



Mounting and maintenance

Antifriction wire race bearings

Bearing elements

Slim bearings

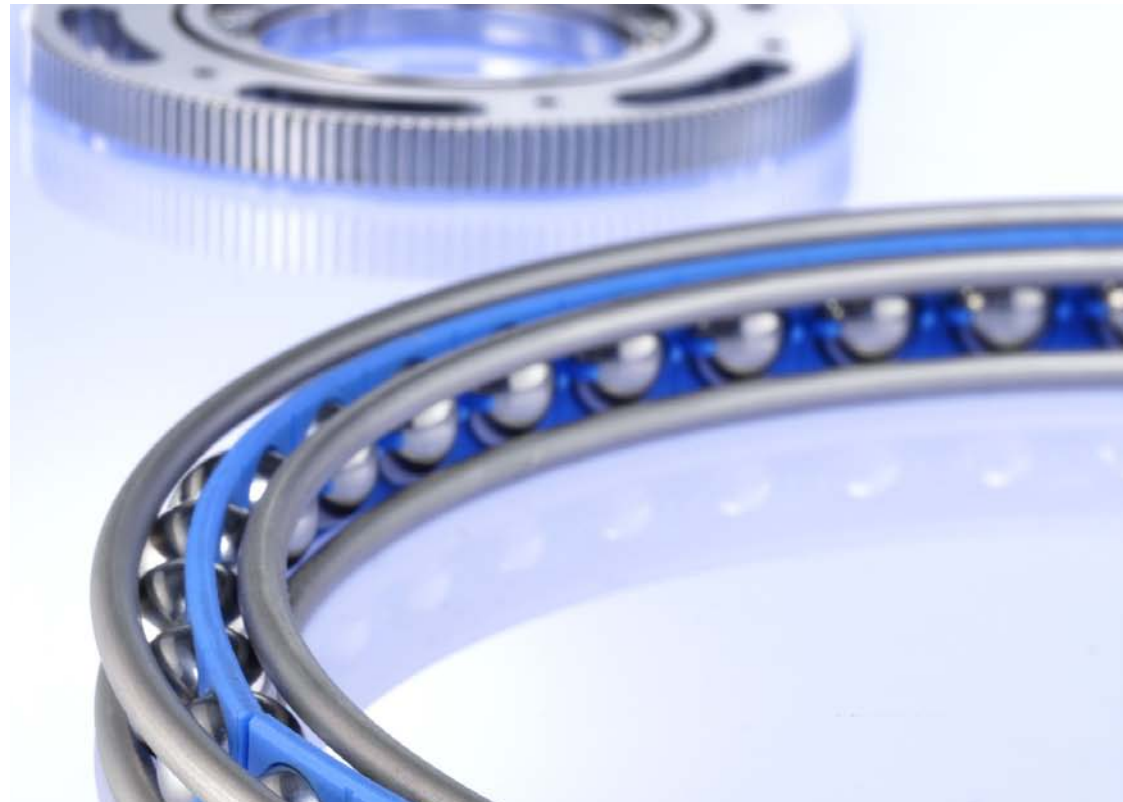
Bearing assemblies

Our service team is at your disposal for further information.

Franke GmbH
Obere Bahnstr. 64
73431 Aalen
Tel.: +49 7361 920-0
Fax: +49 7361 920-120

www.franke-gmbh.de
info@franke-gmbh.de

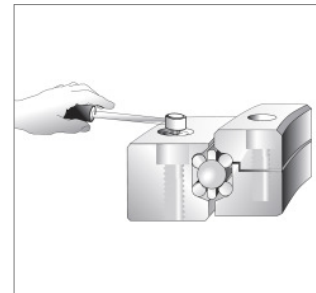
All the indications were checked and found correct. However should there be any incomplete or incorrect indications Franke does not take any responsibility.
Due to the fact that our products are always developed further we reserve the right to modifications.
We do not take responsibility for any misprints.





Mounting and maintenance antifriction bearings

5. Screw Connections



1. Tighten all screws crosswise with a torque wrench according to the values given in table 5.
 - a. Check the screws after about 100 operating hours for signs of settling. Re-tighten the screws if necessary.
 - b. Check the tightness of the screws every 600 operating hours. In special operating conditions (e.g. vibrations), this interval has to be reduced.

