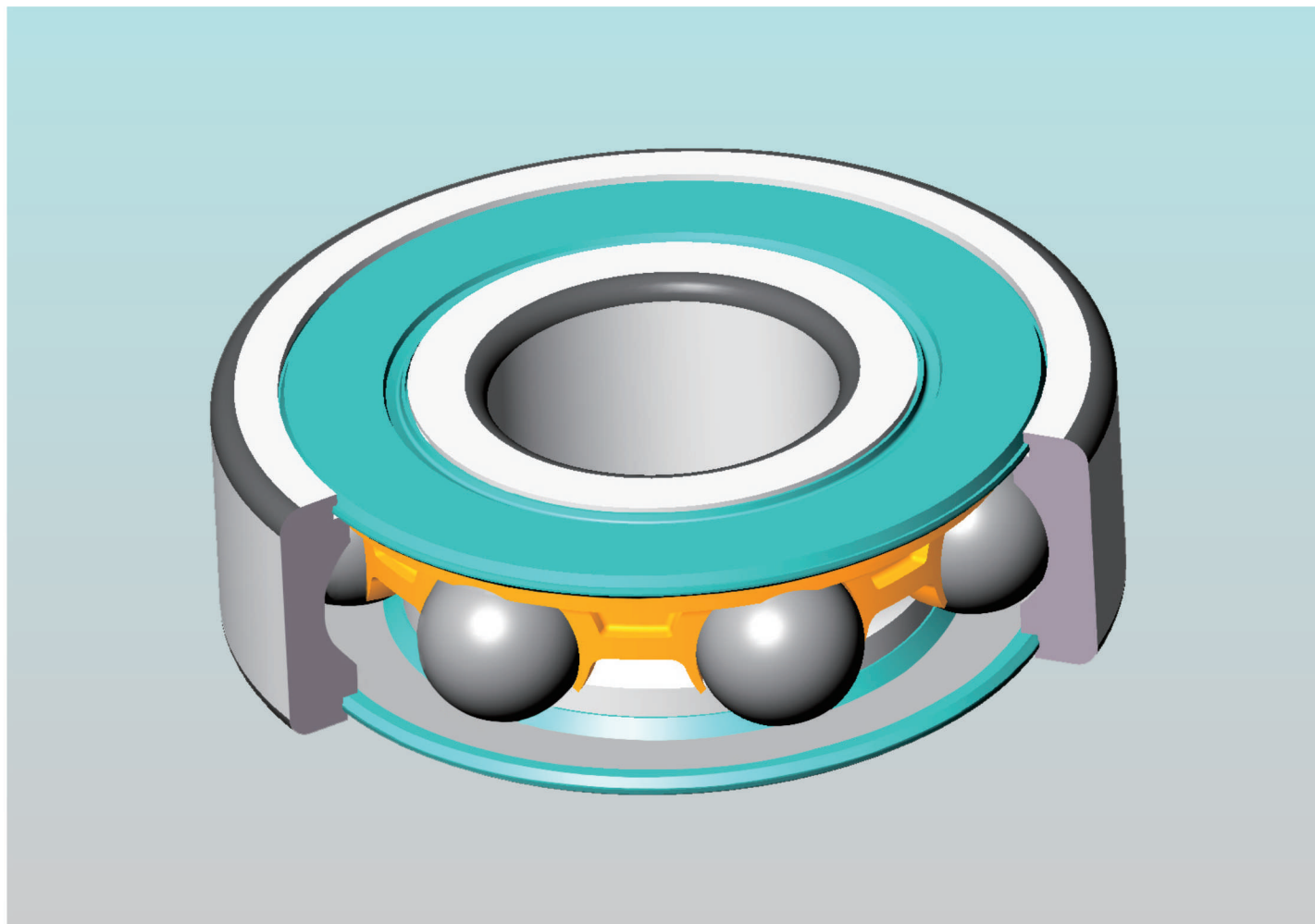


**TMB Extra**  
长寿命高速深沟球轴承  
High-speed & long lifetime deep groove ball bearing

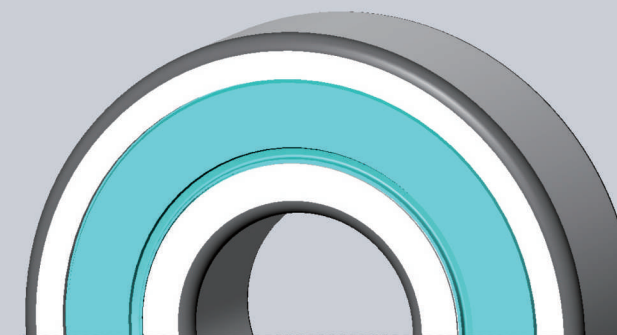


注：图片轴承的结构及外观仅供参考  
Picture for reference only

长寿命高速深沟球轴承 High-speed & long lifetime deep groove ball bearing

Extra系列高速、长寿命、低噪音、免维护深沟球轴承，采用特殊新材料，结合先进的热处理技术，优化内部结构设计，提高轴承的高速稳定性和耐久性，低温升、低摩擦，封入长寿命低噪音轴承润滑脂，是用于新能源电机的新一代轴承

Extra series is a type of high-speed deep groove ball bearing with long lifetime, low noise and free of maintenance, which has special characteristics like stable high running speed, durability, low temperature rise, and low friction by adopting special bearing steel material combined with new heat treatment technology, enhanced internal structure design and filled special grease. It's a new generation electric motor bearing applied in field of new energy vehicle.



**低摩擦 Low friction**  
采用最优化的内部几何形状  
Adopting the most optimized internal geometry  
特殊宽温润油脂  
Special mild grease  
低摩擦系数的塑钢保持架  
Plastic cage with low friction coefficient

