


STAR – Tolerance Rings
STAR – Ball Knobs, Knob and Lever Type Handles

STAR – Tolerance Rings

Product Overview

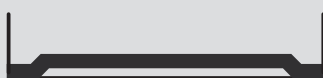
Tolerance rings are made of hard, embossed spring steel strip and belong to the class of frictionally engaging fasteners.

STAR Tolerance Rings were designed for especially easy, low-cost fastening of machine parts. They replace complex contour-locking keyways or pinned, wedged and threaded connections and eliminate the need for expensive machining.

- ▶ Particularly inexpensive machine element
 - ▶ Rigid and secure fastening of machine parts
 - ▶ Rapid, cost-saving assembly
 - ▶ Simple design of mating parts
 - ▶ Resistant to a number of chemical substances
- 

Series 0810 (AN)

The flat edges are at the outer diameter of the tolerance ring. For use with a standard nominal shaft.

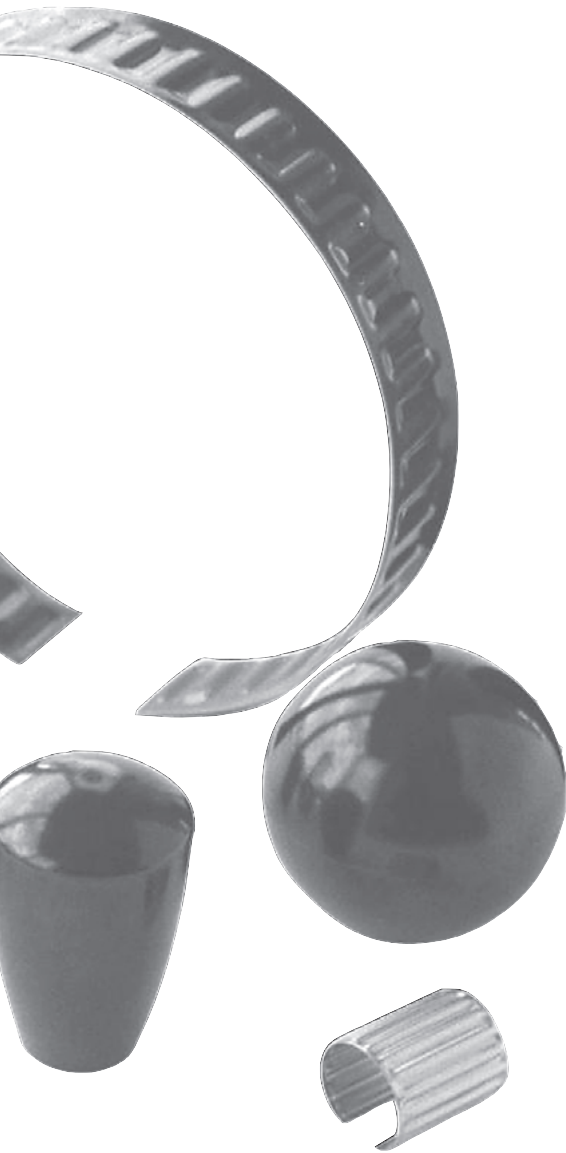


Series 0820 (BN)

The flat edges are at the inner diameter of the tolerance ring. For use with a standard nominal bore.



Tolerance Rings



▶ Elastic seating for small rolling bearings
(Series 0801)

▶ Compensation of different
thermal expansion rates
between machine parts
made of different materials

▶ High temperature resistance

▶ No need for keyways or other
contour-locking joints

▶ Special sizes on request

▶ Wide machining tolerances
for parts to be joined

Please contact us for samples.

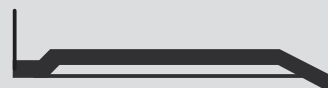
Series 0801 (ANL)

This curved type is specifically designed for mounting small bearings.



Series 0804 (ANS)

This type has a slanting edge and is used for mounting larger rolling bearings, especially in light metal housings.



STAR – Linear Motion Technology

Ball Rail Systems

Standard Ball Rail Systems
Ball Rail Systems with Aluminum Runner Blocks
Super Ball Rail Systems
Wide Ball Rail Systems
Miniature Ball Rail Systems
Cam Roller Guides
Accessories

Roller Rail Systems

Linear Bushings and Shafts

Linear Bushings
Linear Sets
Shafts
Shaft Support Rails
Shaft Support Blocks
Ball Transfer Units

Screw Drives

Linear Motion Systems

Linear Motion Slides
Linear Modules
Compact Modules
Ball Rail Tables
ALU-STAR Profile System
Controllers, Motors, Electrical Accessories
Linear Actuators

Rexroth Star GmbH
D-97419 Schweinfurt



REG. NO.
1617 - 03



STAR – Tolerance Rings

STAR – Ball Knobs, Knob and Lever Type Handles

Product Overview	2
Application Examples	6
General	8
Calculation	13
Mounting Instructions	14
Part Number / Ordering Example	15
Tables	16
– Tolerance Rings 0810 (AN)	16
– Tolerance Rings 0820 (BN)	22
– Tolerance Rings 0801 (ANL)	28
– Tolerance Rings 0804 (ANS)	29
Inquiry/Specification	30
Ball Knobs, Knob and Lever Type Handles	31
– General	31
– Dimensions and Data	32

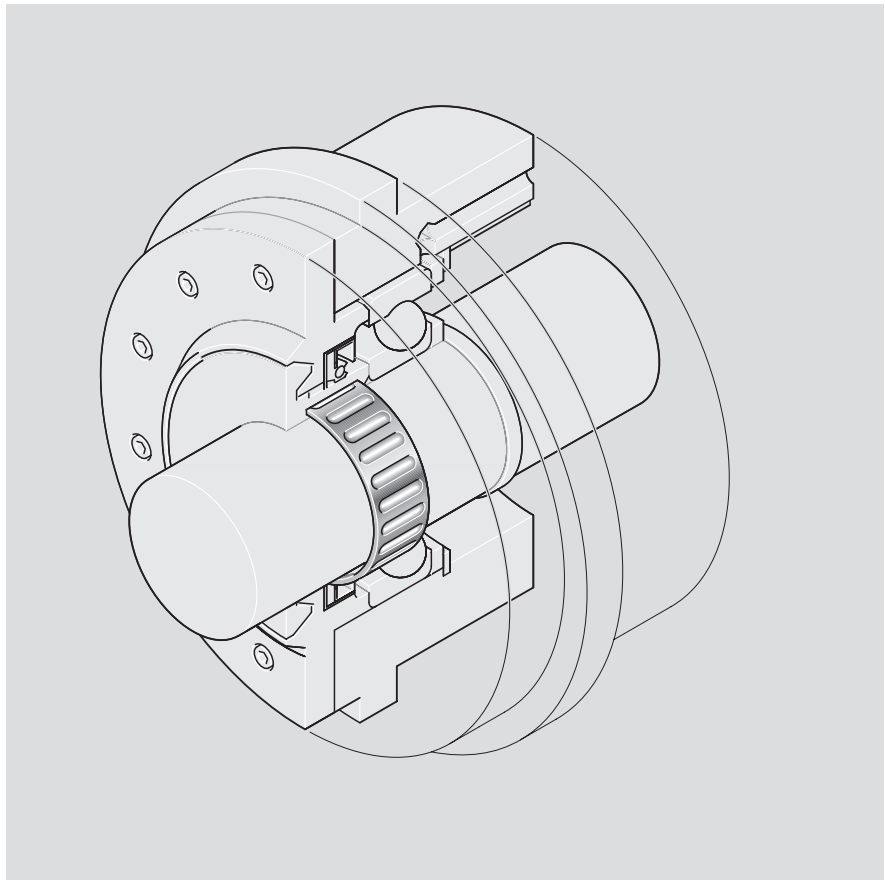
STAR – Tolerance Rings

Application Examples

Tolerance rings for fastening of machine parts without defined force transmission

In many applications there are no defined forces to be transmitted between the parts to be joined. What is generally required in such cases is a fixing device for such simple machine parts as handles, ball knobs, labyrinth rings or bushings.

When STAR Tolerance Rings are used to fasten ball knobs to connecting rods, for example, they eliminate the need for the usual thread on the rod and in the ball knob. Unlike threaded connections, joints made with STAR Tolerance Rings will never loosen.

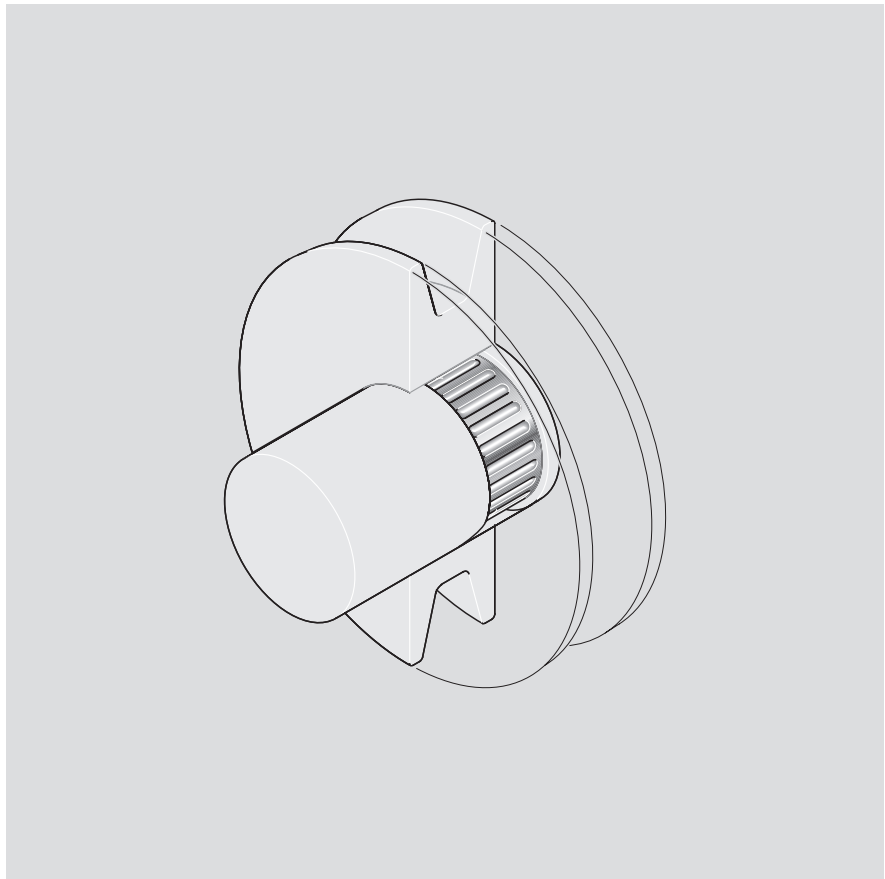


Fastening of a labyrinth ring on a shaft using a STAR Tolerance Ring

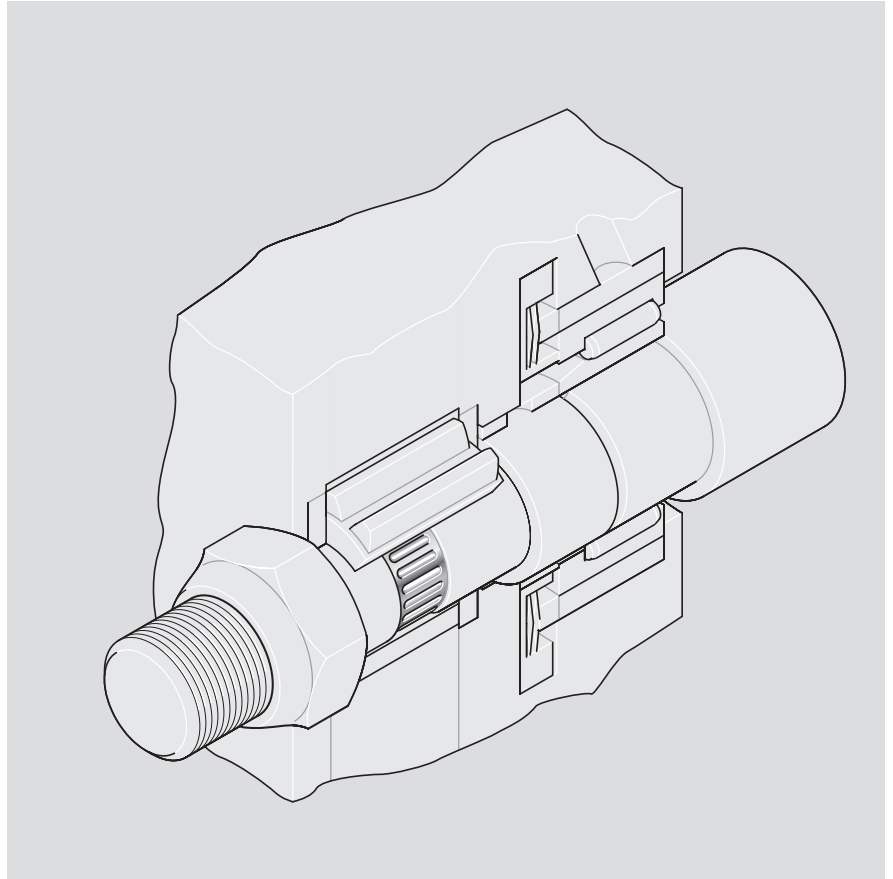
Tolerance rings for fastening of machine parts to transmit torque

The fastening of belt pulleys, flywheels or fan rotors involves transmission of defined axial or circumferential forces.