Screw size	Torque [Nm]	
	Property class 8.8	Property class 8.8
M 6	10	17
M 8	25	41
M10	49	83
M12	86	145
M16	210	355

Table 5: Screw connections torque



4.1 Re-lubrication and lubricating intervals

- Re-lubricate the bearing at average operating temperature.
- Rotate the bearing while re-lubricating.

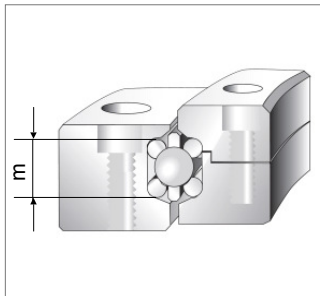
The re-lubricating intervals are dependant on the application. The following table shows guide values:

Circumferential speed Vu [m/s]	Re-lubrication interval [h]
0 bis < 3	5000
3 bis < 5	1000
5 bis < 8	600
8 bis >10	200

Table 3: Re-lubrication intervals

Quantity of lubricant:

After determination of the re-lubrication interval, calculate the quantity of lubricant with the following formula:



$$M = KK\emptyset * (m * 2) / 3 * x$$

- M = Quantity in g
- KK∅ = Ball pitch diameter in mm
- m = Height of wire bed in mm
- x = Factor x in mm⁻¹ is given in table 4:

Re-lubrication	x [mm ⁻¹]
weekly	0,002
monthly	0,003
annually	0,004
every 2-3 years	0,005

Table 4: Quantity of lubricant factor

Note for lubrication of teethed bearings:

We recommend an automatic toothing lubrication.

With manual lubrication, grease tooth pitch and gear prior to the initial operation.



Contents

	Page
1. General notes	3
1.1 Used symbols	3
1.2 Specified normal operation	3
1.3 Protection and maintenance measures	3
1.4 Preparation for mounting, tools and auxiliaries	3
1.5 Antifriction bearing variants overview	4
2. Mounting of bearing elements and slim bearings	5
2.1 Adjustment of bearing elements and slim bearings	6
2.2 Measurement of rotational resistance	7
2.3 Sealing installation	9
3. Mounting of bearing assemblies	10
4. Lubrication and maintenance	11
4.1 Re-lubrication and lubricating intervals	13
5. Screw connections	14



Mounting and maintenance antifriction bearings

1. General Notes

1.1 Used symbols

1. specifies one-step operating instructions

hints and recommendations (e.g. concerning tightening torques).

1.2 Specified normal operation

Franke antifriction bearings are provided for precise rotational movements as e.g. in the medical technology, measuring technology, textile industry or machine engineering.

1.3 Protection and maintenance measures

In order to protect the Franke antifriction bearings from humidity and damages, store bearings in their original packing until assembly. Only use Franke original parts for assembly and repair. Franke antifriction bearings must be lubricated. Information on lubrication of Franke bearings can be found in chapter 4 “Lubrication and maintenance.”

1.4 Preparation for mounting, tools and auxiliaries

- Torque wrench
- Fixing screws
- Holding screws
- Dial gauge
- Allen key
- Screw driver
- Washers if necessary
- Grinding machine (with massive adjustment)



Mounting and maintenance antifriction bearings

4. Lubrication and maintenance

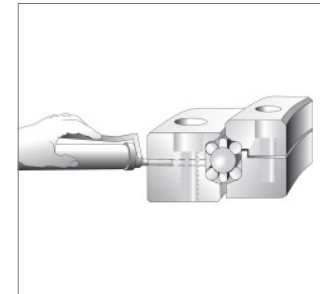
Lubricants

- For long term lubrication use fully synthetic lubricants due to their higher aging resistance. We recommend the fully synthetic special grease “ISOFLEX TOPAS NCA 52” from Klüber (DIN 51502: KHC 2 N-50).
- As alternative lubricants high-grade lithium soap greases based on polyalpha-olefin or mineral, or greases according to DIN 51825 K2K-40 respectively, can be used.

Ensure that the lubricants are suitable for the particular application and the used materials (ball cage or sealing).

With mixing lubricants, ensure the compatibility of the different grades. Allow especially for basic oil type, thickener, viscosity of the basic oil type and NLGI-class. Enquire these issues with the manufacturer of the lubricant, particularly when the bearings will run under extreme operating conditions.