**高转速 High speed**  
更加优化的结构参数  
optimized structural parameters  
低离心变形的塑钢保持架  
Plastic cage with low centrifugal deformation

性能特点 Performance & Characteristics

1 高速、高承载能力  
High-speed, high load capacity

专用于新能源汽车驱动电机的高速高承载能力E系列轴承，采用特殊材料技术，新结构设计、新工艺技术，通过建立动力学静力学模型分析计算，优化轴承沟曲率、波纹度设计，通过保持架碰撞力计算，优化保持架设计。

E series bearing with high-speed and high load capacity which specially applied in the driven motor of new energy vehicle. Adopting unique raw material with enhanced structure design and new process technology. Enhancing curvature of bearing groove, waviness design by building dynamic & static model and making analysis and calculation. Enhancing cage design by calculating striking force to cage.

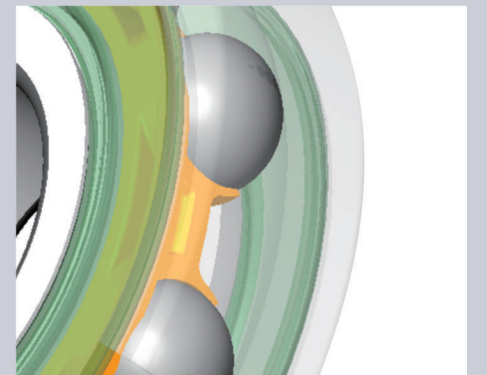
**高刚性 High rigidity**  
带润滑脂 self-lubricating grease  
镂空结构 hollow structure

**新型塑钢保持架 New plastic cage**

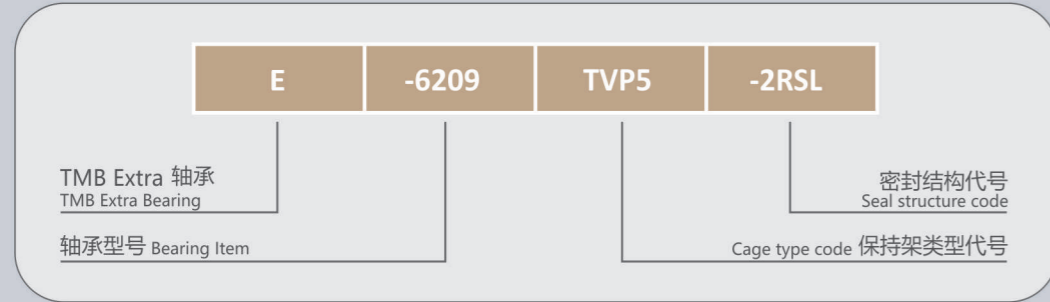
2 低温升 Low temperature rise

高速轴承通过减摩设计，高速运转下摩擦力小，产生的摩擦热低，适用于高转速工作环境。保持架采用高刚性的塑钢材料及特殊镂空结构，一方面提高保持架的旋转稳定性，另一方面保持架的储油供油能力增强，保证轴承高速下充分的润滑能力。