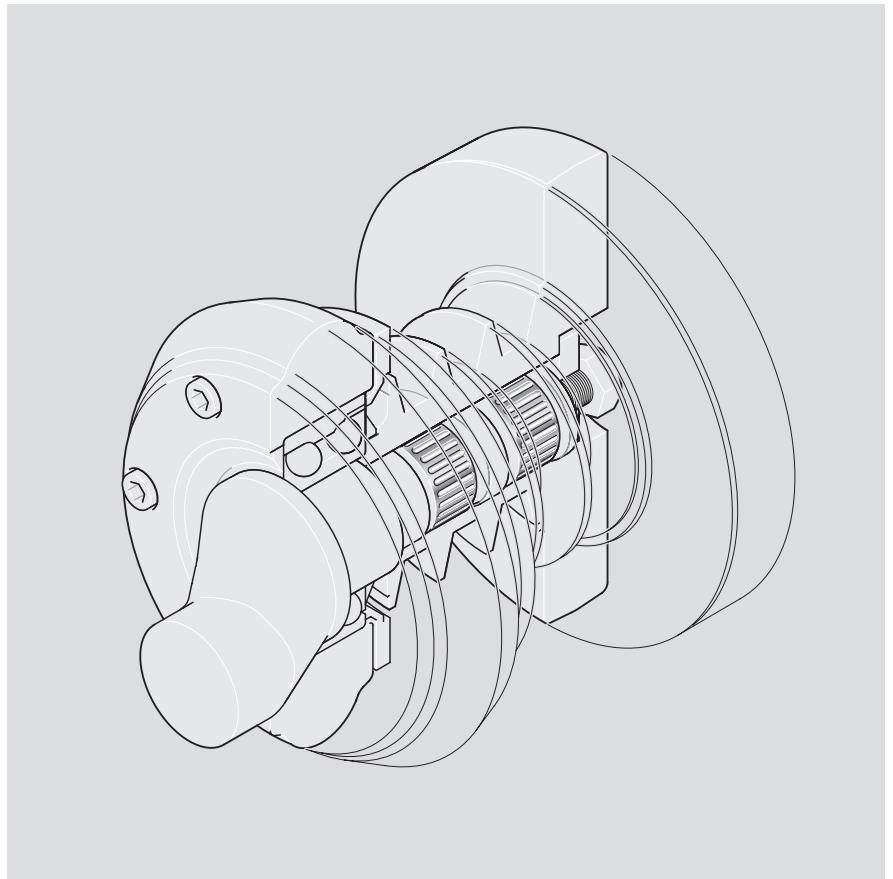
The assembly forces and transmittable torque depend very much on the design and finish of the parts to be joined and can differ greatly in practice from the values given in the tables.



Fastening of a V-belt pulley on a shaft (instead of a contour-locking joint with keyway).



Pinion fastening with Star Tolerance Ring in turbomolecular pumps.



Tandem mounting of Star Tolerance Rings in a mowing machine drive.

STAR – Tolerance Rings

General

Materials

Top-quality spring steel strip made from carbon steel or stainless steel (austenitic)

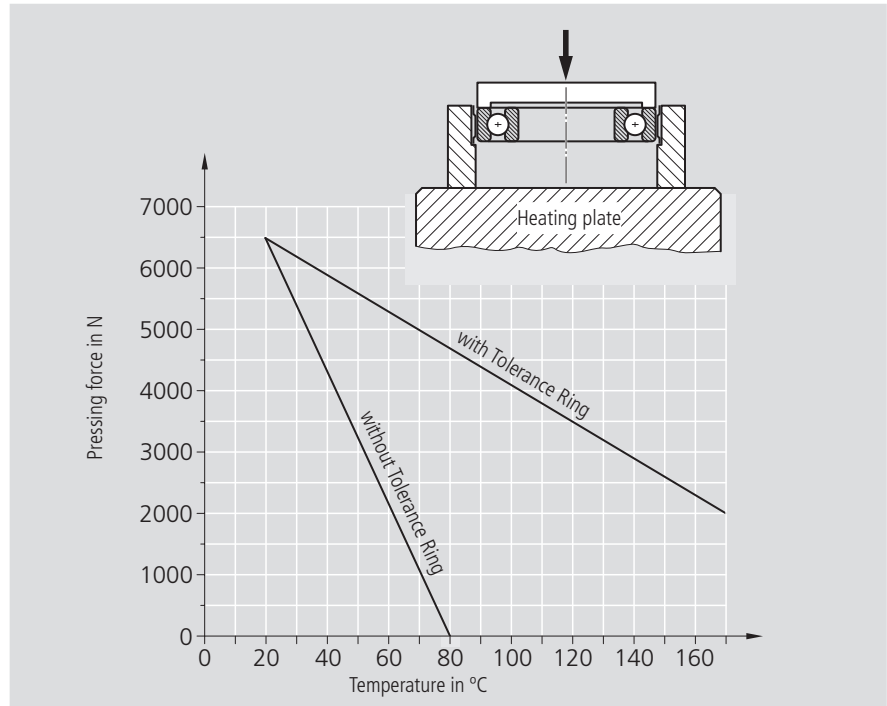
Temperature resistance

Tolerance rings made from carbon steel

up to 200°C continuous;
brief peaks up to 250°C
(no deterioration of spring qualities).

Tolerance rings made from stainless steel

up to 250°C continuous;
brief peaks up to 300°C
(no deterioration of spring qualities).

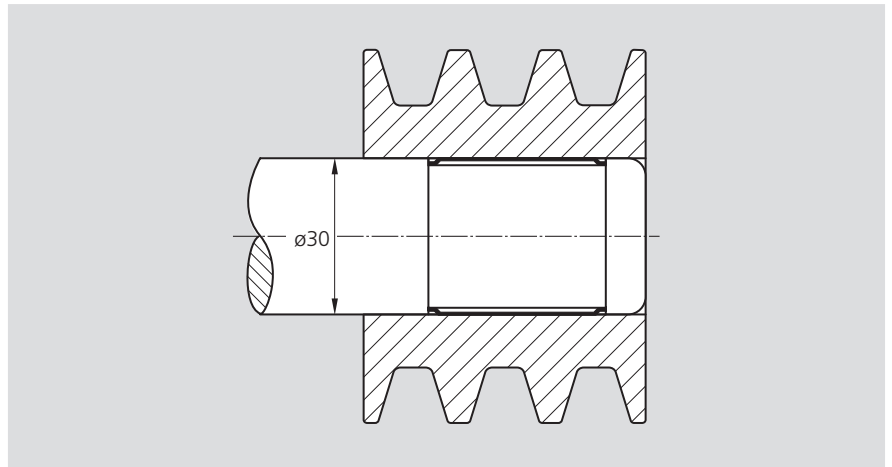


The graph shows the mounting of rolling bearings of 200 mm diameter at a temperature of 20°C with and without a tolerance ring. In both cases the pressing force is initially 6500 N. As the temperature rises, the pressing force falls.

For rolling bearings mounted without a tolerance ring, the pressing force falls to zero at a temperature of 80°C, whereas with a tolerance ring there is still a small pressure force of 2000 N at a temperature of 170°C.

Tolerance ring joints for transmission of torque

Very often, an axial or circumferential force of known magnitude is to be transmitted. Examples include the mounting of pulleys, flywheels or fan rotors, to name but a few.



This figure shows a V-belt pulley fastened to a shaft by means of a Tolerance Ring 0820-030-08. The connection transfers a torque M of at least 88 Nm.

This corresponds to an E-motor output of $P = 4.3$ kW at a speed $n = 1400 \text{ min}^{-1}$ and a safety factor of $S = 3$ for the starting torque

Transmission of torque

Polar moment of inertia

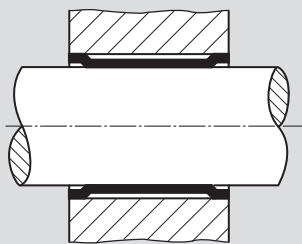
$$W_p = \frac{d^3 \cdot \pi}{16} \text{ [cm}^3\text{]}$$

The figures below show tolerance ring joints in **free** and **centered** arrangements as compared with a **conventional contour-locking** connection for the same shaft diameters.

Conventional fastening methods necessitate the machining of keyways into the shafts and bores of the mating parts. These keyways weaken the shaft and thus reduce the polar moment of inertia W_p . This disadvantage does not apply when STAR Tolerance Rings are used.

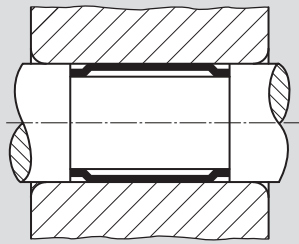
The polar moment of inertia W_p remains constant in the free arrangement and is reduced only very slightly in the centered arrangement.

Free arrangement, Series 0810



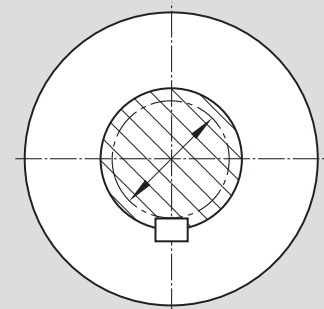
Shaft diameter = 30 mm
Polar moment of inertia $W_p = 5.3 \text{ cm}^3$

Centered arrangement, Series 0820



Shaft diameter = 30 mm
Polar moment of inertia $W_p = 4.3 \text{ cm}^3$

Conventional connection



Shaft diameter = 30 mm
Polar moment of inertia $W_p = 2.0 \text{ cm}^3$

STAR – Tolerance Rings

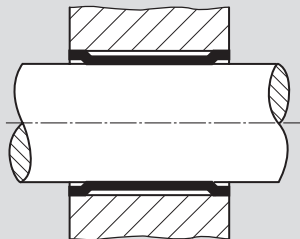
General

Design hints

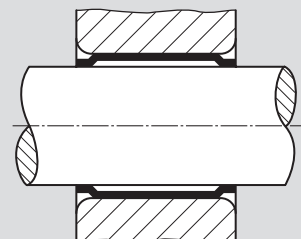
Free arrangement

This arrangement is suitable for series 0810 and 0820 rings. It is extremely economical because the ring is simply placed between the straight, cylindrical surfaces of the bore and shaft. However, the assembly may be slightly off-center, and allowance must be made for a reduction of about 20% in the torques M given in the tables.

Free arrangement, Series 0810



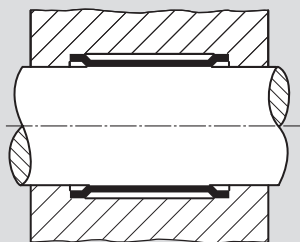
Free arrangement, Series 0820



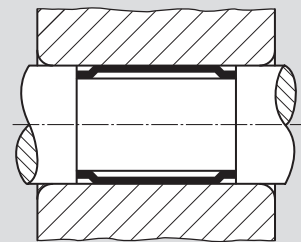
Centered arrangement

This arrangement is used when perfect concentricity is required or when circumferential or major radial impact loads are to be expected. Selection of the appropriate fit between shaft and bore keeps run-out within the required tolerance limits, at the same time providing shock absorption to protect the tolerance rings from damage.

Centered arrangement, Series 0810

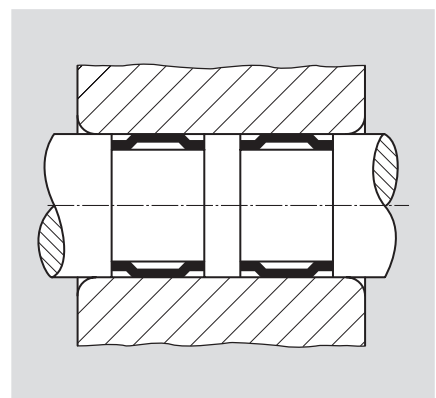
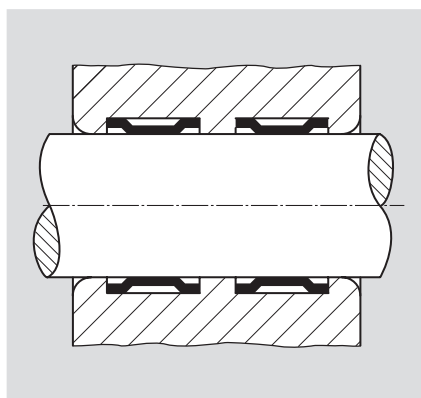


Centered arrangement, Series 0820



Tandem mounting of tolerance rings

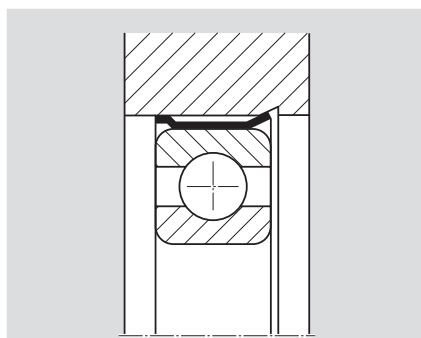
If the load permissible on one tolerance ring is exceeded in a given application, it is possible to fit two or more tolerance rings end to end until the sum of their load ratings exceeds the load to be carried. However, it is important to ensure that the individual tolerance rings of the assembly are separated by webs to prevent adjacent tolerance rings from slipping over each other during mounting.



