GMN Paul Müller Industrie GmbH & Co. KG
Äußere Bayreuther Str. 230 · D-90411 Nuremberg
Phone: +49 (0) 911-5691-0
www.gmn.de/en/

Ball bearings:
Phone: +49 (0) 911-56 91-259
Mail: vertrieb.kula@gmn.de

Visit us on:
facebook Linkedin Youtube

Official GMN agency:

4000 202610 EN

GMN



High precision ball bearings

4000 202610 EN



Contents:

GMN
High precision ball bearings
Page 4

Product overview
Page 6

Spindle ball bearings
Page 8

Materials
Page 10

Standard series
S, SM, KH
Page 14

Special designs
for direct lubrication
+A, +AB, +L, +LB, +AG
Page 16

Bearing designation
Bearing data
Page 20

Deep groove ball bearings
Page 69

Types, materials
Page 70

Bearing designation
Bearing data
Page 74

Engineering
Page 83

Bearing selection
Page 85

Preload
Page 88

Bearing arrangements
Page 92

Spacers
Page 94

Contact angle
Matching accuracy
Page 95

Precision classes
Page 96

Accuracy of associated
components
Page 98

Bearing lubrication
Page 100

Speed limits
Page 108

Handling of bearings
Page 110

Tightening torques for
precision nuts
Page 112

Grease distribution run
Page 114

Service life of grease
Page 115

Bearing calculation
Page 116

Static load capacity
Page 120

Bearing frequencies
Page 120

Service

Bearing analysis
Consultation
Training courses
Page 121

Special applications
Page 122

Index
Page 124

Internet
Quality management
Page 126



GMN High precision ball bearings

On the basis of long experience in the development and production of high-quality machine components, GMN has specialized in the field of high-precision ball bearings to manufacture high performance, long-life deep groove and spindle bearings.

Certification under international standards guarantees the highest levels of precision in the development and production of GMN ball bearings and secures consistently outstanding quality characteristics with regard to speed suitability, stability and durability.

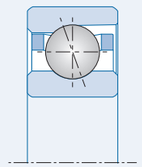
This comprehensive product line comprises – in addition to a large number of standard solutions – also special designs optimized for specific demands.



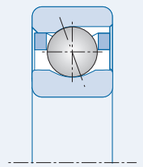
GMN
Spindle ball bearings

Standard series: S, SM, KH

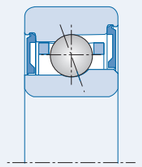
Series: S



Series: SM

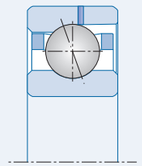


Series: KH

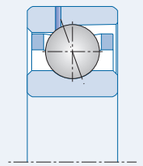


Special design (oil lubrication): +A, +AB, +L, +LB

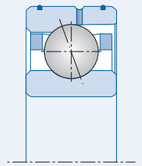
Version: +A



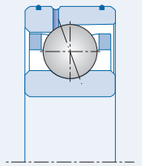
Version: +AB



Version: +L

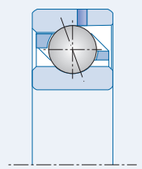


Version: +LB



Special design (grease lubrication): +AG

Version: +AG



Series S
- Standard bearing
- Reference speed coefficient: $1.7 \cdot 10^6$ mm/min

Series SM
- Optimized inner ring geometry
- Reference speed coefficient: $2.0 \cdot 10^6$ mm/min

Series KH
- Optimized inner geometry
- Reference speed coefficient: $2.1 \cdot 10^6$ mm/min

Version +A
- Oil supply through outer ring (open side)
- Optimized for minimum quantity lubrication

Version +AB
- Oil supply through outer ring (closed side)
- Optimized for minimum quantity lubrication

Version +L
- Oil supply through outer ring (open side)
- Optimized for minimum quantity lubrication
- with perimeter ring groove and O-ring (seal)

Version +LB
- Oil supply through outer ring (closed side)
- Optimized for minimum quantity lubrication
- with perimeter ring groove and O-ring (seal)

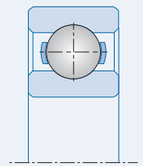
Version +AG
Grease re-lubrication through outer ring
Increased service life or speed

Special designs on request

GMN
Deep groove ball bearings

Standard series: 60../62..

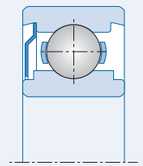
Series: 60../62..



- General purpose
- Absorbs axial and radial forces in both directions
- Reference speed coefficient: $1.0 \cdot 10^6$ mm/min (T9H cage)

Special design (1 shield): Z

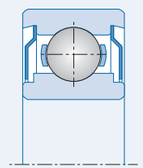
Series: Z



- Version with one shield
- Greased

Special design (2 shields): 2Z

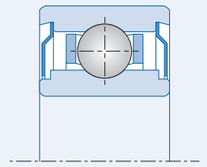
Series: 2Z



- Version with two shields
- Greased

Special design (2 shields): X2Z

Series: X2Z

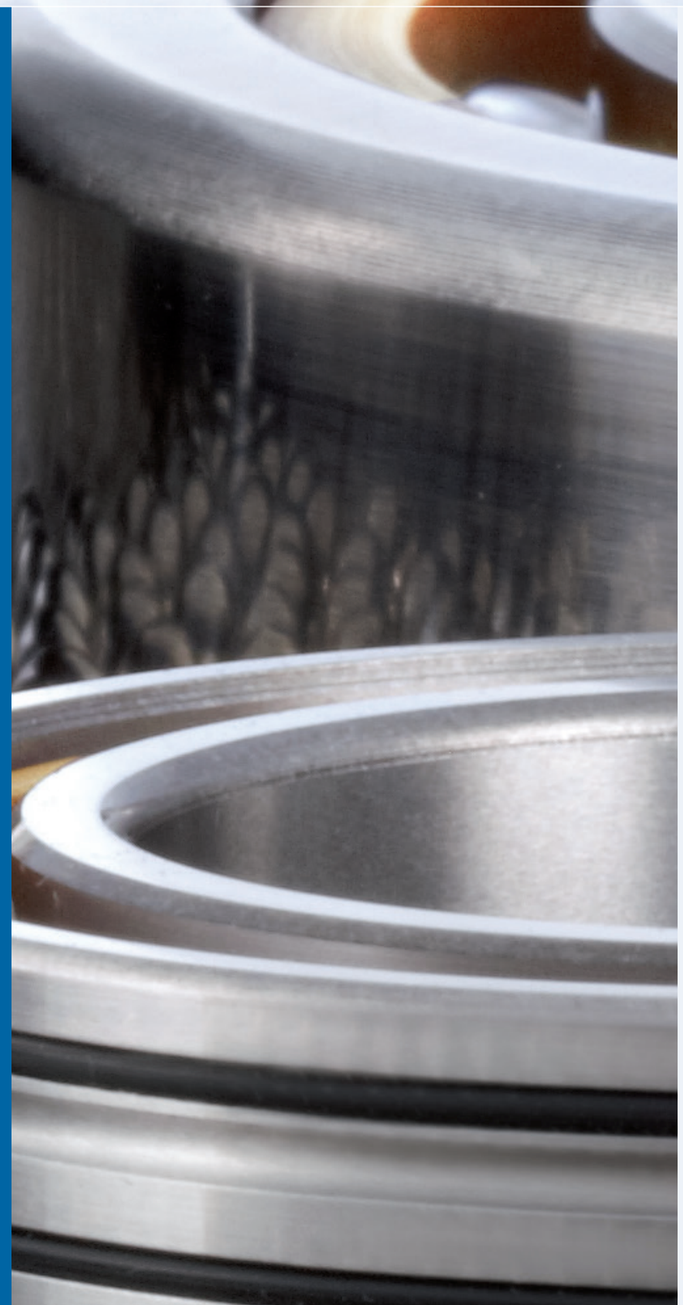


- Extra-wide design with two shields
- Greased
- Reference speed coefficient: $1.0 \cdot 10^6$ mm/min



GMN
High precision spindle ball bearings

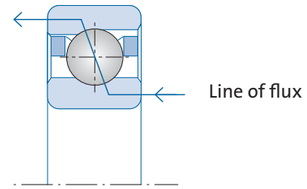
Product characteristics
Series
Materials
Cages
Hybrid ball bearings
Standard designs
Special designs Lubrication
Bearing designation
Bearing data



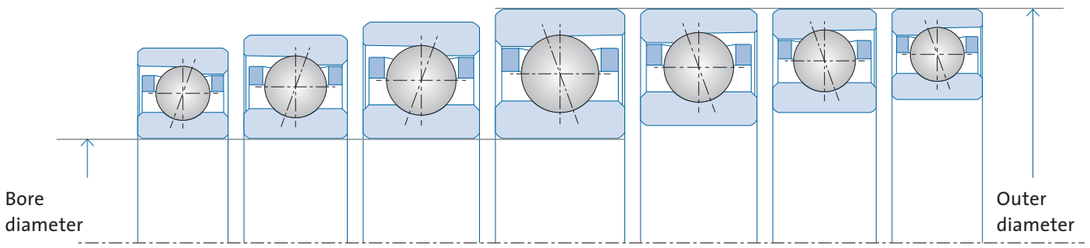
Product characteristics:

- Bore diameter 5–120 mm
- Nominal contact angle 15°–25°
- Forces are transmitted from one raceway to the other under this pressure angle
- Optimized for maximum speeds
- Absorbs large radial and axial loads
- Placement against a second bearing is necessary
- Larger number of balls than with deep groove ball bearings
- Great rigidity and load capacity
- All series and sizes are available as hybrid bearings
- All GMN ball bearings are available greased
- All GMN bearing bore sizes are available with various outer diameters





GMN spindle ball bearings: Bore diameter / Outer diameter



GMN series:	S 618..	S 619..	S 60..	S 62..	S 60..	S 619..	S 618..
ISO series:	18	19	10	02	10	19	18

Boundary dimensions per DIN, ISO and ABMA



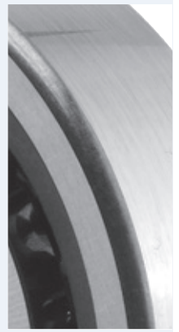
Materials Rings

GMN uses only high-quality materials and processing techniques to manufacture all components of its high precision spindle ball bearings.

The highest standards of quality assure the best possible performance efficiency and optimal service life for GMN products.

Inner and outer ring





Material
Bearing steel (chrome steel) 100 Cr 6
Material no. 1.3505, SAE 52100, SUJ2
Special steels on request

Permissible operating temperature
Heat treated for continuous operating temperatures up to 150°C

Hardness
60 to 64 HRC, fully hardened; corresponds to 700–800 HV30

Characteristics
High purity and homogeneity, vacuum-degassed

Cages

GMN ball bearing components are continuously being optimized by ongoing development efforts to further improve their technical characteristics.
Due to their outstanding characteristics, cage types TA and TXM exhibit exceptional performance with respect to speed, load capacity and service life.

TA cage





Material
Laminated phenolic resin
Phenolic resin with fine mesh cotton webbing

Permissible operating temperature
120°C

Cage guidance
on outer ring

Fabrication
machining

Application
for S, SM, KH series
general purpose

Characteristics
low friction coefficient,
for oil and grease lubrication

TXM cage





Material
Partially crystalline high performance plastic
PEEK (polyetheretherketone), carbon fiber reinforced

Permissible operating temperature
250°C

Cage guidance
on outer ring, ball retaining

Fabrication
injection molded

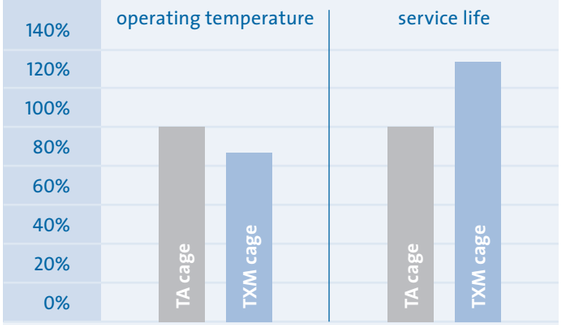
Application
For S, SM, KH series
Optimized for grease lubrication and highly dynamic applications with oil-air lubrication

Characteristics
low friction coefficient,
reduces/eliminates cage vibrations
great mechanical, chemical and thermal stability

Advantages:

- High resistance to wear
- Outstanding emergency operating characteristics due to favorable sliding properties and reduced abrasion
- Reduced operating temperature due to lower friction and more favorable tribology
- Constant grease lubrication due to the formation of grease reservoirs in provided cage pockets
- Long service life
- Increased cost effectiveness

TA- and TXM cages in comparison



Other cage materials, types, special treatments (e.g. TB, brass, Torlon, silver-coated aluminum bronze) are available on request.

Material Balls



Hybrid ball bearings

Hybrid ball bearings are characterized by a combination of materials; bearing steel (inner and outer rings) and ceramic (balls).

The material-based characteristics of ceramic balls (in comparison to bearings with steel balls) offer clear performance improvements, especially under critical conditions in machine operation.

Balls (standard material)





Material
Bearing steel (chrome steel) 100 Cr 6
Material no. 1.3505, SAE 52100, SUJ2
Special steels on request

Permissible operating temperature
Heat treated for continuous operating temperatures up to 150°C

Hardness
60 to 64 HRC, fully hardened; corresponds to 700–800 HV30

Characteristics
High purity and homogeneity, vacuum-degassed

Balls (hybrid ball bearings)





Material
Ceramic (silicon nitride Si_3N_4)

Material characteristics
· Low chemical affinity to 100 Cr 6
· Low friction coefficient
· Low heat conductivity
· Corrosion resistance
· Non magnetic
· Electrically insulating

Longer service life
Because of their material characteristics, hybrid bearings are able to attain more than twice the service life of steel bearings. Machine operation time is significantly increased.

Higher speeds
Due to their tribological characteristics and lower mass forces, speeds can be increased as much as 30% in comparison with steel balls.

Low-cost lubrication
The maximum speed for grease and oil lubrication is increased. Therefore grease lubrication can frequently be use instead of cost-intensive oil lubrication.

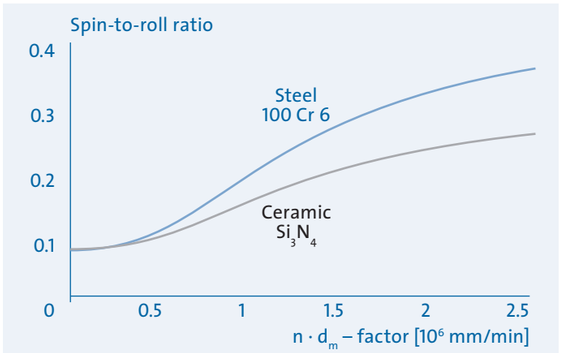
Greater rigidity
The characteristics of the materials improve both radial and axial rigidity. The advantages here are increased accuracy and a shift of critical resonance.

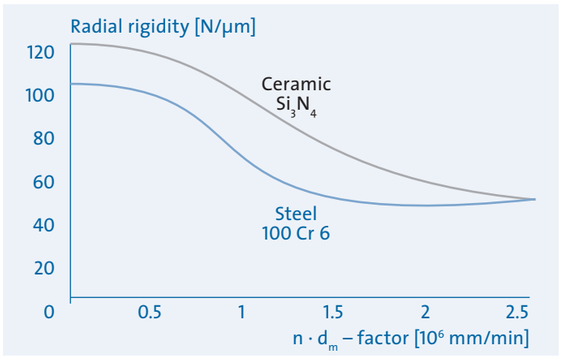
Improved machining accuracy
Greater bearing rigidity, reduced thermal expansion and lower vibration excitation make it possible to achieve maximum processing accuracy.

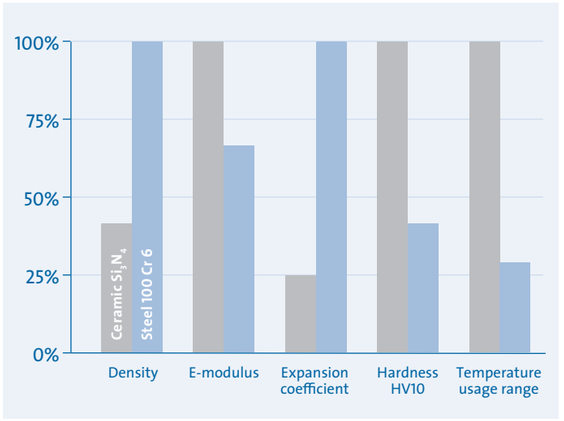
Application examples
· Machine tool spindles
· Fast running machine bearing journals
· Lifetime optimized precision bearings

Characteristics of ceramics (silicon nitride) Si_3N_4 and bearing steel (chrome steel) 100 Cr 6

Characteristics at room temperature		Ceramic Si_3N_4	Steel 100 Cr 6
Density	[g/cm³]	3.2	7.8
Expansion coefficient	[10^{-6}/K]	3.2	11.5
E-modulus	[GPa]	315	210
Poisson's ratio	-	0.26	0.3
Vickers hardness HV10	-	1600	700
Tensile strength	[MPa]	700	2500
Fracture toughness	[MPa $m^{0,5}$]	7	20
Thermal conductivity	[W/mK]	30–35	40–45
Specific electrical resistance	[Ωmm²/m]	10^{17}–10^{18}	0.1–1







Standard series

Designs S, SM, KH

GMN offers a comprehensive range of sizes, series, and designs with its standard spindle ball bearings in the S, SM, and KH designs.

All open designs are suitable for grease or oil lubrication. All sealed designs are supplied with grease for life.

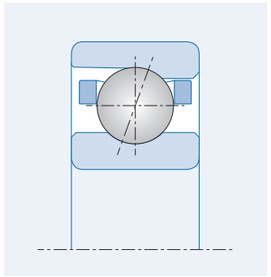
Availability:
Dimensions in bearing tables D_{1Z} and D_{2Z} indicate the general availability of bearings with 2RZ seals.
-> *page 22 ff.*

S/SM/KH .. 2RZ with seals:

· No speed reduction due to contactless seals
(seals are temperature-stable up to 120°C)
· No grease leakage in vertical or inclined installation position
· Reduced grease desiccation due to air flow
· No additional sealing elements needed
· Less sensitive to contamination at the installation site

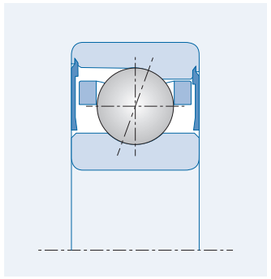
Bearings that are not available with 2RZ seals can be sealed with CF seals from GMN for fixed bearing applications if necessary. For more information:
-> *www.gmn.de/en/seals/*

Series S





Series S .. 2RZ with seals

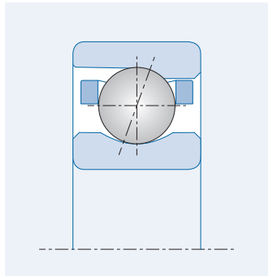




The GMN series S product line covers an extensive range of dimensions, speed suitability and load carrying capacity.

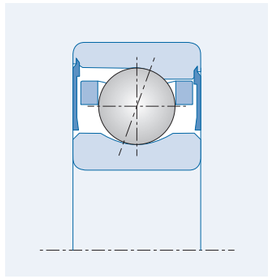
· Standard spindle bearings
· High speed suitability and rigidity
· Highly economical and reliable

Series SM





Series SM .. 2RZ with seals

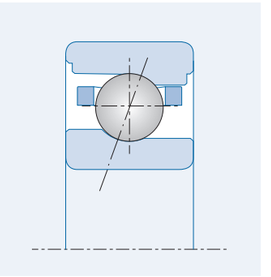




Due to optimized inner geometry, GMN series SM permits almost 20% higher speeds – in comparison to series S.

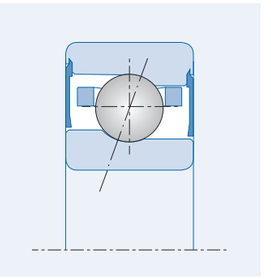
· Optimized inner ring curvature for high speeds
· Long service life due to minimized friction
· Highly resistant to temperature influences due to large radial clearance
· Low operating temperature due to minimal friction

Series KH





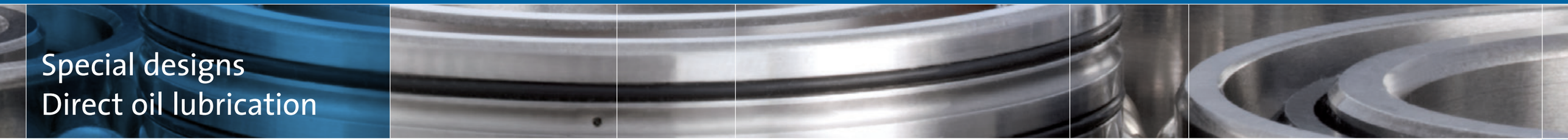
Series KH .. 2RZ with seals





Because bearing geometry is optimized, the GMN series KH provides outstanding speed properties, service life and economy.

· Optimized for highest speeds
· Low operating temperature due to optimized raceway geometry
· High resistance to temperature influences due to large radial bearing clearance
· Optimized ratio of ball complement and ball diameter to load rating
· Optimized inner geometry with respect to grease space and oil lubrication

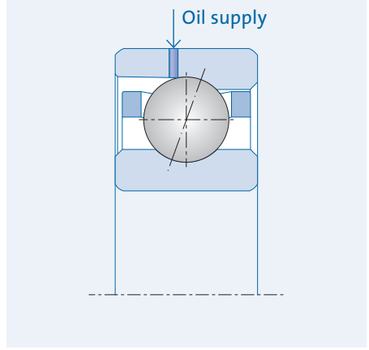


Special designs
Direct oil lubrication

Conventional oil-lubricated spindle bearings are provided with oil through an oil supply hole located on the side.

GMN spindle bearing designs +A, +AB, +L and +LB permit a direct supply of oil to the point of lubrication through a hole in the outer ring.

Special design +A

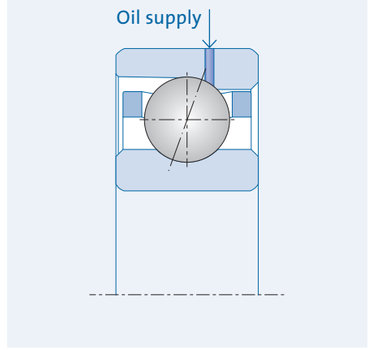




Lubrication hole to the raceway on the open side

- Optimized for highest speeds
- Reduced bearing wear
- High operating security
- Suffix A (designation example: HY SMA 6005)

Special design +AB

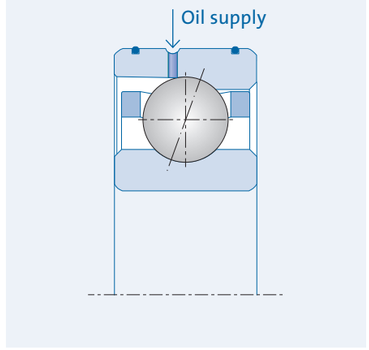




Lubrication hole to the raceway on the closed side

- Optimized for highest speeds
- Reduced bearing wear
- High operating security
- Suffix AB (designation example: HY SMAB 6006)

Special design +L

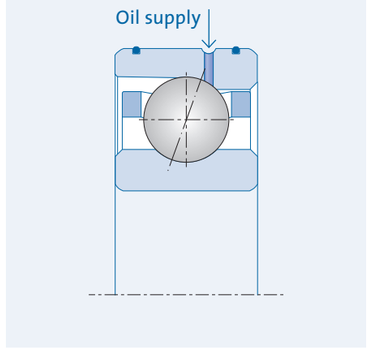




Lubrication hole to the raceway on the open side and sealed with O-rings

- Optimized for highest speeds
- Reduced bearing wear
- High operating security
- High oil position compatibility (ring groove) in the housing
- Additional outer ring seal
- Suffix L (designation example: HY SML 6007)

Special design +LB





Lubrication hole to the raceway on the closed side and sealed with O-rings

- Optimized for highest speeds
- Reduced bearing wear
- High operating security
- Tolerant of the oil feed position in the housing (circumferential groove)
- Additional outer ring seal
- Suffix LB (designation example: HY SMLB 6008)

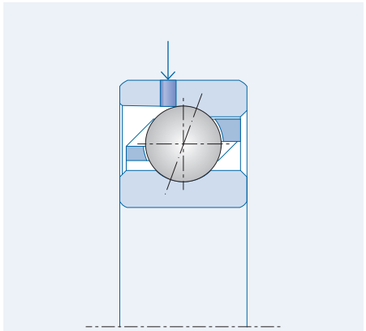
Detailed information: -> *p. 105*



Special designs
Grease re-lubrication

To assure maximum machine operation time, GMN also offers spindle bearings which can deliver regulated quantities of lubricant through holes in the outer ring directly to the point of lubrication without complex oil lubricant supply systems.