High-speed bearing was designed with antifriction that can help to reduce the friction and heat under high-speed working conditions. Cage is adopted with high rigidity plastic steel material and special hollow-out structure, which can not only improve the rotation stability of cage, but also has strong oil storage and supply capacity, make sure it has adequate lubrication.



## 公称型号 Nominal Item



## 轴承使用温度范围 Bearing temperature range of application

**-40°C ~ +150°C**

【特殊要求需与研发工程师确认】  
Confirm with engineer if need special requirements

## 径向内部游隙 Radial internal clearance

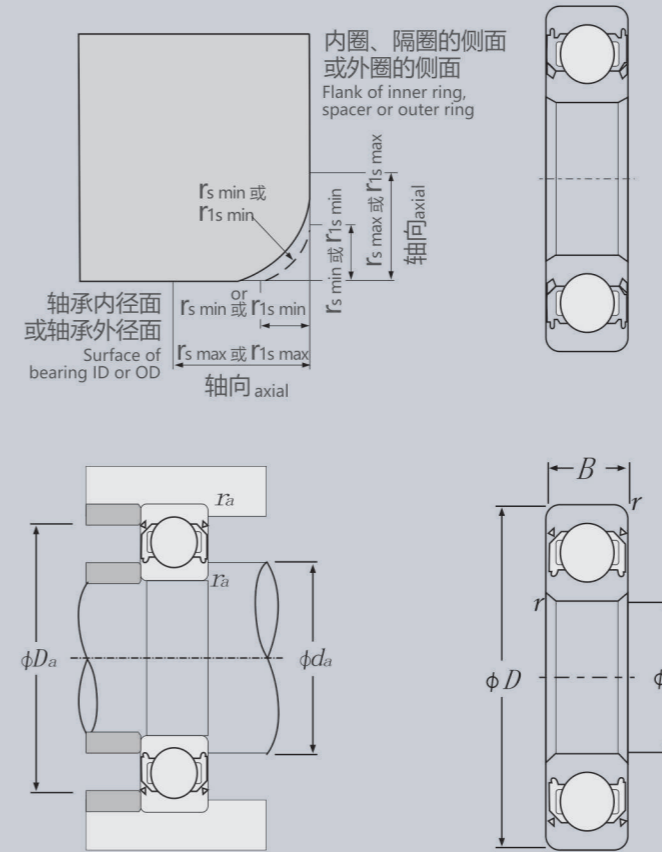
单位 Unit:  $\mu\text{m}$

| 轴承内径 d/mm<br>Bearing ID |         | C2  |     | CN  |     | 电机专用<br>motor dedicated |     | C3  |     | C4  |     |
|-------------------------|---------|-----|-----|-----|-----|-------------------------|-----|-----|-----|-----|-----|
| 超过<br>Exceed            | 到<br>To | min | max | min | max | min                     | max | min | max | min | max |
| 18                      | 24      | 3   | 7   | 8   | 15  | 8                       | 13  | 15  | 25  | 25  | 33  |
| 24                      | 30      | 3   | 7   | 8   | 15  | 10                      | 15  | 15  | 25  | 26  | 38  |
| 30                      | 40      | 3   | 9   | 10  | 16  | 15                      | 20  | 18  | 30  | 31  | 43  |
| 40                      | 50      | 3   | 9   | 10  | 18  | 15                      | 20  | 21  | 33  | 33  | 45  |
| 50                      | 65      | 5   | 12  | 15  | 25  | 20                      | 25  | 26  | 40  | 42  | 57  |
| 65                      | 80      | 5   | 12  | 18  | 28  | 20                      | 25  | 30  | 45  | 48  | 65  |
| 80                      | 100     | 5   | 15  | 18  | 28  | 23                      | 30  | 35  | 50  | 55  | 75  |