Note: The shaft tips should not be aligned.

Tolerance rings with slanting edge

The slanting edge keeps the tolerance ring fixed in place. This version is mainly used to mount large rolling bearings in light metal housings.



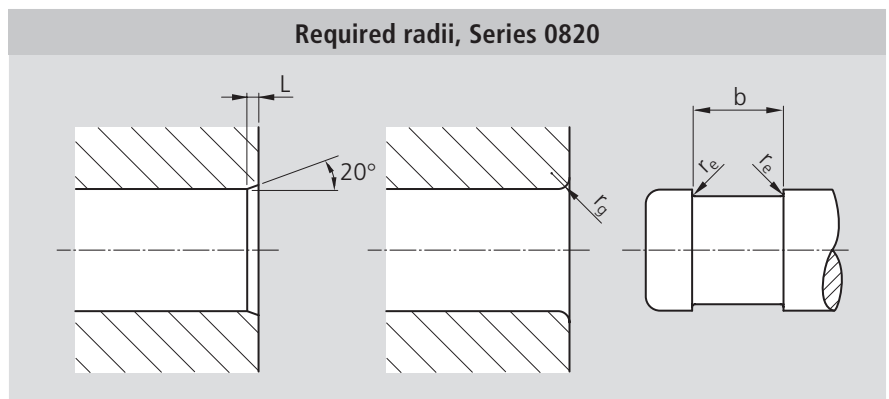
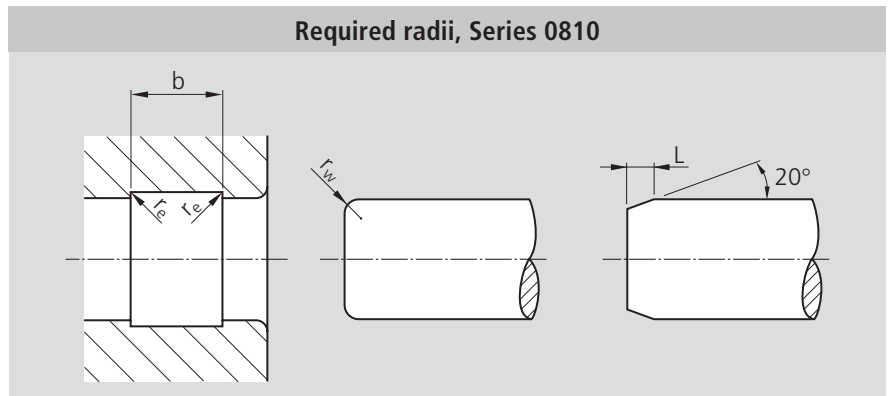
Design of mating parts

In order to ensure maximum effect and long life and to prevent damage to the tolerance rings, the following must be observed in the design of the mating parts:

When series 0810 tolerance rings are to be used, the leading edge of the shaft must be rounded to radius r_w ; series 0820 requires a radius r_g at the leading edge of the bore.

When the centered arrangement is to be used, the transition radii r_e at the walls of the retaining grooves in the bore and shaft should be as small as possible to ensure that the tolerance rings sit firmly against the walls of the grooves. Retaining groove b requires a C13 fit. Details concerning the correct radius and groove width tolerance limits are given in the tables.

If the radii indicated cannot be made, we recommend a chamfer of 20° .



Size of radii r_e , r_g and r_w

Bore or shaft diameter (mm)	r_g, r_w (mm)	Chamfer 20° L in mm
≤ 16	1.0	1.5
$> 16 \leq 48$	1.25	2.0
$> 48 \leq 120$	1.5 - 2.0	2.5
$> 120 \leq 240$	3.0 - 4.0	3.5
> 240	4.0 - 5.0	4.5
$r_e \leq \text{to } 0.2 r_g$		

C13 tolerance limits for groove width b

Nominal dimension (mm)	C13 tolerance limit (μm)
≤ 10	+ 300 + 80
$> 10 \leq 18$	+ 365 + 95
$> 18 \leq 30$	+ 440 + 110
$> 30 \leq 40$	+ 510 + 120
$> 40 \leq 50$	+ 520 + 130
$> 50 \leq 65$	+ 600 + 140
$> 65 \leq 80$	+ 610 + 150

STAR – Tolerance Rings

General

Shaft and bore tolerances

The tolerance limits chosen for shaft and bore diameters determine the fit between the two elements and thus the holding capacity of the tolerance ring assembly.

See Tolerance Ring tables for dimensions.

Please note the following:

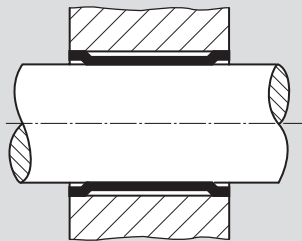
a) Shaft tolerances are permissible up to ISO h9, bore tolerances up to ISO H9, in exceptional cases up to ISO h11 resp. H11.

b) The tolerances quoted for the mounting of rolling bearings and for torque transfer refer to the combinations steel on steel or steel on many nonferrous metals. They apply to temperatures up to 100°C. Applications should be tested if they involve materials that differ considerably from steel in their strength properties.

c) The torque capacities given in the tables apply to the centered arrangement. If the free arrangement is used, a reduction of 20% must be allowed for.

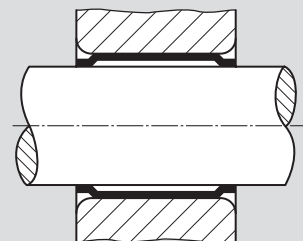
Free arrangement, Series 0810

Standard shaft system



Free arrangement, Series 0820

Standard bore system



Calculation

Guide values

With the aid of the formulas given below you can approximately calculate the values that determine the size of tolerance ring required for your application.

If you prefer, Rexroth STAR can do this for you.

In this case, please use the form on page 30.

Known:	Output Speed Max. radial load	P [kW] [1 HP = 0.736 kW] n [min ⁻¹] F [N]
Selected:	Safety factor S Guide values:	for fastening pulleys 2.5 - 3 reversible motion 6
Torque calculation		1) Calculation of mounting force: $\frac{7 \cdot M \text{ (catalog)}}{d} \text{ [N]}$
$M = \frac{9550 \cdot P}{n} \cdot S$		1) Calculation of axial seating capacity: $\frac{2 \cdot M \text{ (catalog)}}{d} \text{ [N]}$
M = torque [Nm]		d = tolerance ring diameter in mm

1) These values to be taken as guide values only.

Selection criteria

For radial and circumferential radial loads, choose the centered arrangement.

The transferable torque capacities and radial loads indicated in the tables are standard values only. These values may be influenced by the strength, surface hardness, surface roughness and lubrication of mounting parts and can thus vary greatly.

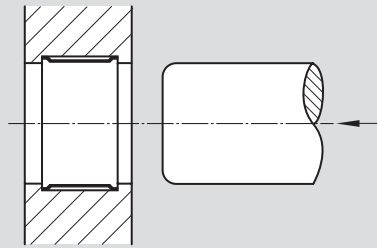
STAR – Tolerance Rings Mounting Instructions

Mounting

Always use a new tolerance ring when assembling parts!

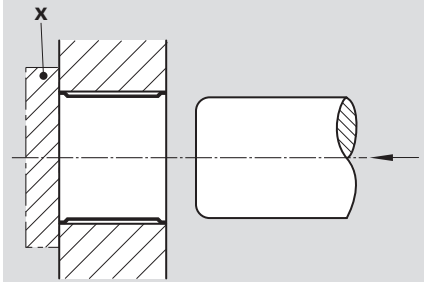
Centered arrangement, Series 0810-

The tolerance ring is placed in the housing, then the shaft pressed into the ring.



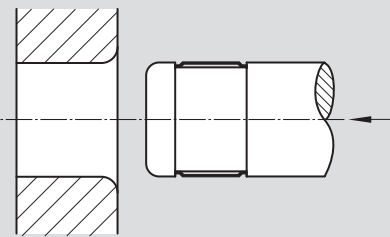
Free arrangement, Series 0810-

The tolerance ring is placed in the bore and a piece of flat stock (x) used to support it while the shaft is pressed into place.



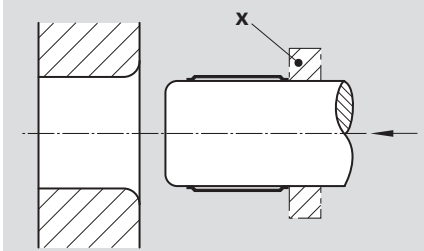
Centered arrangement, Series 0820-

The tolerance ring is first placed in the shaft groove, then the shaft with the ring in place is pressed into the bore.



Free arrangement, Series 0820-

The tolerance ring is placed around the straight shaft and a piece of flat stock (x) is used to brace the ring as the shaft is pressed into place.



Part Number / Ordering Example

Part number		08 .. -	... -	..
Series	10 = Series 0810 (AN) 20 = Series 0820 (BN) 01 = Series 0801 (ANL) only available in stainless steel 04 = Series 0804 (ANS)			
Tolerance ring diameter (d)				
Code for tolerance ring width (b) / material	from 01 to 49 = carbon steel from 51 to 99 = stainless steel			

Ordering Example		0810 -	010 -	54
Series	10 = Series 0810 (AN)			
Tolerance ring diameter (d)	d = 10			
Tolerance ring width (b) / material	b = 12 / stainless steel			

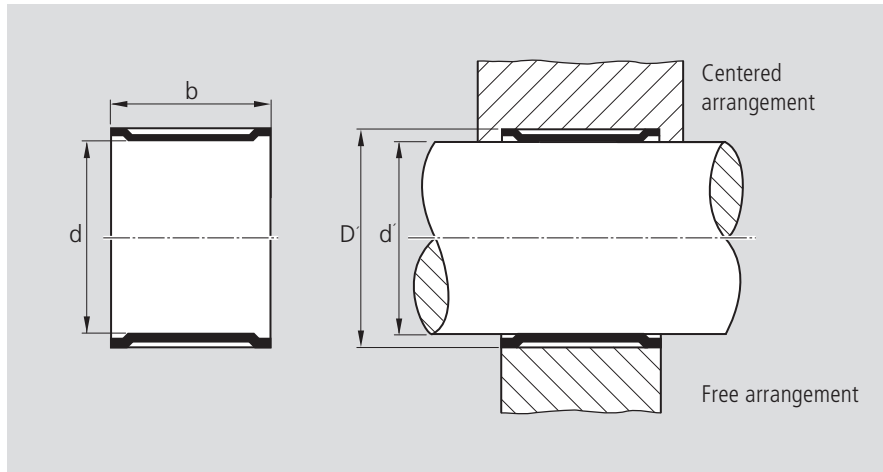
Please always use the nine-digit part number when ordering.

We have listed the part numbers in full in the following tables to make your choice easier.

For large quantities, many different special versions are available on request.