Special design +AG

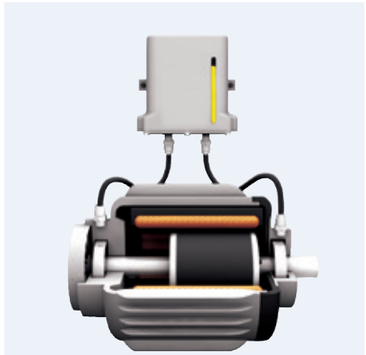




Lubrication holes to the raceway on the open side

- Optimized for maximum speeds (speed factor n · dm up to 2.1 · 106 mm/min)
- Maximum service life (up to factor 10)
- Reduced overhead for grease distribution
- High operating security
- Low capital expenditure
- Suffix AG (designation example: HY SMAG 6005)

Re-lubrication system



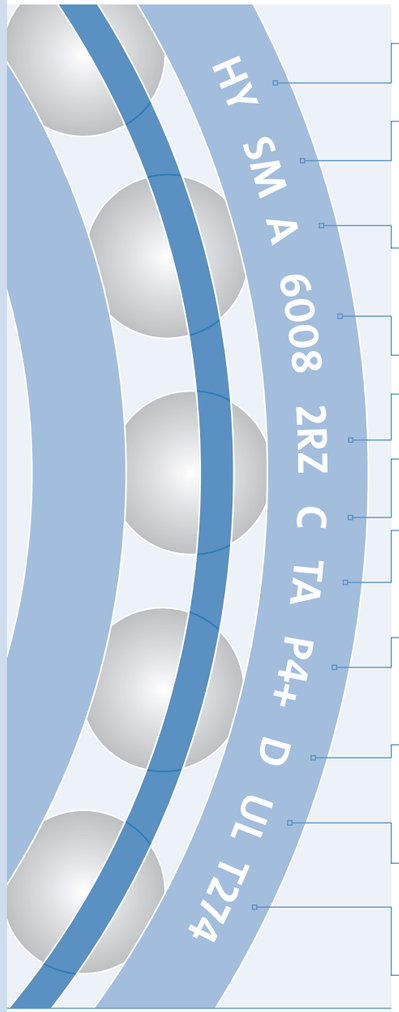
Re-lubrication unit and lubricant supply

- Exactly dosed and delivered grease quantity
- Lubricant matched to bearing requirements
- Small space requirement
- Simple assembly and handling
- Minimal operating costs (no compressed air, oil consumption)
- Fully automatic or machine controlled lubrication
- Individually programmable operating time
- Minimum design effort

Complete bearing

- Increase of permissible speed range with grease lubrication
- Optimal, long-term lubricant supply
- Simple system technology

GMN
Bearing designation



Material	- N HY	Bearings made of bearing steel have no designation Bearings made of high nitrogen steels, special material (on request) Balls and rings made of different materials (HYBRID bearings)
Series	S SM KH	Standard spindle bearings Standard spindle bearings for higher speeds Standard spindle bearings for highest speeds
Lubrication	- A AB L LB AG	Standard Oil lubrication hole through outer ring on open side Oil lubrication hole through outer ring on closed side Oil lubrication hole through outer ring on open side, outer ring seal with O-rings Oil lubrication hole through outer ring on closed side outer ring seal with O-rings Grease lubrication hole through outer ring on open side
Bearing size	6008	Designation of dimension series and bore diameter
Seal	2RZ	Seal on both sides
Nominal contact angle	C E 18°	15° 25° Special design
Cage	TA TXM VK	Laminated phenolic resin cage guided in outer ring Plastic cage guided in outer ring, ball-retaining Full complement (no cage)
Precision	P4+ UP+ P4 A7 P2 A9	Tolerance class P4+, corresponds to P4S Tolerance class UP+, ultra-precision according to GMN standard Tolerance class P4, corresponds to ABEC 7 according to ABMA standard Tolerance class ABEC 7 acording to ABMA standard, corresponds to P4 Tolerance class P2, corresponds to ABEC 9 according to ABMA standard Tolerance class ABEC 9 according to ABMA standard corresponds to P2
Bearing sets	D T Q	2 bearings 3 bearings 4 bearings
Matching and preload	UL UM US UV B F T	Universal matching – light preload Universal matching – medium preload Universal matching – heavy preload Universal matching – preload per agreement O arrangement X arrangement Tandem arrangement
Lubrication	- T274	ungreased Tribology code, equivalent to LUBCON Turmogrease Highspeed L252



GMN
High precision spindle ball bearings
Bearing data

Bore diameter 5 to 120 mm

Boundary dimensions

Ball data

Dimensions

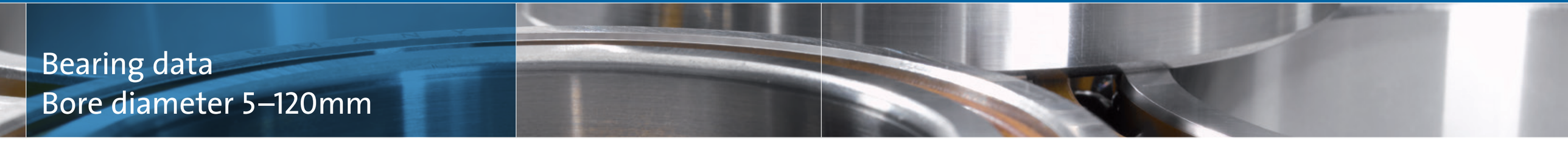
Abutment dimensions

Weight Contact angle

Load rating

Speed values

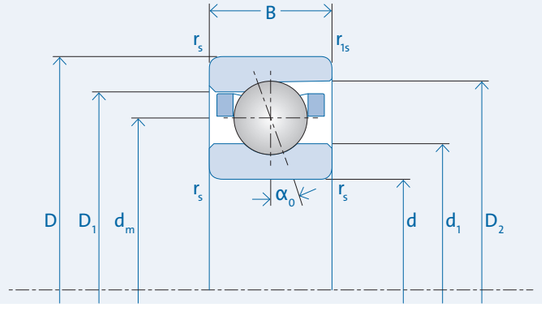
Preload/axial rigidity



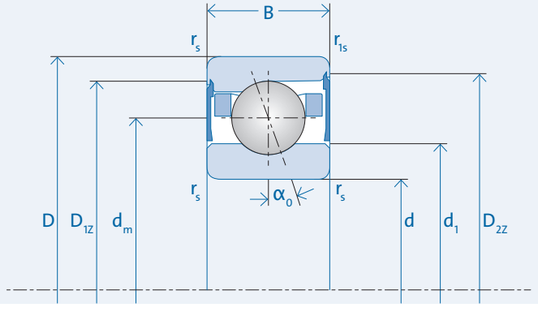
Bearing data
Bore diameter 5–120mm

Explanation of symbols

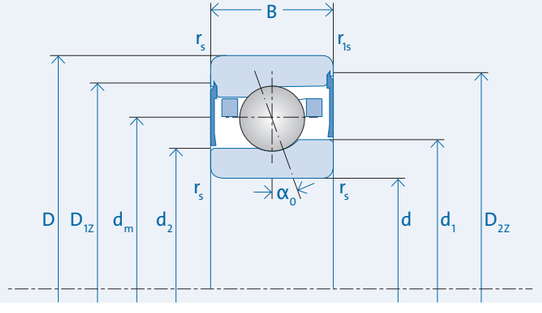
Design S/SM



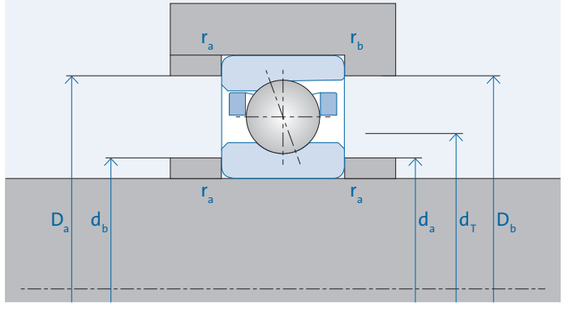
Design S/SM .. 2RZ



Design KH .. 2RZ



Mounting dimensions



Boundary dimensions

d	[mm]	Bore diameter
D	[mm]	Outside diameter
B	[mm]	Width (single bearing)

Balls

d_m	[mm]	Pitch circle diameter
D_W	[mm]	Ball diameter
Z	[pcs]	Number of balls

Dimensions

d_1	[mm]	Outside diameter inner ring (back face)
d_2	[mm]	Outside diameter inner ring (front face)
D_1	[mm]	Inner diameter outer ring (back face)
D_2	[mm]	Inner diameter outer ring (front face)
D_{1Z}	[mm]	Inner diameter outer ring (back face)
D_{2Z}	[mm]	Inner diameter outer ring (front face)
$r_{s\,min}$	[mm]	min. chamfer dimension (back face)
$r_{1s\,min}$	[mm]	min. chamfer dimension (front face)

Mounting dimensions

$r_{a\,max}$	[mm]	max. chamfer dimension (back face)
$r_{b\,max}$	[mm]	max. chamfer dimension (front face)
$d_{a,\,b\,min}$	[mm]	min. shaft shoulder diameter
$D_{a\,max}$	[mm]	max. diameter housing shoulder (back face)
$D_{b\,max}$	[mm]	max. diameter housing shoulder (front face)
d_T	[mm]	Pitch circle for oiling nozzle
m	[kg]	Weight
α_0	[°]	Contact angle

Load rating

C_r	[kN]	Dynamic load rating, radial
C_{0r}	[kN]	Static load rating, radial
C_{Ur}	[N]	Fatigue load limit, radial

Speed values: *Correction factors -> p. 108*

n_{oil}	[1/min]	Speed with oil-air lubrication
n_{grease}	[1/min]	Speed with grease lubrication

Preload / Rigidity (with rigid arrangement)

F_V L	[N]	Preload light (L)
C_{ax} L	[N/µm]	Axial rigidity, light (L), bearing pair*
F_V M	[N]	Preload medium (M)
C_{ax} M	[N/µm]	Axial rigidity, medium (M), bearing pair*
F_V S	[N]	Preload heavy (S)
C_{ax} S	[N/µm]	Axial rigidity, heavy (S), bearing pair*

Preload with spring preloaded arrangement

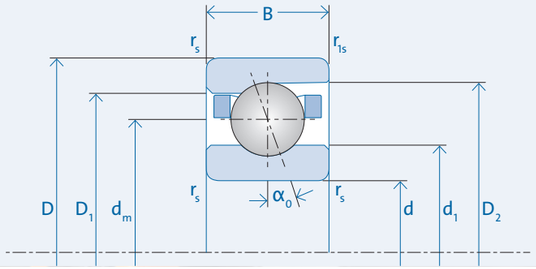
F_f	[N]	Recommended spring preload

*C_{ax} values (nominal; bearing pair in X or O arrangement); *C_{rad} values -> p. 91*

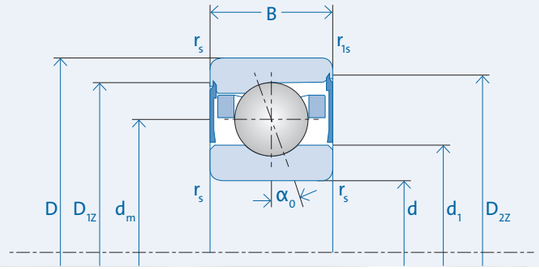


Bearing data
Bore diameter 5–120mm

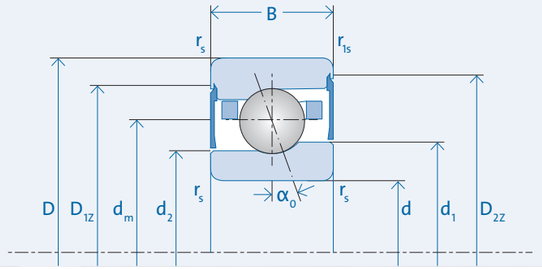
Design S/SM



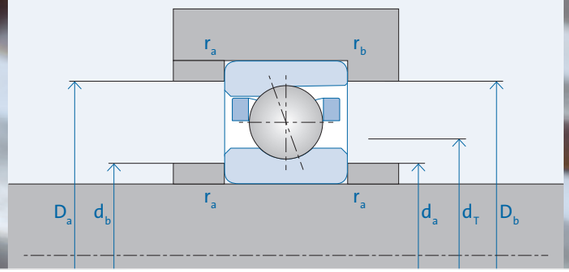
Design S/SM .. 2RZ



Design KH .. 2RZ

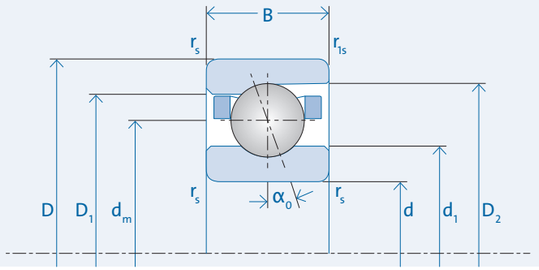


Mounting dimensions

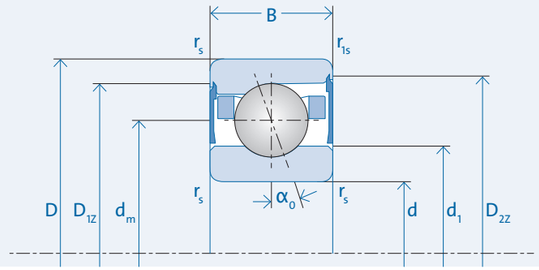


Designation	d [mm]	D [mm]	B [mm]	d_m [mm]	D_W [mm]	Z [pcs]	d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	$r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]	$D_{b\,max}$ [mm]	d_T [mm]	m [kg]	α_o [°]	C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	n_{oil} [1/min]	n_{grease} [1/min]	F_V L [N]	C_{ax} L [N/µm]	F_V M [N]	C_{ax} M [N/µm]	F_V S [N]	C_{ax} S [N/µm]	F_f [N]	Designation
d = 5mm																																			**d = 5mm**
S 619/5 C	5	13	4	8.9	2.381	8	7.1		10.7	11.3	-	-	0.2	0.2	0.2	0.2	6.3	12.0	12.0	8.1	0.002	15	1.2	0.43	22.4	190000	145000	6	7	18	11	36	15	25	S 619/5 C
HY S 619/5 C	5	13	4	8.9	2.381	8	7.1		10.7	11.3	-	-	0.2	0.2	0.2	0.2	6.3	12.0	12.0	8.1	0.002	15	1.2	0.415	15.6	240000	180000	6	7	18	12	36	17	15	HY S 619/5 C
S 605 C	5	14	5	8.6	2.381	8	6.9		10.3	11.0	-	-	0.2	0.2	0.2	0.2	6.3	13.0	13.0	7.8	0.004	15	1.4	0.55	28.5	200000	150000	7	8	20	13	40	19	30	S 605 C
HY S 605 C	5	14	5	8.6	2.381	8	6.9		10.3	11.0	-	-	0.2	0.2	0.2	0.2	6.3	13.0	13.0	7.8	0.003	15	1.4	0.53	19.9	245000	185000	7	9	20	14	40	20	20	HY S 605 C
SM 605 C	5	14	5	8.6	2.381	8	6.9		10.3	11.0	-	-	0.2	0.2	0.2	0.2	6.3	13.0	13.0	7.8	0.004	15	0.99	0.315	16.2	235000	175000	5	6	14	9	28	13	20	SM 605 C
HY SM 605 C	5	14	5	8.6	2.381	8	6.9		10.3	11.0	-	-	0.2	0.2	0.2	0.2	6.3	13.0	13.0	7.8	0.003	15	0.99	0.3	11.3	290000	220000	5	7	14	10	28	14	10	HY SM 605 C
S 625 C	5	16	5	10	3.175	7	7.7		12.5	13.2	-	-	0.3	0.3	0.3	0.3	6.8	14.7	14.7	9.0	0.005	15	1.93	0.72	37.5	170000	125000	10	9	30	15	60	21	40	S 625 C
HY S 625 C	5	16	5	10	3.175	7	7.7		12.5	13.2	-	-	0.3	0.3	0.3	0.3	6.8	14.7	14.7	9.0	0.004	15	1.93	0.685	26	210000	160000	10	10	30	16	60	22	30	HY S 625 C
d = 6mm																																			**d = 6mm**
S 619/6 C	6	15	5	10.3	2.381	9	8.5		12.1	12.7	-	-	0.2	0.2	0.2	0.2	7.4	14.0	14.0	9.4	0.004	15	1.32	0.515	26.5	165000	125000	7	8	20	12	40	17	30	S 619/6 C
HY S 619/6 C	6	15	5	10.3	2.381	9	8.5		12.1	12.7	-	-	0.2	0.2	0.2	0.2	7.4	14.0	14.0	9.4	0.003	15	1.32	0.495	18.6	205000	155000	7	9	20	13	40	19	20	HY S 619/6 C
S 606 C	6	17	6	10	2.381	9	8.3		11.7	12.5	-	-	0.3	0.3	0.3	0.3	7.5	15.8	15.8	9.2	0.007	15	1.54	0.665	34.5	170000	130000	8	9	25	16	45	21	40	S 606 C
HY S 606 C	6	17	6	10	2.381	9	8.3		11.7	12.5	-	-	0.3	0.3	0.3	0.3	7.5	15.8	15.8	9.2	0.007	15	1.54	0.64	24.1	215000	160000	8	10	25	17	45	23	25	HY S 606 C
SM 606 C	6	17	6	10	2.381	9	8.3		11.7	12.5	-	-	0.3	0.3	0.3	0.3	7.5	15.8	15.8	9.2	0.007	15	1.1	0.375	19.4	200000	150000	6	7	18	11	32	15	20	SM 606 C
HY SM 606 C	6	17	6	10	2.381	9	8.3		11.7	12.5	-	-	0.3	0.3	0.3	0.3	7.5	15.8	15.8	9.2	0.007	15	1.1	0.36	13.5	250000	190000	6	8	18	12	32	16	15	HY SM 606 C
S 626 C	6	19	6	13.3	3.175	10	10.7		15.8	16.6	-	-	0.3	0.3	0.3	0.3	8.1	17.6	17.6	12.1	0.008	15	2.6	1.18	61.5	125000	96000	15	13	40	20	80	29	65	S 626 C
HY S 626 C	6	19	6	13.3	3.175	10	10.7		15.8	16.6	-	-	0.3	0.3	0.3	0.3	8.1	17.6	17.6	12.1	0.007	15	2.6	1.13	42.5	160000	120000	15	14	40	22	80	31	45	HY S 626 C

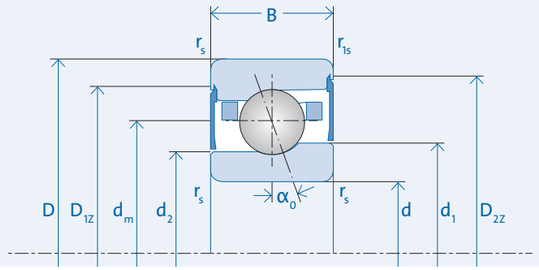
Design S/SM



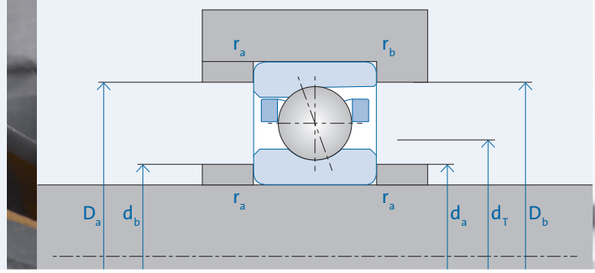
Design S/SM .. 2RZ



Design KH .. 2RZ

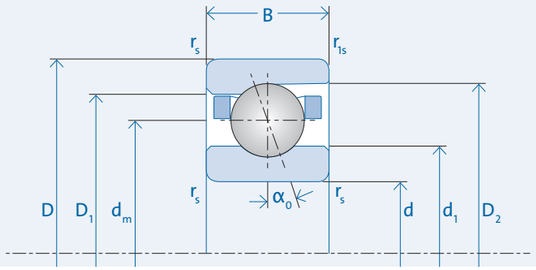


Mounting dimensions

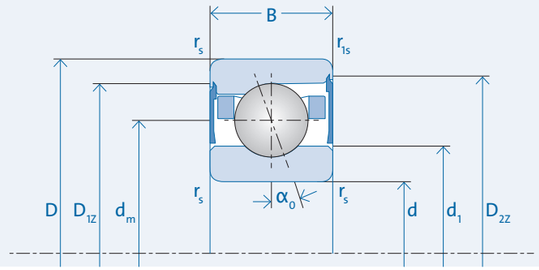


Designation	Boundary dim. d [mm]	D [mm]	B [mm]	Balls d_m [mm]	D_W [mm]	Z [pcs]	Dimensions d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	Mounting dimensions $r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]	$D_{b\,max}$ [mm]	d_r [mm]	Weight m [kg]	CA α_o [°]	Load rating C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	Speed values n_{oil} [1/min]	n_{grease} [1/min]	Preload / Rigidity $F_V L$ [N]	$C_{ax} L$ [N/µm]	$F_V M$ [N]	$C_{ax} M$ [N/µm]	$F_V S$ [N]	$C_{ax} S$ [N/µm]	F_f [N]	Designation
d = 7mm																																			**d = 7mm**
S 619/7 C	7	17	5	11.8	2.381	11	10.0		13.6	14.2	-	-	0.3	0.3	0.3	0.3	8.6	15.7	15.7	10.9	0.005	15	1.51	0.66	34.5	145000	110000	8	9	23	15	46	20	35	**S 619/7 C**
HY S 619/7 C	7	17	5	11.8	2.381	11	10.0		13.6	14.2	-	-	0.3	0.3	0.3	0.3	8.6	15.7	15.7	10.9	0.005	15	1.51	0.635	23.9	180000	135000	8	10	23	16	46	22	25	**HY S 619/7 C**
S 607 C	7	19	6	13.3	3.175	10	10.7		15.8	16.6	-	-	0.3	0.3	0.3	0.3	9.0	17.6	17.6	12.1	0.007	15	2.6	1.18	61.5	125000	96000	12	12	40	20	80	29	65	**S 607 C**
HY S 607 C	7	19	6	13.3	3.175	10	10.7		15.8	16.6	-	-	0.3	0.3	0.3	0.3	9.0	17.6	17.6	12.1	0.006	15	2.6	1.13	42.5	160000	120000	12	13	40	22	80	31	45	**HY S 607 C**
SM 607 C	7	19	6	13.3	3.175	10	10.7		15.8	16.6	-	-	0.3	0.3	0.3	0.3	9.0	17.6	17.6	12.1	0.007	15	1.92	0.68	35.5	150000	110000	10	10	30	15	60	21	40	**SM 607 C**
HY SM 607 C	7	19	6	13.3	3.175	10	10.7		15.8	16.6	-	-	0.3	0.3	0.3	0.3	9.0	17.6	17.6	12.1	0.006	15	1.92	0.655	24.7	185000	140000	10	10	30	16	60	22	25	**HY SM 607 C**
S 627 C	7	22	7	14.7	3.969	9	11.8		17.6	18.7	-	-	0.3	0.3	0.3	0.3	9.3	20.5	20.5	13.4	0.012	15	3.4	1.48	77	115000	87000	20	13	50	20	100	27	85	**S 627 C**
HY S 627 C	7	22	7	14.7	3.969	9	11.8		17.6	18.7	-	-	0.3	0.3	0.3	0.3	9.3	20.5	20.5	13.4	0.011	15	3.4	1.41	53.5	145000	110000	20	14	50	21	100	30	60	**HY S 627 C**
d = 8mm																																			**d = 8mm**
S 619/8 C	8	19	6	13.3	3.175	10	10.7		15.8	16.6	-	-	0.3	0.2	0.3	0.2	9.9	17.6	17.6	12.2	0.007	15	2.6	1.18	61.5	125000	96000	12	12	35	19	70	27	65	**S 619/8 C**
HY S 619/8 C	8	19	6	13.3	3.175	10	10.7		15.8	16.6	-	-	0.3	0.2	0.3	0.2	9.9	17.6	17.6	12.2	0.006	15	2.6	1.13	42.5	160000	120000	12	13	35	21	70	29	45	**HY S 619/8 C**
SM 619/8 C	8	19	6	13.3	3.175	10	10.7		15.8	16.6	-	-	0.3	0.3	0.3	0.3	9.9	17.6	17.6	12.2	0.007	15	1.92	0.68	35.5	150000	110000	10	10	30	15	60	21	40	**SM 619/8 C**
HY SM 619/8 C	8	19	6	13.3	3.175	10	10.7		15.8	16.6	-	-	0.3	0.3	0.3	0.3	9.9	17.6	17.6	12.2	0.006	15	1.92	0.655	24.7	185000	140000	10	10	30	16	60	22	25	**HY SM 619/8 C**
S 608 C	8	22	7	14.7	3.969	9	11.8		17.6	18.7	-	-	0.3	0.3	0.3	0.3	10.2	20.5	20.5	13.4	0.012	15	3.4	1.48	77	115000	87000	17	12	50	20	100	27	85	**S 608 C**
HY S 608 C	8	22	7	14.7	3.969	9	11.8		17.6	18.7	-	-	0.3	0.3	0.3	0.3	10.2	20.5	20.5	13.4	0.010	15	3.4	1.41	53.5	145000	110000	17	14	50	21	100	30	60	**HY S 608 C**
SM 608 C	8	22	7	14.7	3.969	9	11.8		17.6	18.7	-	-	0.3	0.3	0.3	0.3	10.2	20.5	20.5	13.4	0.012	15	2.7	0.99	51	135000	100000	13	10	40	16	80	22	55	**SM 608 C**
HY SM 608 C	8	22	7	14.7	3.969	9	11.8		17.6	18.7	-	-	0.3	0.3	0.3	0.3	10.2	20.5	20.5	13.4	0.010	15	2.7	0.95	35.5	170000	130000	13	11	40	17	80	24	40	**HY SM 608 C**
d = 9mm																																			**d = 9mm**
S 619/9 C	9	20	6	14.8	3.175	11	12.4		17.2	18.0	-	-	0.3	0.2	0.3	0.2	10.9	18.5	18.6	13.7	0.007	15	2.8	1.35	70	115000	86000	12	12	40	21	75	29	75	**S 619/9 C**
HY S 619/9 C	9	20	6	14.8	3.175	11	12.4		17.2	18.0	-	-	0.3	0.2	0.3	0.2	10.9	18.5	18.6	13.7	0.006	15	2.8	1.29	49	145000	110000	12	14	40	23	75	31	55	**HY S 619/9 C**
S 609 C	9	24	7	16.7	3.969	10	13.5		19.9	20.7	-	-	0.3	0.3	0.3	0.3	11.2	22.5	22.5	15.2	0.014	15	3.75	1.72	90	100000	77000	20	15	60	24	120	34	100	**S 609 C**
HY S 609 C	9	24	7	16.7	3.969	10	13.5		19.9	20.7	-	-	0.3	0.3	0.3	0.3	11.2	22.5	22.5	15.2	0.012	15	3.75	1.65	62.5	130000	96000	20	16	60	26	120	37	70	**HY S 609 C**
SM 609 C	9	24	7	16.7	3.969	10	13.5		19.9	20.7	-	-	0.3	0.3	0.3	0.3	11.2	22.5	22.5	15.2	0.014	15	2.95	1.16	60	120000	90000	16	12	50	20	100	27	65	**SM 609 C**
HY SM 609 C	9	24	7	16.7	3.969	10	13.5		19.9	20.7	-	-	0.3	0.3	0.3	0.3	11.2	22.5	22.5	15.2	0.012	15	2.95	1.11	42	150000	115000	16	13	50	21	100	29	45	**HY SM 609 C**
S 629 C	9	26	8	18	4.762	10	14.7		21.4	22.9	-	-	0.3	0.3	0.3	0.3	11.7	24.3	24.3	16.5	0.019	15	5.45	2.65	136	94000	71000	30	19	80	30	160	42	150	**S 629 C**
HY S 629 C	9	26	8	18	4.762	10	14.7		21.4	22.9	-	-	0.3	0.3	0.3	0.3	11.7	24.3	24.3	16.5	0.016	15	5.45	2.55	95	120000	89000	30	21	80	32	160	45	100	**HY S 629 C**