## 配合 Match

| 轴承类型<br>bearing type              | 轴配合 axial match    |                     | 轴承座配合 bearing block match            |                     |
|-----------------------------------|--------------------|---------------------|--------------------------------------|---------------------|
|                                   | 轴径 mm<br>shaft Dia | 公差<br>tolerance     | 轴承座孔径<br>bearing block bore diameter | 公差<br>tolerance     |
| 深沟球轴承<br>deep groove ball bearing | ~18                | j5                  | 全部尺寸<br>overall size                 | H6 或 J6<br>H6 or J6 |
|                                   | 18~100             | k5 或 m5<br>k5 or m5 |                                      |                     |

## 轴承型号及规格 Bearing item and specification



| r 下标 s min 或<br>r 下标 1s min<br>r subscripts s min<br>or r subscripts 1s min | 轴承公称内径 d<br>bearing nominal ID d |                 | r 下标 s min 或<br>r 下标 1s min<br>r subscripts s min<br>or r subscripts 1s min |                   |
|---|----------------------------------|-----------------|---|-------------------|
|   | 超过<br>exceed                     | 到<br>to         | 径向<br>radial  | 轴向<br>axial       |
| 1.0   | —<br>50                          | 50<br>—         | 1.5<br>1.9  | 3.0<br>3.0        |
| 1.1   | —<br>120                         | 120<br>—        | 2.0<br>2.5  | 3.5<br>4.0        |
| 1.5   | —<br>120                         | 120<br>—        | 2.3<br>3.0  | 4.0<br>5.0        |
| 2.0   | —<br>80<br>220                   | 80<br>220<br>—  | 3.0<br>3.5<br>3.8   | 4.5<br>5.0<br>6.0 |
| 2.1   | —<br>280                         | 280<br>—        | 4.0<br>4.5  | 6.5<br>7.0        |
| 2.5   | —<br>100<br>280                  | 100<br>280<br>— | 3.8<br>4.5<br>5.0   | 6.0<br>6.0<br>7.0 |

| 序号<br>series No | 轴承型号<br>bearing item | d  | D   | B  | 额定热转速<br>油 脂<br>rated heat rotate speed<br>grease |       | Cr/KN | Cor/KN |
|-----------------|----------------------|----|-----|----|---|-------|-------|--------|
|                 |                      |    |     |    | 油   | 脂     |       |        |
| 1               | E-6201 (2RSL 2Z)     | 12 | 32  | 10 | 29000   | 26000 | 7.05  | 3.10   |
| 2               | E-6202 (2RSL 2Z)     | 15 | 35  | 11 | 24000   | 22000 | 9.68  | 3.57   |
| 3               | E-6203 (2RSL 2Z)     | 17 | 40  | 12 | 24000   | 22000 | 11.9  | 4.85   |
| 4               | E-6204 (2RSL 2Z)     | 20 | 47  | 14 | 22000   | 20000 | 16.0  | 6.65   |
| 5               | E-6205 (2RSL 2Z)     | 25 | 52  | 15 | 19000   | 18000 | 16.8  | 7.85   |
| 6               | E-6206 (2RSL 2Z)     | 30 | 62  | 16 | 19000   | 18000 | 23.4  | 11.3   |
| 7               | E-6207 (2RSL 2Z)     | 35 | 72  | 17 | 18000   | 16000 | 29.5  | 15.3   |
| 8               | E-6208 (2RSL 2Z)     | 40 | 80  | 18 | 18000   | 16000 | 32.0  | 17.8   |
| 9               | E-6209 (2RSL 2Z)     | 45 | 85  | 19 | 17500   | 15000 | 35.3  | 20.2   |
| 10              | E-6210 (2RSL 2Z)     | 50 | 90  | 20 | 15000   | 13000 | 40.3  | 23.1   |
| 11              | E-6211 (2RSL 2Z)     | 55 | 100 | 21 | 15000   | 13000 | 49.9  | 29.3   |
| 12              | E-6312 (2RSL 2Z)     | 60 | 110 | 22 | 13000   | 11000 | 52.4  | 36.0   |
| 13              | E-6313 (2RSL 2Z)     | 65 | 120 | 23 | 13000   | 11000 | 57.2  | 40.5   |