STAR – Tolerance Rings

Tolerance Ring Series 0810 (AN)



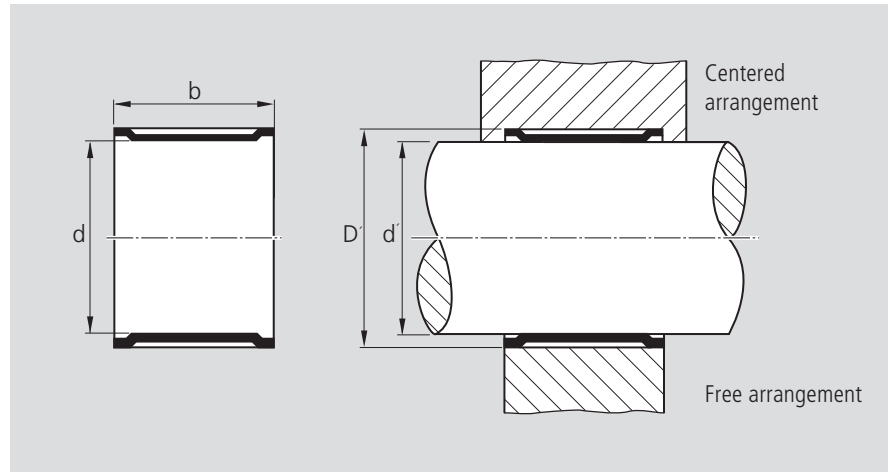
Part number	old	Carbon steel	Stainless steel	Tolerance ring dimensions (mm)		Shaft or bore diameter ¹⁾ (mm)			Load ¹⁾		
				d	b	Shaft d' h9	Bore for mounting rolling bearings D'	Bore for torque transfer D'	Torque capacity ³⁾ M (Nm)	Permissible radial load ²⁾ F (N)	Weight kg/1000 pieces approx.
0810-006-01	AN 6 x 6	●		6	6	6	6.985 6.93	6.86 6.82	0.5	600	0.16
0810-010-51	AN 10 x 4			10	4	10	11.48 11.41	11.30 11.23	1.0	1000	0.25
0810-010-52	AN 10 x 6		6		2.0				1500	0.35	
0810-010-53	AN 10 x 10	●	10		3.0				2100	0.60	
0810-010-54	AN 10 x 12		12		3.5				2600	0.78	
0810-012-51	AN 12 x 4			12	4	12	13.48 13.41	13.30 13.23	1.5	1200	0.30
0810-012-52	AN 12 x 6		6		2.0				1800	0.40	
0810-012-53	AN 12 x 10	●	10		3.5				2400	0.70	
0810-012-54	AN 12 x 12		12		4.2				2900	0.80	
0810-014-51	AN 14 x 8			14	8	14	15.48 15.41	15.30 15.23	5.5	2000	0.65
0810-014-52	AN 14 x 12		12		7.5				3700	0.95	
0810-014-53	AN 14 x 14	●	14		8.0				4200	1.10	
0810-015-51	AN 15 x 8				15				8	15	16.48 16.41
0810-015-52	AN 15 x 12		12	8.5		4000	1.00				
0810-015-53	AN 15 x 14	●	14	10.0		4700	1.25				
0810-016-51	AN 16 x 5			16		5	16	17.48 17.41	17.30 17.23		
0810-016-52	AN 16 x 8		8		7.0	2400				0.70	
0810-016-53	AN 16 x 10	●	10		8.0	2800				0.90	
0810-016-54	AN 16 x 12		12		9.5	3500				1.05	
0810-018-01	AN 18 x 6	●		18	6	18	19.98 19.89	19.75 19.67	6.0	1900	0.90
0810-018-02	AN 18 x 10		10		11.0				4300	1.50	
0810-018-03	AN 18 x 16		16		17.0				8000	2.40	

1) Please refer to the sections "General" and "Calculation".

2) Severely reduced in pulsating and alternating load applications. Please inquire.

3) For guide values, see "Calculation" section, 20% lower in free arrangement.

Tolerance Ring Series 0810 (AN)



Part number	old	Material		Tolerance ring dimensions (mm)		Shaft or bore diameter ¹⁾ (mm)			Load ¹⁾		
		Carbon steel	Stainless steel	d	b	Shaft d' h9	Bore for mounting rolling bearings D'	Bore for torque transfer D'	Torque capacity ³⁾ M (Nm)	Permissible radial load ²⁾ F (N)	Weight kg/1000 pieces approx.
0810-019-01	AN 19 x 6				6						
0810-019-02	AN 19 x 10	●		19	10	19	20.98	20.75	7	1900	0.95
0810-019-03	AN 19 x 16				16				13	4500	1.60
0810-020-01	AN 20 x 12				12				21	8500	2.50
0810-020-02	AN 20 x 14	●		20	14	20	21.98	21.75	18	6100	2.05
0810-020-03	AN 20 x 16				16				21	7500	2.30
0810-020-04	AN 20 x 20				20				24	8500	2.65
0810-022-01	AN 22 x 7				7				30	12000	3.30
0810-022-02	AN 22 x 10	●		22	10	22	23.98	23.75	16	3000	1.30
0810-022-03	AN 22 x 16				16				17	5400	1.80
0810-022-04	AN 22 x 20				20				28	9000	2.90
0810-024-01	AN 24 x 16	●		24	16	24	25.98	25.75	35	11000	3.75
0810-024-02	AN 24 x 20				20				32	11000	3.15
0810-024-03	AN 24 x 7				7				45	15000	3.70
0810-025-01	AN 25 x 10	●		25	10	25	26.98	26.75	18	3600	1.45
0810-025-02	AN 25 x 16				16				24	6200	2.05
0810-025-03	AN 25 x 20				20				35	12000	3.20
0810-028-01	AN 28 x 10	●		28	10	28	29.98	29.75	47	15000	4.05
0810-028-02	AN 28 x 12				12				30	7200	2.20
0810-028-03	AN 28 x 20				20				36	10000	1.70
0810-028-04	AN 28 x 30				30				57	17000	4.50
0810-030-01	AN 30 x 12	●		30	12	30	31.98	31.75	86	26000	6.80
0810-030-02	AN 30 x 16				16				45	10000	3.00
0810-030-03	AN 30 x 30				30				51	14000	3.90
									97	27000	7.25

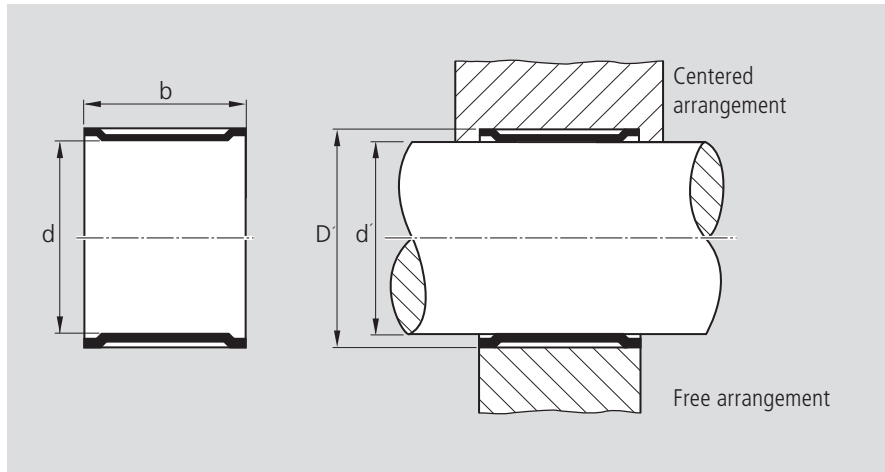
1) Please refer to the sections "General" and "Calculation".

2) Severely reduced in pulsating and alternating load applications. Please inquire.

3) For guide values, see "Calculation" section, 20% lower in free arrangement.

STAR – Tolerance Rings

Tolerance Ring Series 0810 (AN)



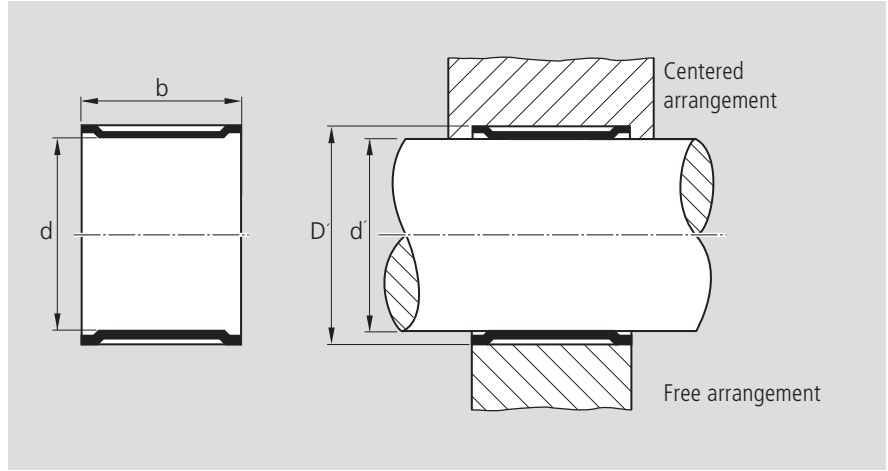
Part number	old	Carbon steel	Stainless steel	Tolerance ring dimensions (mm)		Shaft or bore diameter ¹⁾ (mm)			Load ¹⁾		
				d	b	Shaft d' h9	Bore for mounting rolling bearings D'	Bore for torque transfer D''	Torque capacity ³⁾ M (Nm)	Permissible radial load ²⁾ F (N)	Weight kg/1000 pieces approx.
0810-032-01	AN 32 x 8	●		32	8	32	33.98	33.75	33	3000	3.00
0810-032-02	AN 32 x 10			32	10		33.89	33.67	39	4300	3.45
0810-032-03	AN 32 x 14				14				55	6800	4.80
0810-035-01	AN 35 x 10	●		35	10	35	36.98	36.75	44	4800	3.75
0810-035-02	AN 35 x 14				14		36.89	36.67	64	7500	5.25
0810-040-01	AN 40 x 10				10				60	5400	4.25
0810-040-02	AN 40 x 12	●		40	12	40	41.98	41.75	74	6900	5.10
0810-040-03	AN 40 x 16				16		41.89	41.67	93	11000	6.80
0810-040-04	AN 40 x 30				30				180	20000	12.85
0810-045-01	AN 45 x 12	●		45	12	45	46.98	46.75	90	11000	55.75
0810-045-02	AN 45 x 20				20		46.89	46.67	155	16000	9.55
0810-047-01	AN 47 x 8				8				70	4500	4.00
0810-047-02	AN 47 x 14	●		47	14	47	48.98	48.75	120	10000	7.00
0810-047-03	AN 47 x 18				18		48.89	48.67	160	14000	8.95
0810-047-04	AN 47 x 20				20				200	16000	9.95
0810-047-05	AN 47 x 22				22				220	18000	10.95
0810-050-01	AN 50 x 15	●		50	15	50	52.47	52.15	150	11000	10.20
0810-050-02	AN 50 x 20				20		52.35	52.03	200	17000	13.30
0810-050-03	AN 50 x 48				48				380	40000	31.90

1) Please refer to the sections "General" and "Calculation".

2) Severely reduced in pulsating and alternating load applications. Please inquire.

3) For guide values, see "Calculation" section, 20% lower in free arrangement.

Tolerance Ring Series 0810 AN

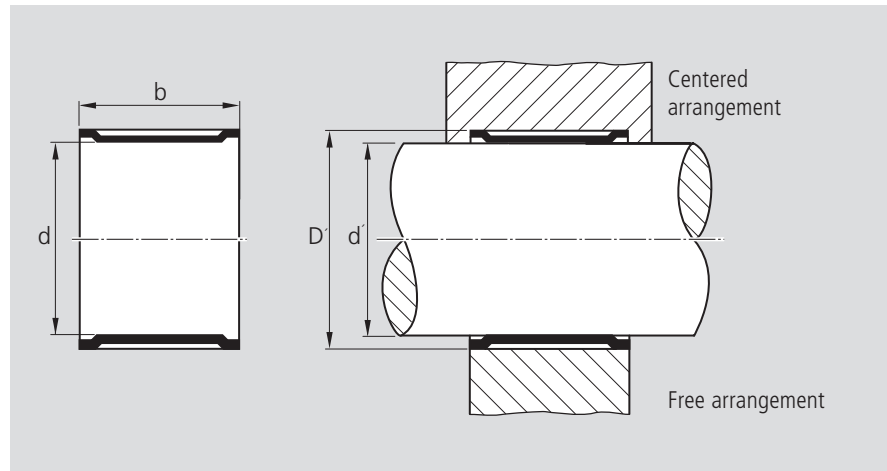


Part number	old	Carbon steel	Stainless steel	Tolerance ring dimensions (mm)		Shaft or bore diameter ¹⁾ (mm)			Load ¹⁾				
				d	b	Shaft d' h9	Bore for mounting rolling bearings D'	Bore for torque transfer D'	Torque capacity ³⁾ M (Nm)	Permissible radial load ²⁾ F (N)	Weight kg/1000 pieces approx.		
0810-052-01	AN 52 x 8	●		52	8	52	54.47	54.15	90	5000	5.50		
0810-052-02	AN 52 x 15				15		54.35	54.03	170	12000	10.40		
0810-052-03	AN 52 x 20				20				230	18000	13.80		
0810-055-01	AN 55 x 15	●		55	15	55	57.47	57.15	210	14000	11.20		
0810-055-02	AN 55 x 20				20		57.35	57.03	260	19000	14.60		
0810-060-01	AN 60 x 15	●			60		15	60	62.47	62.15	270	15000	12.20
0810-060-02	AN 60 x 25			25		62.35	62.03		440	25000	19.90		
0810-062-01	AN 62 x 9			62		9	62		64.47	64.15	190	7100	7.45
0810-062-02	AN 62 x 10				10	64.35		64.03			200	8200	8.20
0810-062-03	AN 62 x 15	●			15						300	14000	12.60
0810-062-04	AN 62 x 20				20						400	21000	16.40
0810-062-05	AN 62 x 25				25						500	26000	20.50
0810-065-01	AN 65 x 25	●		65	25	65	67.47	67.15	520	26000	21.50		
0810-065-03	AN 65 x 63				63		67.37	67.03	850	66000	54.20		
0810-070-01	AN 70 x 15			70	15	70	72.47	72.15	400	16000	13.85		
0810-070-02	AN 70 x 25	●			25				72.35	72.03	550	29000	23.10
0810-070-03	AN 70 x 48				48				72.35	72.03	800	55000	45.50
0810-070-04	AN 70 x 63				63						1000	73000	58.10
0810-072-01	AN 72 x 10	●		72	10	72	74.47	74.15	230	9500	9.50		
0810-072-02	AN 72 x 20				20		74.35	74.03	490	25000	19.00		

1) Please refer to the sections "General" and "Calculation".
 2) Severely reduced in pulsating and alternating load applications. Please inquire.
 3) For guide values, see "Calculation" section, 20% lower in free arrangement.