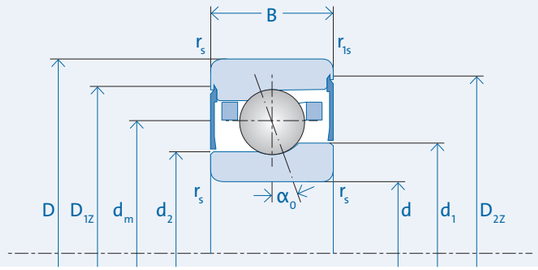
Design S/SM



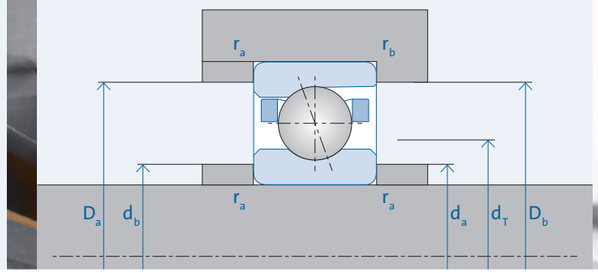
Design S/SM .. 2RZ



Design KH .. 2RZ

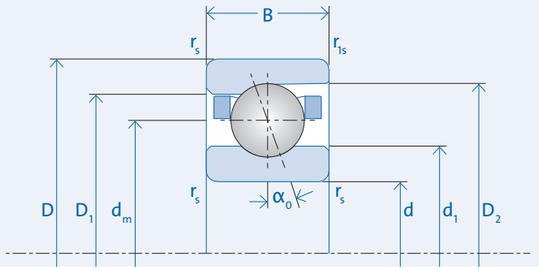


Mounting dimensions

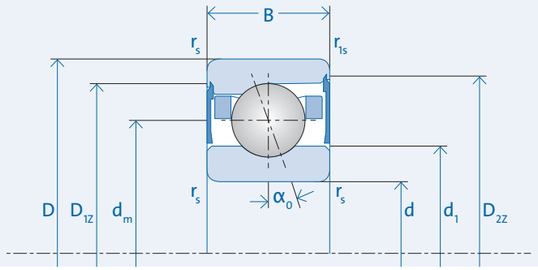


Designation	Boundary dim. d [mm]	D [mm]	B [mm]	Balls d_m [mm]	D_W [mm]	Z [pcs]	Dimensions d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	Mounting dimensions $r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]	$D_{b\,max}$ [mm]	d_T [mm]	Weight m [kg]	CA α_o [°]	Load rating C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	Speed values n_{oil} [1/min]	n_{grease} [1/min]	Preload / Rigidity $F_V L$ [N]	$C_{ax} L$ [N/µm]	$F_V M$ [N]	$C_{ax} M$ [N/µm]	$F_V S$ [N]	$C_{ax} S$ [N/µm]	F_f [N]	Designation
d = 10mm																																			**d = 10mm**
S 61800 C	10	19	5	14.5	2.381	13	12.8		16.2	16.9	-	-	0.3	0.2	0.3	0.2	11.6	17.7	17.8	13.6	0.005	15	1.66	0.83	43	115000	88000	8	10	25	17	50	23	45	S 61800 C
HY S 61800 C	10	19	5	14.5	2.381	13	12.8		16.2	16.9	-	-	0.3	0.2	0.3	0.2	11.6	17.7	17.8	13.6	0.005	15	1.66	0.8	30	145000	110000	8	11	25	18	50	25	35	HY S 61800 C
S 61800 E	10	19	5	14.5	2.381	13	12.8		16.2	16.9	-	-	0.3	0.2	0.3	0.2	11.6	17.7	17.8	13.6	0.005	25	1.58	0.79	41	100000	75000	13	25	40	38	80	50	80	S 61800 E
HY S 61800 E	10	19	5	14.5	2.381	13	12.8		16.2	16.9	-	-	0.3	0.2	0.3	0.2	11.6	17.7	17.8	13.6	0.005	25	1.58	0.76	28.5	125000	94000	13	28	40	42	80	55	55	HY S 61800 E
S 61900 C	10	22	6	15.7	3.175	11	13.6		17.8	18.9	-	-	0.3	0.3	0.3	0.3	11.8	20.6	20.6	14.7	0.009	15	2.8	1.37	71.5	110000	81000	12	12	40	21	75	29	80	S 61900 C
HY S 61900 C	10	22	6	15.7	3.175	11	13.6		17.8	18.9	-	-	0.3	0.3	0.3	0.3	11.8	20.6	20.6	14.7	0.009	15	2.8	1.31	49.5	135000	100000	12	14	40	23	75	31	55	HY S 61900 C
S 61900 E	10	22	6	15.7	3.175	11	13.6		17.8	18.9	-	-	0.3	0.3	0.3	0.3	11.8	20.6	20.6	14.7	0.009	25	2.7	1.31	68	92000	69000	22	32	70	49	140	65	130	S 61900 E
HY S 61900 E	10	22	6	15.7	3.175	11	13.6		17.8	18.9	-	-	0.3	0.3	0.3	0.3	11.8	20.6	20.6	14.7	0.009	25	2.7	1.26	47.5	115000	87000	22	35	70	54	140	72	90	HY S 61900 E
SM 61900 C	10	22	6	15.7	3.175	11	13.6		17.8	18.9	-	-	0.3	0.3	0.3	0.3	11.8	20.6	20.6	14.7	0.009	15	2.08	0.81	42	125000	96000	11	11	30	16	65	23	45	SM 61900 C
HY SM 61900 C	10	22	6	15.7	3.175	11	13.6		17.8	18.9	-	-	0.3	0.3	0.3	0.3	11.8	20.6	20.6	14.7	0.009	15	2.08	0.78	29.5	160000	120000	11	12	30	17	65	25	30	HY SM 61900 C
KH 61900 C	10	22	6	15.4	2.381	14	13.6	13.3	17.2	17.9	17.8	18.5	0.3	0.3	0.3	0.3	11.6	20.7	20.7	14.5	0.010	17	1.42	0.595	31	135000	100000	7	12	21	18	45	25	40	KH 61900 C
HY KH 61900 C	10	22	6	15.4	2.381	14	13.6	13.3	17.2	17.9	17.8	18.5	0.3	0.3	0.3	0.3	11.6	20.7	20.7	14.5	0.010	17	1.42	0.57	21.6	170000	130000	7	13	21	20	45	28	25	HY KH 61900 C
KH 61900 E	10	22	6	15.4	2.381	14	13.6	13.3	17.2	17.9	17.8	18.5	0.3	0.3	0.3	0.3	11.6	20.7	20.7	14.5	0.010	25	1.36	0.57	29.5	125000	93000	11	25	35	37	70	49	55	KH 61900 E
HY KH 61900 E	10	22	6	15.4	2.381	14	13.6	13.3	17.2	17.9	17.8	18.5	0.3	0.3	0.3	0.3	11.6	20.7	20.7	14.5	0.010	25	1.36	0.55	20.7	155000	115000	11	27	35	41	70	54	40	HY KH 61900 E
S 6000 C	10	26	8	18	4.762	10	14.7		21.4	22.9	-	-	0.3	0.3	0.3	0.3	12.6	24.3	24.3	16.5	0.018	15	5.45	2.65	136	94000	71000	25	18	80	30	160	42	150	S 6000 C
HY S 6000 C	10	26	8	18	4.762	10	14.7		21.4	22.9	-	-	0.3	0.3	0.3	0.3	12.6	24.3	24.3	16.5	0.016	15	5.45	2.55	95	120000	89000	25	19	80	32	160	45	100	HY S 6000 C
S 6000 E	10	26	8	18	4.762	10	14.7		21.4	22.9	-	-	0.3	0.3	0.3	0.3	12.6	24.3	24.3	16.5	0.018	25	5.25	2.55	132	81000	60000	45	44	130	66	260	88	250	S 6000 E
HY S 6000 E	10	26	8	18	4.762	10	14.7		21.4	22.9	-	-	0.3	0.3	0.3	0.3	12.6	24.3	24.3	16.5	0.016	25	5.25	2.42	92	100000	76000	45	49	130	73	260	97	170	HY S 6000 E
SM 6000 C	10	26	8	18	4.762	10	14.7		21.4	22.9	-	-	0.3	0.3	0.3	0.3	12.6	24.3	24.3	16.5	0.018	15	3.95	1.54	80	110000	83000	18	13	60	22	110	29	85	SM 6000 C
HY SM 6000 C	10	26	8	18	4.762	10	14.7		21.4	22.9	-	-	0.3	0.3	0.3	0.3	12.6	24.3	24.3	16.5	0.016	15	3.95	1.48	56	140000	105000	18	15	60	24	110	31	60	HY SM 6000 C
KH 6000 C	10	26	8	17	3.175	11	14.7	14.2	19.5	20.3	20.5	21.3	0.3	0.3	0.3	0.3	11.8	24.7	24.7	15.9	0.020	17	2.02	0.79	41	125000	93000	10	12	30	19	60	26	50	KH 6000 C
HY KH 6000 C	10	26	8	17	3.175	11	14.7	14.2	19.5	20.3	20.5	21.3	0.3	0.3	0.3	0.3	11.8	24.7	24.7	15.9	0.019	17	2.02	0.76	28.5	155000	115000	10	14	30	21	60	28	35	HY KH 6000 C
KH 6000 E	10	26	8	17	3.175	11	14.7	14.2	19.5	20.3	20.5	21.3	0.3	0.3	0.3	0.3	11.8	24.7	24.7	15.9	0.020	25	1.95	0.76	39.5	110000	84000	16	26	50	39	100	51	75	KH 6000 E
HY KH 6000 E	10	26	8	17	3.175	11	14.7	14.2	19.5	20.3	20.5	21.3	0.3	0.3	0.3	0.3	11.8	24.7	24.7	15.9	0.019	25	1.95	0.725	27.5	140000	105000	16	29	50	43	100	56	50	HY KH 6000 E
S 6200 C	10	30	9	20	5.556	10	16.0		24.5	25.7	-	-	0.6	0.6	0.6	0.6	13.7	27.5	27.5	18.3	0.029	15	7.5	3.75	195	85000	64000	40	23	120	38	230	54	210	S 6200 C
HY S 6200 C	10	30	9	20	5.556	10	16.0		24.5	25.7	-	-	0.6	0.6	0.6	0.6	13.7	27.5	27.5	18.3	0.025	15	7.5	3.6	136	105000	80000	40	25	120	42	230	58	150	HY S 6200 C
S 6200 E	10	30	9	20	5.556	10	16.0		24.5	25.7	-	-	0.6	0.6	0.6	0.6	13.7	27.5	27.5	18.3	0.029	25	7.25	3.65	189	72000	54000	60	53	180	81	360	108	360	S 6200 E
HY S 6200 E	10	30	9	20	5.556	10	16.0		24.5	25.7	-	-	0.6	0.6	0.6	0.6	13.7	27.5	27.5	18.3	0.025	25	7.25	3.5	132	91000	68000	60	59	180	89	360	119	250	HY S 6200 E

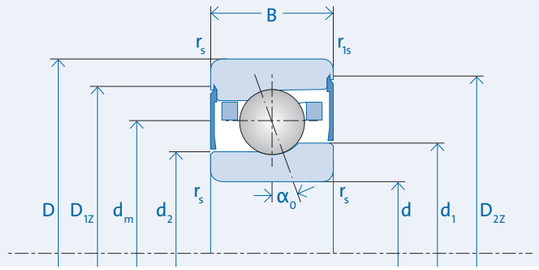
Design S/SM



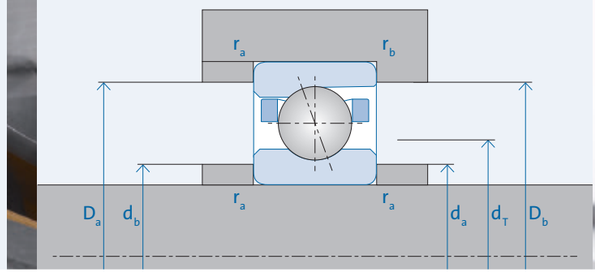
Design S/SM .. 2RZ



Design KH .. 2RZ

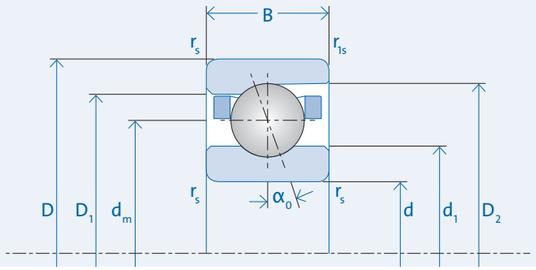


Mounting dimensions

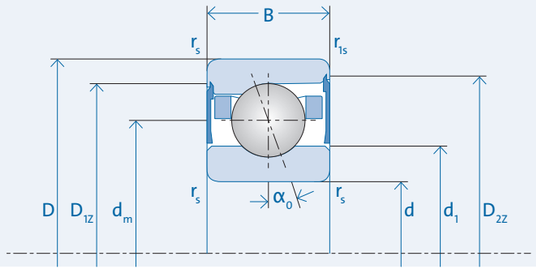


Designation	Boundary dim. d [mm]	D [mm]	B [mm]	Balls d_m [mm]	D_W [mm]	Z [pcs]	Dimensions d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	Mounting dimensions $r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]	$D_{b\,max}$ [mm]	d_T [mm]	Weight m [kg]	CA α_o [°]	Load rating C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	Speed values n_{oil} [1/min]	n_{grease} [1/min]	Preload / Rigidity $F_V L$ [N]	$C_{ax} L$ [N/µm]	$F_V M$ [N]	$C_{ax} M$ [N/µm]	$F_V S$ [N]	$C_{ax} S$ [N/µm]	F_f [N]	Designation
d = 12mm																																			**d = 12mm**
S 61801 C	12	21	5	16.3	2.381	15	14.6		18.0	18.7	-	-	0.3	0.2	0.3	0.2	13.6	19.7	19.8	15.4	0.006	15	1.8	0.98	51	105000	78000	9	12	25	18	55	26	55	**S 61801 C**
HY S 61801 C	12	21	5	16.3	2.381	15	14.6		18.0	18.7	-	-	0.3	0.2	0.3	0.2	13.6	19.7	19.8	15.4	0.005	15	1.8	0.94	35.5	130000	98000	9	13	25	20	55	28	40	**HY S 61801 C**
S 61801 E	12	21	5	16.3	2.381	15	14.6		18.0	18.7	-	-	0.3	0.2	0.3	0.2	13.6	19.7	19.8	15.4	0.006	25	1.71	0.94	48.5	89000	67000	15	29	45	44	90	57	90	**S 61801 E**
HY S 61801 E	12	21	5	16.3	2.381	15	14.6		18.0	18.7	-	-	0.3	0.2	0.3	0.2	13.6	19.7	19.8	15.4	0.005	25	1.71	0.9	34	110000	83000	15	32	45	48	90	63	65	**HY S 61801 E**
S 61901 C	12	24	6	17.5	3.175	13	15.4		19.6	20.7	-	-	0.3	0.3	0.3	0.3	13.9	22.5	22.5	16.5	0.011	15	3.1	1.67	87	97000	73000	15	15	43	24	85	34	95	**S 61901 C**
HY S 61901 C	12	24	6	17.5	3.175	13	15.4		19.6	20.7	-	-	0.3	0.3	0.3	0.3	13.9	22.5	22.5	16.5	0.010	15	3.1	1.6	60.5	120000	91000	15	17	43	26	85	36	65	**HY S 61901 C**
S 61901 E	12	24	6	17.5	3.175	13	15.4		19.6	20.7	-	-	0.3	0.3	0.3	0.3	13.9	22.5	22.5	16.5	0.011	25	2.95	1.6	83	83000	62000	25	37	75	56	150	74	160	**S 61901 E**
HY S 61901 E	12	24	6	17.5	3.175	13	15.4		19.6	20.7	-	-	0.3	0.3	0.3	0.3	13.9	22.5	22.5	16.5	0.010	25	2.95	1.53	58	105000	78000	25	41	75	62	150	81	110	**HY S 61901 E**
SM 61901 C	12	24	6	17.5	3.175	13	15.4		19.6	20.7	-	-	0.3	0.3	0.3	0.3	13.9	22.5	22.5	16.5	0.011	15	2.33	1	52	115000	86000	12	12	35	19	70	26	55	**SM 61901 C**
HY SM 61901 C	12	24	6	17.5	3.175	13	15.4		19.6	20.7	-	-	0.3	0.3	0.3	0.3	13.9	22.5	22.5	16.5	0.010	15	2.33	0.96	36	145000	105000	12	13	35	20	70	28	40	**HY SM 61901 C**
KH 61901 C	12	24	6	17.2	2.381	15	15.4	15.1	19.0	19.6	19.6	20.3	0.3	0.3	0.3	0.3	13.6	22.7	22.7	16.3	0.011	17	1.48	0.655	34	120000	92000	7	12	22	19	45	26	40	**KH 61901 C**
HY KH 61901 C	12	24	6	17.2	2.381	15	15.4	15.1	19.0	19.6	19.6	20.3	0.3	0.3	0.3	0.3	13.6	22.7	22.7	16.3	0.011	17	1.48	0.625	23.7	155000	115000	7	14	22	21	45	29	30	**HY KH 61901 C**
KH 61901 E	12	24	6	17.2	2.381	15	15.4	15.1	19.0	19.6	19.6	20.3	0.3	0.3	0.3	0.3	13.6	22.7	22.7	16.3	0.011	25	1.41	0.63	32.5	110000	83000	12	26	35	39	70	51	60	**KH 61901 E**
HY KH 61901 E	12	24	6	17.2	2.381	15	15.4	15.1	19.0	19.6	19.6	20.3	0.3	0.3	0.3	0.3	13.6	22.7	22.7	16.3	0.011	25	1.41	0.6	22.7	140000	105000	12	29	35	43	70	56	45	**HY KH 61901 E**
S 6001 C	12	28	8	20	4.762	11	16.7		23.4	24.8	-	-	0.3	0.3	0.3	0.3	14.6	26.2	26.2	18.5	0.020	15	5.9	3.05	157	85000	64000	30	20	90	33	180	47	170	**S 6001 C**
HY S 6001 C	12	28	8	20	4.762	11	16.7		23.4	24.8	-	-	0.3	0.3	0.3	0.3	14.6	26.2	26.2	18.5	0.017	15	5.9	2.9	109	105000	80000	30	22	90	36	180	51	120	**HY S 6001 C**
S 6001 E	12	28	8	20	4.762	11	16.7		23.4	24.8	-	-	0.3	0.3	0.3	0.3	14.6	26.2	26.2	18.5	0.020	25	5.65	2.9	151	73000	54000	50	49	140	72	280	96	290	**S 6001 E**
HY S 6001 E	12	28	8	20	4.762	11	16.7		23.4	24.8	-	-	0.3	0.3	0.3	0.3	14.6	26.2	26.2	18.5	0.017	25	5.65	2.8	105	91000	68000	50	54	140	80	280	106	200	**HY S 6001 E**
SM 6001 C	12	28	8	20	4.762	11	16.7		23.4	24.8	-	-	0.3	0.3	0.3	0.3	14.6	26.2	26.2	18.5	0.020	15	4.3	1.77	92	100000	75000	22	15	65	24	130	33	100	**SM 6001 C**
HY SM 6001 C	12	28	8	20	4.762	11	16.7		23.4	24.8	-	-	0.3	0.3	0.3	0.3	14.6	26.2	26.2	18.5	0.017	15	4.3	1.7	64	125000	94000	22	17	65	26	130	36	70	**HY SM 6001 C**
KH 6001 C	12	28	8	19	3.175	13	16.7	16.2	21.5	22.3	22.5	23.3	0.3	0.3	0.3	0.3	13.9	26.6	26.6	18.0	0.022	17	2.26	0.96	50	110000	83000	11	14	35	22	70	30	60	**KH 6001 C**
HY KH 6001 C	12	28	8	19	3.175	13	16.7	16.2	21.5	22.3	22.5	23.3	0.3	0.3	0.3	0.3	13.9	26.6	26.6	18.0	0.021	17	2.26	0.92	35	140000	105000	11	16	35	25	70	33	45	**HY KH 6001 C**
KH 6001 E	12	28	8	19	3.175	13	16.7	16.2	21.5	22.3	22.5	23.3	0.3	0.3	0.3	0.3	13.9	26.6	26.6	18.0	0.022	25	2.18	0.93	48	100000	75000	18	30	55	45	110	59	90	**KH 6001 E**
HY KH 6001 E	12	28	8	19	3.175	13	16.7	16.2	21.5	22.3	22.5	23.3	0.3	0.3	0.3	0.3	13.9	26.6	26.6	18.0	0.021	25	2.18	0.89	33.5	125000	94000	18	33	55	50	110	65	65	**HY KH 6001 E**
S 6201 C	12	32	10	22	5.953	10	18.3		26.0	28.1	-	-	0.6	0.6	0.6	0.6	15.6	29.4	29.4	20.5	0.036	15	8.3	4.2	218	77000	58000	42	23	130	39	250	54	240	**S 6201 C**
HY S 6201 C	12	32	10	22	5.953	10	18.3		26.0	28.1	-	-	0.6	0.6	0.6	0.6	15.6	29.4	29.4	20.5	0.031	15	8.3	4	152	97000	72000	42	25	130	42	250	59	170	**HY S 6201 C**
S 6201 E	12	3	10	22	5.953	10	18.3		26.0	28.1	-	-	0.6	0.6	0.6	0.6	15.6	29.4	29.4	20.5	0.036	25	8	4.05	211	66000	49000	70	56	200	84	400	112	400	**S 6201 E**
HY S 6201 E	12	32	10	22	5.953	10	18.3		26.0	28.1	-	-	0.6	0.6	0.6	0.6	15.6	29.4	29.4	20.5	0.031	25	8	3.9	147	82000	62000	70	62	200	93	400	123	280	**HY S 6201 E**

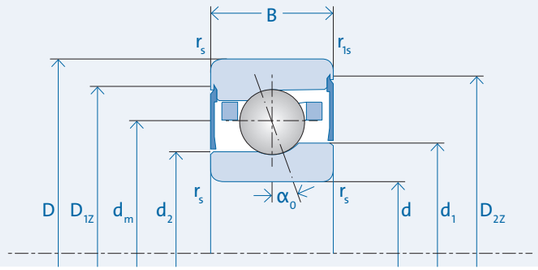
Design S/SM



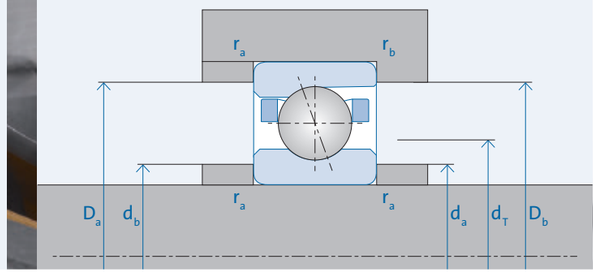
Design S/SM .. 2RZ



Design KH .. 2RZ

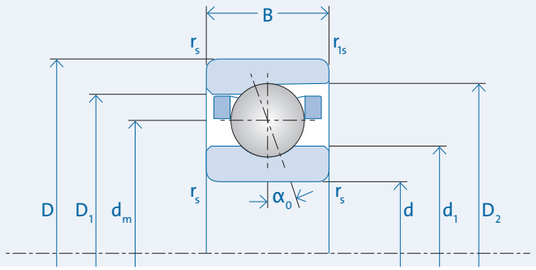


Mounting dimensions

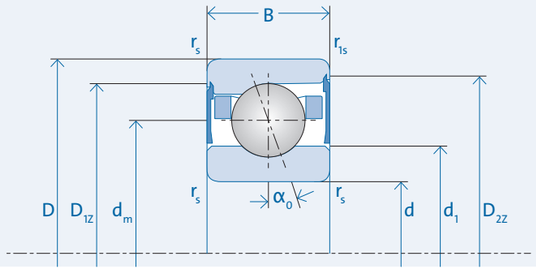


Designation	Boundary dim. d [mm]	D [mm]	B [mm]	Balls d_m [mm]	D_W [mm]	Z [pcs]	Dimensions d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	Mounting dimensions $r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]	$D_{b\,max}$ [mm]	d_T [mm]	Weight m [kg]	CA α_o [°]	Load rating C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	Speed values n_{oil} [1/min]	n_{grease} [1/min]	Preload / Rigidity $F_V L$ [N]	$C_{ax} L$ [N/µm]	$F_V M$ [N]	$C_{ax} M$ [N/µm]	$F_V S$ [N]	$C_{ax} S$ [N/µm]	F_f [N]	Designation
d = 15mm																																			**d = 15mm**
S 61802 C	15	24	5	19.5	2.381	17	17.8		21.2	21.9	-	-	0.3	0.2	0.3	0.	16.5	22.6	22.7	18.6	0.007	15	1.9	1.17	60.5	87000	65000	10	13	30	21	60	29	65	**S 61802 C**
HY S 61802 C	15	24	5	19.5	2.381	17	17.8		21.2	21.9	-	-	0.3	0.2	0.3	0.2	16.5	22.6	22.7	18.6	0.006	15	1.9	1.12	42	110000	82000	10	14	30	23	60	31	45	**HY S 61802 C**
S 61802 E	15	24	5	19.5	2.381	17	17.8		21.2	21.9	-	-	0.3	0.2	0.3	0.2	16.5	22.6	22.7	18.6	0.007	25	1.79	1.1	57.5	74000	56000	15	32	45	47	90	62	110	**S 61802 E**
HY S 61802 E	15	24	5	19.5	2.381	17	17.8		21.2	21.9	-	-	0.3	0.2	0.3	0.2	16.5	22.6	22.7	18.6	0.006	25	1.79	1.06	40	93000	70000	15	35	45	52	90	68	75	**HY S 61802 E**
S 61902 C	15	28	7	21.5	3.969	13	18.7		24.3	25.5	-	-	0.3	0.3	0.3	0.3	17.1	26.3	26.3	20.2	0.015	15	4.5	2.47	128	79000	59000	22	18	70	30	140	42	140	**S 61902 C**
HY S 61902 C	15	28	7	21.5	3.969	13	18.7		24.3	25.5	-	-	0.3	0.3	0.3	0.3	17.1	26.3	26.3	20.2	0.013	15	4.5	2.36	90	99000	74000	22	20	70	33	140	45	100	**HY S 61902 C**
S 61902 E	15	28	7	21.5	3.969	13	18.7		24.3	25.5	-	-	0.3	0.3	0.3	0.3	17.1	26.3	26.3	20.2	0.015	25	4.3	2.36	122	67000	51000	35	44	110	67	220	89	230	**S 61902 E**
HY S 61902 E	15	28	7	21.5	3.969	13	18.7		24.3	25.5	-	-	0.3	0.3	0.3	0.3	17.1	26.3	26.3	20.2	0.013	25	4.3	2.25	85	84000	63000	35	48	110	74	220	97	160	**HY S 61902 E**
SM 61902 C	15	28	7	21.5	3.969	13	18.7		24.3	25.5	-	-	0.3	0.3	0.3	0.3	17.1	26.3	26.3	20.2	0.015	15	3.6	1.58	82	93000	70000	18	15	55	24	110	32	90	**SM 61902 C**
HY SM 61902 C	15	28	7	21.5	3.969	13	18.7		24.3	25.5	-	-	0.3	0.3	0.3	0.3	17.1	26.3	26.3	20.2	0.013	15	3.6	1.51	57	115000	87000	18	16	55	26	110	35	60	**HY SM 61902 C**
KH 61902 C	15	28	7	21	2.778	16	18.7	18.4	23.3	23.9	23.9	24.5	0.3	0.3	0.3	0.3	16.7	26.6	26.6	19.9	0.016	17	2.01	0.95	49	100000	75000	10	15	30	23	60	31	60	**KH 61902 C**
HY KH 61902 C	15	28	7	21	2.778	16	18.7	18.4	23.3	23.9	23.9	24.5	0.3	0.3	0.3	0.3	16.7	26.6	26.6	19.9	0.015	17	2.01	0.91	34.5	125000	94000	10	17	30	26	60	34	45	**HY KH 61902 C**
KH 61902 E	15	28	7	21	2.778	16	18.7	18.4	23.3	23.9	23.9	24.5	0.3	0.3	0.3	0.3	16.7	26.6	26.6	19.9	0.016	25	1.93	0.91	47	90000	68000	16	32	50	48	100	62	90	**KH 61902 E**
HY KH 61902 E	15	28	7	21	2.778	16	18.7	18.4	23.3	23.9	23.9	24.5	0.3	0.3	0.3	0.3	16.7	26.6	26.6	19.9	0.015	25	1.93	0.87	33	115000	85000	16	35	50	53	100	69	60	**HY KH 61902 E**
S 6002 C	15	32	9	23.5	4.762	13	20.2		26.9	28.4	-	-	0.3	0.3	0.3	0.3	17.6	30.2	30.2	21.9	0.029	15	6.65	3.8	197	72000	54000	32	23	100	38	200	54	210	**S 6002 C**
HY S 6002 C	15	32	9	23.5	4.762	13	20.2		26.9	28.4	-	-	0.3	0.3	0.3	0.3	17.6	30.2	30.2	21.9	0.025	15	6.65	3.65	137	90000	68000	32	25	100	41	200	58	150	**HY S 6002 C**
S 6002 E	15	32	9	23.5	4.762	13	20.2		26.9	28.4	-	-	0.3	0.3	0.3	0.3	17.6	30.2	30.2	21.9	0.029	25	6.35	3.65	188	62000	46000	55	56	160	84	320	112	360	**S 6002 E**
HY S 6002 E	15	32	9	23.5	4.762	13	20.2		26.9	28.4	-	-	0.3	0.3	0.3	0.3	17.6	30.2	30.2	21.9	0.025	25	6.35	3.5	131	77000	58000	55	62	160	93	320	123	250	**HY S 6002 E**
SM 6002 C	15	32	9	23.5	4.762	13	20.2		26.9	28.4	-	-	0.3	0.3	0.3	0.3	17.6	30.2	30.2	21.9	0.029	15	4.9	2.16	113	85000	64000	22	17	75	28	150	38	120	**SM 6002 C**
HY SM 6002 C	15	32	9	23.5	4.762	13	20.2		26.9	28.4	-	-	0.3	0.3	0.3	0.3	17.6	30.2	30.2	21.9	0.025	15	4.9	2.07	78	105000	80000	22	19	75	31	150	42	85	**HY SM 6002 C**
KH 6002 C	15	32	9	22.9	3.969	13	20.2	19.4	25.7	27.0	26.7	28.0	0.3	0.3	0.3	0.3	17.1	30.4	30.4	21.6	0.030	17	3.4	1.48	77	92000	69000	17	18	50	27	100	36	95	**KH 6002 C**
HY KH 6002 C	15	32	9	22.9	3.969	13	20.2	19.4	25.7	27.0	26.7	28.0	0.3	0.3	0.3	0.3	17.1	30.4	30.4	21.6	0.028	17	3.4	1.42	54	115000	86000	17	20	50	30	100	40	65	**HY KH 6002 C**
KH 6002 E	15	32	9	22.9	3.969	13	20.2	19.4	25.7	27.0	26.7	28.0	0.3	0.3	0.3	0.3	17.1	30.4	30.4	21.6	0.030	25	3.3	1.43	74	83000	62000	30	39	80	55	160	72	140	**KH 6002 E**
HY KH 6002 E	15	32	9	22.9	3.969	13	20.2	19.4	25.7	27.0	26.7	28.0	0.3	0.3	0.3	0.3	17.1	30.4	30.4	21.6	0.028	25	3.3	1.37	51.5	105000	78000	30	43	80	61	160	79	100	**HY KH 6002 E**
S 6202 C	15	35	11	25.3	5.953	11	21.1		29.0	31.3	-	-	0.6	0.3	0.6	0.3	18.6	32.3	32.7	23.4	0.043	15	9	4.9	255	67000	50000	45	25	130	41	270	59	280	**S 6202 C**
HY S 6202 C	15	35	11	25.3	5.953	11	21.1		29.0	31.3	-	-	0.6	0.3	0.6	0.3	18.6	32.3	32.7	23.4	0.037	15	9	4.7	178	84000	63000	45	28	130	44	270	64	190	**HY S 6202 C**
S 6202 E	15	35	11	25.3	5.953	11	21.1		29.0	31.3	-	-	0.6	0.3	0.6	0.3	18.6	32.3	32.7	23.4	0.043	25	8.7	4.75	245	57000	43000	75	61	220	93	440	124	460	**S 6202 E**
HY S 6202 E	15	35	11	25.3	5.953	11	21.1		29.0	31.3	-	-	0.6	0.3	0.6	0.3	18.6	32.3	32.7	23.4	0.037	25	8.7	4.55	171	72000	54000	75	68	220	102	440	135	320	**HY S 6202 E**