Initial lubrication



The amount of lubricant is dependant on the free space inside the bearing:

1. Calculate the free space.
 - a. Fill 20-30% of the calculated free space with lubricant through the intended lubrication holes.
 - b. With pivot bearings, fill 30-40% of the calculated free space with lubricant through several of the intended lubrication holes.



Mounting and maintenance antifriction bearings

- b. Insert the sealing. Cut the overlapping edges to the appropriate length.
 - ☞ For providing accurate gluing joints, cut the sealing exact square to the length.
2. Gluing of sealing:

Take the sealing out of the sealing groove. Clean the cut-off points until they are free of grease.

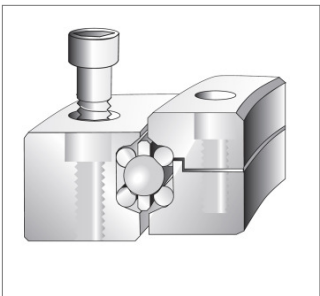
 - a. Apply an appropriate glue (e.g. Loctite 401) on the cut-off points.
 - b. Press the cut-off points exactly together for approximately 20 seconds and let the glue cure for about 5 minutes.
3. Insert the sealing in the sealing groove.

☞ Increase of rotational resistance by sealing S10 (accessories) table 2:

KK Ø	Torque [Nm]
100 < 250	1,0
250 < 400	1,5
400 < 700	3,0
700 < 1000	4,0
1000 < 1600	5,0

Table 2: Increase of rotational resistance per sealing S10

3. Mounting of Bearing Assemblies



1. First check the plane surfaces of the mating structure for evenness.
 - a. Put the bearing assembly on the fixing surface and insert the fixing screws in the bores.
 - b. Check the easy turning of the screws and the bore positions.
2. Screw together the bearing assembly and the mating structure.
 - ☞ Allow for the required tightening torques (see chapter 5, page 13).



Mounting and maintenance antifriction bearings

1.5 Overview Antifriction Bearings Variants

Bearing elements

Bearing elements (Type LE...) are composed of four race rings and a multipart cage with balls. In addition a mating structure is necessary that can optionally be made of steel, cast aluminium, non corrosive steel, bronze, composite material or plastics.

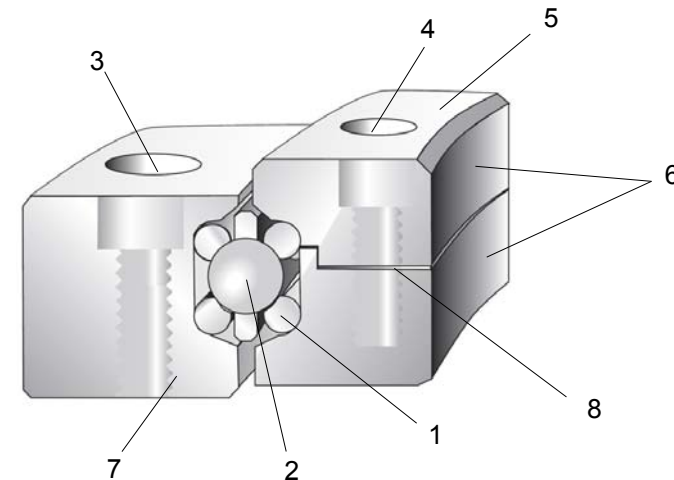
The rotational resistance is influenced by grinding or by adjusting of the parted mating structure.

Slim bearing

In slim bearings (Type LDD) the bearing element is embedded in an inner and outer steel shell sleeve. The sleeves are separated on the perimeter, building a pre-finished bearing that is directly integrated in the construction.

Bearing assemblies

Bearing assemblies (Type LD...) are pre-finished complete bearings (bearing elements with mating structure). Adjusting the bearing clearance is not necessary.

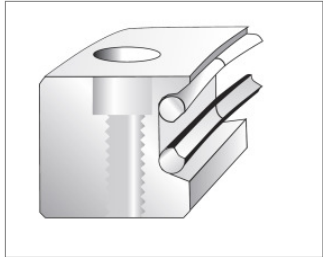


- | | |
|------------------------------|--|
| 1. Race rings | 5. Separated inner mating structure (inner ring) |
| 2. Multipart cage with balls | 6. Adjustment ring |
| 3. Fixing screws | 7. Outer mating structure (outer ring) |
| 4. Holding screws | 8. Adjustment surface |



Mounting and maintenance antifriction bearings

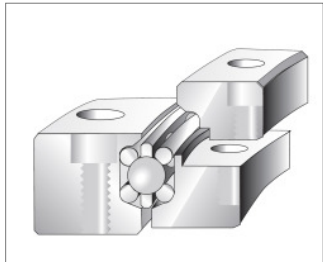
2. Mounting of Bearing Elements and Slim Bearings



☞ The raceways must be cleaned before mounting. Remove remains of corrosion inhibitors and pollution on the raceways with a cloth.