STAR – Tolerance Rings

Tolerance Ring Series 0810 (AN)



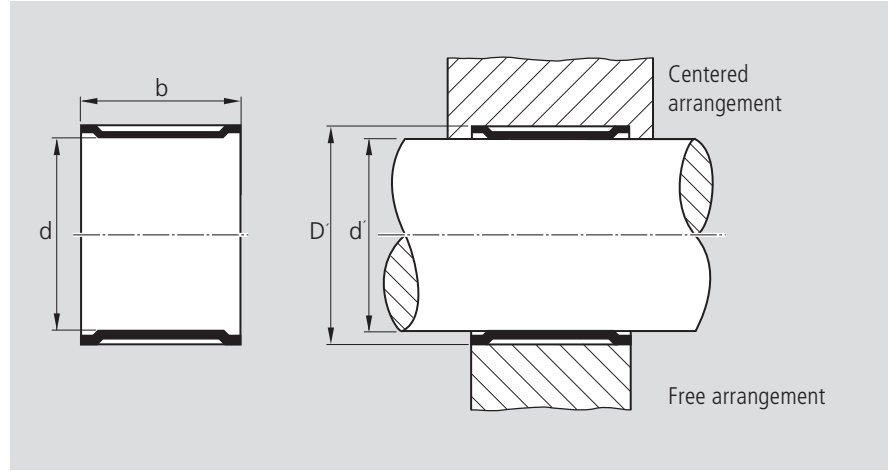
Part number	old	Carbon steel	Stainless steel	Tolerance ring dimensions (mm)		Shaft or bore diameter ¹⁾ (mm)			Load ¹⁾													
				d	b	Shaft d' h9	Bore for mounting rolling bearings D'	Bore for torque transfer D'	Torque capacity ³⁾ M (Nm)	Permissible radial load ²⁾ F (N)	Weight kg/1000 pieces approx.											
0810-075-01	AN 75 x 20	●		75	20	75	77.47	77.15	600	25000	20.10											
0810-075-02	AN 75 x 30				30		77.35	77.03				800	36000	29.70								
0810-080-01	AN 80 x 10			80	10	80	82.47	82.15	240	10000	10.60											
0810-080-02	AN 80 x 12				12							82.35	82.03	280	13000	12.65						
0810-080-03	AN 80 x 20	●			20												630	28000	21.20			
0810-080-04	AN 80 x 25				25															750	75000	26.35
0810-080-05	AN 80 x 30				30																	
0810-090-01	AN 90 x 15			15	560	22000	21.40															
0810-090-02	AN 90 x 23	●		23				870	35000	32.80												
0810-090-03	AN 90 x 32			32							1250	50000	45.60									
0810-095-01	AN 95 x 19	●		19	95	97.96 97.82	97.56 97.42							960	30000	27.00						
0810-100-01	AN 100 x 15			15				100	102.96 102.82	102.56 102.42							950	25000	24.50			
0810-100-02	AN 100 x 19	●		19	1050	30000	30.50															
0810-100-03	AN 100 x 25			25							1300	43000	39.40									
0810-110-01	AN 110 x 15			15				110	112.96 112.82	112.56 112.42				1150	28000	26.00						
0810-110-02	AN 110 x 19	●		19	1350	35000	33.00															
0810-110-03	AN 110 x 28			28							1750	52000	48.50									
0810-120-01	AN 120 x 19	●		19				120	122.96 122.82	122.56 122.42				1300	36000	35.80						

1) Please refer to the sections "General" and "Calculation".

2) Severely reduced in pulsating and alternating load applications. Please inquire.

3) For guide values, see "Calculation" section, 20% lower in free arrangement.

Tolerance Ring Series 0810 (AN)

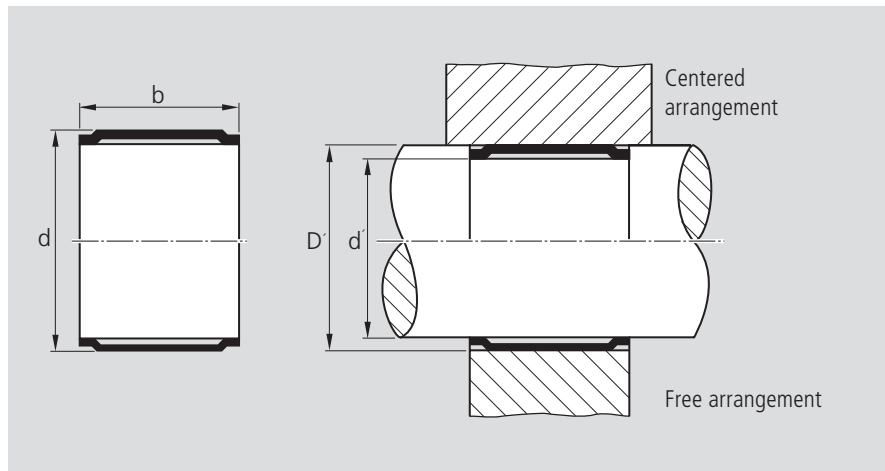
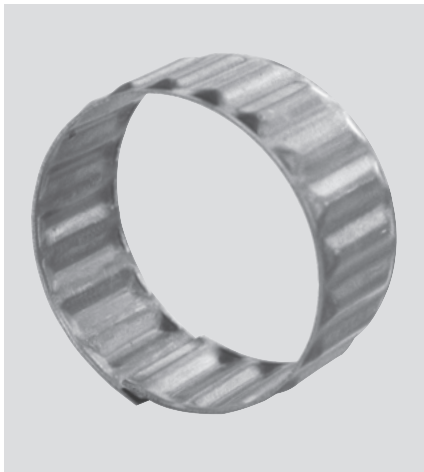


Part number		Carbon steel	Stainless steel	Tolerance ring dimensions (mm)		Shaft or bore diameter ¹⁾ (mm)			Load ¹⁾		
	old			d	b	Shaft d' h9	Bore for mounting rolling bearings D'	Bore for torque transfer D'	Torque capacity ³⁾ M (Nm)	Permissible radial load ²⁾ F (N)	Weight kg/1000 pieces approx.
0810-125-01	AN 125 x 22	●		125	22	125	128.96 128.80	128.48 128.32	1300	40000	50.80
0810-140-01	AN 140 x 24	●		140	24	140	143.96 143.80	143.48 143.32	1800	51000	61.80
0810-145-01	AN 145 x 24	●		145	24	145	148.96 148.80	148.48 148.32	1950	53000	64.00
0810-150-02	AN 150 x 42	●		150	42	150	153.96 153.80	153.48 153.32	2800 3400	70000 92000	91.00 116.00
0810-160-01	AN 160 x 24	●		160	24	160	163.96 163.80	163.48 163.32	2400 3000 2550	60000 73000 64000	70.50 97.00 76.50
0810-160-02	AN 160 x 33				33						
0810-160-04	AN 160 x 26				26						
0810-180-01	AN 180 x 33	●		180	33	180	183.96 183.80	183.48 183.32	3600	75000	123.00
0810-200-03	AN 200 x 31	●		200	31	200	204.95 204.77	204.40 204.22	4100	92000	130.00
0810-210-01	AN 210 x 33	●		210	33	210	214.95 214.77	214.40 214.22	4900	99000	145.00

1) Please refer to the sections "General" and "Calculation".
 2) Severely reduced in pulsating and alternating load applications. Please inquire.
 3) For guide values, see "Calculation" section, 20% lower in free arrangement.

STAR – Tolerance Rings

Tolerance Ring Series 0820 (BN)



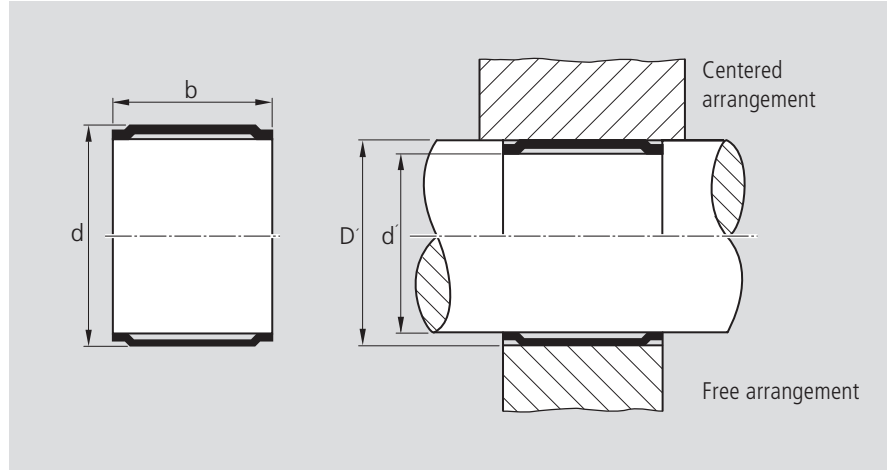
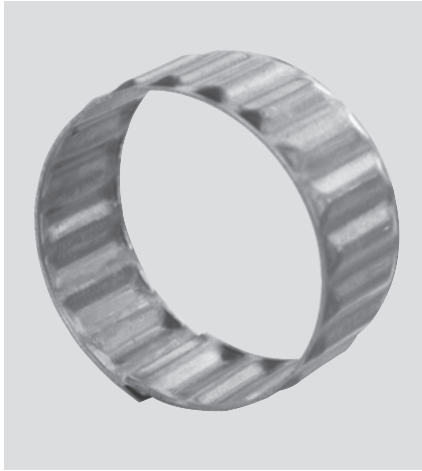
Part number	old	Carbon steel	Stainless steel	Tolerance ring dimensions (mm)		Shaft or bore diameter ¹⁾ (mm)			Load ¹⁾				
				d	b	Bore D _{h9}	Shaft for mounting rolling bearings d'	Shaft for torque transfer d'	Torque capacity ³⁾ M (Nm)	Permissible radial load ²⁾ F (N)	Weight kg/1000 pieces approx.		
0820-005-01	BN 5 x 5	●		5	5	5	4.06	4.18	0.20	250	0.09		
0820-005-02	BN 5 x 6				6		4.01	4.14	0.25	300	0.13		
0820-005-03	BN 5 x 8				8				0.35	400	0.14		
0820-006-01	BN 6 x 6	●		6	6	6	5.06	5.18	0.40	400	0.15		
0820-006-02	BN 6 x 8				8		5.01	5.14	0.55	500	0.16		
0820-006-03	BN 6 x 10				10				0.70	700	0.26		
0820-008-51	BN 8 x 7	●		8	7	8	6.57	6.71	0.75	800	0.28		
0820-008-52	BN 8 x 8				8		6.51	6.65	0.90	1000	0.33		
0820-008-53	BN 8 x 10				10				1.30	1400	0.42		
0820-010-51	BN 10 x 10	●		10	10	10	8.57	8.71	3.0	1800	0.50		
0820-010-52	BN 10 x 12				12		8.51	8.65	3.6	2100	0.60		
0820-010-53	BN 10 x 14				14				4.2	2500	0.70		
0820-011-52	BN 11 x 10	●		11	10	11	9.57	9.71	3.5	2000	0.55		
0820-011-53	BN 11 x 14				14		9.51	9.65	5.0	2800	0.70		
0820-012-51	BN 12 x 6	●		12	6	12	10.59	10.77	2.0	900	0.40		
0820-012-52	BN 12 x 8				8				10.52	10.70	3.0	1600	0.50
0820-012-53	BN 12 x 10				10						3.5	2300	0.60
0820-012-54	BN 12 x 12				12						4.5	2900	0.70
0820-012-55	BN 12 x 14				14						5.0	3600	0.85
0820-012-56	BN 12 x 18				18						7.0	5000	1.10

1) Please refer to the sections "General" and "Calculation".