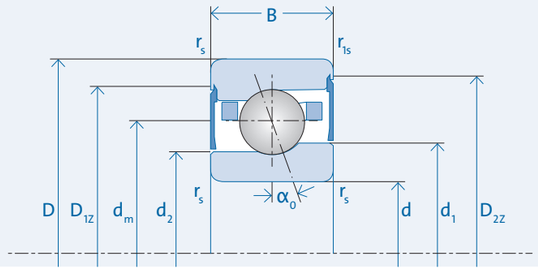
Design S/SM



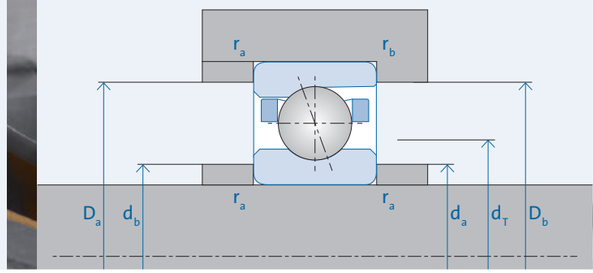
Design S/SM .. 2RZ



Design KH .. 2RZ

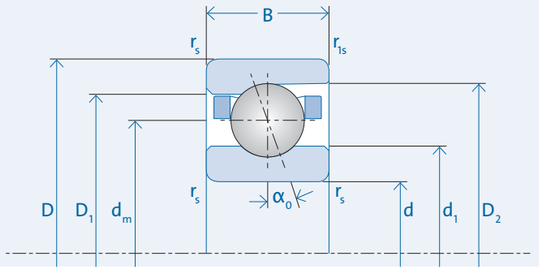


Mounting dimensions

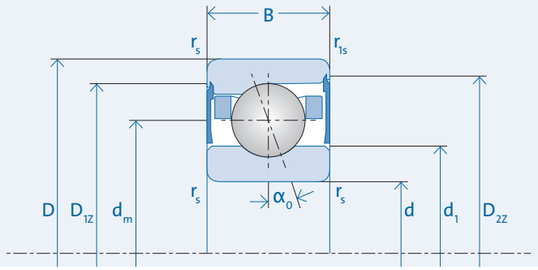


Designation	Boundary dim. d [mm]	D [mm]	B [mm]	Balls d_m [mm]	D_W [mm]	Z [pcs]	Dimensions d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	Mounting dimensions $r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]	$D_{b\,max}$ [mm]	d_T [mm]	Weight m [kg]	CA α_o [°]	Load rating C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	Speed values n_{oil} [1/min]	n_{grease} [1/min]	Preload / Rigidity $F_V L$ [N]	$C_{ax} L$ [N/µm]	$F_V M$ [N]	$C_{ax} M$ [N/µm]	$F_V S$ [N]	$C_{ax} S$ [N/µm]	F_f [N]	Designation
d = 17mm																																			**d = 17mm**
S 61803 C	17	26	5	21.5	2.381	19	19.8		23.2	23.9	-	-	0.3	0.2	0.3	0.2	18.6	24.6	24.7	20.6	0.008	15	2	1.32	68.5	79000	59000	10	14	30	22	60	31	75	**S 61803 C**
HY S 61803 C	17	26	5	21.5	2.381	19	19.8		23.2	23.9	-	-	0.3	0.2	0.3	0.2	18.6	24.6	24.7	20.6	0.007	15	2	1.26	48	99000	74000	10	15	30	24	60	33	50	**HY S 61803 C**
S 61803 E	17	26	5	21.5	2.381	19	19.8		23.2	23.9	-	-	0.3	0.2	0.3	0.2	18.6	24.6	24.7	20.6	0.008	25	1.89	1.25	65	67000	51000	16	35	50	53	100	69	120	**S 61803 E**
HY S 61803 E	17	26	5	21.5	2.381	19	19.8		23.2	23.9	-	-	0.3	0.2	0.3	0.2	18.6	24.6	24.7	20.6	0.007	25	1.89	1.19	45	84000	63000	16	38	50	58	100	76	85	**HY S 61803 E**
S 61903 C	17	30	7	23.8	3.969	14	21.0		26.6	27.8	-	-	0.3	0.3	0.3	0.3	19.1	28.3	28.3	22.5	0.016	15	4.7	2.75	142	71000	54000	25	20	75	32	150	45	150	**S 61903 C**
HY S 61903 C	17	30	7	23.8	3.969	14	21.0		26.6	27.8	-	-	0.3	0.3	0.3	0.3	19.1	28.3	28.3	22.5	0.014	15	4.7	2.65	99	89000	67000	25	22	75	35	150	49	110	**HY S 61903 C**
S 61903 E	17	30	7	23.8	3.969	14	21.0		26.6	27.8	-	-	0.3	0.3	0.3	0.3	19.1	28.3	28.3	22.5	0.016	25	4.45	2.6	135	61000	46000	40	48	120	73	240	96	260	**S 61903 E**
HY S 61903 E	17	30	7	23.8	3.969	14	21.0		26.6	27.8	-	-	0.3	0.3	0.3	0.3	19.1	28.3	28.3	22.5	0.014	25	4.45	2.48	94	76000	57000	40	53	120	80	240	105	180	**HY S 61903 E**
SM 61903 C	17	30	7	23.8	3.969	14	21.0		26.6	27.8	-	-	0.3	0.3	0.3	0.3	19.1	28.3	28.3	22.5	0.016	15	3.75	1.76	92	84000	63000	19	16	55	25	110	34	100	**SM 61903 C**
HY SM 61903 C	17	30	7	23.8	3.969	14	21.0		26.6	27.8	-	-	0.3	0.3	0.3	0.3	19.1	28.3	28.3	22.5	0.014	15	3.75	1.69	64	105000	79000	19	18	55	27	110	37	70	**HY SM 61903 C**
KH 61903 C	17	30	7	23.3	2.778	18	21.0	20.7	25.6	26.2	26.2	26.8	0.3	0.3	0.3	0.3	18.7	28.6	28.6	22.2	0.017	17	2.15	1.08	56	90000	68000	11	17	35	27	65	34	70	**KH 61903 C**
HY KH 61903 C	17	30	7	23.3	2.778	18	21.0	20.7	25.6	26.2	26.2	26.8	0.3	0.3	0.3	0.3	18.7	28.6	28.6	22.2	0.017	17	2.15	1.04	39	115000	84000	11	19	35	29	65	38	50	**HY KH 61903 C**
KH 61903 E	17	30	7	23.3	2.778	18	21.0	20.7	25.6	26.2	26.2	26.8	0.3	0.3	0.3	0.3	18.7	28.6	28.6	22.2	0.017	25	2.06	1.03	53.5	82000	61000	17	35	50	52	100	67	100	**KH 61903 E**
HY KH 61903 E	17	30	7	23.3	2.778	18	21.0	20.7	25.6	26.2	26.2	26.8	0.3	0.3	0.3	0.3	18.7	28.6	28.6	22.2	0.017	25	2.06	0.99	37.5	100000	76000	17	39	50	57	100	74	70	**HY KH 61903 E**
S 6003 C	17	35	10	26	4.762	14	22.7		29.4	30.9	31.5	31.8	0.3	0.3	0.3	0.3	19.6	33.2	33.2	24.4	0.038	15	6.95	4.2	218	65000	49000	35	25	105	40	210	57	240	**S 6003 C**
HY S 6003 C	17	35	10	26	4.762	14	22.7		29.4	30.9	31.5	31.8	0.3	0.3	0.3	0.3	19.6	33.2	33.2	24.4	0.034	15	6.95	4.05	152	82000	61000	35	27	105	44	210	62	170	**HY S 6003 C**
S 6003 E	17	35	10	26	4.762	14	22.7		29.4	30.9	31.5	31.8	0.3	0.3	0.3	0.3	19.6	33.2	33.2	24.4	0.038	25	6.65	4	208	56000	42000	60	61	170	91	340	120	390	**S 6003 E**
HY S 6003 E	17	35	10	26	4.762	14	22.7		29.4	30.9	31.5	31.8	0.3	0.3	0.3	0.3	19.6	33.2	33.2	24.4	0.034	25	6.65	3.85	145	70000	52000	60	67	170	100	340	132	280	**HY S 6003 E**
SM 6003 C	17	35	10	26	4.762	14	22.7		29.4	30.9	31.5	31.8	0.3	0.3	0.3	0.3	19.6	33.2	33.2	24.4	0.038	15	5.15	2.43	126	77000	58000	25	19	80	30	160	41	140	**SM 6003 C**
HY SM 6003 C	17	35	10	26	4.762	14	22.7		29.4	30.9	31.5	31.8	0.3	0.3	0.3	0.3	19.6	33.2	33.2	24.4	0.034	15	5.15	2.33	88	96000	72000	25	21	80	33	160	45	95	**HY SM 6003 C**
KH 6003 C	17	35	10	25.6	3.969	15	22.7	22.0	28.4	29.6	29.8	30.4	0.3	0.3	0.3	0.3	19.2	33.4	33.4	24.2	0.039	17	3.75	1.77	92	82000	62000	19	20	55	31	110	41	110	**KH 6003 C**
HY KH 6003 C	17	35	10	25.6	3.969	15	22.7	22.0	28.4	29.6	29.8	30.4	0.3	0.3	0.3	0.3	19.2	33.4	33.4	24.2	0.037	17	3.75	1.69	64	105000	77000	19	22	55	34	110	45	80	**HY KH 6003 C**
KH 6003 E	17	35	10	25.6	3.969	15	22.7	22.0	28.4	29.6	29.8	30.4	0.3	0.3	0.3	0.3	19.2	33.4	33.4	24.2	0.039	25	3.6	1.7	88	74000	56000	30	42	90	63	180	82	170	**KH 6003 E**
HY KH 6003 E	17	35	10	25.6	3.969	15	22.7	22.0	28.4	29.6	29.8	30.4	0.3	0.3	0.3	0.3	19.2	33.4	33.4	24.2	0.037	25	3.6	1.62	61.5	93000	70000	30	47	90	70	180	90	120	**HY KH 6003 E**
S 6203 C	17	40	12	28.5	6.747	11	24.1		33.0	35.4	-	-	0.6	0.3	0.6	0.3	20.9	37.2	37.6	26.6	0.063	15	11.4	6.4	332	60000	45000	60	29	170	47	350	68	360	**S 6203 C**
HY S 6203 C	17	40	12	28.5	6.747	11	24.1		33.0	35.4	-	-	0.6	0.3	0.6	0.3	20.9	37.2	37.6	26.6	0.055	15	11.4	6.1	232	75000	56000	60	32	170	52	350	74	250	**HY S 6203 C**
S 6203 E	17	40	12	28.5	6.747	11	24.1		33.0	35.4	-	-	0.6	0.3	0.6	0.3	20.9	37.2	37.6	26.6	0.063	25	11	6.15	320	51000	38000	90	68	280	106	560	141	610	**S 6203 E**
HY S 6203 E	17	40	12	28.5	6.747	11	24.1		33.0	35.4	-	-	0.6	0.3	0.6	0.3	20.9	37.2	37.6	26.6	0.055	25	11	5.9	223	64000	48000	90	76	280	116	560	155	420	**HY S 6203 E**

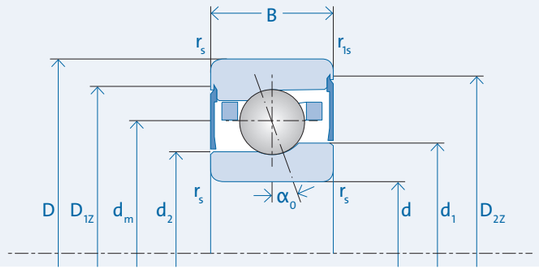
Design S/SM



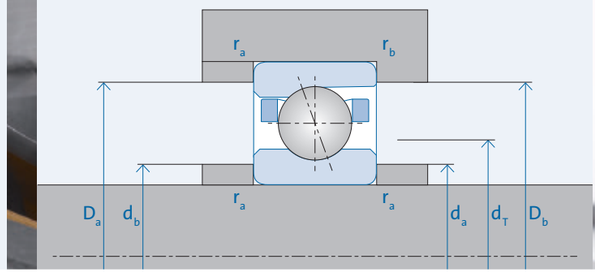
Design S/SM .. 2RZ



Design KH .. 2RZ

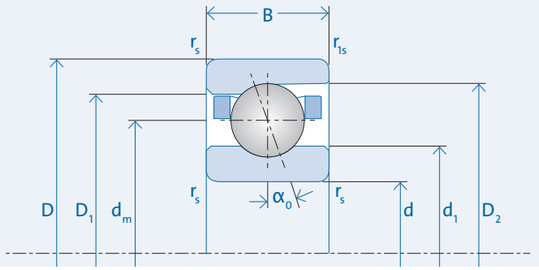


Mounting dimensions

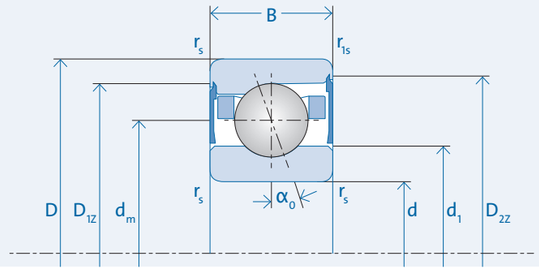


Designation	Boundary dim. d [mm]	D [mm]	B [mm]	Balls d_m [mm]	D_W [mm]	Z [pcs]	Dimensions d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	Mounting dimensions $r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]	$D_{b\,max}$ [mm]	d_T [mm]	Weight m [kg]	CA α_o [°]	Load rating C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	Speed values n_{oil} [1/min]	n_{grease} [1/min]	Preload / Rigidity $F_V L$ [N]	$C_{ax} L$ [N/µm]	$F_V M$ [N]	$C_{ax} M$ [N/µm]	$F_V S$ [N]	$C_{ax} S$ [N/µm]	F_f [N]	Designation
d = 20mm																																			**d = 20mm**
S 61804 C	20	32	7	26	3.175	18	23.9		28.1	29.2	-	-	0.3	0.3	0.3	0.3	21.8	30.5	30.5	24.9	0.017	15	3.65	2.55	131	65000	49000	19	20	55	32	110	45	140	**S 61804 C**
HY S 61804 C	20	32	7	26	3.175	18	23.9		28.1	29.2	-	-	0.3	0.3	0.3	0.3	21.8	30.5	30.5	24.9	0.016	15	3.65	2.42	92	82000	61000	19	22	55	35	110	49	100	**HY S 61804 C**
S 61804 E	20	32	7	26	3.175	18	23.9		28.1	29.2	-	-	0.3	0.3	0.3	0.3	21.8	30.5	30.5	24.9	0.017	25	3.45	2.41	125	56000	42000	30	48	90	73	170	95	240	**S 61804 E**
HY S 61804 E	20	32	7	26	3.175	18	23.9		28.1	29.2	-	-	0.3	0.3	0.3	0.3	21.8	30.5	30.5	24.9	0.016	25	3.45	2.3	87	70000	52000	30	54	90	81	170	104	170	**HY S 61804 E**
S 61904 C	20	37	9	28.5	4.762	15	25.1		31.9	33.3	-	-	0.3	0.3	0.3	0.3	22.5	35.1	35.1	26.9	0.034	15	7.25	4.6	239	60000	45000	35	26	110	43	220	60	260	**S 61904 C**
HY S 61904 C	20	37	9	28.5	4.762	15	25.1		31.9	33.3	-	-	0.3	0.3	0.3	0.3	22.5	35.1	35.1	26.9	0.030	15	7.25	4.4	167	75000	56000	35	28	110	47	220	65	180	**HY S 61904 C**
S 61904 E	20	37	9	28.5	4.762	15	25.1		31.9	33.3	-	-	0.3	0.3	0.3	0.3	22.5	35.1	35.1	26.9	0.034	25	6.85	4.4	228	51000	38000	55	62	170	94	340	125	430	**S 61904 E**
HY S 61904 E	20	37	9	28.5	4.762	15	25.1		31.9	33.3	-	-	0.3	0.3	0.3	0.3	22.5	35.1	35.1	26.9	0.030	25	6.85	4.2	159	64000	48000	55	68	170	104	340	137	300	**HY S 61904 E**
SM 61904 C	20	37	9	28.5	4.762	15	25.1		31.9	33.3	-	-	0.3	0.3	0.3	0.3	22.5	35.1	35.1	26.9	0.034	15	5.4	2.7	140	70000	53000	30	21	80	31	170	44	150	**SM 61904 C**
HY SM 61904 C	20	37	9	28.5	4.762	15	25.1		31.9	33.3	-	-	0.3	0.3	0.3	0.3	22.5	35.1	35.1	26.9	0.030	15	5.4	2.6	97	88000	66000	30	23	80	34	170	48	110	**HY SM 61904 C**
KH 61904 C	20	37	9	27.9	3.969	16	25.1	24.5	30.7	32.0	31.7	33.0	0.3	0.3	0.3	0.3	22.1	35.4	35.4	26.6	0.036	17	3.9	1.92	100	75000	56000	20	22	60	33	120	44	120	**KH 61904 C**
HY KH 61904 C	20	37	9	27.9	3.969	16	25.1	24.5	30.7	32.0	31.7	33.0	0.3	0.3	0.3	0.3	22.1	35.4	35.4	26.6	0.034	17	3.9	1.84	69.5	94000	71000	20	24	60	36	120	48	85	**HY KH 61904 C**
KH 61904 E	20	37	9	27.9	3.969	16	25.1	24.5	30.7	32.0	31.7	33.0	0.3	0.3	0.3	0.3	22.1	35.4	35.4	26.6	0.036	25	3.7	1.84	96	68000	51000	30	44	90	66	180	85	180	**KH 61904 E**
HY KH 61904 E	20	37	9	27.9	3.969	16	25.1	24.5	30.7	32.0	31.7	33.0	0.3	0.3	0.3	0.3	22.1	35.4	35.4	26.6	0.034	25	3.7	1.76	66.5	85000	64000	30	49	90	73	180	94	130	**HY KH 61904 E**
S 6004 C	20	42	12	31	6.35	13	26.6		35.5	37.5	37.6	38.4	0.6	0.3	0.6	0.3	23.8	39.1	39.6	29.0	0.065	15	12.2	7.7	399	55000	41000	60	34	180	56	360	80	440	**S 6004 C**
HY S 6004 C	20	42	12	31	6.35	13	26.6		35.5	37.5	37.6	38.4	0.6	0.3	0.6	0.3	23.8	39.1	39.6	29.0	0.056	15	12.2	7.35	278	69000	51000	60	37	180	61	360	86	300	**HY S 6004 C**
S 6004 E	20	42	12	31	6.35	13	26.6		35.5	37.5	37.6	38.4	0.6	0.3	0.6	0.3	23.8	39.1	39.6	29.0	0.065	25	11.7	7.4	383	47000	35000	100	81	300	124	600	166	730	**S 6004 E**
HY S 6004 E	20	42	12	31	6.35	13	26.6		35.5	37.5	37.6	38.4	0.6	0.3	0.6	0.3	23.8	39.1	39.6	29.0	0.056	25	11.7	7.05	267	58000	44000	100	89	300	136	600	182	510	**HY S 6004 E**
SM 6004 C	20	42	12	31	6.35	13	26.6		35.5	37.5	37.6	38.4	0.6	0.3	0.6	0.3	23.8	39.1	39.6	29.0	0.065	15	8.3	3.85	200	65000	48000	40	23	120	37	240	50	220	**SM 6004 C**
HY SM 6004 C	20	42	12	31	6.35	13	26.6		35.5	37.5	37.6	38.4	0.6	0.3	0.6	0.3	23.8	39.1	39.6	29.0	0.056	15	8.3	3.7	139	81000	60000	40	26	120	40	240	55	150	**HY SM 6004 C**
KH 6004 C	20	42	12	30.2	5.556	14	26.6	25.3	34.3	35.9	36.4	38.0	0.6	0.3	0.6	0.3	23.5	39.3	39.7	28.6	0.067	17	6.5	3.1	160	70000	52000	35	27	100	40	200	54	200	**KH 6004 C**
HY KH 6004 C	20	42	12	30.2	5.556	14	26.6	25.3	34.3	35.9	36.4	38.0	0.6	0.3	0.6	0.3	23.5	39.3	39.7	28.6	0.061	17	6.5	2.95	111	87000	65000	35	30	100	44	200	59	140	**HY KH 6004 C**
KH 6004 E	20	42	12	30.2	5.556	14	26.6	25.3	34.3	35.9	36.4	38.0	0.6	0.3	0.6	0.3	23.5	39.3	39.7	28.6	0.067	25	6.3	2.95	154	63000	47000	50	54	160	82	320	106	290	**KH 6004 E**
HY KH 6004 E	20	42	12	30.2	5.556	14	26.6	25.3	34.3	35.9	36.4	38.0	0.6	0.3	0.6	0.3	23.5	39.3	39.7	28.6	0.061	25	6.3	2.85	107	79000	59000	50	60	160	90	320	117	200	**HY KH 6004 E**
S 6204 C	20	47	14	33.5	7.938	11	28.5		38.6	41.6	-	-	1.0	0.6	1.0	0.6	25.1	43.1	43.6	31.4	0.105	15	16.9	10.1	526	51000	38000	85	39	260	66	500	93	570	**S 6204 C**
HY S 6204 C	20	47	14	33.5	7.938	11	28.5		38.6	41.6	-	-	1.0	0.6	1.0	0.6	25.1	43.1	43.6	31.4	0.089	15	16.9	9.7	367	63000	48000	85	42	260	71	500	100	400	**HY S 6204 C**
S 6204 E	20	47	14	33.5	7.938	11	28.5		38.6	41.6	-	-	1.0	0.6	1.0	0.6	25.1	43.1	43.6	31.4	0.105	25	16.2	9.8	511	43000	32000	140	91	410	139	820	187	970	**S 6204 E**
HY S 6204 E	20	47	14	33.5	7.938	11	28.5		38.6	41.6	-	-	1.0	0.6	1.0	0.6	25.1	43.1	43.6	31.4	0.089	25	16.2	9.4	356	54000	41000	140	100	410	152	820	204	670	**HY S 6204 E**