Assembly of Bearing Elements (types LEL and LER)

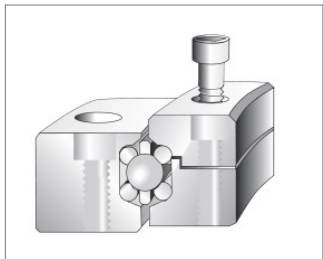
1. Insertion of the raceways: For holding the raceways into position, please lubricate their beddings with some grease. Insert two raceways in the inner connecting structure and two raceways in the outer connecting structure.



a. Insert the two raceways by shifting the open junctions by 180°.

2. Lubricate the cage segments and fit them into the outer connecting structure (outer ring).

a. Only use provided balls of the quality grade G28 (DIN 5401).



☞ If balls are lost, exchange all balls to avoid impairments of the running characteristics of the bearing.

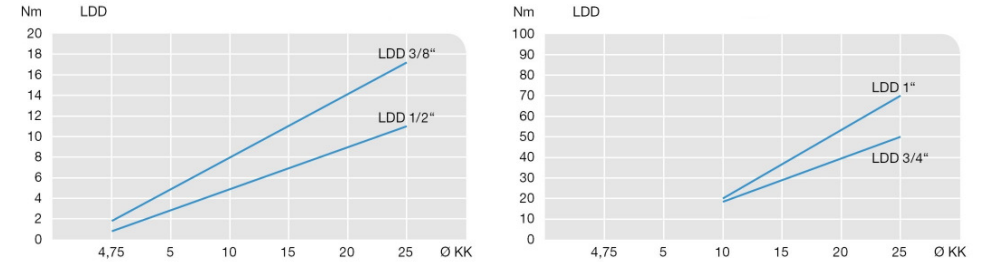
b. Close the bearing at the divided side.

3. Insert the screws into the borings. After that, the bearing can be adjusted according to the proper rotary resistance either with shims or with massive adjustment.



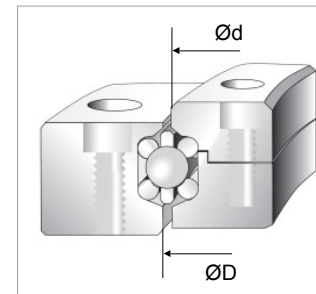
Mounting and maintenance antifriction bearings

Charts: maximum rotary resistance of bearing elements



- If the rotary resistance differs by more than 5 – 10% from the necessary value, the process must be repeated.
- Mounting with shims: If the measured value differs, please change the thickness of the shims and repeat the adjustment.
- Tighten all screws properly.
 - ☞ Pay attention to the prescribed tightening torques (see chapter 5, page 13).
- Lubricate the bearing via the in-built grease borings (see chapter 4 “Initial lubrication”).

2.3 Mounting of Seal

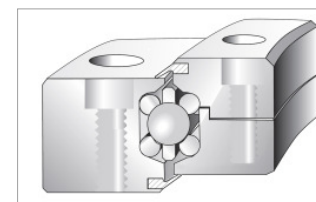


Sealings for Franke bearings can be ordered as accessories (sold by meter).

1. Calculate the required sealing length as follows:

Installation on inner ring: $d \cdot \Pi + 25 \text{ mm}$

Installation on outer ring: $D \cdot \Pi + 25 \text{ mm}$



2. Determine the exact sealing length:

- The formula for determine the sealing length shows a guide value. The final length of the sealing is determined when inserting the sealing in the sealing groove.



Mounting and maintenance antifriction bearings

2.2 Measuring of the Rotational Resistance

The rotary resistance gives information about the pretension of the bearing assembly. It depends on the individual type and the rolling circle diameter. The stiffness is indirectly related to the rotary resistance. The following rule is valid: the higher the rotary resistance, the higher the stiffness.