## 轴承型号及规格 Bearing model and specification

| 序号<br>series No | 轴承型号<br>bearing item | d   | D   | B  | 额定热转速<br>油 脂<br>rated heat rotate speed<br>grease |       | Cr/KN | Cor/KN |
|-----------------|----------------------|-----|-----|----|---|-------|-------|--------|
|                 |                      |     |     |    |   |       |       |        |
| 14              | E-6214(2RSL 2Z)      | 70  | 125 | 24 | 12000   | 10000 | 62.5  | 44.6   |
| 15              | E-6215(2RSL 2Z)      | 75  | 130 | 25 | 11000   | 9000  | 67.4  | 49.5   |
| 16              | E-6216(2RSL 2Z)      | 80  | 140 | 26 | 10000   | 8500  | 72.8  | 53.0   |
| 17              | E-6217(2RSL 2Z)      | 85  | 150 | 28 | 9500  | 8000  | 84.0  | 62.5   |
| 18              | E-6218(2RSL 2Z)      | 90  | 160 | 30 | 8500  | 7000  | 96.0  | 71.5   |
| 19              | E-6219(2RSL 2Z)      | 95  | 170 | 32 | 8000  | 6500  | 109   | 81.9   |
| 20              | E-6220(2RSL 2Z)      | 100 | 180 | 34 | 7500  | 6000  | 124   | 93.0   |
| 21              | E-6303(2RSL 2Z)      | 17  | 47  | 14 | 22000   | 20000 | 16.2  | 6.65   |
| 22              | E-6304(2RSL 2Z)      | 20  | 52  | 15 | 22000   | 20000 | 18.6  | 7.9    |
| 23              | E-6305(2RSL 2Z)      | 25  | 62  | 17 | 20000   | 18000 | 25.5  | 11.2   |
| 24              | E-6306(2RSL 2Z)      | 30  | 72  | 19 | 18000   | 16000 | 29.9  | 15.8   |
| 25              | E-6307(2RSL 2Z)      | 35  | 80  | 21 | 18000   | 16000 | 33.3  | 19.2   |
| 26              | E-6308(2RSL 2Z)      | 40  | 90  | 23 | 17000   | 15000 | 40.7  | 23.9   |
| 27              | E-6309(2RSL 2Z)      | 45  | 100 | 25 | 17000   | 15000 | 52.9  | 31.8   |
| 28              | E-6310(2RSL 2Z)      | 50  | 110 | 27 | 15000   | 13000 | 61.8  | 37.9   |
| 29              | E-6311(2RSL 2Z)      | 55  | 120 | 29 | 14000   | 12000 | 71.5  | 44.6   |
| 30              | E-6312(2RSL 2Z)      | 60  | 130 | 31 | 12000   | 10000 | 81.8  | 51.9   |
| 31              | E-6313(2RSL 2Z)      | 65  | 140 | 33 | 11000   | 9500  | 92.7  | 59.7   |
| 32              | E-6314(2RSL 2Z)      | 70  | 150 | 35 | 11000   | 9000  | 104   | 68.1   |
| 33              | E-6315(2RSL 2Z)      | 75  | 160 | 37 | 10000   | 8500  | 113   | 77.5   |
| 34              | E-6316(2RSL 2Z)      | 80  | 170 | 39 | 9000  | 8000  | 123   | 86.5   |
| 35              | E-6317(2RSL 2Z)      | 85  | 180 | 41 | 8500  | 7000  | 133   | 96.6   |
| 36              | E-6318(2RSL 2Z)      | 90  | 190 | 43 | 8000  | 6000  | 143   | 107    |
| 37              | E-6319(2RSL 2Z)      | 95  | 200 | 45 | 7500  | 6000  | 153   | 118    |
| 38              | E-6320(2RSL 2Z)      | 100 | 215 | 47 | 6000  | 4500  | 173   | 140    |
| 39              | E-6002 (2RSL 2Z)     | 15  | 32  | 9  | 24000   | 22000 | 5.6   | 2.85   |
| 40              | E-6003 (2RSL 2Z)     | 17  | 35  | 10 | 22000   | 20000 | 6.20  | 3.25   |
| 41              | E-6004 (2RSL 2Z)     | 20  | 42  | 12 | 20000   | 18000 | 9.40  | 5.15   |
| 42              | E-6005 (2RSL 2Z)     | 25  | 47  | 12 | 20000   | 18000 | 10.1  | 5.85   |
| 43              | E-6006 (2RSL 2Z)     | 30  | 55  | 13 | 19000   | 17000 | 15.1  | 8.20   |
| 44              | E-6007 (2RSL 2Z)     | 35  | 62  | 14 | 19000   | 17000 | 15.9  | 10.3   |
| 45              | E-6008 (2RSL 2Z)     | 40  | 68  | 15 | 18000   | 16000 | 16.8  | 11.6   |
| 46              | E-6009 (2RSL 2Z)     | 45  | 75  | 16 | 17000   | 15000 | 21.5  | 15.2   |
| 47              | E-6010 (2RSL 2Z)     | 50  | 80  | 16 | 17000   | 15000 | 21.8  | 16.5   |
| 48              | E-6011 (2RSL 2Z)     | 55  | 90  | 18 | 15000   | 13000 | 28.3  | 21.2   |