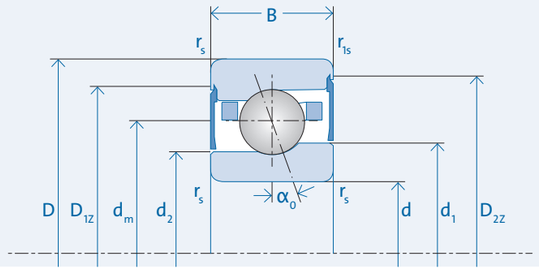
Design S/SM



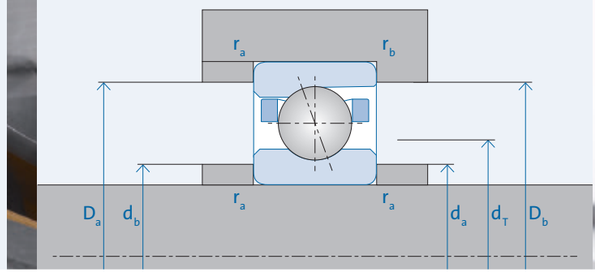
Design S/SM .. 2RZ



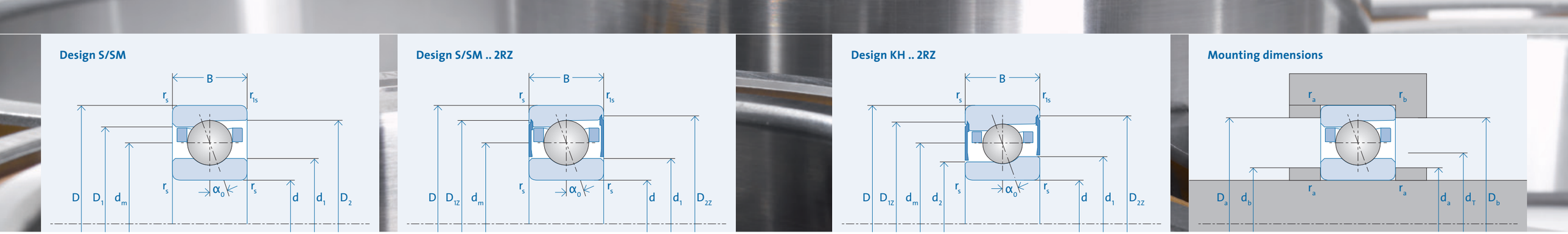
Design KH .. 2RZ



Mounting dimensions



Designation	Boundary dim. d [mm]	D [mm]	B [mm]	Balls d_m [mm]	D_W [mm]	Z [pcs]	Dimensions d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	Mounting dimensions $r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]	$D_{b\,max}$ [mm]	d_T [mm]	Weight m [kg]	CA α_o [°]	Load rating C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	Speed values n_{oil} [1/min]	n_{grease} [1/min]	Preload / Rigidity $F_V L$ [N]	$C_{ax} L$ [N/µm]	$F_V M$ [N]	$C_{ax} M$ [N/µm]	$F_V S$ [N]	$C_{ax} S$ [N/µm]	F_f [N]	Designation
d = 25mm																																			**d = 25mm**
S 61805 C	25	37	7	31	3.175	19	28.9		33.1	34.2	-	-	0.3	0.3	0.3	0.3	26.7	35.5	35.5	29.9	0.020	15	3.65	2.8	144	55000	41000	19	21	55	33	110	46	160	S 61805 C
HY S 61805 C	25	37	7	31	3.175	19	28.9		33.1	34.2	-	-	0.3	0.3	0.3	0.3	26.7	35.5	35.5	29.9	0.019	15	3.65	2.65	101	69000	51000	19	23	55	36	110	50	110	HY S 61805 C
S 61805 E	25	37	7	31	3.175	19	28.9		33.1	34.2	-	-	0.3	0.3	0.3	0.3	26.7	35.5	35.5	29.9	0.020	25	3.45	2.65	136	47000	35000	30	50	90	76	170	98	260	S 61805 E
HY S 61805 E	25	37	7	31	3.175	19	28.9		33.1	34.2	-	-	0.3	0.3	0.3	0.3	26.7	35.5	35.5	29.9	0.019	25	3.45	2.55	95	58000	44000	30	56	90	83	170	107	180	HY S 61805 E
S 61905 C	25	42	9	34	4.762	17	30.6		37.4	38.8	-	-	0.3	0.3	0.3	0.3	27.4	40.1	40.1	32.4	0.040	15	7.7	5.45	282	50000	38000	40	29	120	48	240	67	310	S 61905 C
HY S 61905 C	25	42	9	34	4.762	17	30.6		37.4	38.8	-	-	0.3	0.3	0.3	0.3	27.4	40.1	40.1	32.4	0.035	15	7.7	5.2	197	63000	47000	40	32	120	52	240	73	210	HY S 61905 C
S 61905 E	25	42	9	34	4.762	17	30.6		37.4	38.8	-	-	0.3	0.3	0.3	0.3	27.4	40.1	40.1	32.4	0.040	25	7.3	5.15	268	43000	32000	60	69	180	104	360	138	510	S 61905 E
HY S 61905 E	25	42	9	34	4.762	17	30.6		37.4	38.8	-	-	0.3	0.3	0.3	0.3	27.4	40.1	40.1	32.4	0.035	25	7.3	4.95	187	53000	40000	60	76	180	115	360	151	350	HY S 61905 E
SM 61905 C	25	42	9	34	4.762	17	30.6		37.4	38.8	-	-	0.3	0.3	0.3	0.3	27.4	40.1	40.1	32.4	0.040	15	5.8	3.2	164	59000	44000	30	23	90	35	180	48	180	SM 61905 C
HY SM 61905 C	25	42	9	34	4.762	17	30.6		37.4	38.8	-	-	0.3	0.3	0.3	0.3	27.4	40.1	40.1	32.4	0.035	15	5.8	3.05	114	74000	55000	30	25	90	39	180	53	120	HY SM 61905 C
KH 61905 C	25	42	9	33.4	3.969	19	30.6	30.0	36.2	37.5	37.2	38.5	0.3	0.3	0.3	0.3	27.1	40.3	40.3	32.1	0.042	17	4.25	2.35	122	63000	47000	22	25	65	38	130	51	150	KH 61905 C
HY KH 61905 C	25	42	9	33.4	3.969	19	30.6	30.0	36.2	37.5	37.2	38.5	0.3	0.3	0.3	0.3	27.1	40.3	40.3	32.1	0.039	17	4.25	2.25	85	79000	59000	22	28	65	42	130	55	110	HY KH 61905 C
KH 61905 E	25	42	9	33.4	3.969	19	30.6	30.0	36.2	37.5	37.2	38.5	0.3	0.3	0.3	0.3	27.1	40.3	40.3	32.1	0.042	25	4.1	2.24	117	57000	43000	35	52	100	76	200	99	220	KH 61905 E
HY KH 61905 E	25	42	9	33.4	3.969	19	30.6	30.0	36.2	37.5	37.2	38.5	0.3	0.3	0.3	0.3	27.1	40.3	40.3	32.1	0.039	25	4.1	2.15	81	71000	53000	35	58	100	84	200	109	150	HY KH 61905 E
S 6005 C	25	47	12	36	6.35	15	32.2		40.1	42.5	42.2	43.4	0.6	0.3	0.6	0.3	28.8	44.1	44.5	34.3	0.078	15	13.4	9.3	484	47000	35000	70	39	200	64	400	91	530	S 6005 C
HY S 6005 C	25	47	12	36	6.35	15	32.2		40.1	42.5	42.2	43.4	0.6	0.3	0.6	0.3	28.8	44.1	44.5	34.3	0.068	15	13.4	8.9	337	59000	44000	70	43	200	69	400	98	370	HY S 6005 C
S 6005 E	25	47	12	36	6.35	15	32.2		40.1	42.5	42.2	43.4	0.6	0.3	0.6	0.3	28.8	44.1	44.5	34.3	0.078	25	12.7	8.9	462	40000	30000	110	91	320	139	640	185	880	S 6005 E
HY S 6005 E	25	47	12	36	6.35	15	32.2		40.1	42.5	42.2	43.4	0.6	0.3	0.6	0.3	28.8	44.1	44.5	34.3	0.068	25	12.7	8.5	322	50000	38000	110	101	320	152	640	203	610	HY S 6005 E
SM 6005 C	25	47	12	36	6.35	15	32.2		40.1	42.5	42.2	43.4	0.6	0.3	0.6	0.3	28.8	44.1	44.5	34.3	0.078	15	9.2	4.7	245	56000	42000	50	28	140	43	280	59	270	SM 6005 C
HY SM 6005 C	25	47	12	36	6.35	15	32.2		40.1	42.5	42.2	43.4	0.6	0.3	0.6	0.3	28.8	44.1	44.5	34.3	0.068	15	9.2	4.5	171	69000	52000	50	31	140	47	280	64	190	HY SM 6005 C
KH 6005 C	25	47	12	35.8	5.556	17	32.2	30.9	39.9	41.5	42.0	43.6	0.6	0.3	0.6	0.3	28.6	44.2	44.6	34.2	0.077	17	7.4	3.95	203	59000	44000	35	30	110	47	220	63	250	KH 6005 C
HY KH 6005 C	25	47	12	35.8	5.556	17	32.2	30.9	39.9	41.5	42.0	43.6	0.6	0.3	0.6	0.3	28.6	44.2	44.6	34.2	0.070	17	7.4	3.75	142	73000	55000	35	33	110	52	220	68	180	HY KH 6005 C
KH 6005 E	25	47	12	35.8	5.556	17	32.2	30.9	39.9	41.5	42.0	43.6	0.6	0.3	0.6	0.3	28.6	44.2	44.6	34.2	0.077	25	7.1	3.75	195	53000	40000	60	65	180	96	360	125	370	KH 6005 E
HY KH 6005 E	25	47	12	35.8	5.556	17	32.2	30.9	39.9	41.5	42.0	43.6	0.6	0.3	0.6	0.3	28.6	44.2	44.6	34.2	0.070	25	7.1	3.6	136	66000	50000	60	72	180	107	360	138	260	HY KH 6005 E
S 6205 C	25	52	15	39.1	7.938	13	34.0		44.1	47.2	-	-	1.0	0.6	1.0	0.6	30.2	47.9	48.4	36.8	0.125	15	19	12.7	660	44000	33000	100	45	300	77	600	111	720	S 6205 C
HY S 6205 C	25	52	15	39.1	7.938	13	34.0		44.1	47.2	-	-	1.0	0.6	1.0	0.6	30.2	47.9	48.4	36.8	0.110	15	19	12.2	460	54000	41000	100	50	300	83	600	119	500	HY S 6205 C
S 6205 E	25	52	15	39.1	7.938	13	34.0		44.1	47.2	-	-	1.0	0.6	1.0	0.6	30.2	47.9	48.4	36.8	0.125	25	18.2	12.1	629	37000	28000	150	103	450	159	900	214	1190	S 6205 E
HY S 6205 E	25	52	15	39.1	7.938	13	34.0		44.1	47.2	-	-	1.0	0.6	1.0	0.6	30.2	47.9	48.4	36.8	0.110	25	18.2	11.6	438	46000	35000	150	114	450	175	900	234	830	HY S 6205 E



Design S/SM

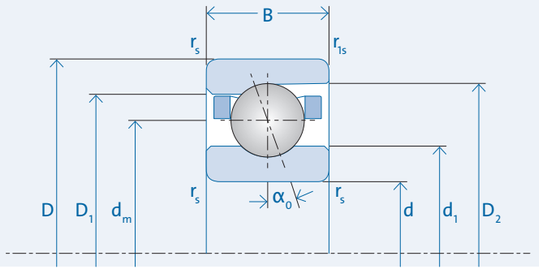
Design S/SM .. 2RZ

Design KH .. 2RZ

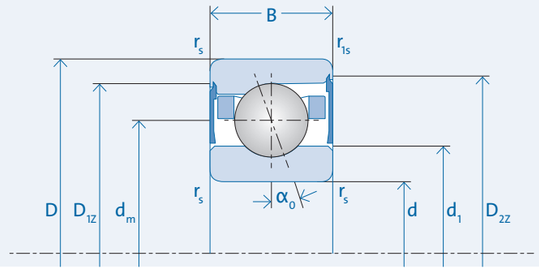
Mounting dimensions

Designation	Boundary dim.			Balls			Dimensions								Mounting dimensions						Weight	CA	Load rating			Speed values		Preload / Rigidity							Designation
	d [mm]	D [mm]	B [mm]	d_m [mm]	D_W [mm]	Z [pcs]	d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	$r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]	$D_{b\,max}$ [mm]	d_T [mm]	m [kg]	α_o [°]	C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	n_{oil} [1/min]	n_{grease} [1/min]	F_V L [N]	C_{ax} L [N/µm]	F_V M [N]	C_{ax} M [N/µm]	F_V S [N]	C_{ax} S [N/µm]	F_f [N]	
d = 30mm																																			**d = 30mm**
S 61806 C	30	42	7	36.2	3.175	22	34.1		38.3	39.4	-	-	0.3	0.3	0.3	0.3	31.7	40.5	40.5	35.1	0.024	15	3.85	3.3	170	47000	35000	20	23	60	37	120	52	190	S 61806 C
HY S 61806 C	30	42	7	36.2	3.175	22	34.1		38.3	39.4	-	-	0.3	0.3	0.3	0.3	31.7	40.5	40.5	35.1	0.022	15	3.85	3.15	119	59000	44000	20	25	60	40	120	56	130	HY S 61806 C
S 61806 E	30	42	7	36.2	3.175	22	34.1		38.3	39.4	-	-	0.3	0.3	0.3	0.3	31.7	40.5	40.5	35.1	0.024	25	3.65	3.1	161	40000	30000	30	55	90	83	180	109	300	S 61806 E
HY S 61806 E	30	42	7	36.2	3.175	22	34.1		38.3	39.4	-	-	0.3	0.3	0.3	0.3	31.7	40.5	40.5	35.1	0.022	25	3.65	2.95	112	50000	38000	30	61	90	91	180	120	210	HY S 61806 E
S 61906 C	30	47	9	38.5	4.762	18	35.1		41.9	43.3	43.9	44.1	0.3	0.3	0.3	0.3	32.3	45.1	45.1	36.8	0.046	15	7.8	5.9	306	44000	33000	40	30	120	49	240	69	330	S 61906 C
HY S 61906 C	30	47	9	38.5	4.762	18	35.1		41.9	43.3	43.9	44.1	0.3	0.3	0.3	0.3	32.3	45.1	45.1	36.8	0.041	15	7.8	5.65	213	55000	41000	40	33	120	53	240	75	230	HY S 61906 C
S 61906 E	30	47	9	38.5	4.762	18	35.1		41.9	43.3	43.9	44.1	0.3	0.3	0.3	0.3	32.3	45.1	45.1	36.8	0.046	25	7.4	5.6	290	38000	28000	60	71	190	110	380	146	550	S 61906 E
HY S 61906 E	30	47	9	38.5	4.762	18	35.1		41.9	43.3	43.9	44.1	0.3	0.3	0.3	0.3	32.3	45.1	45.1	36.8	0.041	25	7.4	5.35	202	47000	35000	60	79	190	121	380	160	380	HY S 61906 E
SM 61906 C	30	47	9	38.5	4.762	18	35.1		41.9	43.3	43.9	44.1	0.3	0.3	0.3	0.3	32.3	45.1	45.1	36.8	0.046	15	5.95	3.45	178	52000	39000	30	23	90	37	180	50	190	SM 61906 C
HY SM 61906 C	30	47	9	38.5	4.762	18	35.1		41.9	43.3	43.9	44.1	0.3	0.3	0.3	0.3	32.3	45.1	45.1	36.8	0.041	15	5.95	3.3	124	65000	49000	30	26	90	40	180	54	130	HY SM 61906 C
KH 61906 C	30	47	9	37.9	3.969	22	35.1	34.5	40.7	42.0	41.7	43.0	0.3	0.3	0.3	0.3	32.1	45.3	45.3	36.5	0.049	17	4.65	2.8	144	55000	42000	23	28	70	43	140	57	180	KH 61906 C
HY KH 61906 C	30	47	9	37.9	3.969	22	35.1	34.5	40.7	42.0	41.7	43.0	0.3	0.3	0.3	0.3	32.1	45.3	45.3	36.5	0.046	17	4.65	2.65	100	69000	52000	23	31	70	47	140	62	120	HY KH 61906 C
KH 61906 E	30	47	9	37.9	3.969	22	35.1	34.5	40.7	42.0	41.7	43.0	0.3	0.3	0.3	0.3	32.1	45.3	45.3	36.5	0.049	25	4.4	2.65	137	50000	38000	35	57	110	87	220	112	260	KH 61906 E
HY KH 61906 E	30	47	9	37.9	3.969	22	35.1	34.5	40.7	42.0	41.7	43.0	0.3	0.3	0.3	0.3	32.1	45.3	45.3	36.5	0.046	25	4.4	2.55	96	63000	47000	35	64	110	96	220	124	180	HY KH 61906 E
S 6006 C	30	55	13	42.5	7.144	16	38.1		47.0	49.8	49.1	50.7	1.0	0.6	1.0	0.6	34.9	50.9	51.4	40.5	0.115	15	16.5	12	624	40000	30000	85	43	250	71	500	101	680	S 6006 C
HY S 6006 C	30	55	13	42.5	7.144	16	38.1		47.0	49.8	49.1	50.7	1.0	0.6	1.0	0.6	34.9	50.9	51.4	40.5	0.100	15	16.5	11.5	435	50000	38000	85	48	250	77	500	109	470	HY S 6006 C
S 6006 E	30	55	13	42.5	7.144	16	38.1		47.0	49.8	49.1	50.7	1.0	0.6	1.0	0.6	34.9	50.9	51.4	40.5	0.115	25	15.7	11.5	595	34000	25500	130	102	400	157	800	209	1130	S 6006 E
HY S 6006 E	30	55	13	42.5	7.144	16	38.1		47.0	49.8	49.1	50.7	1.0	0.6	1.0	0.6	34.9	50.9	51.4	40.5	0.100	25	15.7	11	415	43000	32000	130	113	400	173	800	229	790	HY S 6006 E
SM 6006 C	30	55	13	42.5	7.144	16	38.1		47.0	49.8	49.1	50.7	1.0	0.6	1.0	0.6	34.9	50.9	51.4	40.5	0.115	15	11.9	6.5	338	47000	35000	60	32	180	50	360	69	370	SM 6006 C
HY SM 6006 C	30	55	13	42.5	7.144	16	38.1		47.0	49.8	49.1	50.7	1.0	0.6	1.0	0.6	34.9	50.9	51.4	40.5	0.100	15	11.9	6.25	236	59000	44000	60	35	180	55	360	75	260	HY SM 6006 C
KH 6006 C	30	55	13	41.7	5.556	20	38.1	36.8	45.8	47.4	47.9	49.5	1.0	0.6	1.0	0.6	34.5	51.2	51.7	40.1	0.120	17	8.2	4.75	247	50000	38000	40	35	120	54	250	73	310	KH 6006 C
HY KH 6006 C	30	55	13	41.7	5.556	20	38.1	36.8	45.8	47.4	47.9	49.5	1.0	0.6	1.0	0.6	34.5	51.2	51.7	40.1	0.110	17	8.2	4.55	172	63000	47000	40	39	120	59	250	79	210	HY KH 6006 C
KH 6006 E	30	55	13	41.7	5.556	20	38.1	36.8	45.8	47.4	47.9	49.5	1.0	0.6	1.0	0.6	34.5	51.2	51.7	40.1	0.120	25	7.8	4.55	236	46000	34000	65	74	200	111	390	143	450	KH 6006 E
HY KH 6006 E	30	55	13	41.7	5.556	20	38.1	36.8	45.8	47.4	47.9	49.5	1.0	0.6	1.0	0.6	34.5	51.2	51.7	40.1	0.110	25	7.8	4.35	165	57000	43000	65	82	200	123	390	157	310	HY KH 6006 E
S 6206 C	30	62	16	46	9.525	13	40.4		52.1	55.7	-	-	1.0	0.6	1.0	0.6	35.8	57.6	58.1	43.6	0.195	15	25	16.9	878	37000	27500	130	50	380	81	760	116	960	S 6206 C
HY S 6206 C	30	62	16	46	9.525	13	40.4		52.1	55.7	-	-	1.0	0.6	1.0	0.6	35.8	57.6	58.1	43.6	0.170	15	25	16.2	612	46000	35000	130	54	380	88	760	125	670	HY S 6206 C
S 6206 E	30	62	16	46	9.525	13	40.4		52.1	55.7	-	-	1.0	0.6	1.0	0.6	35.8	57.6	58.1	43.6	0.195	25	24	16.2	842	32000	23500	200	116	600	177	1200	237	1600	S 6206 E
HY S 6206 E	30	62	16	46	9.525	13	40.4		52.1	55.7	-	-	1.0	0.6	1.0	0.6	35.8	57.6	58.1	43.6	0.170	25	24	15.5	587	39000	29500	200	128	600	195	1200	259	1110	HY S 6206 E

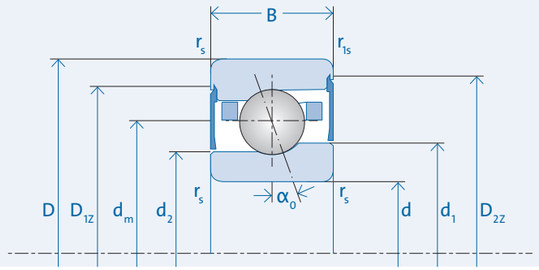
Design S/SM



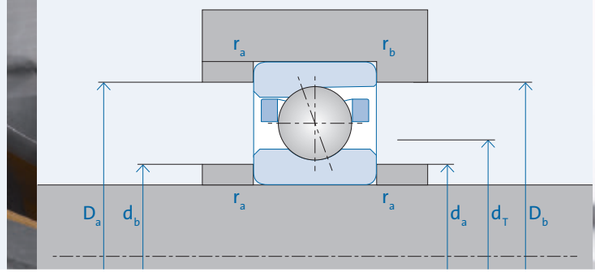
Design S/SM .. 2RZ



Design KH .. 2RZ

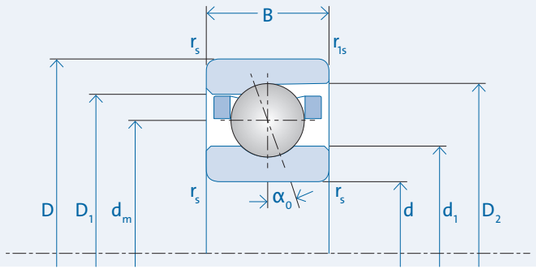


Mounting dimensions

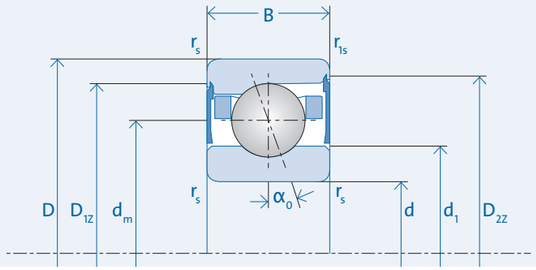


Designation	Boundary dim. d [mm]	D [mm]	B [mm]	Balls d_m [mm]	D_W [mm]	Z [pcs]	Dimensions d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	Mounting dimensions $r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]	$D_{b\,max}$ [mm]	d_T [mm]	Weight m [kg]	CA α_o [°]	Load rating C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	Speed values n_{oil} [1/min]	n_{grease} [1/min]	Preload / Rigidity $F_V L$ [N]	$C_{ax} L$ [N/µm]	$F_V M$ [N]	$C_{ax} M$ [N/µm]	$F_V S$ [N]	$C_{ax} S$ [N/µm]	F_f [N]	Designation
d = 35mm																																			**d = 35mm**
S 61807 C	35	47	7	41	3.175	24	38.9		431	44.2	-	-	0.3	0.3	0.3	0.3	36.6	45.5	45.5	39.9	0.027	15	3.95	3.65	188	41000	31000	20	24	60	39	120	54	200	**S 61807 C**
HY S 61807 C	35	47	7	41	3.175	24	38.9		43.1	44.2	-	-	0.3	0.3	0.3	0.3	36.6	45.5	45.5	39.9	0.025	15	3.95	3.45	131	52000	39000	20	27	60	42	120	59	140	**HY S 61807 C**
S 61807 E	35	47	7	41	3.175	24	38.9		43.1	44.2	-	-	0.3	0.3	0.3	0.3	36.6	45.5	45.5	39.9	0.027	25	3.75	3.45	177	35000	26500	30	58	90	87	190	117	340	**S 61807 E**
HY S 61807 E	35	47	7	41	3.175	24	38.9		43.1	44.2	-	-	0.3	0.3	0.3	0.3	36.6	45.5	45.5	39.9	0.025	25	3.75	3.3	124	44000	33000	30	64	90	96	190	129	230	**HY S 61807 E**
S 61907 C	35	55	10	45	5.556	18	41.4		48.6	50.6	50.6	51.4	0.6	0.3	0.6	0.3	38.2	52.3	52.7	43.3	0.072	15	10.9	8.8	454	38000	28500	55	37	165	61	330	86	490	**S 61907 C**
HY S 61907 C	35	55	10	45	5.556	18	41.4		48.6	50.6	50.6	51.4	0.6	0.3	0.6	0.3	38.2	52.3	52.7	43.3	0.065	15	10.9	8.4	316	47000	35000	55	40	165	66	330	92	340	**HY S 61907 C**
S 61907 E	35	55	10	45	5.556	18	41.4		48.6	50.6	50.6	51.4	0.6	0.3	0.6	0.3	38.2	52.3	52.7	43.3	0.072	25	10.3	8.3	430	32000	24000	90	89	260	134	520	178	820	**S 61907 E**
HY S 61907 E	35	55	10	45	5.556	18	41.4		48.6	50.6	50.6	51.4	0.6	0.3	0.6	0.3	38.2	52.3	52.7	43.3	0.065	25	10.3	8	300	40000	30000	90	99	260	147	520	195	570	**HY S 61907 E**
SM 61907 C	35	55	10	45	5.556	18	41.4		48.6	50.6	50.6	51.4	0.6	0.3	0.6	0.3	38.2	52.3	52.7	43.3	0.072	17	8	4.8	249	44000	33000	40	33	120	51	240	68	310	**SM 61907 C**
HY SM 61907 C	35	55	10	45	5.556	18	41.4		48.6	50.6	50.6	51.4	0.6	0.3	0.6	0.3	38.2	52.3	52.7	43.3	0.065	17	8	4.6	173	56000	42000	40	37	120	56	240	75	220	**HY SM 61907 C**
KH 61907 C	35	55	10	44.3	3.969	26	41.4	40.8	47.1	48.4	48.1	49.4	0.6	0.3	0.6	0.3	37.8	52.6	53.0	43.0	0.079	17	5.05	3.35	173	47000	36000	25	32	80	50	150	64	210	**KH 61907 C**
HY KH 61907 C	35	55	10	44.3	3.969	26	41.4	40.8	47.1	48.4	48.1	49.4	0.6	0.3	0.6	0.3	37.8	52.6	53.0	43.0	0.075	17	5.05	3.2	121	59000	44000	25	35	80	55	150	71	150	**HY KH 61907 C**
KH 61907 E	35	55	10	44.3	3.969	26	41.4	40.8	47.1	48.4	48.1	49.4	0.6	0.3	0.6	0.3	37.8	52.6	53.0	43.0	0.079	25	4.8	3.2	165	43000	32000	40	67	120	99	240	129	310	**KH 61907 E**
HY KH 61907 E	35	55	10	44.3	3.969	26	41.4	40.8	47.1	48.4	48.1	49.4	0.6	0.3	0.6	0.3	37.8	52.6	53.0	43.0	0.075	25	4.8	3.05	115	54000	40000	40	74	120	110	240	142	220	**HY KH 61907 E**
S 6007 C	35	62	14	48.5	7.938	16	43.2		53.1	56.6	55.8	57.8	1.0	0.6	1.0	0.6	40.2	57.7	58.3	46.1	0.150	15	20.6	15.7	815	35000	26500	100	49	300	80	600	114	890	**S 6007 C**
HY S 6007 C	35	62	14	48.5	7.938	16	43.2		53.1	56.6	55.8	57.8	1.0	0.6	1.0	0.6	40.2	57.7	58.3	46.1	0.130	15	20.6	15	568	44000	33000	100	53	300	87	600	123	620	**HY S 6007 C**
S 6007 E	35	62	14	48.5	7.938	16	43.2		53.1	56.6	55.8	57.8	1.0	0.6	1.0	0.6	40.2	57.7	58.3	46.1	0.150	25	19.6	15	777	30000	22500	170	119	500	180	1000	240	1470	**S 6007 E**
HY S 6007 E	35	62	14	48.5	7.938	16	43.2		53.1	56.6	55.8	57.8	1.0	0.6	1.0	0.6	40.2	57.7	58.3	46.1	0.130	25	19.6	14.3	542	37000	28000	170	131	500	198	1000	263	1030	**HY S 6007 E**
SM 6007 C	35	62	14	48.5	7.938	16	43.2		53.1	56.6	55.8	57.8	1.0	0.6	1.0	0.6	40.2	57.7	58.3	46.1	0.150	15	14.3	8.1	420	41000	31000	70	35	210	55	420	75	460	**SM 6007 C**
HY SM 6007 C	35	62	14	48.5	7.938	16	43.2		53.1	56.6	55.8	57.8	1.0	0.6	1.0	0.6	40.2	57.7	58.3	46.1	0.130	15	14.3	7.8	293	52000	39000	70	39	210	60	420	81	320	**HY SM 6007 C**
KH 6007 C	35	62	14	47.3	6.35	20	43.2	41.5	51.5	53.8	53.6	56.0	1.0	0.6	1.0	0.6	39.7	58.0	58.5	45.5	0.155	17	10.4	6.2	322	44000	33000	50	40	160	62	320	82	400	**KH 6007 C**
HY KH 6007 C	35	62	14	47.3	6.35	20	43.2	41.5	51.5	53.8	53.6	56.0	1.0	0.6	1.0	0.6	39.7	58.0	58.5	45.5	0.145	17	10.4	5.95	225	55000	42000	50	44	160	68	320	90	280	**HY KH 6007 C**
KH 6007 E	35	62	14	47.3	6.35	20	43.2	41.5	51.5	53.8	53.6	56.0	1.0	0.6	1.0	0.6	39.7	58.0	58.5	45.5	0.155	25	10	5.95	308	40000	30000	80	83	250	125	500	162	580	**KH 6007 E**
HY KH 6007 E	35	62	14	47.3	6.35	20	43.2	41.5	51.5	53.8	53.6	56.0	1.0	0.6	1.0	0.6	39.7	58.0	58.5	45.5	0.145	25	10	5.7	215	50000	38000	80	92	250	138	500	179	410	**HY KH 6007 E**
S 6207 C	35	72	17	53.5	11.112	13	47.4		60.6	64.8	-	-	1.1	0.6	1.0	0.6	41.9	66.7	67.7	50.9	0.290	15	35	24.5	1275	32000	24000	180	61	530	101	1000	141	1390	**S 6207 C**
HY S 6207 C	35	72	17	53.5	11.112	13	47.4		60.6	64.8	-	-	1.1	0.6	1.0	0.6	41.9	66.7	67.7	50.9	0.245	15	35	23.5	889	40000	30000	180	67	530	110	1000	152	970	**HY S 6207 C**
S 6207 E	35	72	17	53.5	11.112	13	47.4		60.6	64.8	-	-	1.1	0.6	1.0	0.6	41.9	66.7	67.7	50.9	0.290	25	33.5	23.4	1217	27000	20500	280	141	840	217	1700	293	2310	**S 6207 E**
HY S 6207 E	35	72	17	53.5	11.112	13	47.4		60.6	64.8	-	-	1.1	0.6	1.0	0.6	41.9	66.7	67.7	50.9	0.245	25	33.5	22.4	848	34000	25500	280	156	840	238	1700	320	1610	**HY S 6207 E**