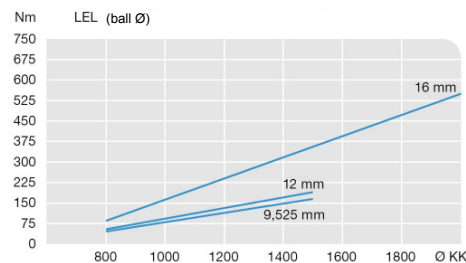
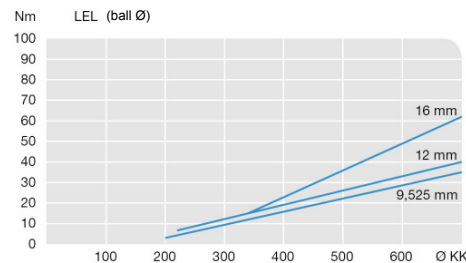
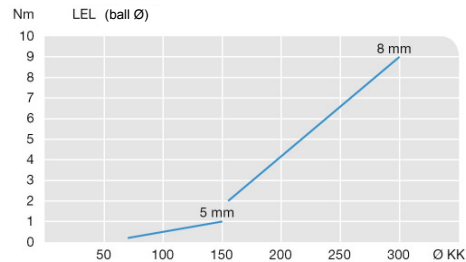
The rotary resistance of all delivered Franke Bearing Assemblies is already set in the company.



1. Turn the bearing two to three times through 360° and measure the rotary resistance for checking the adjustment of the bearing. Please pay attention to the reference values shown in the tables on page 7 and 8.

The rotary resistance can be adjusted individually depending on the application.

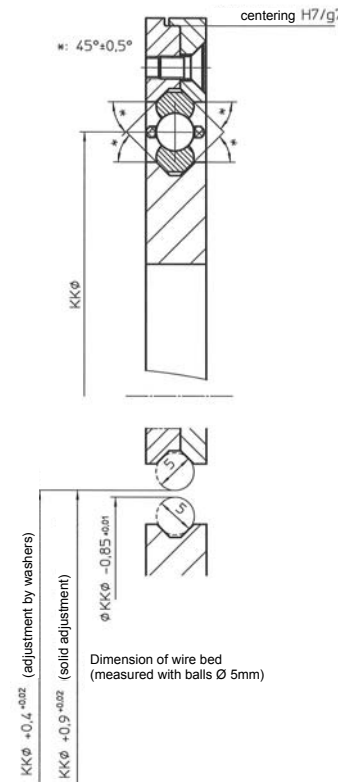
Charts: maximum rotary resistance of bearing elements



Mounting and maintenance antifriction bearings

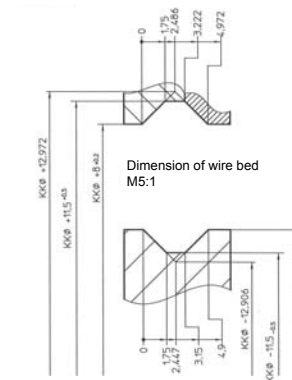
Assembly of Bearing Elements (type LEG)

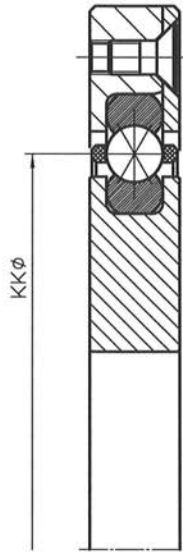
Pre-loaded bearing with adjustment possibility



1. Insertion of the raceways: For holding the raceways into position, please lubricate their beddings with some grease. Insert one raceway in the inner connecting structure and one raceway in the outer connecting structure.
 - a. Insert the two raceways by shifting the open junctions by 180°.
2. Lubricate the cage segments and fit them into the connecting structure.
 - a. While mounting the cage segments, only use provided balls of the quality grade 3 (DIN 5401). If balls are lost, exchange all balls to avoid impairments of the running characteristics of the bearing.
 - b. Close the bearing at the divided side.
3. Insert the screws in the borings.

After that, the bearing can be adjusted without clearance for the correct rotary resistance either with shims or with massive adjustment. Fitting tolerances correspond with Franke-standard (IT6/7 for diameters or H7 for overall height).





Assembly of Bearing Elements (type LEG)

Bearing with clearance and without adjustment.