## 试验验证 Test verification



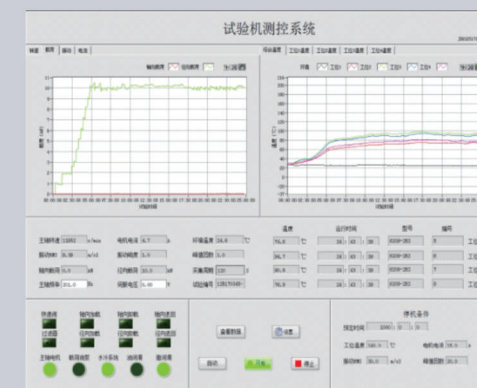
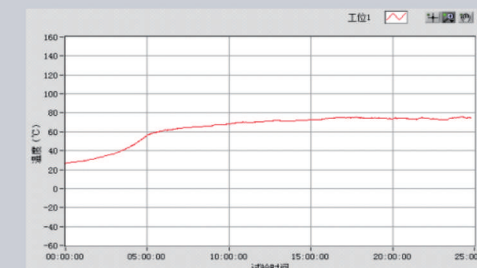
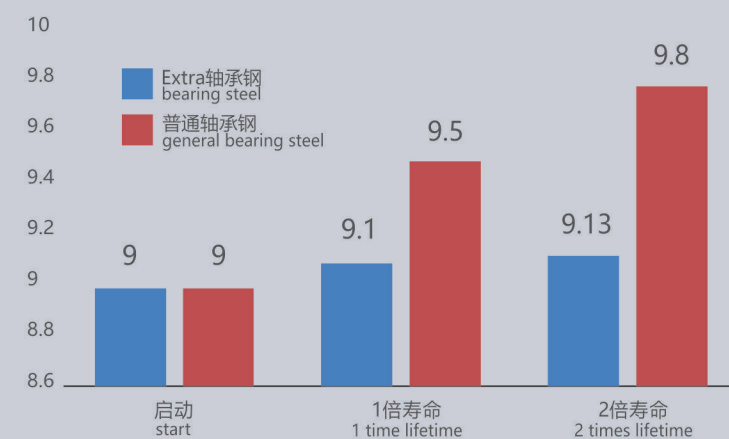
新能源高速电机使用E-6209轴承  
E-6209 bearing application in high-speed motor of new energy vehicle

- 1) 该轴承闭式自润滑轴承  
The bearing is closed type and self-lubricating
- 2) 安装方式: 四套一组安装  
Mounting method: mounted 4 peieces in a group  
轴:m5 Axis:m5  
壳体:H6 Housing:H6
- 3) 加载方式: 采用自动液压 / 电缸加载系统, 径向加载  
Loading method:loaded in radial direction through adopting pre-owner hydraulic Electric cylinder loading system
- 4) 测试过程中监控轴承的振动、温升数据  
Monitoring bearing vibration and data of temperature rise during test