2) Severely reduced in pulsating and alternating load applications. Please inquire.

3) For guide values, see "Calculation" section, 20% lower in free arrangement.

Tolerance Ring Series 0820 (BN)

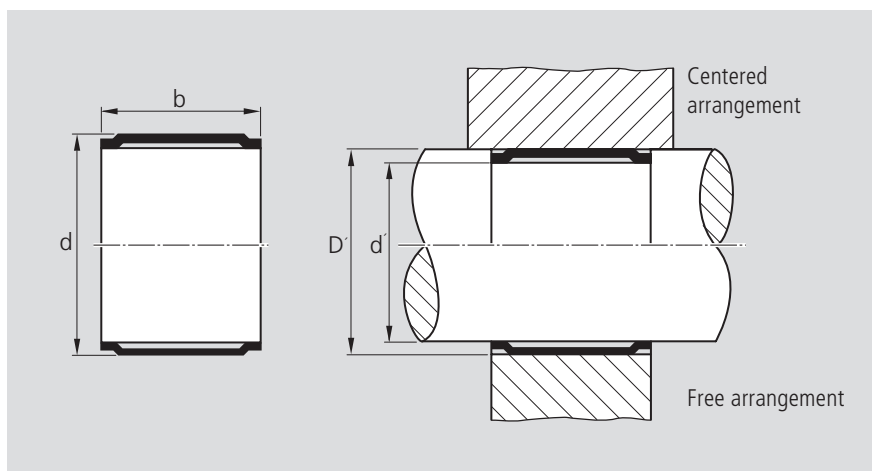


Part number	old	Carbon steel	Stainless steel	Tolerance ring dimensions (mm)		Shaft or bore diameter ¹⁾ (mm)			Load ¹⁾		
				d	b	Bore D' h9	Shaft for mounting rolling bearings d'	Shaft for torque transfer d'	Torque capacity ³⁾ M (Nm)	Permissible radial load ²⁾ F (N)	Weight kg/1000 pieces approx.
0820-014-52	BN 14 x 10				10				5	2500	0.75
0820-014-53	BN 14 x 14		●	14	14	14	12.59	12.77	7	4100	1.00
0820-014-54	BN 14 x 15				15		12.52	12.70	7.5	4500	1.20
0820-014-55	BN 14 x 20				20				10	5000	1.65
0820-015-51	BN 15 x 6				6				3.5	1100	0.50
0820-015-52	BN 15 x 8				8				5	2000	0.60
0820-015-53	BN 15 x 10		●	15	10	15	13.59	13.77	6	2800	0.75
0820-015-54	BN 15 x 12				12		13.52	13.70	7	3500	0.90
0820-015-55	BN 15 x 14				14				8	4300	1.05
0820-016-51	BN 16 x 10				10				6.5	3100	0.80
0820-016-52	BN 16 x 14		●	16	14	16	14.59	14.77	9.5	5600	1.25
0820-016-53	BN 16 x 16				16		14.52	14.70	11	6000	1.30
0820-017-51	BN 17 x 6				6				4.5	1300	0.60
0820-017-52	BN 17 x 8				8				6	2300	0.70
0820-017-53	BN 17 x 10		●	17	10	17	15.59	15.77	8	3200	0.85
0820-017-54	BN 17 x 12				12		15.52	15.70	9	4100	1.05
0820-017-55	BN 17 x 14				14				11	5100	1.20
0820-017-56	BN 17 x 16				16				12	6300	1.35
0820-018-51	BN 18 x 10				10				9	3400	0.90
0820-018-52	BN 18 x 16		●	18	16	18	16.59	16.77	14	6500	1.50
0820-018-53	BN 18 x 22				22		16.52	16.70	20	9500	2.00

1) Please refer to the sections "General" and "Calculation".
 2) Severely reduced in pulsating and alternating load applications. Please inquire.
 3) For guide values, see "Calculation" section, 20% lower in free arrangement.

STAR – Tolerance Rings

Tolerance Ring Series 0820 (BN)



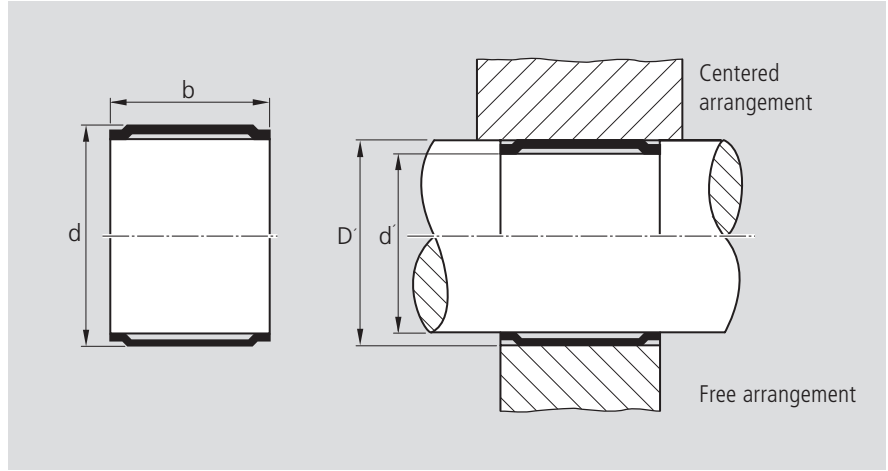
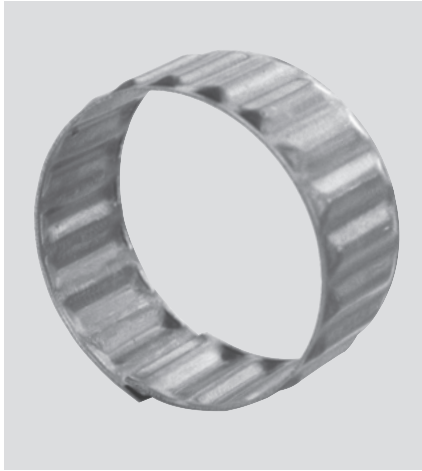
Part number		Carbon steel	Stainless steel	Tolerance ring dimensions (mm)		Shaft or bore diameter ¹⁾ (mm)			Load ¹⁾				
old	d			b	Bore D' h9	Shaft		Torque capacity ³⁾ M (Nm)	Permissible radial load ²⁾ F (N)	Weight kg/1000 pieces approx.			
						for mounting rolling bearings d'	for torque transfer d''						
0820-019-51	BN 19 x 10			19	10	19	17.59	17.77	9.5	3000	0.95		
0820-019-52	BN 19 x 19	●			19		17.52	17.70	20	8500	1.80		
0820-019-53	BN 19 x 22				22				23	9900	2.10		
0820-020-01	BN 20 x 6			20	6	20	18.11	18.33	6.5	1900	0.90		
0820-020-02	BN 20 x 8				8				18.02	18.25	9	3200	1.20
0820-020-03	BN 20 x 10				10						11	4500	1.50
0820-020-04	BN 20 x 12				12						13	5800	1.70
0820-020-05	BN 20 x 14	●			14						16	7000	2.10
0820-020-06	BN 20 x 15				15						17	7900	2.25
0820-020-07	BN 20 x 18				18						21	9900	2.70
0820-020-08	BN 20 x 20				20						23	11000	3.00
0820-020-09	BN 20 x 22				22						25	12500	3.25
0820-020-10	BN 20 x 16				16						18	8800	2.40
0820-022-01	BN 22 x 12			22	12	22	20.11	20.33			18	6000	2.00
0820-022-02	BN 22 x 15	●			15		20.02	20.25	25	8000	2.40		
0820-022-03	BN 22 x 22				22		33	13000	3.60				
0820-024-01	BN 24 x 15			24	15	24	22.11	22.33	27	8400	2.35		
0820-024-02	BN 24 x 22	●			22		22.02	22.25	39	15000	3.45		
0820-024-03	BN 24 x 24				24		43	16000	4.30				
0820-025-01	BN 25 x 8			25	8	25	23.11	23.33	14	4000	1.50		
0820-025-02	BN 25 x 10				10				20	5700	2.00		
0820-025-03	BN 25 x 12				12				24	7200	2.25		
0820-025-04	BN 25 x 14				14				28	8900	2.62		
0820-025-05	BN 25 x 15	●			15				30	10000	2.80		
0820-025-06	BN 25 x 18				18				35	12000	3.40		
0820-025-07	BN 25 x 20				20				39	14000	3.75		
0820-025-08	BN 25 x 21				21				41	15000	3.95		
0820-025-09	BN 25 x 25				25				50	18000	4.70		

1) Please refer to the sections "General" and "Calculation".

2) Severely reduced in pulsating and alternating load applications. Please inquire.

3) For guide values, see "Calculation" section, 20% lower in free arrangement.

Tolerance Ring Series 0820 (BN)



Part number	old	Carbon steel	Stainless steel	Tolerance ring dimensions (mm)		Shaft or bore diameter ¹⁾ (mm)			Load ¹⁾		
				d	b	Bore D' h9	Shaft for mounting rolling bearings d'	Shaft for torque transfer d'	Torque capacity ³⁾ M (Nm)	Permissible radial load ²⁾ F (N)	Weight kg/1000 pieces approx.
0820-028-01	BN 28 x 12	●		28	12	28	26.11	26.33	28	8000	2.25
0820-028-02	BN 28 x 20				20				16000	4.20	
0820-028-03	BN 28 x 22				22				18000	4.60	
0820-028-04	BN 28 x 25				25				20000	5.10	
0820-030-01	BN 30 x 8	●		30	8	30	28.11	28.33	27	4900	1.85
0820-030-02	BN 30 x 10				10				7000	2.30	
0820-030-03	BN 30 x 12				12				9000	2.80	
0820-030-04	BN 30 x 15				15				14000	2.85	
0820-030-05	BN 30 x 19				19				16000	4.30	
0820-030-06	BN 30 x 20				20				17000	4.35	
0820-030-07	BN 30 x 23				23				20000	5.20	
0820-030-08	BN 30 x 30				30				26000	6.80	
0820-032-01	BN 32 x 12	●		32	12	32	30.11	30.33	40	9200	2.90
0820-032-02	BN 32 x 16				16				14000	3.90	
0820-032-03	BN 32 x 23				23				21000	5.50	
0820-032-04	BN 32 x 30				30				27000	7.17	
0820-035-01	BN 35 x 8	●		35	8	35	33.13	33.40	35	3200	2.85
0820-035-02	BN 35 x 10				10				4500	3.20	
0820-035-03	BN 35 x 12				12				5800	3.35	
0820-035-04	BN 35 x 15				15				7900	3.92	
0820-035-05	BN 35 x 17				17				9200	6.00	
0820-035-06	BN 35 x 23				23				13000	8.10	
0820-035-07	BN 35 x 25				25				14000	8.80	
0820-035-08	BN 35 x 30				30				15500	10.60	

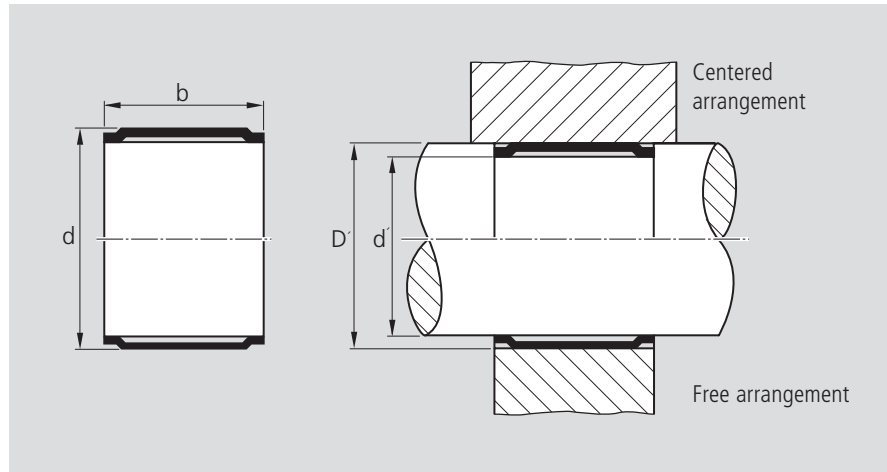
1) Please refer to the sections "General" and "Calculation".

2) Severely reduced in pulsating and alternating load applications. Please inquire.

3) For guide values, see "Calculation" section, 20% lower in free arrangement.