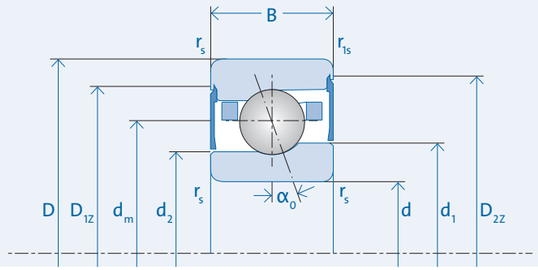
Design S/SM



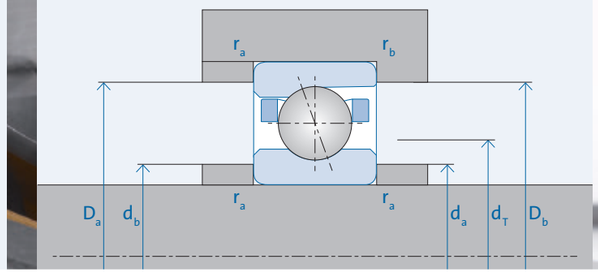
Design S/SM .. 2RZ



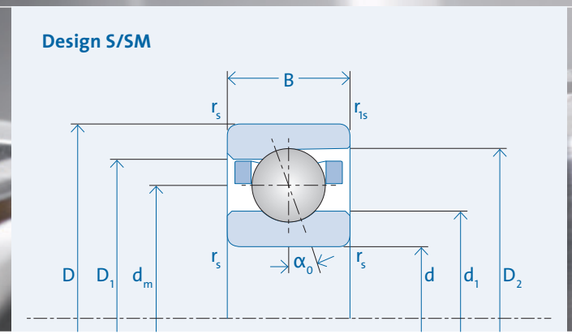
Design KH .. 2RZ

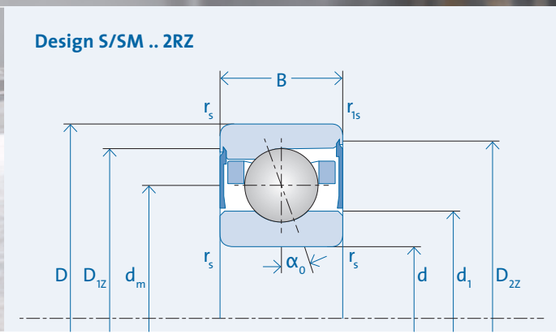


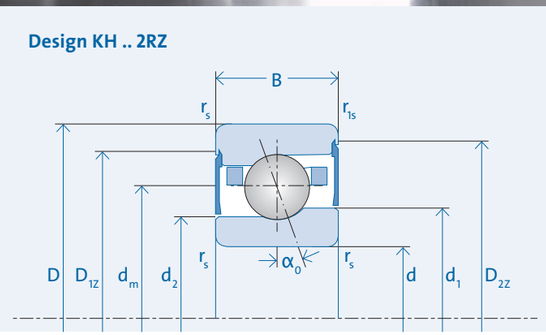
Mounting dimensions

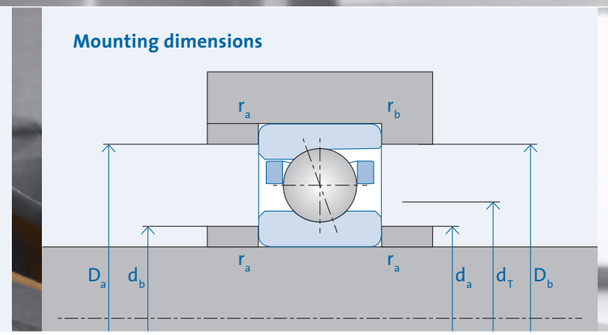


Designation	Boundary dim. d [mm]	D [mm]	B [mm]	Balls d_m [mm]	D_W [mm]	Z [pcs]	Dimensions d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	Mounting dimensions $r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]	$D_{b\,max}$ [mm]	d_T [mm]	Weight m [kg]	CA α_o [°]	Load rating C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	Speed values n_{oil} [1/min]	n_{grease} [1/min]	Preload / Rigidity $F_V L$ [N]	$C_{ax} L$ [N/µm]	$F_V M$ [N]	$C_{ax} M$ [N/µm]	$F_V S$ [N]	$C_{ax} S$ [N/µm]	F_f [N]	Designation
d = 40mm																																			**d = 40mm**
S 61808 C	40	52	7	46	3.175	26	43.9		48.1	49.2	-	-	0.3	0.3	0.3	0.3	41.6	50.5	50.5	44.9	0.030	15	4.05	3.95	206	37000	27500	21	26	60	41	120	56	220	S 61808 C
HY S 61808 C	40	52	7	46	3.175	26	43.9		48.1	49.2	-	-	0.3	0.3	0.3	0.3	41.6	50.5	50.5	44.9	0.028	15	4.05	3.8	143	46000	35000	21	29	60	44	120	61	160	HY S 61808 C
S 61808 E	40	52	7	46	3.175	26	43.9		48.1	49.2	-	-	0.3	0.3	0.3	0.3	41.6	50.5	50.5	44.9	0.030	25	3.8	3.75	194	32000	23500	30	61	100	96	190	123	370	S 61808 E
HY S 61808 E	40	52	7	46	3.175	26	43.9		48.1	49.2	-	-	0.3	0.3	0.3	0.3	41.6	50.5	50.5	44.9	0.028	25	3.8	3.6	135	39000	29500	30	68	100	105	190	135	260	HY S 61808 E
S 61908 C	40	62	12	51	6.35	19	46.8		55.2	57.4	57.7	58.5	0.6	0.3	0.6	0.3	43.5	59.0	59.4	49.0	0.105	15	14.9	12.8	666	33000	25000	75	46	230	77	460	109	730	S 61908 C
HY S 61908 C	40	62	12	51	6.35	19	46.8		55.2	57.4	57.7	58.5	0.6	0.3	0.6	0.3	43.5	59.0	59.4	49.0	0.094	15	14.9	12.3	465	42000	31000	75	50	230	83	460	118	510	HY S 61908 C
S 61908 E	40	62	12	51	6.35	19	46.8		55.2	57.4	57.7	58.5	0.6	0.3	0.6	0.3	43.5	59.0	59.4	49.0	0.105	25	14.1	12.2	633	28500	21500	120	110	360	167	720	223	1200	S 61908 E
HY S 61908 E	40	62	12	51	6.35	19	46.8		55.2	57.4	57.7	58.5	0.6	0.3	0.6	0.3	43.5	59.0	59.4	49.0	0.094	25	14.1	11.7	441	36000	26500	120	121	360	184	720	244	840	HY S 61908 E
SM 61908 C	40	62	12	51	6.35	19	46.8		55.2	57.4	57.7	58.5	0.6	0.3	0.6	0.3	43.5	59.0	59.4	49.0	0.105	17	10.4	6.4	334	39000	29500	55	40	160	61	320	82	410	SM 61908 C
HY SM 61908 C	40	62	12	51	6.35	19	46.8		55.2	57.4	57.7	58.5	0.6	0.3	0.6	0.3	43.5	59.0	59.4	49.0	0.094	17	10.4	6.15	233	49000	37000	55	45	160	67	320	90	290	HY SM 61908 C
KH 61908 C	40	62	12	49.7	4.762	25	46.8	45.3	53.1	54.6	55.2	56.7	0.6	0.3	0.6	0.3	43.1	59.3	59.8	48.3	0.115	17	6.85	4.6	237	42000	32000	35	37	100	55	210	75	290	KH 61908 C
HY KH 61908 C	40	62	12	49.7	4.762	25	46.8	45.3	53.1	54.6	55.2	56.7	0.6	0.3	0.6	0.3	43.1	59.3	59.8	48.3	0.110	17	6.85	4.4	165	53000	40000	35	41	100	61	210	82	210	HY KH 61908 C
KH 61908 E	40	62	12	49.7	4.762	25	46.8	45.3	53.1	54.6	55.2	56.7	0.6	0.3	0.6	0.3	43.1	59.3	59.8	48.3	0.115	25	6.55	4.35	226	38000	28500	55	77	160	113	330	148	430	KH 61908 E
HY KH 61908 E	40	62	12	49.7	4.762	25	46.8	45.3	53.1	54.6	55.2	56.7	0.6	0.3	0.6	0.3	43.1	59.3	59.8	48.3	0.110	25	6.55	4.15	158	48000	36000	55	86	160	125	330	163	300	HY KH 61908 E
S 6008 C	40	68	15	54	7.938	18	49.2		59.0	62.1	61.7	63.3	1.0	0.6	1.0	0.6	45.2	63.7	64.2	51.8	0.185	15	22	18.1	942	31000	23500	110	54	330	90	660	127	1030	S 6008 C
HY S 6008 C	40	68	15	54	7.938	18	49.2		59.0	62.1	61.7	63.3	1.0	0.6	1.0	0.6	45.2	63.7	64.2	51.8	0.165	15	22	17.3	656	39000	29500	110	59	330	97	660	137	720	HY S 6008 C
S 6008 E	40	68	15	54	7.938	18	49.2		59.0	62.1	61.7	63.3	1.0	0.6	1.0	0.6	45.2	63.7	64.2	51.8	0.185	25	20.9	17.2	896	27000	20000	180	130	530	198	1100	268	1700	S 6008 E
HY S 6008 E	40	68	15	54	7.938	18	49.2		59.0	62.1	61.7	63.3	1.0	0.6	1.0	0.6	45.2	63.7	64.2	51.8	0.165	25	20.9	16.5	625	34000	25000	180	144	530	218	1100	293	1180	HY S 6008 E
SM 6008 C	40	68	15	54	7.938	18	49.2		59.0	62.1	61.7	63.3	1.0	0.6	1.0	0.6	45.2	63.7	64.2	51.8	0.185	15	15.4	9.4	486	37000	28000	80	40	230	61	460	83	530	SM 6008 C
HY SM 6008 C	40	68	15	54	7.938	18	49.2		59.0	62.1	61.7	63.3	1.0	0.6	1.0	0.6	45.2	63.7	64.2	51.8	0.165	15	15.4	9	339	46000	35000	80	44	230	67	460	91	370	HY SM 6008 C
KH 6008 C	40	68	15	53.3	6.35	22	49.2	47.5	57.5	59.8	60.2	62.6	1.0	0.6	1.0	0.6	44.7	64.0	64.5	51.4	0.195	17	10.9	6.95	361	39000	29500	55	44	160	65	330	88	450	KH 6008 C
HY KH 6008 C	40	68	15	53.3	6.35	22	49.2	47.5	57.5	59.8	60.2	62.6	1.0	0.6	1.0	0.6	44.7	64.0	64.5	51.4	0.180	17	10.9	6.65	252	49000	37000	55	48	160	72	330	96	310	HY KH 6008 C
KH 6008 E	40	68	15	53.3	6.35	22	49.2	47.5	57.5	59.8	60.2	62.6	1.0	0.6	1.0	0.6	44.7	64.0	64.5	51.4	0.195	25	10.5	6.65	345	36000	26500	90	92	260	135	520	174	650	KH 6008 E
HY KH 6008 E	40	68	15	53.3	6.35	22	49.2	47.5	57.5	59.8	60.2	62.6	1.0	0.6	1.0	0.6	44.7	64.0	64.5	51.4	0.180	25	10.5	6.35	240	45000	33000	90	102	260	149	520	192	460	HY KH 6008 E
S 6208 C	40	80	18	60	11.906	13	52.8		67.6	72.1	-	-	1.1	0.6	1.0	0.6	47.0	74.6	75.6	56.9	0.365	15	36.5	26	1339	28500	21500	185	59	560	97	1100	136	1460	S 6208 C
HY S 6208 C	40	80	18	60	11.906	13	52.8		67.6	72.1	-	-	1.1	0.6	1.0	0.6	47.0	74.6	75.6	56.9	0.310	15	36.5	24.6	934	35000	26500	185	64	560	105	1100	147	1020	HY S 6208 C
S 6208 E	40	80	18	60	11.906	13	52.8		67.6	72.1	-	-	1.1	0.6	1.0	0.6	47.0	74.6	75.6	56.9	0.365	25	35	24.7	1282	24000	18000	300	140	900	214	1800	285	2430	S 6208 E
HY S 6208 E	40	80	18	60	11.906	13	52.8		67.6	72.1	-	-	1.1	0.6	1.0	0.6	47.0	74.6	75.6	56.9	0.310	25	35	23.6	894	30000	22500	300	155	900	235	1800	313	1690	HY S 6208 E



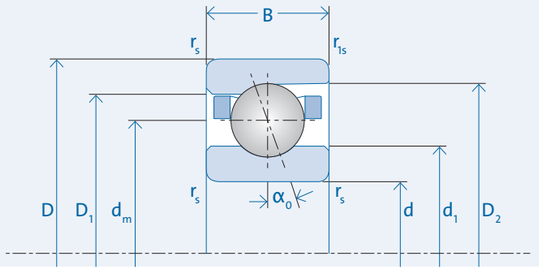




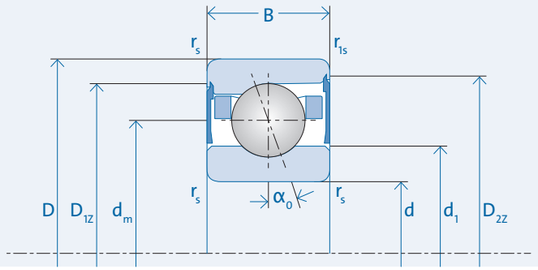


Designation	Boundary dim. d [mm]	D [mm]	B [mm]	Balls d_m [mm]	D_W [mm]	Z [pcs]	Dimensions d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	Mounting dimensions $r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]	$D_{b\,max}$ [mm]	d_T [mm]	Weight m [kg]	CA α_o [°]	Load rating C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	Speed values n_{oil} [1/min]	n_{grease} [1/min]	Preload / Rigidity $F_V L$ [N]	$C_{ax} L$ [N/µm]	$F_V M$ [N]	$C_{ax} M$ [N/µm]	$F_V S$ [N]	$C_{ax} S$ [N/µm]	F_f [N]	Designation
d = 45mm																																			**d = 45mm**
S 61909 C	45	68	12	56.5	6.35	20	52.3		60.7	62.9	63.2	64.0	0.6	0.3	0.6	0.3	48.8	64.7	65.5	54.5	0.125	15	15.2	13.8	715	30000	22500	80	49	230	79	460	112	780	S 61909 C
HY S 61909 C	45	68	12	56.5	6.35	20	52.3		60.7	62.9	63.2	64.0	0.6	0.3	0.6	0.3	48.8	64.7	65.5	54.5	0.110	15	15.2	13.2	498	38000	28000	80	53	230	86	460	121	540	HY S 61909 C
S 61909 E	45	68	12	56.5	6.35	20	52.3		60.7	62.9	63.2	64.0	0.6	0.3	0.6	0.3	48.8	64.7	65.5	54.5	0.125	25	14.3	13.1	678	25500	19000	120	113	360	173	720	230	1280	S 61909 E
HY S 61909 E	45	68	12	56.5	6.35	20	52.3		60.7	62.9	63.2	64.0	0.6	0.3	0.6	0.3	48.8	64.7	65.5	54.5	0.110	25	14.3	12.5	472	32000	24000	120	125	360	190	720	252	900	HY S 61909 E
SM 61909 C	45	68	12	56.5	6.35	20	52.3		60.7	62.9	63.2	64.0	0.6	0.3	0.6	0.3	48.8	64.7	65.5	54.5	0.125	17	10.6	6.85	357	35000	26500	55	42	160	63	320	84	440	SM 61909 C
HY SM 61909 C	45	68	12	56.5	6.35	20	52.3		60.7	62.9	63.2	64.0	0.6	0.3	0.6	0.3	48.8	64.7	65.5	54.5	0.110	17	10.6	6.55	249	44000	33000	55	46	160	69	320	92	310	HY SM 61909 C
KH 61909 C	45	68	12	55.2	4.762	28	52.3	50.8	58.6	60.1	60.7	62.2	0.6	0.3	0.6	0.3	48.4	65.0	65.7	53.8	0.135	17	7.3	5.2	268	38000	28500	35	40	110	61	220	81	330	KH 61909 C
HY KH 61909 C	45	68	12	55.2	4.762	28	52.3	50.8	58.6	60.1	60.7	62.2	0.6	0.3	0.6	0.3	48.4	65.0	65.7	53.8	0.130	17	7.3	4.95	187	48000	36000	35	44	110	67	220	89	230	HY KH 61909 C
KH 61909 E	45	68	12	55.2	4.762	28	52.3	50.8	58.6	60.1	60.7	62.2	0.6	0.3	0.6	0.3	48.4	65.0	65.7	53.8	0.135	25	6.95	4.95	256	34000	26000	60	86	170	124	350	162	480	KH 61909 E
HY KH 61909 E	45	68	12	55.2	4.762	28	52.3	50.8	58.6	60.1	60.7	62.2	0.6	0.3	0.6	0.3	48.4	65.0	65.7	53.8	0.130	25	6.95	4.7	178	43000	32000	60	95	170	137	350	179	340	HY KH 61909 E
S 6009 C	45	75	16	60	8.731	18	54.7		65.0	68.9	67.7	70.0	1.0	0.6	1.0	0.6	50.4	70.5	70.7	57.6	0.240	15	27	22.8	1187	28500	21500	130	61	400	103	800	147	1290	S 6009 C
HY S 6009 C	45	75	16	60	8.731	18	54.7		65.0	68.9	67.7	70.0	1.0	0.6	1.0	0.6	50.4	70.5	70.7	57.6	0.210	15	27	21.9	828	35000	26500	130	67	400	112	800	158	900	HY S 6009 C
S 6009 E	45	75	16	60	8.731	18	54.7		65.0	68.9	67.7	70.0	1.0	0.6	1.0	0.6	50.4	70.5	70.7	57.6	0.240	25	26	21.7	1130	24000	18000	210	146	650	226	1300	302	2140	S 6009 E
HY S 6009 E	45	75	16	60	8.731	18	54.7		65.0	68.9	67.7	70.0	1.0	0.6	1.0	0.6	50.4	70.5	70.7	57.6	0.210	25	26	20.8	788	30000	22500	210	161	650	248	1300	331	1490	HY S 6009 E
SM 6009 C	45	75	16	60	8.731	18	54.7		65.0	68.9	67.7	70.0	1.0	0.6	1.0	0.6	50.4	70.5	70.7	57.6	0.240	15	18.5	11.5	596	33000	25000	90	43	275	68	550	93	650	SM 6009 C
HY SM 6009 C	45	75	16	60	8.731	18	54.7		65.0	68.9	67.7	70.0	1.0	0.6	1.0	0.6	50.4	70.5	70.7	57.6	0.210	15	18.5	11	415	42000	31000	90	48	275	75	550	101	450	HY SM 6009 C
KH 6009 C	45	75	16	58.8	6.35	22	54.7	53.0	63.0	65.3	65.6	67.8	1.0	0.6	1.0	0.6	49.5	71.1	71.3	56.9	0.250	17	10.8	7.05	366	36000	27000	55	44	160	65	330	88	450	KH 6009 C
HY KH 6009 C	45	75	16	58.8	6.35	22	54.7	53.0	63.0	65.3	65.6	67.8	1.0	0.6	1.0	0.6	49.5	71.1	71.3	56.9	0.235	17	10.8	6.75	255	45000	33000	55	48	160	72	330	96	320	HY KH 6009 C
KH 6009 E	45	75	16	58.8	6.35	22	54.7	53.0	63.0	65.3	65.6	67.8	1.0	0.6	1.0	0.6	49.5	71.1	71.3	56.9	0.250	25	10.3	6.7	349	32000	24000	90	92	260	135	520	174	660	KH 6009 E
HY KH 6009 E	45	75	16	58.8	6.35	22	54.7	53.0	63.0	65.3	65.6	67.8	1.0	0.6	1.0	0.6	49.5	71.1	71.3	56.9	0.235	25	10.3	6.45	243	40000	30000	90	102	260	149	520	192	460	HY KH 6009 E
S 6209 C	45	85	19	65	12.7	14	57.4		72.5	77.9	-	-	1.1	0.6	1.0	0.6	52.5	79.2	79.9	61.7	0.415	15	45.5	34	1759	26000	19500	230	71	700	119	1400	170	1920	S 6209 C
HY S 6209 C	45	85	19	65	12.7	14	57.4		72.5	77.9	-	-	1.1	0.6	1.0	0.6	52.5	79.2	79.9	61.7	0.345	15	45.5	32.5	1227	33000	24500	230	78	700	129	1400	183	1340	HY S 6209 C
S 6209 E	45	85	19	65	12.7	14	57.4		72.5	77.9	-	-	1.1	0.6	1.0	0.6	52.5	79.2	79.9	61.7	0.415	25	43.5	32.5	1686	22500	16500	370	168	1100	256	2200	343	3200	S 6209 E
HY S 6209 E	45	85	19	65	12.7	14	57.4		72.5	77.9	-	-	1.1	0.6	1.0	0.6	52.5	79.2	79.9	61.7	0.345	25	43.5	31	1175	28000	21000	370	185	1100	282	2200	375	2230	HY S 6209 E

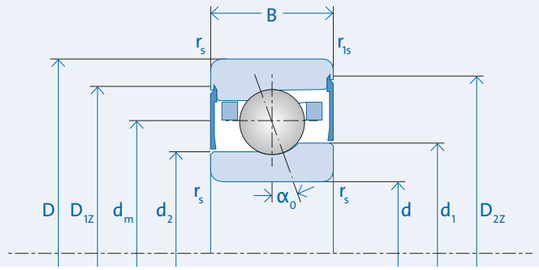
Design S/SM



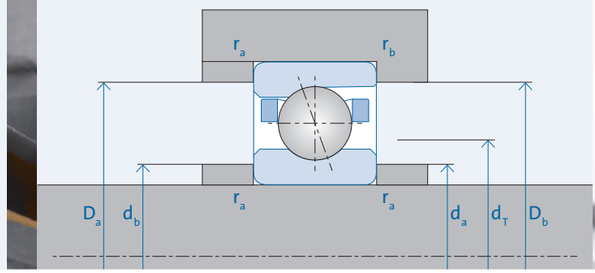
Design S/SM .. 2RZ



Design KH .. 2RZ

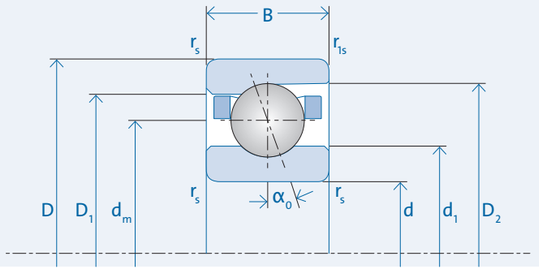


Mounting dimensions

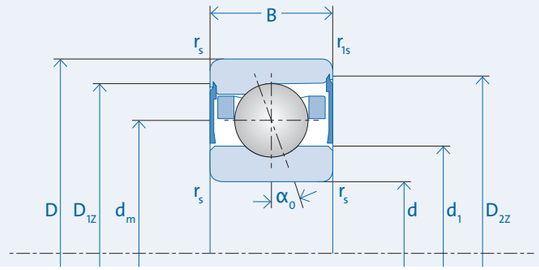


	Boundary dim.			Balls			Dimensions								Mounting dimensions								Weight	CA	Load rating			Speed values		Preload / Rigidity							
Designation	d [mm]	D [mm]	B [mm]	d_m [mm]	D_W [mm]	Z [pcs]	d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	$r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]		$D_{b\,max}$ [mm]	d_T [mm]	m [kg]	α_o [°]	C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	n_{oil} [1/min]	n_{grease} [1/min]	F_V L [N]	C_{ax} L [N/µm]	F_V M [N]	C_{ax} M [N/µm]	F_V S [N]	C_{ax} S [N/µm]	F_f [N]	Designation
d = 50mm																																				**d = 50mm**
S 61910 C	50	72	12	61	6.35	21	56.8		65.2	67.4	67.7	68.5	0.6	0.3	0.6	0.3	53.7	68.8		69.5	58.9	0.125	15	15.4	14.6	760	28000	21000	80	50	230	81	460	115	830	**S 61910 C**
HY S 61910 C	50	72	12	61	6.35	21	56.8		65.2	67.4	67.7	68.5	0.6	0.3	0.6	0.3	53.7	68.8		69.5	58.9	0.110	15	15.4	14	530	35000	26000	80	55	230	88	460	124	580	**HY S 61910 C**
S 61910 E	50	72	12	61	6.35	21	56.8		65.2	67.4	67.7	68.5	0.6	0.3	0.6	0.3	53.7	68.8		69.5	58.9	0.125	25	14.5	13.9	720	24000	18000	120	117	370	180	740	239	1360	**S 61910 E**
HY S 61910 E	50	72	12	61	6.35	21	56.8		65.2	67.4	67.7	68.5	0.6	0.3	0.6	0.3	53.7	68.8		69.5	58.9	0.110	25	14.5	13.3	502	29500	22500	120	129	370	198	740	262	950	**HY S 61910 E**
SM 61910 C	50	72	12	61	6.35	21	56.8		65.2	67.4	67.7	68.5	0.6	0.3	0.6	0.3	53.7	68.8		69.5	58.9	0.125	17	10.9	7.3	378	33000	24500	55	43	170	67	330	88	470	**SM 61910 C**
HY SM 61910 C	50	72	12	61	6.35	21	56.8		65.2	67.4	67.7	68.5	0.6	0.3	0.6	0.3	53.7	68.8		69.5	58.9	0.110	17	10.9	6.95	264	41000	31000	55	48	170	73	330	96	330	**HY SM 61910 C**
KH 61910 C	50	72	12	59.7	4.762	30	56.8	55.3	63.1	64.6	65.2	66.7	0.6	0.3	0.6	0.3	53.3	69.0		69.7	58.3	0.140	17	7.5	5.6	290	35000	26500	40	44	110	64	230	86	360	**KH 61910 C**
HY KH 61910 C	50	72	12	59.7	4.762	30	56.8	55.3	63.1	64.6	65.2	66.7	0.6	0.3	0.6	0.3	53.3	69.0		69.7	58.3	0.130	17	7.5	5.35	202	44000	33000	40	48	110	70	230	94	250	**HY KH 61910 C**
KH 61910 E	50	72	12	59.7	4.762	30	56.8	55.3	63.1	64.6	65.2	66.7	0.6	0.3	0.6	0.3	53.3	69.0		69.7	58.3	0.140	25	7.15	5.35	276	32000	24000	60	90	180	132	360	171	520	**KH 61910 E**
HY KH 61910 E	50	72	12	59.7	4.762	30	56.8	55.3	63.1	64.6	65.2	66.7	0.6	0.3	0.6	0.3	53.3	69.0		69.7	58.3	0.130	25	7.15	5.1	193	40000	30000	60	99	180	146	360	189	370	**HY KH 61910 E**
S 6010 C	50	80	16	65	8.731	19	59.7		70.0	73.9	72.7	75.0	1.0	0.6	1.0	0.6	55.4	75.5		75.7	62.5	0.255	15	28	24.5	1276	26000	19500	140	65	420	108	840	155	1390	**S 6010 C**
HY S 6010 C	50	80	16	65	8.731	19	59.7		70.0	73.9	72.7	75.0	1.0	0.6	1.0	0.6	55.4	75.5		75.7	62.5	0.225	15	28	23.5	890	33000	24500	140	71	420	118	840	167	970	**HY S 6010 C**
S 6010 E	50	80	16	65	8.731	19	59.7		70.0	73.9	72.7	75.0	1.0	0.6	1.0	0.6	55.4	75.5		75.7	62.5	0.255	25	26.5	23.3	1213	22500	16500	220	153	670	236	1330	315	2300	**S 6010 E**
HY S 6010 E	50	80	16	65	8.731	19	59.7		70.0	73.9	72.7	75.0	1.0	0.6	1.0	0.6	55.4	75.5		75.7	62.5	0.225	25	26.5	22.3	846	28000	21000	220	169	670	260	1330	345	1600	**HY S 6010 E**
SM 6010 C	50	80	16	65	8.731	19	59.7		70.0	73.9	72.7	75.0	1.0	0.6	1.0	0.6	55.4	75.5		75.7	62.5	0.255	15	19	12.4	644	31000	23000	100	47	290	72	580	98	700	**SM 6010 C**
HY SM 6010 C	50	80	16	65	8.731	19	59.7		70.0	73.9	72.7	75.0	1.0	0.6	1.0	0.6	55.4	75.5		75.7	62.5	0.225	15	19	11.9	449	38000	29000	100	52	290	79	580	107	490	**HY SM 6010 C**
KH 6010 C	50	80	16	63.8	6.35	25	59.7	58.0	68.0	70.3	70.7	73.1	1.0	0.6	1.0	0.6	54.6	76.0		76.2	61.9	0.270	17	11.6	8.1	419	33000	24500	60	49	180	74	350	97	520	**KH 6010 C**
HY KH 6010 C	50	80	16	63.8	6.35	25	59.7	58.0	68.0	70.3	70.7	73.1	1.0	0.6	1.0	0.6	54.6	76.0		76.2	61.9	0.255	17	11.6	7.8	292	41000	31000	60	54	180	81	350	106	360	**HY KH 6010 C**
KH 6010 E	50	80	16	63.8	6.35	25	59.7	58.0	68.0	70.3	70.7	73.1	1.0	0.6	1.0	0.6	54.6	76.0		76.2	61.9	0.270	25	11.1	7.7	400	30000	22500	90	100	280	150	560	194	760	**KH 6010 E**
HY KH 6010 E	50	80	16	63.8	6.35	25	59.7	58.0	68.0	70.3	70.7	73.1	1.0	0.6	1.0	0.6	54.6	76.0		76.2	61.9	0.255	25	11.1	7.35	279	37000	28000	90	111	280	166	560	214	530	**HY KH 6010 E**
S 6210 C	50	90	20	70	12.7	15	62.5		76.9	82.9	-	-	1.1	0.6	1.0	0.6	57.4	84.1		84.8	66.7	0.465	15	47.5	37.5	1931	24500	18000	240	75	720	125	1440	178	2100	**S 6210 C**
HY S 6210 C	50	90	20	70	12.7	15	62.5		76.9	82.9	-	-	1.1	0.6	1.0	0.6	57.4	84.1		84.8	66.7	0.390	15	47.5	35.5	1346	30000	23000	240	82	720	135	1440	192	1470	**HY S 6210 C**
S 6210 E	50	90	20	70	12.7	15	62.5		76.9	82.9	-	-	1.1	0.6	1.0	0.6	57.4	84.1		84.8	66.7	0.465	25	45	35.5	1846	20500	15500	380	177	1140	271	2280	362	3500	**S 6210 E**
HY S 6210 E	50	90	20	70	12.7	15	62.5		76.9	82.9	-	-	1.1	0.6	1.0	0.6	57.4	84.1		84.8	66.7	0.390	25	45	34	1287	26000	19500	380	195	1140	298	2280	396	2440	**HY S 6210 E**