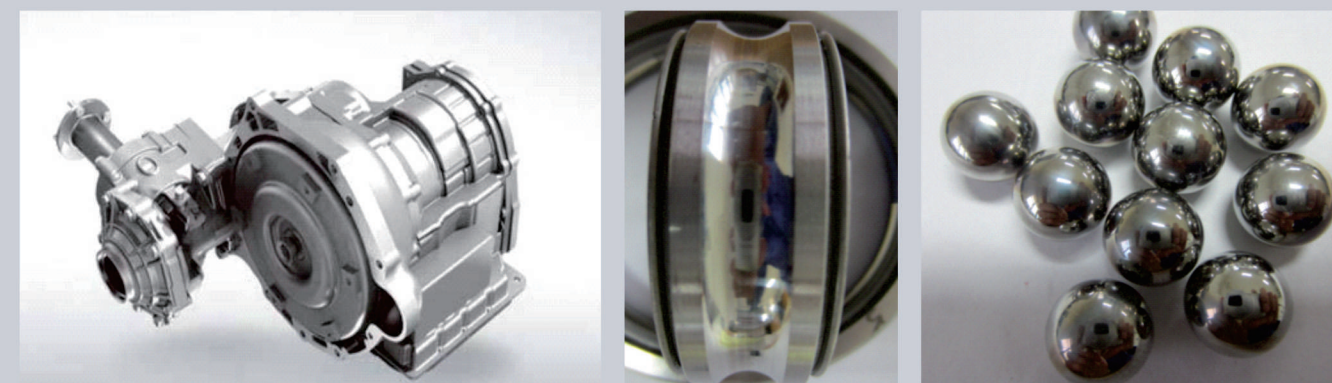
试验转速 Test rotate speed 16000r/min

## 精度保持性 Precision retainability

运转2倍疲劳寿命后振动值对比  
Vibration comparison diagram after two times fatigue lifetime test



## 通过第三方强化寿命台架实验 Enhanced lifetime bench test through third party.



## 性能特点 Performance & Characteristics

### 3 卓越的密封性能 Superior sealing performance

采用优化的低摩擦高密封性密封圈，通过接触部位及构造最优化设计，开发了能同时实现高密封要求的同时，低摩擦高速运转。

Adopting enhancing seals with low friction and high sealing performance which not only satisfy high sealing requirements, but also low friction and high running speed at the same time by optimized contacted section and structure.

高密封性  
低摩擦力

High sealing and  
low friction

### 4 低噪音 Low noise

通过采用性能保持架，运用先进的超精加工工艺，实现了低噪音。与金属浪型保持架相比，噪音值减低5dB。

Making bearing with low noise by using proper cage and advanced grinding process. It's noise level reduces 5dB comparing with meta-wave type cage.

| 保持架类型 Cage type          | 材质 Material | 噪音值(分贝值) Noise level(dB) |
|--------------------------|-------------|--------------------------|
| 钢制保持架 Steel cage         | SPCC        | 52                       |
| 传统塑料保持架 Old plastic cage | PA66+%25    | 49                       |
| 新型塑钢保持架 New plastic cage | PA46+%30    | 45                       |