1. Insertion of the raceways: For holding the raceways into position, please lubricate their beddings with some grease. Insert one raceway in the inner connecting structure and one raceway in the outer connecting structure.
 - a. Insert the two raceways by shifting the open junctions by 180°.
2. Lubricate the cage segments and fit them into the connecting structure.
 - a. While mounting the cage segments, only use provided balls of the quality grade 3 (DIN 5401). If balls are lost, exchange all balls to avoid impairments of the running characteristics of the bearing.
 - b. Close the bearing on the divided side and insert the screws in the borings. There is no adjustment with shims or massive adjustment. The bearing has a clearance: ~0,05mm – 0,1mm. (The Clearance can be reduced on request by means of ball arranging +10µm / -10µm.)

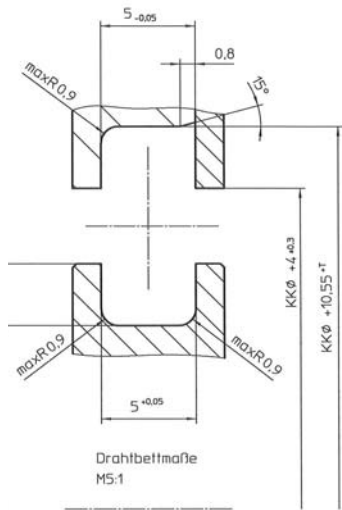
Tolerances of overall height:
divided ring: -0,05mm
solid ring: +0,05mm

Installation tolerances of diameters:

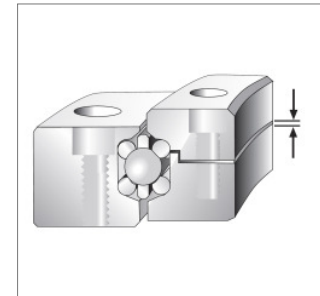
KKØ	[mm]	bis 150	150-300	ab 300
T	[mm]	0,03	0,04	0,05

Assembly of Slim Bearings

Insert the slim bearing in the inner ring of the connecting structure. Close the bearing with the second divided side of the connecting structure (outer ring).

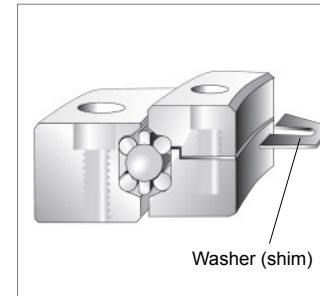


2.1 Adjustment of Bearing Elements and Slim Bearings



Adjustment with washers

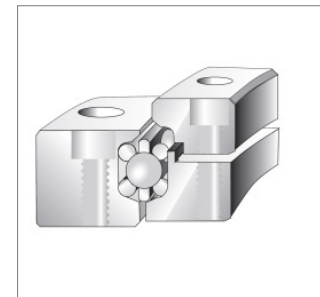
1. Tighten the screws slightly.
 - a. Measure the space between the divided connecting structures on several places all around.
 - b. Add the measured values up and average them.
2. Arrange the washer-packages:
 - a. Choose the washers (see table 1).
The thickness of the washers should not be more than 0,01mm under the average value.
 - b. Space out the washers (in the same height) between all holding and fixing screws of the divided connecting structure. It is possible to order shims by screw diameter in several thicknesses.



Washer (shim)

Thickness [mm]	0,025	0,1	0,2	0,2	0,3	0,3	0,5	1,0
M6	79015A	79034A	79035A	79036A	79037A	79038A	79039A	79040A
M8	79041A	79023A	79042A	79000A	79026A	79043A	79044A	79045A
M10	79046A	79012A	79010A	79011A	79047A	79048A	79049A	79050A
M12	79118A	79051A	79052A	79053A	79054A	79055A	79056A	79065A
M16	79119A	79024A	79066A	79057A	79058A	79059A	79060A	79061A

Table 1: order numbers of washers



Solid Adjustment

1. Tighten the screws properly.
 - ☞ Pay attention to the prescribed tightening torques (see chapter 5, page 13).
 - a. Turn the bearing two to three times through 360°. Measure the radial space between inner and outer ring using a test gauge.
 - b. Take off the adjustment ring.
 - c. Grind off the determined value plus 0.02-0.03mm on the adjustment surface.
2. Remove the ground dust and refit the ring again.