STAR – Tolerance Rings

Tolerance Ring Series 0820 (BN)



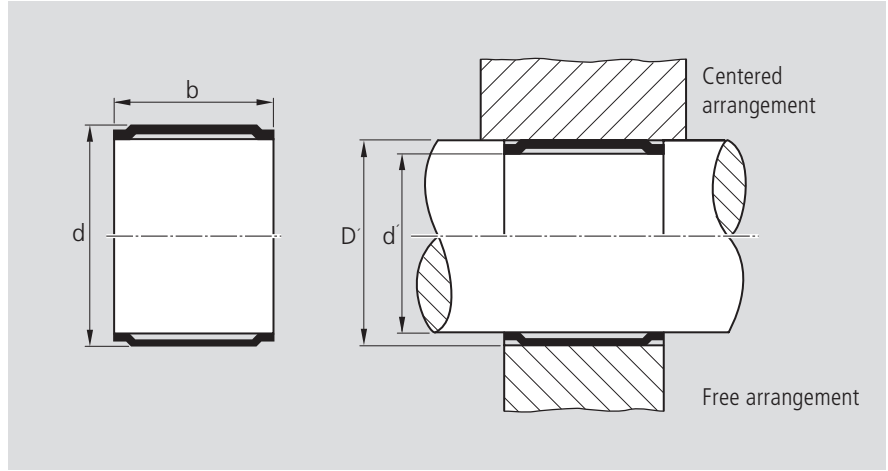
Part number		Carbon steel	Stainless steel	Tolerance ring dimensions (mm)		Shaft or bore diameter ¹⁾ (mm)			Load ¹⁾		
old	d			b	Bore D _{h9}	Shaft for mounting rolling bearings d'	Shaft for torque transfer d'	Torque capacity ³⁾ M (Nm)	Permissible radial load ²⁾ F (N)	Weight kg/1000 pieces approx.	
0820-040-01	BN 40 x 10	●		40	10	40	38.13	38.40	57	5200	4.25
0820-040-02	BN 40 x 15				15				80	9000	5.50
0820-040-03	BN 40 x 23				23				130	15000	9.30
0820-040-04	BN 40 x 30				30				176	20000	12.15
0820-040-05	BN 40 x 33				33				190	22000	13.35
0820-040-06	BN 40 x 40				40				200	24000	16.20
0820-045-01	BN 45 x 10	●		45	10	45	43.13	43.40	75	6500	5.00
0820-045-02	BN 45 x 15				15				110	10000	6.85
0820-045-03	BN 45 x 23				23				170	17000	10.50
0820-045-04	BN 45 x 25				25				180	18000	11.40
0820-045-05	BN 45 x 30				30				210	23000	13.70
0820-050-01	BN 50 x 12	●		50	12	50	48.13	48.40	110	8300	6.40
0820-050-02	BN 50 x 16				16				150	13000	8.15
0820-050-03	BN 50 x 23				23				220	19000	11.70
0820-050-04	BN 50 x 27				27				250	22000	13.75
0820-050-05	BN 50 x 30				30				280	22000	15.25
0820-050-06	BN 50 x 40				40				380	32000	20.35
0820-055-01	BN 55 x 14	●		55	14	55	52.65	52.97	160	11000	10.00
0820-055-02	BN 55 x 29				29				340	25000	20.20
0820-060-01	BN 60 x 22	●		60	22	60	57.65	57.97	320	21000	16.80
0820-060-02	BN 60 x 28				28				420	27000	21.35
0820-075-01	BN 75 x 31	●		75	31	75	72.65	72.97	780	37000	29.65
0820-075-02	BN 75 x 37				37				950	37000	35.40

1) Please refer to the sections "General" and "Calculation".

2) Severely reduced in pulsating and alternating load applications. Please inquire.

3) For guide values, see "Calculation" section, 20% lower in free arrangement.

Tolerance Ring Series 0820 (BN)

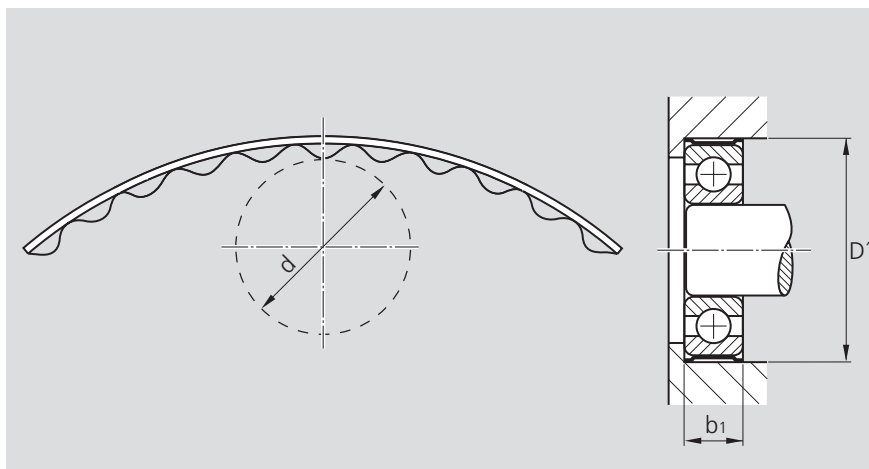
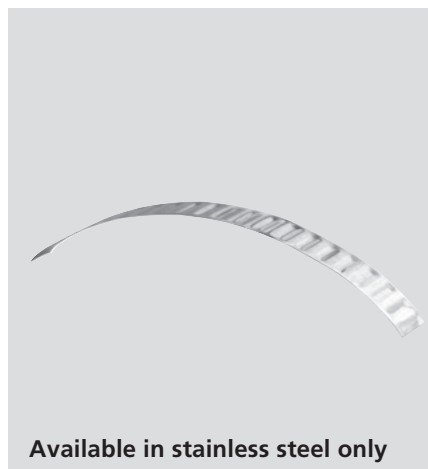


Part number		Carbon steel	Stainless steel	Tolerance ring dimensions (mm)		Shaft or bore diameter ¹⁾ (mm)			Load ¹⁾		
old	d			b	Bore D h9	Shaft for mounting rolling bearings d'	Shaft for torque transfer d'	Torque capacity ³⁾ M (Nm)	Permissible radial load ²⁾ F (N)	Weight kg/1000 pieces approx.	
0820-080-01	BN 80 x 39	●		80	39	80	77.65 77.53	77.97 77.85	1120	51000	39.80
0820-085-01	BN 85 x 22	●		85	41	85	82.18 82.04	82.58 82.44	800 1300	31000 58000	28.55 53.20
0820-085-02	BN 85 x 41										
0820-090-01	BN 90 x 24	●		90	24 30 43	90	87.18 87.04	87.58 87.44	850 1100 1550	37000 46000 64000	33.00 41.20 59.90
0820-090-02	BN 90 x 30										
0820-090-03	BN 90 x 43										
0820-120-01	BN 120 x 28	●		120	28	120	117.18 117.04	117.58 117.44	2300	56000	51.60
0820-140-01	BN 140 x 22	●		140	22	120	136.20 136.04	136.68 136.52	1250	44000	58.50
0820-180-01	BN 180 x 46	●		180	46	180	176.20 176.04	176.68 176.52	6000	118000	148.50

1) Please refer to the sections "General" and "Calculation".
 2) Severely reduced in pulsating and alternating load applications. Please inquire.
 3) For guide values, see "Calculation" section, 20% lower in free arrangement.

STAR – Tolerance Rings

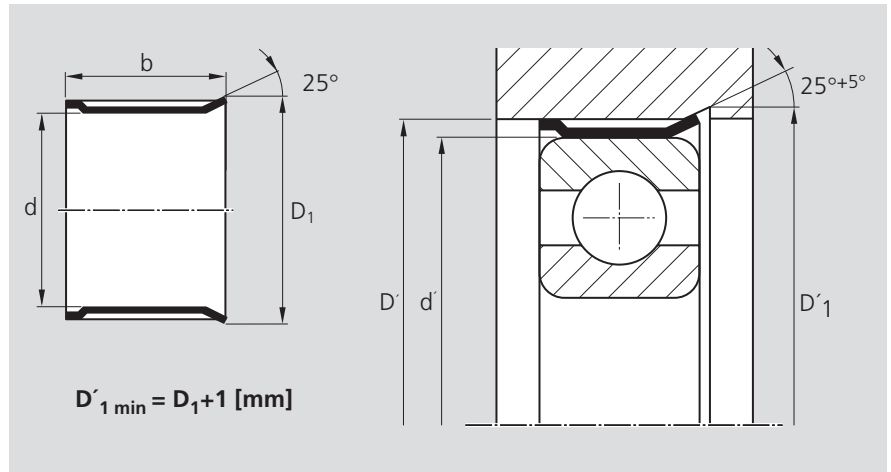
Tolerance Ring Series 0801 (ANL)



Part number	old	Tolerance ring dimensions (mm)		Shaft or bore diameter ¹⁾ (mm)		Load ¹⁾		Weight kg/1000 pieces approx.
		d	b	Rolling bearing diameter	Bore D'	Working width b ₁ ^{C13} (mm)	Permissible radial load ²⁾ F (N)	
0801-013-51	ANL 13 x 5	13	5	13 \triangleq 624 (EL 4)	13.65 13.60	5	125	0.20
0801-016-51	ANL 16 x 5	16	5	13 \triangleq 625 (EL 5)	16.65 16.60	5	150	0.21
0801-019-51	ANL 19 x 6	19	6	19 \triangleq 626 (EL 6) 604 (EL 7) 635 (R 5)	19.65 19.60	6	220	0.35
0801-022-52	ANL 22 x 7	22	7	22 \triangleq 608 (EL 8) 627 (R 7)	22.65 22.60	7	300	0.37
0801-024-51	ANL 24 x 7	24	7	24 \triangleq 609 (EL 9)	24.65 24.60	7	330	0.50
0801-026-51	ANL 26 x 8	26	8	26 \triangleq 629 (R 9) 6000	26.65 26.60	8	400	0.55
0801-028-51	ANL 28 x 8	28	8	28 \triangleq 6001	28.65 28.60	8	440	0.62
0801-030-51	ANL 30 x 9	30	9	30 \triangleq 6200	30.65 30.60	9	520	0.70
0801-032-52	ANL 32 x 9	32	9	32 \triangleq 6002	32.65 32.60	9	560	0.84
0801-032-53	ANL 32 x 10	32	10	32 \triangleq 6201	32.65 32.60	10	620	0.88
0801-040-52	ANL 40 x 12	40	12	40 \triangleq 6203	40.65 40.60	12	810	1.31

1) Please refer to the sections "General" and "Calculation".
2) Severely reduced in pulsating and alternating load applications. Please inquire.

Tolerance Ring Series 0804 (ANS)



Part number		Carbon steel	Stainless steel	Tolerance ring dimensions (mm)			Shaft or bore diameter ¹⁾ (mm)		Load	Weight kg/1000 pieces approx.
	old			d	b	D ₁	Rolling bearing diameter d'	Bore D'	Permissible radial load ²⁾ F (N)	
0804-090-01	ANS 90 x 18	●		90	18	94.1	90	92.96 92.82	2600	25.60
0804-110-01	ANS 110 x 19	●		110	19	114.1	110	112.96 112.82	3500	34.70
0804-140-01	ANS 140 x 24	●		140	24	145.3	140	143.96 143.80	5100	61.80
0804-160-02	ANS 160 x 26	●		160	26	165.3	160	163.96 163.80	6500	87.50
0804-180-01	ANS 180 x 28	●		180	28	185.3	180	183.96 183.80	7000	92.40
0804-200-01	ANS 200 x 31	●		200	31	206.4	200	204.95 204.77	9000	132.00
0804-225-01	ANS 225 x 31	●		225	31	231.6	225	229.95 229.77	10000	148.00

1) Please refer to the sections "General" and "Calculation".

2) Severely reduced in pulsating and alternating load applications. Please inquire.

STAR – Ball Knobs, Knob and Lever Type Handles

Product Overview



Star Ball Knobs, Knob and Lever Type Handles

for mounting with STAR Tolerance Rings onto commercially available drawn shafts or threadless connecting rods.

The accompanying STAR Tolerance Ring ensures that the knob or handle sits tightly and securely.

No additional machining of the shafts or connecting rods necessary, hence a highly cost-effective solution.

Advantages

- no thread
- no machining to fit
- no bonding

Material

FS 31 DIN 7708

Color

black

Temperature resistance

100°C

Shaft tolerance

commercially available shafts with tolerance h9, e.g., bright round steel DIN 671

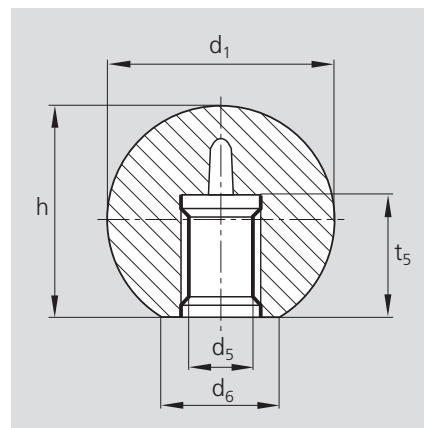
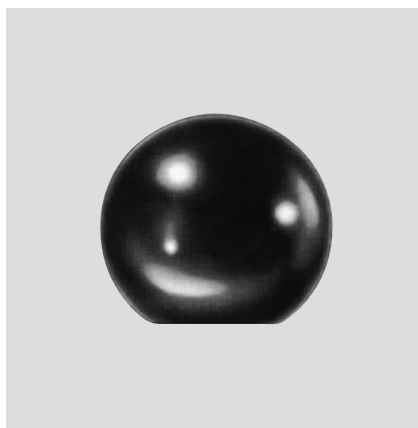
Mounting instructions

Ball knobs are mounted by hammering them lightly onto the shafts. Please use only rubber or plastic hammers with a maximum weight of 200 g!