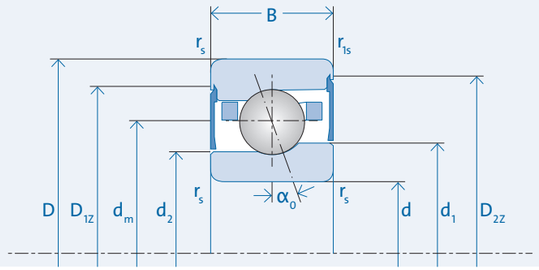
Design S/SM



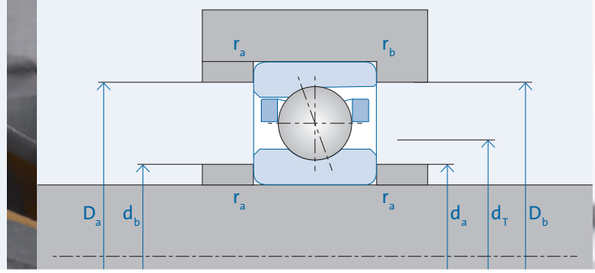
Design S/SM .. 2RZ



Design KH .. 2RZ

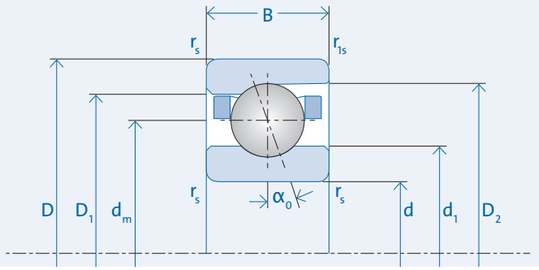


Mounting dimensions

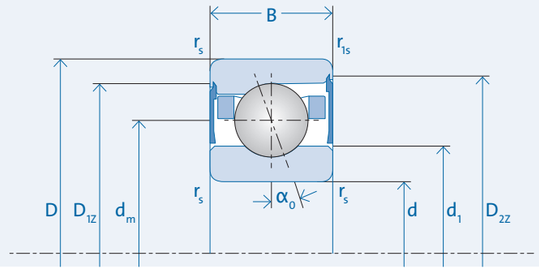


Designation	Boundary dim. d [mm]	D [mm]	B [mm]	Balls d_m [mm]	D_W [mm]	Z [pcs]	Dimensions d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	Mounting dimensions $r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]	$D_{b\,max}$ [mm]	d_T [mm]	Weight m [kg]	CA α_o [°]	Load rating C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	Speed values n_{oil} [1/min]	n_{grease} [1/min]	Preload / Rigidity $F_V L$ [N]	$C_{ax} L$ [N/µm]	$F_V M$ [N]	$C_{ax} M$ [N/µm]	$F_V S$ [N]	$C_{ax} S$ [N/µm]	F_f [N]	Designation
d = 55mm																																			**d = 55mm**
S 61911 C	55	80	13	67.5	7.144	21	63.1		71.9	74.7	74.6	75.9	1.0	0.3	1.0	0.3	59.9	75.5	76.9	65.4	0.175	15	18.4	17.3	899	25000	19000	90	52	280	86	560	122	980	S 61911 C
HY S 61911 C	55	80	13	67.5	7.144	21	63.1		71.9	74.7	74.6	75.9	1.0	0.3	1.0	0.3	59.9	75.5	76.9	65.4	0.155	15	18.4	16.6	627	31000	23500	90	57	280	94	560	131	680	HY S 61911 C
S 61911 E	55	80	13	67.5	7.144	21	63.1		71.9	74.7	74.6	75.9	1.0	0.3	1.0	0.3	59.9	75.5	76.9	65.4	0.175	25	17.4	16.4	851	21500	16000	150	128	440	192	880	254	1610	S 61911 E
HY S 61911 E	55	80	13	67.5	7.144	21	63.1		71.9	74.7	74.6	75.9	1.0	0.3	1.0	0.3	59.9	75.5	76.9	65.4	0.155	25	17.4	15.7	593	27000	20000	150	141	440	211	880	279	1130	HY S 61911 E
SM 61911 C	55	80	13	67.5	7.144	21	63.1		71.9	74.7	74.6	75.9	1.0	0.3	1.0	0.3	59.9	75.5	76.9	65.4	0.175	17	13.6	9.5	491	29500	22000	70	48	210	74	420	99	610	SM 61911 C
HY SM 61911 C	55	80	13	67.5	7.144	21	63.1		71.9	74.7	74.6	75.9	1.0	0.3	1.0	0.3	59.9	75.5	76.9	65.4	0.155	17	13.6	9.1	343	37000	28000	70	54	210	81	420	108	430	HY SM 61911 C
KH 61911 C	55	80	13	66.7	5.556	30	63.1	61.8	70.8	72.4	72.9	74.5	1.0	0.3	1.0	0.3	59.6	75.8	77.1	65.0	0.185	17	10	7.6	393	31000	23500	50	49	150	75	300	99	490	KH 61911 C
HY KH 61911 C	55	80	13	66.7	5.556	30	63.1	61.8	70.8	72.4	72.9	74.5	1.0	0.3	1.0	0.3	59.6	75.8	77.1	65.0	0.175	25	9.6	6.9	261	36000	26500	80	116	240	170	480	220	490	HY KH 61911 C
KH 61911 E	55	80	13	66.7	5.556	30	63.1	61.8	70.8	72.4	72.9	74.5	1.0	0.3	1.0	0.3	59.6	75.8	77.1	65.0	0.185	25	9.6	7.2	374	28500	21500	80	104	240	154	480	199	710	KH 61911 E
HY KH 61911 E	55	80	13	66.7	5.556	30	63.1	61.8	70.8	72.4	72.9	74.5	1.0	0.3	1.0	0.3	59.6	75.8	77.1	65.0	0.175	25	9.6	6.9	261	36000	26500	80	116	240	170	480	220	490	HY KH 61911 E
S 6011 C	55	90	18	72.5	9.525	20	66.8		78.2	82.2	-	-	1.1	1.0	1.0	1.0	61.4	84.6	84.7	69.8	0.385	15	32.5	29.5	1529	23500	17500	160	69	490	115	980	163	1670	S 6011 C
HY S 6011 C	55	90	18	72.5	9.525	20	66.8		78.2	82.2	-	-	1.1	1.0	1.0	1.0	61.4	84.6	84.7	69.8	0.345	15	32.5	28.5	1066	29500	22000	160	76	490	125	980	176	1160	HY S 6011 C
S 6011 E	55	90	18	72.5	9.525	20	66.8		78.2	82.2	-	-	1.1	1.0	1.0	1.0	61.4	84.6	84.7	69.8	0.385	25	30.5	28	1452	20000	15000	260	167	770	253	1540	337	2750	S 6011 E
HY S 6011 E	55	90	18	72.5	9.525	20	66.8		78.2	82.2	-	-	1.1	1.0	1.0	1.0	61.4	84.6	84.7	69.8	0.345	25	30.5	27	1013	25000	19000	260	185	770	279	1540	369	1920	HY S 6011 E
SM 6011 C	55	90	18	72.5	9.525	20	66.8		78.2	82.2	-	-	1.1	1.0	1.0	1.0	61.4	84.6	84.7	69.8	0.385	15	23.1	15.7	814	27500	20500	115	51	350	81	700	110	890	SM 6011 C
HY SM 6011 C	55	90	18	72.5	9.525	20	66.8		78.2	82.2	-	-	1.1	1.0	1.0	1.0	61.4	84.6	84.7	69.8	0.345	15	23.1	15	568	34000	26000	115	57	350	88	700	120	620	HY SM 6011 C
KH 6011 C	55	90	18	71.5	7.938	23	66.8	65.6	76.5	79.6	79.2	82.4	1.1	1.0	1.0	1.0	60.8	85.0	85.1	69.3	0.400	17	16.7	11.5	595	29500	22000	80	54	250	84	500	111	740	KH 6011 C
HY KH 6011 C	55	90	18	71.5	7.938	23	66.8	65.6	76.5	79.6	79.2	82.4	1.1	1.0	1.0	1.0	60.8	85.0	85.1	69.3	0.370	17	16.7	11	415	37000	27500	80	60	250	92	500	122	520	HY KH 6011 C
KH 6011 E	55	90	18	71.5	7.938	23	66.8	65.6	76.5	79.6	79.2	82.4	1.1	1.0	1.0	1.0	60.8	85.0	85.1	69.3	0.400	25	15.9	10.9	568	26500	20000	130	115	400	172	800	223	1080	KH 6011 E
HY KH 6011 E	55	90	18	71.5	7.938	23	66.8	65.6	76.5	79.6	79.2	82.4	1.1	1.0	1.0	1.0	60.8	85.0	85.1	69.3	0.370	25	15.9	10.5	396	33000	25000	130	128	400	190	800	246	750	HY KH 6011 E
S 6211 C	55	100	21	77.5	14.288	15	69.0		85.8	92.0	-	-	1.5	1.0	1.5	1.0	63.8	93.0	93.4	73.8	0.620	15	58	46.5	2416	22000	16500	300	84	900	138	1800	197	2630	S 6211 C
HY S 6211 C	55	100	21	77.5	14.288	15	69.0		85.8	92.0	-	-	1.5	1.0	1.5	1.0	63.8	93.0	93.4	73.8	0.510	15	58	44.5	1684	27500	20500	300	91	900	150	1800	213	1830	HY S 6211 C
S 6211 E	55	100	21	77.5	14.288	15	69.0		85.8	92.0	-	-	1.5	1.0	1.5	1.0	63.8	93.0	93.4	73.8	0.620	25	55.5	44.5	2310	18500	14000	470	196	1400	299	2800	400	4380	S 6211 E
HY S 6211 E	55	100	21	77.5	14.288	15	69.0		85.8	92.0	-	-	1.5	1.0	1.5	1.0	63.8	93.0	93.4	73.8	0.510	25	55.5	42.5	1611	23500	17500	470	217	1400	329	2800	438	3050	HY S 6211 E

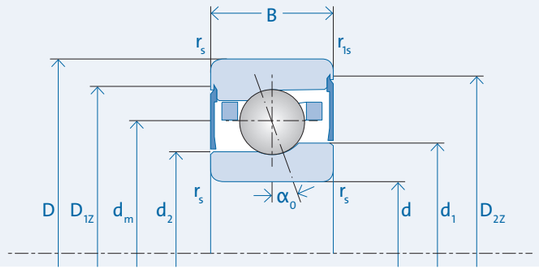
Design S/SM



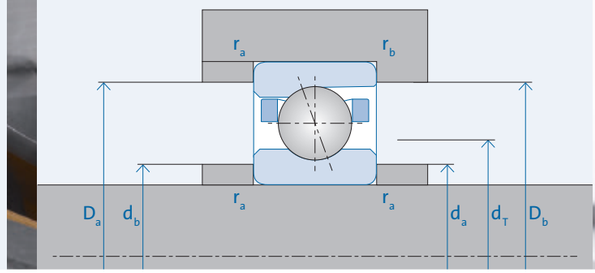
Design S/SM .. 2RZ



Design KH .. 2RZ

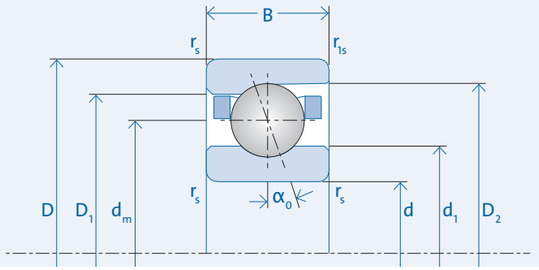


Mounting dimensions

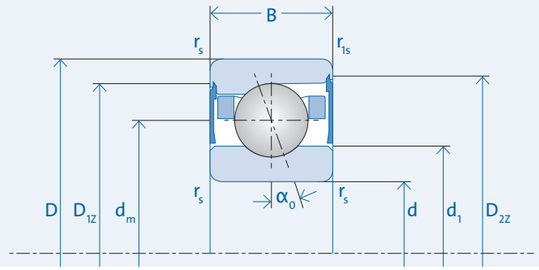


Designation	Boundary dim. d [mm]	D [mm]	B [mm]	Balls d_m [mm]	D_W [mm]	Z [pcs]	Dimensions d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	Mounting dimensions $r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]	$D_{b\,max}$ [mm]	d_T [mm]	Weight m [kg]	CA α_o [°]	Load rating C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	Speed values n_{oil} [1/min]	n_{grease} [1/min]	Preload / Rigidity $F_V L$ [N]	$C_{ax} L$ [N/µm]	$F_V M$ [N]	$C_{ax} M$ [N/µm]	$F_V S$ [N]	$C_{ax} S$ [N/µm]	F_f [N]	Designation
d = 60mm																																			**d = 60mm**
S 61912 C	60	85	13	72.5	7.144	23	68.1		76.9	79.7	-	-	1.0	0.3	1.0	0.3	64.9	80.5	81.8	70.4	0.190	15	19.2	19.1	995	23500	17500	100	57	300	94	600	132	1080	S 61912 C
HY S 61912 C	60	85	13	72.5	7.144	23	68.1		76.9	79.7	-	-	1.0	0.3	1.0	0.3	64.9	80.5	81.8	70.4	0.170	15	19.2	18.3	694	29500	22000	100	63	300	102	600	142	760	HY S 61912 C
S 61912 E	60	85	13	72.5	7.144	23	68.1		76.9	79.7	-	-	1.0	0.3	1.0	0.3	64.9	80.5	81.8	70.4	0.190	25	18.1	18.1	941	20000	15000	150	135	460	206	920	273	1780	S 61912 E
HY S 61912 E	60	85	13	72.5	7.144	23	68.1		76.9	79.7	-	-	1.0	0.3	1.0	0.3	64.9	80.5	81.8	70.4	0.170	25	18.1	17.3	656	25000	19000	150	150	460	227	920	300	1240	HY S 61912 E
SM 61912 C	60	85	13	72.5	7.144	23	68.1		76.9	79.7	-	-	1.0	0.3	1.0	0.3	64.9	80.5	81.8	70.4	0.190	19	14.1	10.4	538	27500	20500	70	60	220	93	430	121	750	SM 61912 C
HY SM 61912 C	60	85	13	72.5	7.144	23	68.1		76.9	79.7	-	-	1.0	0.3	1.0	0.3	64.9	80.5	81.8	70.4	0.170	19	14.1	9.9	375	34000	26000	70	67	220	102	430	133	520	HY SM 61912 C
KH 61912 C	60	85	13	71.7	5.556	32	68.1	66.8	75.8	77.4	77.9	79.5	1.0	0.3	1.0	0.3	64.6	80.8	82.1	70.0	0.200	17	10.3	8.2	422	29500	22000	50	52	160	80	310	104	520	KH 61912 C
HY KH 61912 C	60	85	13	71.7	5.556	32	68.1	66.8	75.8	77.4	77.9	79.5	1.0	0.3	1.0	0.3	64.6	80.8	82.1	70.0	0.185	17	10.3	7.8	294	37000	27500	50	57	160	88	310	115	370	HY KH 61912 C
KH 61912 E	60	85	13	71.7	5.556	32	68.1	66.8	75.8	77.4	77.9	79.5	1.0	0.3	1.0	0.3	64.6	80.8	82.1	70.0	0.200	25	9.8	7.8	403	26500	20000	80	109	240	160	490	209	760	KH 61912 E
HY KH 61912 E	60	85	13	71.7	5.556	32	68.1	66.8	75.8	77.4	77.9	79.5	1.0	0.3	1.0	0.3	64.6	80.8	82.1	70.0	0.185	25	9.8	7.4	281	33000	25000	80	121	240	177	490	230	530	HY KH 61912 E
S 6012 C	60	95	18	77.5	9.525	22	71.9		83.2	87.1	-	-	1.1	1.0	1.0	1.0	66.4	89.5	89.6	74.9	0.415	15	34	33	1704	22000	16500	170	75	515	124	1030	175	1860	S 6012 C
HY S 6012 C	60	95	18	77.5	9.525	22	71.9		83.2	87.1	-	-	1.1	1.0	1.0	1.0	66.4	89.5	89.6	74.9	0.370	15	34	31.5	1188	27500	20500	170	83	515	135	1030	189	1290	HY S 6012 C
S 6012 E	60	95	18	77.5	9.525	22	71.9		83.2	87.1	-	-	1.1	1.0	1.0	1.0	66.4	89.5	89.6	74.9	0.415	25	32	31.5	1617	18500	14000	270	180	810	274	1620	364	3070	S 6012 E
HY S 6012 E	60	95	18	77.5	9.525	22	71.9		83.2	87.1	-	-	1.1	1.0	1.0	1.0	66.4	89.5	89.6	74.9	0.370	25	32	30	1127	23500	17500	270	199	810	301	1620	399	2140	HY S 6012 E
SM 6012 C	60	95	18	77.5	9.525	22	71.9		83.2	87.1	-	-	1.1	1.0	1.0	1.0	66.4	89.5	89.6	74.9	0.415	15	24.5	17.5	911	26000	19500	125	56	375	88	750	119	990	SM 6012 C
HY SM 6012 C	60	95	18	77.5	9.525	22	71.9		83.2	87.1	-	-	1.1	1.0	1.0	1.0	66.4	89.5	89.6	74.9	0.370	15	24.5	16.8	635	32000	24000	125	62	375	96	750	130	690	HY SM 6012 C
KH 6012 C	60	95	18	76.5	7.938	24	71.9	70.7	81.5	84.6	84.2	87.4	1.1	1.0	1.0	1.0	65.7	90.1	90.2	74.4	0.430	17	17	12.1	626	27500	20500	90	58	260	87	510	115	780	KH 6012 C
HY KH 6012 C	60	95	18	76.5	7.938	24	71.9	70.7	81.5	84.6	84.2	87.4	1.1	1.0	1.0	1.0	65.7	90.1	90.2	74.4	0.400	17	17	11.5	436	34000	25500	90	65	260	96	510	126	540	HY KH 6012 C
KH 6012 E	60	95	18	76.5	7.938	24	71.9	70.7	81.5	84.6	84.2	87.4	1.1	1.0	1.0	1.0	65.7	90.1	90.2	74.4	0.430	25	16.2	11.5	597	25000	18500	140	122	400	177	800	229	1130	KH 6012 E
HY KH 6012 E	60	95	18	76.5	7.938	24	71.9	70.7	81.5	84.6	84.2	87.4	1.1	1.0	1.0	1.0	65.7	90.1	90.2	74.4	0.400	25	16.2	11	416	31000	23500	140	135	400	196	800	252	790	HY KH 6012 E
S 6212 C	60	110	22	85.7	15.875	15	76.0		95.5	101.7	-	-	1.5	1.0	1.5	1.0	69.4	102.6	103.0	81.5	0.800	15	70	57	2959	20000	15000	350	90	1000	145	2100	211	3220	S 6212 C
HY S 6212 C	60	110	22	85.7	15.875	15	76.0		95.5	101.7	-	-	1.5	1.0	1.5	1.0	69.4	102.6	103.0	81.5	0.650	15	70	54.5	2063	25000	18500	350	99	1000	158	2100	228	2250	HY S 6212 C
S 6212 E	60	110	22	85.7	15.875	15	76.0		95.5	101.7	-	-	1.5	1.0	1.5	1.0	69.4	102.6	103.0	81.5	0.800	25	66.5	54.5	2830	17000	12500	560	215	1700	329	3400	439	5360	S 6212 E
HY S 6212 E	60	110	22	85.7	15.875	15	76.0		95.5	101.7	-	-	1.5	1.0	1.5	1.0	69.4	102.6	103.0	81.5	0.650	25	66.5	52	1973	21000	16000	560	237	1700	362	3400	481	3740	HY S 6212 E