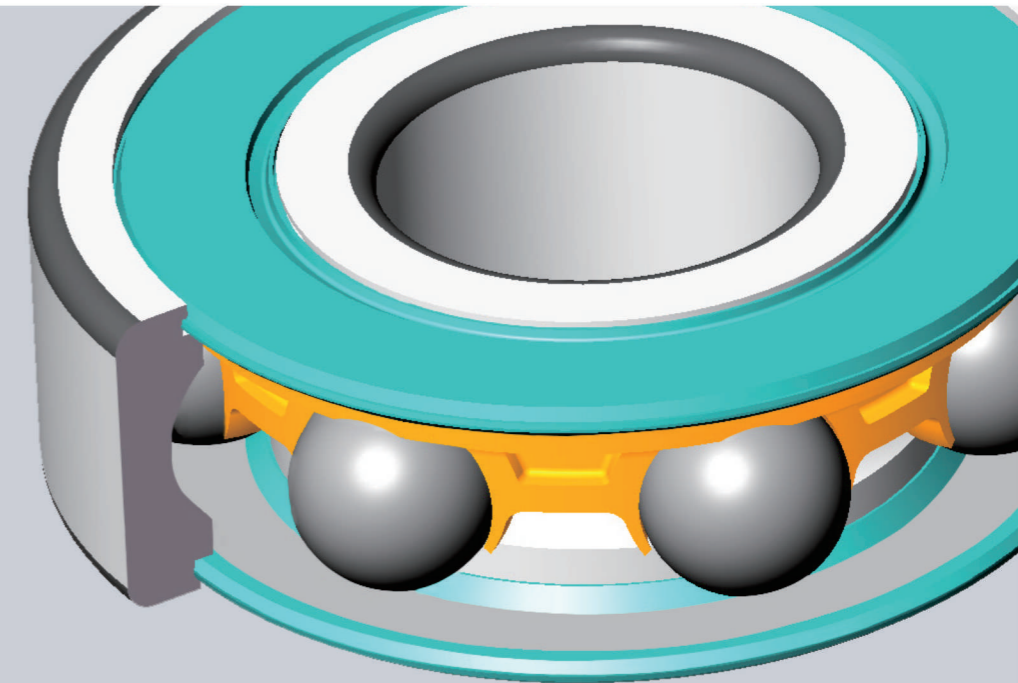
## 精度 Precision

### 内圈 Inner ring

| 轴承内径<br>Bearing ID |         | 尺寸公差<br>Tolerance of dimension |            |     |      | 单位<br>Unit |            |            | μm  |     |     |
|--------------------|---------|--------------------------------|------------|-----|------|------------|------------|------------|-----|-----|-----|
| d/mm               |         | Δ dmp                          |            | Vdp | Vdmp | Kia        | Δ Bs       |            | VBs | Sd  | Sia |
| 超过<br>Exceed       | 到<br>To | 上<br>Above                     | 下<br>Below | max | max  | max        | 上<br>Above | 下<br>Below | max | max | max |
| 10                 | 18      | 0                              | -5         | 4   | 3    | 4          | 0          | -80        | 5   | 7   | 7   |
| 18                 | 30      | 0                              | -6         | 5   | 3    | 4          | 0          | -120       | 5   | 8   | 8   |
| 30                 | 50      | 0                              | -8         | 6   | 4    | 5          | 0          | -120       | 5   | 8   | 8   |
| 50                 | 80      | 0                              | -9         | 7   | 5    | 5          | 0          | -150       | 6   | 8   | 8   |
| 80                 | 120     | 0                              | -10        | 8   | 5    | 6          | 0          | -200       | 7   | 9   | 9   |

### 外圈 Outer ring

| 轴承外径<br>Bearing OD |         | 尺寸公差<br>Tolerance of dimension |            |     |      | 单位<br>Unit |   |            | μm  |     |     |
|--------------------|---------|--------------------------------|------------|-----|------|------------|---|------------|-----|-----|-----|
| D/mm               |         | Δ Dmp                          |            | Vdp | Vdmp | Kea        | Δ Cs  |            | Vcs | SD  | Sea |
| 超过<br>Exceed       | 到<br>To | 上<br>Above                     | 下<br>Below | max | max  | max        | 上<br>Above  | 下<br>Below | max | max | max |
| 30                 | 50      | 0                              | -7         | 5   | 4    | 7          | 与同一<br>轴承内圈的<br>ΔBs相同<br><br>be equivalent to<br>inner ring<br>ΔBs of the<br>same bearing |            | 5   | 8   | 8   |
| 50                 | 80      | 0                              | -9         | 7   | 5    | 8          |   | 6          | 8   | 10  |     |
| 80                 | 120     | 0                              | -10        | 8   | 5    | 10         |   | 8          | 9   | 11  |     |
| 120                | 150     | 0                              | -11        | 8   | 6    | 11         |   | 8          | 10  | 13  |     |
| 150                | 180     | 0                              | -13        | 10  | 7    | 13         |   | 8          | 10  | 14  |     |
| 180                | 250     | 0                              | -15        | 11  | 8    | 15         |   | 10         | 11  | 15  |     |



## 2018.8 制

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