STAR – Ball Knobs

Dimensions and Data

Ball Knobs 0850-
to DIN 319, type L,
with STAR Tolerance Ring

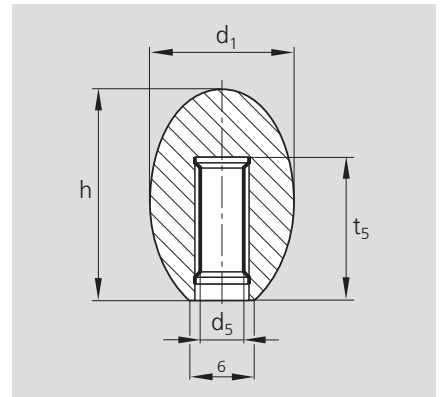


Part number		Dimensions (mm)						Weight approx. kg/1000
	old	d ₁	d ₅ ³⁾	d ₆ [≈]	t ₅ ^{+1/-0.5}	h ^{+1/-0.5}	r ⁴⁾	
0850-164-00	KK16-4	16	4	8	11	15	0.3	2.5
0850-205-00	KK20-5	20	5	12	13	18	0.3	5
0850-256-00	KK25-6	25	6	15	16	22.5	0.3	10.3
0850-258-00	KK25-8	25	8	15	15	22.5	0.5	9.9
0850-251-00	KK25-10	25	10	15	15	22.5	0.75	10
0850-328-00	KK32-8	32	8	18	15	29	0.5	22.5
0850-321-00	KK32-10	32	10	18	20	29	0.75	21
0850-322-00	KK32-12	32	12	18	20	29	1	20.5
0850-323-00	KK32-13	32	13	18	20	29	1	20
0850-401-00	KK40-10	40	10	22	20	37	0.75	43
0850-402-00	KK40-12	40	12	22	23	37	1	42
0850-403-00	KK40-13	40	13	22	21	37	1	42
0850-404-00	KK40-14	40	14	22	23	37	1	40
0850-406-00	KK40-16	40	16	22	23	37	1.25	39
0850-456-00	KK45-16	45	16	24	23	41	1.25	56
0850-502-00	KK50-12	50	12	28	20	46	1	84
0850-506-00	KK50-16	50	16	28	23	46	1.25	82
0850-520-00	KK50-20	50	20	28	28	46	1.5	80

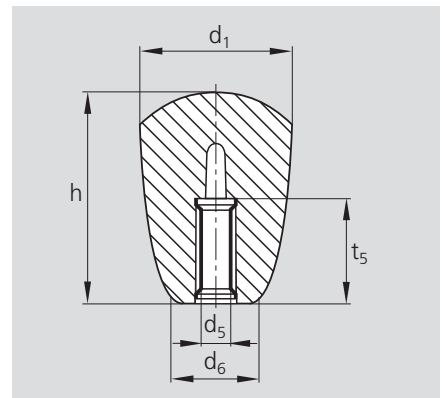
³⁾ Shaft tolerance: d₅_{H9}

⁴⁾ Recommended shaft radius

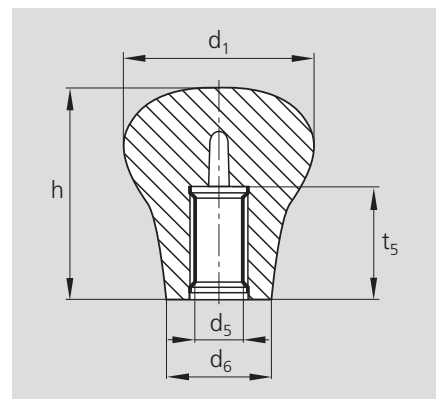
**Knob Type Handles 0852-
with STAR Tolerance Ring**



Part number		d ₁	d ₅ ¹⁾	Dimensions (mm)		h	r ²⁾	Weight approx. kg/1000
	old			d ₆ ≈	t ₅			
0852-206-00	KG 20-6	20	6	10	20	30	0.3	8



Part number		d ₁	d ₅ ¹⁾	Dimensions (mm)		h	r ²⁾	Weight approx. kg/1000
	old			d ₆ ≈	t ₅			
0852-256-00	KG 25-6	25	6	14	19	40	0.3	18
0852-258-00	KG 25-8	25	8	14	19	40	0.5	17



Part number		d ₁	d ₅ ¹⁾	Dimensions (mm)		h	r ²⁾	Weight approx. kg/1000
	old			d ₆ ≈	t ₅			
0852-358-00	KG 35-8	35	8	20	22	41	0.5	29

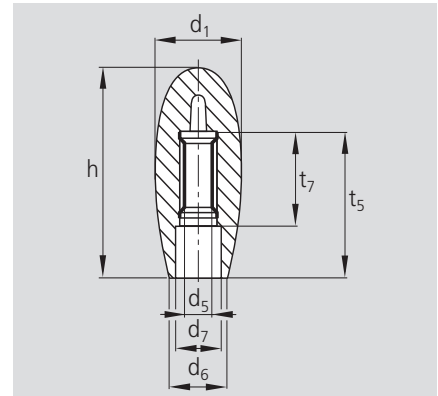
¹⁾ Shaft tolerance: d₅_{H9}

²⁾ Recommended shaft radius

STAR – Lever Type Handles

Dimensions and Data

Lever Type Handles 0851- with STAR Tolerance Ring

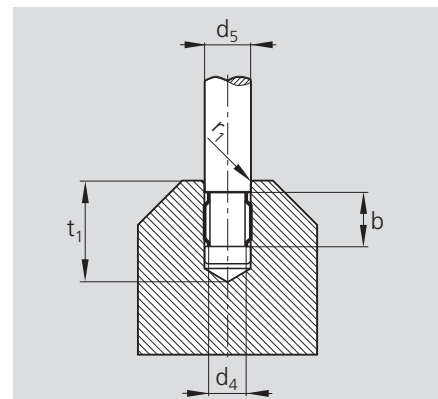


Part number		Dimensions (mm)								Weight approx. kg/1000
	old	d ₁	d ₅ ¹⁾	d ₆ ≈	d ₇	t ₅	t ₇	h	r ²⁾	
0851-228-00	BG 22-8	22	8	15	12	32	20	50	0.5	16
0851-221-00	BG 22-10	22	10	15	12	32	20	50	0.5	12.5
0851-308-00	BG 30-8	30	8	20	14	42	22	70	0.5	47
0851-301-00	BG 30-10	30	10	20	14	42	22	70	0.75	46
0851-302-00	BG 30-12	30	12	20	14	42	22	70	0.75	45

¹⁾ Shaft tolerance: d₅^{h9}

²⁾ Recommended shaft radius

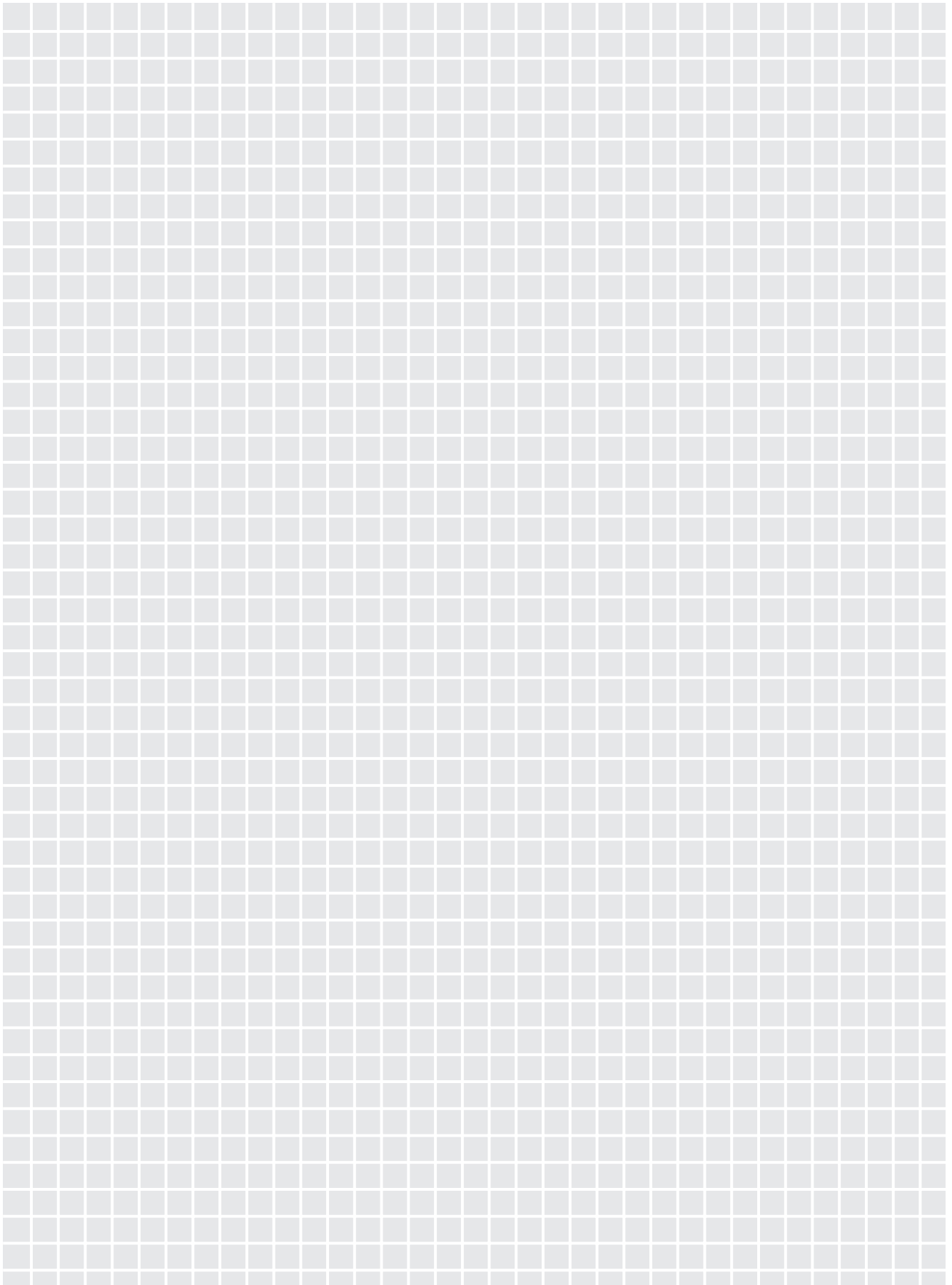
Connecting Rod Mount 0820- with STAR Tolerance Ring



Part number		Dimensions (mm)					
	old	d ₅ ³⁾	d ₄ h ₁₀	b C ₁₃	t ₁	r ₁	
0820-005-01	BN 5x5	5	4.18	5	12	0.3	
0820-006-01	BN 6x6	6	5.18	6	14	0.3	
0820-008-52	BN 8x8	8	6.71	8	16	0.5	
0820-010-51	BN 10x10	10	8.71	10	18	0.75	
0820-012-54	BN 12x12	12	10.77	12	22	1	
0820-013-53	BN 13x12	13	11.77	12	22	1	
0820-016-52	BN 16x14	16	14.77	14	25	1.25	
0820-020-07	BN 20x18	20	18.33	18	30	1.5	

³⁾ Recommended bore tolerance: d₅^{h9}

Notes



Great care has been taken during the compilation of this publication to ensure all the information contained is accurate. We accept no responsibility however for any damage resulting from incorrect or incomplete information contained.

For deliveries and other services in the course of commercial business, the general terms and conditions for supplies and services contained in the valid price lists and the confirmations of order apply.

As our products are constantly in the process of further development, they are subject to alteration without notice.

STAR, Ball Rail and  are trademarks registered for Rexroth Star GmbH, Germany.

Roller Rail is a trademark of Rexroth Star GmbH, Germany.

Reproduction of this document, even in extract form, is only permitted with our approval.

Rexroth Star GmbH

D-97419 Schweinfurt
Germany

Telephone +49-9721-937-0

Telefax +49-9721-937-275
(general)

Telefax +49-9721-937-250
(direct)

www.rexroth-star.com

Tolerance Rings
Ball Knobs, Knob and Lever Type Handles
RE 82 970/10.99