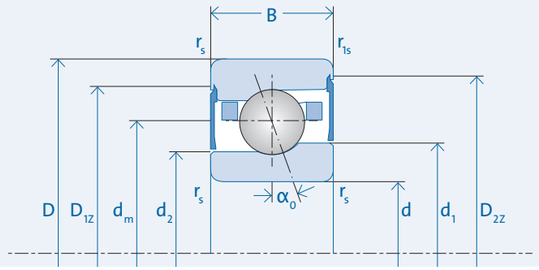
Design S/SM



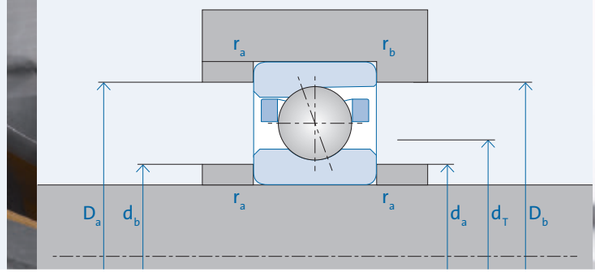
Design S/SM .. 2RZ



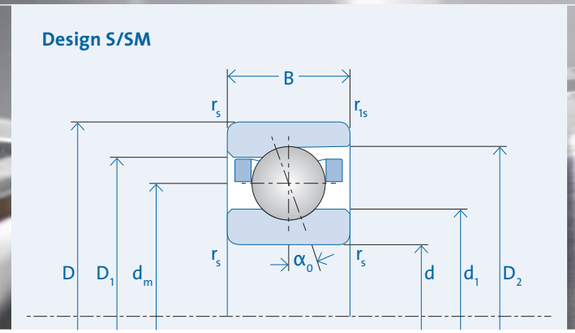
Design KH .. 2RZ

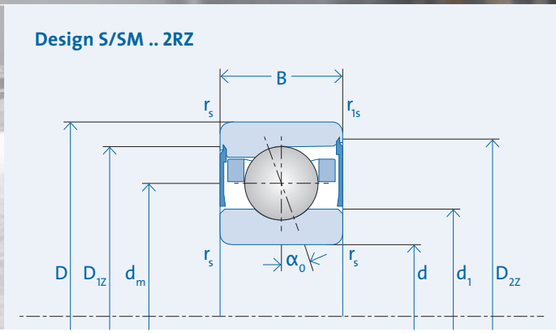


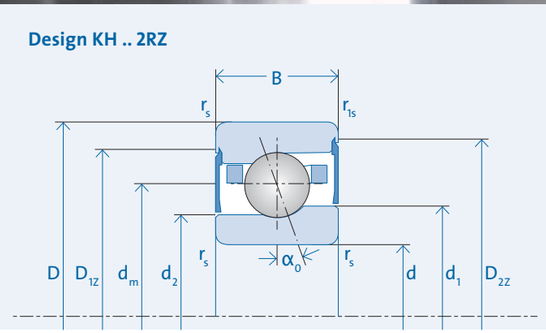
Mounting dimensions

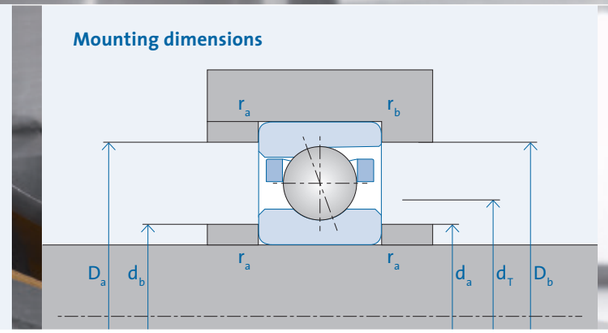


Designation	Boundary dim. d [mm]	D [mm]	B [mm]	Balls d_m [mm]	D_W [mm]	Z [pcs]	Dimensions d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	Mounting dimensions $r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]	$D_{b\,max}$ [mm]	d_T [mm]	Weight m [kg]	CA α_o [°]	Load rating C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	Speed values n_{oil} [1/min]	n_{grease} [1/min]	Preload / Rigidity $F_V L$ [N]	$C_{ax} L$ [N/µm]	$F_V M$ [N]	$C_{ax} M$ [N/µm]	$F_V S$ [N]	$C_{ax} S$ [N/µm]	F_f [N]	Designation
d = 65mm																																			**d = 65mm**
S 61913 C	65	90	13	77.5	7.144	24	73.1		81.9	84.7	-	-	1.0	0.3	1.0	0.3	69.9	85.5	86.9	75.4	0.200	15	19.5	20.1	1047	22000	16500	100	59	300	96	600	134	1140	**S 61913 C**
HY S 61913 C	65	90	13	77.5	7.144	24	73.1		81.9	84.7	-	-	1.0	0.3	1.0	0.3	69.9	85.5	86.9	75.4	0.180	15	19.5	19.3	730	27500	20500	100	65	300	104	600	145	800	**HY S 61913 C**
S 61913 E	65	90	13	77.5	7.144	24	73.1		81.9	84.7	-	-	1.0	0.3	1.0	0.3	69.9	85.5	86.9	75.4	0.200	25	18.3	19.1	990	18500	14000	160	142	470	214	940	283	1880	**S 61913 E**
HY S 61913 E	65	90	13	77.5	7.144	24	73.1		81.9	84.7	-	-	1.0	0.3	1.0	0.3	69.9	85.5	86.9	75.4	0.180	25	18.3	18.2	690	23500	17500	160	157	470	235	940	310	1310	**HY S 61913 E**
SM 61913 C	65	90	13	77.5	7.144	24	73.1		81.9	84.7	-	-	1.0	0.3	1.0	0.3	69.9	85.5	86.9	75.4	0.200	19	14.4	10.9	566	26000	19500	75	64	220	95	440	125	790	**SM 61913 C**
HY SM 61913 C	65	90	13	77.5	7.144	24	73.1		81.9	84.7	-	-	1.0	0.3	1.0	0.3	69.9	85.5	86.9	75.4	0.180	19	14.4	10.4	394	32000	24000	75	71	220	105	440	137	550	**HY SM 61913 C**
KH 61913 C	65	90	13	76.7	5.556	34	73.1	71.8	80.8	82.4	82.9	84.5	1.0	0.3	1.0	0.3	69.5	85.8	87.1	75.0	0.215	17	10.6	8.7	452	27500	20500	55	55	160	83	320	110	560	**KH 61913 C**
HY KH 61913 C	65	90	13	76.7	5.556	34	73.1	71.8	80.8	82.4	82.9	84.5	1.0	0.3	1.0	0.3	69.5	85.8	87.1	75.0	0.200	17	10.6	8.4	315	34000	25500	55	61	160	91	320	120	390	**HY KH 61913 C**
KH 61913 E	65	90	13	76.7	5.556	34	73.1	71.8	80.8	82.4	82.9	84.5	1.0	0.3	1.0	0.3	69.5	85.8	87.1	75.0	0.215	25	10.1	8.3	431	25000	18500	80	113	250	169	500	218	820	**KH 61913 E**
HY KH 61913 E	65	90	13	76.7	5.556	34	73.1	71.8	80.8	82.4	82.9	84.5	1.0	0.3	1.0	0.3	69.5	85.8	87.1	75.0	0.200	25	10.1	8	300	31000	23000	80	125	250	187	500	241	570	**HY KH 61913 E**
S 6013 C	65	100	18	82.5	9.525	23	76.9		88.2	92.1	-	-	1.1	1.0	1.0	1.0	71.3	94.5	94.6	79.9	0.445	15	34.5	35	1801	20500	15500	175	78	525	128	1050	181	1960	**S 6013 C**
HY S 6013 C	65	100	18	82.5	9.525	23	76.9		88.2	92.1	-	-	1.1	1.0	1.0	1.0	71.3	94.5	94.6	79.9	0.395	15	34.5	33.5	1256	26000	19500	175	86	525	139	1050	195	1370	**HY S 6013 C**
S 6013 E	65	100	18	82.5	9.525	23	76.9		88.2	92.1	-	-	1.1	1.0	1.0	1.0	71.3	94.5	94.6	79.9	0.445	25	32.5	33	1708	17500	13000	275	187	825	283	1650	376	3240	**S 6013 E**
HY S 6013 E	65	100	18	82.5	9.525	23	76.9		88.2	92.1	-	-	1.1	1.0	1.0	1.0	71.3	94.5	94.6	79.9	0.395	25	32.5	31.5	1191	22000	16500	275	206	825	312	1650	412	2260	**HY S 6013 E**
SM 6013 C	65	100	18	82.5	9.525	23	76.9		88.2	92.1	-	-	1.1	1.0	1.0	1.0	71.3	94.5	94.6	79.9	0.445	15	25	18.6	967	24000	18000	130	59	380	91	760	123	1050	**SM 6013 C**
HY SM 6013 C	65	100	18	82.5	9.525	23	76.9		88.2	92.1	-	-	1.1	1.0	1.0	1.0	71.3	94.5	94.6	79.9	0.395	15	25	17.8	674	30000	22500	130	65	380	99	760	134	730	**HY SM 6013 C**
KH 6013 C	65	100	18	81.5	7.938	25	76.9	75.7	86.5	89.6	89.2	92.4	1.1	1.0	1.0	1.0	70.6	95.1	95.2	79.3	0.455	17	17.3	12.7	657	26000	19500	90	60	260	90	520	119	820	**KH 6013 C**
HY KH 6013 C	65	100	18	81.5	7.938	25	76.9	75.7	86.5	89.6	89.2	92.4	1.1	1.0	1.0	1.0	70.6	95.1	95.2	79.3	0.425	17	17.3	12.1	458	32000	24000	90	66	260	99	520	130	570	**HY KH 6013 C**
KH 6013 E	65	100	18	81.5	7.938	25	76.9	75.7	86.5	89.6	89.2	92.4	1.1	1.0	1.0	1.0	70.6	95.1	95.2	79.3	0.455	25	16.5	12.1	626	23500	17500	140	125	410	183	800	234	1190	**KH 6013 E**
HY KH 6013 E	65	100	18	81.5	7.938	25	76.9	75.7	86.5	89.6	89.2	92.4	1.1	1.0	1.0	1.0	70.6	95.1	95.2	79.3	0.425	25	16.5	11.5	436	29000	22000	140	139	410	203	800	259	830	**HY KH 6013 E**
S 6213 C	65	120	23	92.5	15.875	16	82.8		102.3	108.6	-	-	1.5	1.1	1.5	1.0	74.5	112.7	113.0	88.3	1.05	15	72.5	62	3229	18500	14000	370	96	1110	158	2220	224	3520	**S 6213 C**
HY S 6213 C	65	120	23	92.5	15.875	16	82.8		102.3	108.6	-	-	1.5	1.1	1.5	1.0	74.5	112.7	113.0	88.3	0.870	15	72.5	59.5	2251	23000	17000	370	105	1110	172	2220	242	2450	**HY S 6213 C**
S 6213 E	65	120	23	92.5	15.875	16	82.8		102.3	108.6	-	-	1.5	1.1	1.5	1.0	74.5	112.7	113.0	88.3	1.05	25	69	59.5	3083	15500	12000	590	228	1760	347	3520	462	5840	**S 6213 E**
HY S 6213 E	65	120	23	92.5	15.875	16	82.8		102.3	108.6	-	-	1.5	1.1	1.5	1.0	74.5	112.7	113.0	88.3	0.870	25	69	57	2149	19500	14500	590	252	1760	381	3520	506	4070	**HY S 6213 E**



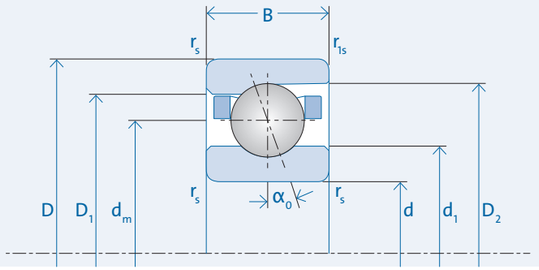




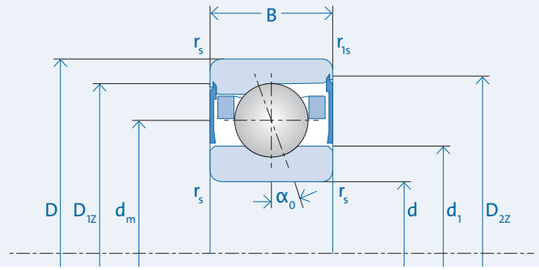


Designation	Boundary dim. d [mm]	D [mm]	B [mm]	Balls d_m [mm]	D_W [mm]	Z [pcs]	Dimensions d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	Mounting dimensions $r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]	$D_{b\,max}$ [mm]	d_T [mm]	Weight m [kg]	CA α_o [°]	Load rating C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	Speed values n_{oil} [1/min]	n_{grease} [1/min]	Preload / Rigidity $F_V L$ [N]	$C_{ax} L$ [N/µm]	$F_V M$ [N]	$C_{ax} M$ [N/µm]	$F_V S$ [N]	$C_{ax} S$ [N/µm]	F_f [N]	Designation
d = 70mm																																			**d = 70mm**
S 61914 C	70	100	16	85	7.938	24	80.1		89.9	93.0	-	-	1.0	0.3	1.0	0.3	75.2	95.4	96.7	82.6	0.335	15	24.4	26.5	1362	20000	15000	130	69	370	110	740	155	1480	**S 61914 C**
HY S 61914 C	70	100	16	85	7.938	24	80.1		89.9	93.0	-	-	1.0	0.3	1.0	0.3	75.2	95.4	96.7	82.6	0.305	15	24.4	25.5	949	25000	19000	130	75	370	120	740	167	1030	**HY S 61914 C**
S 61914 E	70	100	16	85	7.938	24	80.1		89.9	93.0	-	-	1.0	0.3	1.0	0.3	75.2	95.4	96.7	82.6	0.335	25	23	24.8	1289	17000	13000	200	163	590	245	1180	326	2440	**S 61914 E**
HY S 61914 E	70	100	16	85	7.938	24	80.1		89.9	93.0	-	-	1.0	0.3	1.0	0.3	75.2	95.4	96.7	82.6	0.305	25	23	23.7	898	21500	16000	200	180	590	270	1180	357	1700	**HY S 61914 E**
SM 61914 C	70	100	16	85	7.938	24	80.1		89.9	93.0	-	-	1.0	0.3	1.0	0.3	75.2	95.4	96.7	82.6	0.335	19	17.3	13.1	682	23500	17500	90	70	260	104	530	138	950	**SM 61914 C**
HY SM 61914 C	70	100	16	85	7.938	24	80.1		89.9	93.0	-	-	1.0	0.3	1.0	0.3	75.2	95.4	96.7	82.6	0.305	19	17.3	12.6	475	29500	22000	90	78	260	115	530	152	670	**HY SM 61914 C**
KH 61914 C	70	100	16	84.3	6.35	32	80.1	78.5	88.5	90.8	91.3	93.4	1.0	0.3	1.0	0.3	74.8	95.6	97.0	82.3	0.350	17	13	10.7	553	25000	18500	65	59	200	89	390	117	690	**KH 61914 C**
HY KH 61914 C	70	100	16	84.3	6.35	32	80.1	78.5	88.5	90.8	91.3	93.4	1.0	0.3	1.0	0.3	74.8	95.6	97.0	82.3	0.330	17	13	10.2	386	31000	23500	65	65	200	98	390	128	480	**HY KH 61914 C**
KH 61914 E	70	100	16	84.3	6.35	32	80.1	78.5	88.5	90.8	91.3	93.4	1.0	0.3	1.0	0.3	74.8	95.6	97.0	82.3	0.350	25	12.4	10.2	527	22500	17000	100	122	310	182	620	235	1000	**KH 61914 E**
HY KH 61914 E	70	100	16	84.3	6.35	32	80.1	78.5	88.5	90.8	91.3	93.4	1.0	0.3	1.0	0.3	74.8	95.6	97.0	82.3	0.330	25	12.4	9.7	368	28000	21000	100	135	310	201	620	259	700	**HY KH 61914 E**
S 6014 C	70	110	20	90	11.906	21	82.6		97.4	102.0	-	-	1.1	1.0	1.0	1.0	77.3	103.9	104.0	86.6	0.600	15	48.5	46.5	2401	19000	14000	240	86	700	138	1400	194	2610	**S 6014 C**
HY S 6014 C	70	110	20	90	11.906	21	82.6		97.4	102.0	-	-	1.1	1.0	1.0	1.0	77.3	103.9	104.0	86.6	0.510	15	48.5	44.5	1674	23500	17500	240	95	700	151	1400	210	1820	**HY S 6014 C**
S 6014 E	70	110	20	90	11.906	21	82.6		97.4	102.0	-	-	1.1	1.0	1.0	1.0	77.3	103.9	104.0	86.6	0.600	25	46	44	2280	16000	12000	400	211	1200	321	2400	425	4320	**S 6014 E**
HY S 6014 E	70	110	20	90	11.906	21	82.6		97.4	102.0	-	-	1.1	1.0	1.0	1.0	77.3	103.9	104.0	86.6	0.510	25	46	42	1589	20000	15000	400	234	1200	353	2400	466	3010	**HY S 6014 E**
SM 6014 C	70	110	20	90	11.906	21	82.6		97.4	102.0	-	-	1.1	1.0	1.0	1.0	77.3	103.9	104.0	86.6	0.600	15	35.5	25.5	1328	22000	16500	180	66	500	99	1000	134	1450	**SM 6014 C**
HY SM 6014 C	70	110	20	90	11.906	21	82.6		97.4	102.0	-	-	1.1	1.0	1.0	1.0	77.3	103.9	104.0	86.6	0.510	15	35.5	24.4	926	28000	21000	180	73	500	109	1000	146	1010	**HY SM 6014 C**
KH 6014 C	70	110	20	88.3	9.525	24	82.6	81.1	94.0	98.0	96.7	100.8	1.1	1.0	1.0	1.0	76.3	104.6	104.7	85.7	0.630	17	23.7	17.4	902	24000	18000	120	68	360	103	720	137	1120	**KH 6014 C**
HY KH 6014 C	70	110	20	88.3	9.525	24	82.6	81.1	94.0	98.0	96.7	100.8	1.1	1.0	1.0	1.0	76.3	104.6	104.7	85.7	0.580	17	23.7	16.6	629	29500	22500	120	75	360	114	720	150	780	**HY KH 6014 C**
KH 6014 E	70	110	20	88.3	9.525	24	82.6	81.1	94.0	98.0	96.7	100.8	1.1	1.0	1.0	1.0	76.3	104.6	104.7	85.7	0.630	25	22.7	16.6	861	21500	16000	190	143	570	211	1150	274	1630	**KH 6014 E**
HY KH 6014 E	70	110	20	88.3	9.525	24	82.6	81.1	94.0	98.0	96.7	100.8	1.1	1.0	1.0	1.0	76.3	104.6	104.7	85.7	0.580	25	22.7	15.9	600	27000	20000	190	159	570	234	1150	303	1140	**HY KH 6014 E**

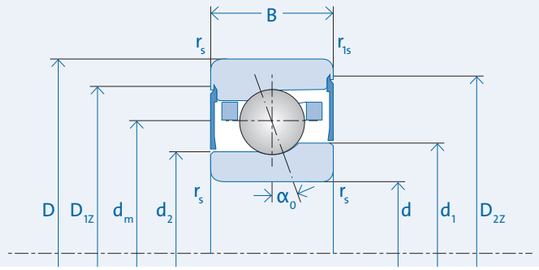
Design S/SM



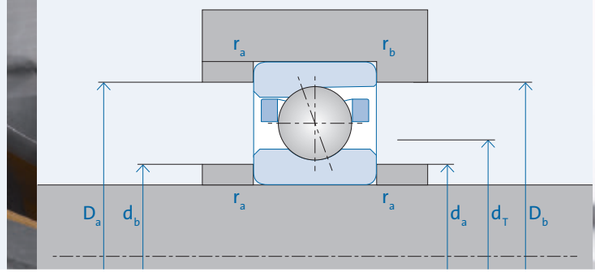
Design S/SM .. 2RZ



Design KH .. 2RZ

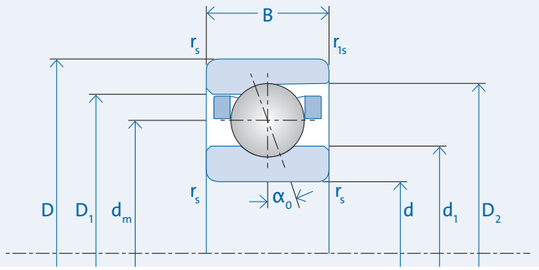


Mounting dimensions

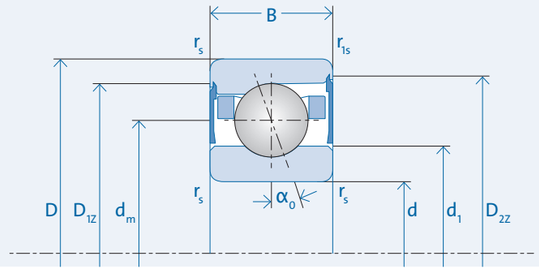


Designation	Boundary dim. d [mm]	D [mm]	B [mm]	Balls d_m [mm]	D_W [mm]	Z [pcs]	Dimensions d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	Mounting dimensions $r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]	$D_{b\,max}$ [mm]	d_r [mm]	Weight m [kg]	CA α_o [°]	Load rating C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	Speed values n_{oil} [1/min]	n_{grease} [1/min]	Preload / Rigidity $F_V L$ [N]	$C_{ax} L$ [N/µm]	$F_V M$ [N]	$C_{ax} M$ [N/µm]	$F_V S$ [N]	$C_{ax} S$ [N/µm]	F_f [N]	Designation
d = 75mm																																			**d = 75mm**
S 61915 C	75	105	16	90	8.731	25	84.7		95.3	98.9	-	-	0.6	0.3	0.6	0.3	79.6	101.0	101.5	87.4	0.350	15	29.5	31.5	1617	19000	14000	150	74	440	119	890	168	1760	S 61915 C
HY S 61915 C	75	105	16	90	8.731	25	84.7		95.3	98.9	-	-	0.6	0.3	0.6	0.3	79.6	101.0	101.5	87.4	0.310	15	29.5	30	1127	23500	17500	150	81	440	130	890	182	1230	HY S 61915 C
S 61915 E	75	105	16	90	8.731	25	84.7		95.3	98.9	-	-	0.6	0.3	0.6	0.3	79.6	101.0	101.5	87.4	0.350	25	27.5	29.5	1530	16000	12000	230	177	700	268	1400	355	2900	S 61915 E
HY S 61915 E	75	105	16	90	8.731	25	84.7		95.3	98.9	-	-	0.6	0.3	0.6	0.3	79.6	101.0	101.5	87.4	0.310	25	27.5	28.5	1066	20000	15000	230	195	700	296	1400	389	2020	HY S 61915 E
SM 61915 C	75	105	16	90	8.731	25	84.7		95.3	98.9	-	-	0.6	0.3	0.6	0.3	79.6	101.0	101.5	87.4	0.350	19	21.4	16.8	874	22000	16500	110	80	320	118	640	155	1220	SM 61915 C
HY SM 61915 C	75	105	16	90	8.731	25	84.7		95.3	98.9	-	-	0.6	0.3	0.6	0.3	79.6	101.0	101.5	87.4	0.310	19	21.4	16.1	610	28000	21000	110	88	320	130	640	171	850	HY SM 61915 C
S 6015 C	75	115	20	95	11.906	22	87.8		102.2	107.1	-	-	1.1	0.6	1.0	0.6	82.3	108.9	109.6	91.6	0.640	15	49.5	49	2541	18000	13500	250	90	760	148	1510	207	2770	S 6015 C
HY S 6015 C	75	115	20	95	11.906	22	87.8		102.2	107.1	-	-	1.1	0.6	1.0	0.6	82.3	108.9	109.6	91.6	0.550	15	49.5	47	1771	22500	17000	250	99	760	161	1510	224	1930	HY S 6015 C
S 6015 E	75	115	20	95	11.906	22	87.8		102.2	107.1	-	-	1.1	0.6	1.0	0.6	82.3	108.9	109.6	91.6	0.640	25	47	46.5	2411	15500	11500	400	218	1190	329	2380	435	4570	S 6015 E
HY S 6015 E	75	115	20	95	11.906	22	87.8		102.2	107.1	-	-	1.1	0.6	1.0	0.6	82.3	108.9	109.6	91.6	0.550	25	47	44.5	1681	19000	14500	400	241	1190	362	2380	477	3190	HY S 6015 E
SM 6015 C	75	115	20	95	11.906	22	87.8		102.2	107.1	-	-	1.1	0.6	1.0	0.6	82.3	108.9	109.6	91.6	0.640	17	36	27	1394	21000	16000	180	81	550	125	1100	166	1730	SM 6015 C
HY SM 6015 C	75	115	20	95	11.906	22	87.8		102.2	107.1	-	-	1.1	0.6	1.0	0.6	82.3	108.9	109.6	91.6	0.550	17	36	26	972	26500	19500	180	90	550	137	1100	182	1210	HY SM 6015 C
d = 80mm																																			**d = 80mm**
S 61916 C	80	110	16	95	9.525	25	89.4		100.8	104.6	-	-	0.6	0.3	0.6	0.3	84.9	105.7	106.5	92.3	0.365	15	35.5	38.5	2002	18000	13500	180	83	540	136	1080	191	2180	S 61916 C
HY S 61916 C	80	110	16	95	9.525	25	89.4		100.8	104.6	-	-	0.6	0.3	0.6	0.3	84.9	105.7	106.5	92.3	0.310	15	35.5	37	1396	22500	17000	180	91	540	147	1080	206	1520	HY S 61916 C
S 61916 E	80	110	16	95	9.525	25	89.4		100.8	104.6	-	-	0.6	0.3	0.6	0.3	84.9	105.7	106.5	92.3	0.365	25	33.5	36.5	1896	15500	11500	280	198	840	300	1680	398	3590	S 61916 E
HY S 61916 E	80	110	16	95	9.525	25	89.4		100.8	104.6	-	-	0.6	0.3	0.6	0.3	84.9	105.7	106.5	92.3	0.310	25	33.5	35	1322	19000	14500	280	219	840	331	1680	436	2510	HY S 61916 E
SM 61916 C	80	110	16	95	9.525	25	89.4		100.8	104.6	-	-	0.6	0.3	0.6	0.3	84.9	105.7	106.5	92.3	0.365	19	25.5	20.3	1056	21000	16000	130	88	390	132	780	174	1480	SM 61916 C
HY SM 61916 C	80	110	16	95	9.525	25	89.4		100.8	104.6	-	-	0.6	0.3	0.6	0.3	84.9	105.7	106.5	92.3	0.310	19	25.5	19.4	736	26500	19500	130	97	390	145	780	191	1030	HY SM 61916 C
S 6016 C	80	125	22	102.5	13.494	20	94.3		110.7	116.2	-	-	1.1	0.6	1.0	0.6	87.7	118.7	119.4	98.6	0.840	15	60	59	3011	16500	12500	310	97	920	159	1830	223	3280	S 6016 C
HY S 6016 C	80	125	22	102.5	13.494	20	94.3		110.7	116.2	-	-	1.1	0.6	1.0	0.6	87.7	118.7	119.4	98.6	0.720	15	60	56	2099	20500	15500	310	107	920	172	1830	241	2290	HY S 6016 C
S 6016 E	80	125	22	102.5	13.494	20	94.3		110.7	116.2	-	-	1.1	0.6	1.0	0.6	87.7	118.7	119.4	98.6	0.840	25	57	56	2861	14000	10500	490	232	1470	353	2930	468	5420	S 6016 E
HY S 6016 E	80	125	22	102.5	13.494	20	94.3		110.7	116.2	-	-	1.1	0.6	1.0	0.6	87.7	118.7	119.4	98.6	0.720	25	57	53.5	1994	17500	13500	490	257	1470	389	2930	513	3780	HY S 6016 E
SM 6016 C	80	125	22	102.5	13.494	20	94.3		110.7	116.2	-	-	1.1	0.6	1.0	0.6	87.7	118.7	119.4	98.6	0.840	17	43	31	1594	19500	14500	220	86	650	130	1300	174	1980	SM 6016 C
HY SM 6016 C	80	125	22	102.5	13.494	20	94.3		110.7	116.2	-	-	1.1	0.6	1.0	0.6	87.7	118.7	119.4	98.6	0.720	17	43	30	1112	24500	18500	220	95	650	143	1300	190	1380	HY SM 6016 C
KH 6016 C	80	125	22	100.9	11.112	24	94.3	92.6	107.5	112.2	113.5	113.5	1.1	0.6	1.0	0.6	87.0	119.2	119.9	97.7	0.880	17	32.5	26	1340	21000	15500	170	79	500	119	990	157	1670	KH 6016 C
HY KH 6016 C	80	125	22	100.9	11.112	24	94.3	92.6	107.5	112.2	113.5	113.5	1.1	0.6	1.0	0.6	87.0	119.2	119.9	97.7	0.800	17	32.5	24.8	934	26000	19500	170	88	500	131	990	173	1160	HY KH 6016 C
KH 6016 E	80	125	22	100.9	11.112	24	94.3	92.6	107.5	112.2	113.5	113.5	1.1	0.6	1.0	0.6	87.0	119.2	119.9	97.7	0.880	25	31	24.7	1279	19000	14000	260	164	790	244	1580	315	2430	KH 6016 E
HY KH 6016 E	80	125	22	100.9	11.112	24	94.3	92.6	107.5	112.2	113.5	113.5	1.1	0.6	1.0	0.6	87.0	119.2	119.9	97.7	0.800	25	31	23.6	892	23500	17500	260	182	790	270	1580	348	1690	HY KH 6016 E

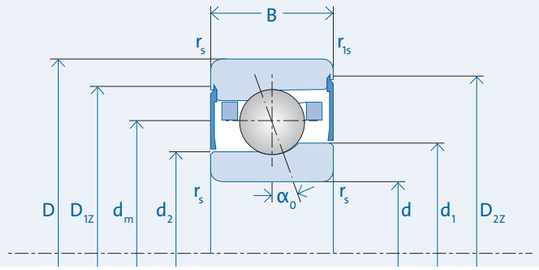
Design S/SM



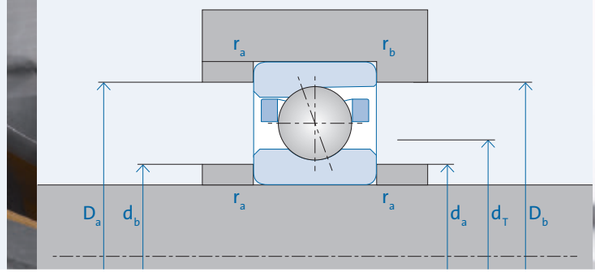
Design S/SM .. 2RZ



Design KH .. 2RZ

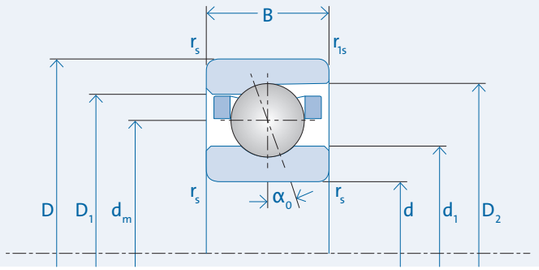


Mounting dimensions

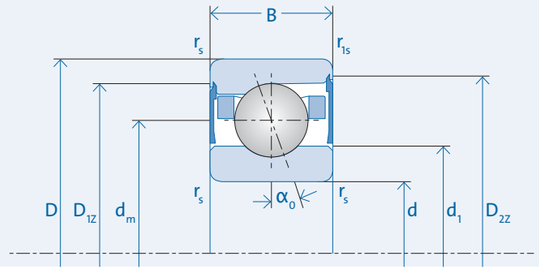


Designation	Boundary dim. d [mm]	D [mm]	B [mm]	Balls d_m [mm]	D_W [mm]	Z [pcs]	Dimensions d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	Mounting dimensions $r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]	$D_{b\,max}$ [mm]	d_T [mm]	Weight m [kg]	CA α_o [°]	Load rating C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	Speed values n_{oil} [1/min]	n_{grease} [1/min]	Preload / Rigidity $F_V L$ [N]	$C_{ax} L$ [N/µm]	$F_V M$ [N]	$C_{ax} M$ [N/µm]	$F_V S$ [N]	$C_{ax} S$ [N/µm]	F_f [N]	Designation
d = 85mm																																			**d = 85mm**
S 61917 C	85	120	18	102.5	10.319	25	96.2		108.8	113.0	-	-	0.6	0.6	0.6	0.6	90.2	115.6	115.6	99.4	0.530	15	40	43.5	2221	16500	12500	200	86	610	141	1220	198	2420	S 61917 C
HY S 61917 C	85	120	18	102.5	10.319	25	96.2		108.8	113.0	-	-	0.6	0.6	0.6	0.6	90.2	115.6	115.6	99.4	0.460	15	40	41.5	1549	20500	15500	200	95	610	153	1220	214	1690	HY S 61917 C
S 61917 E	85	120	18	102.5	10.319	25	96.2		108.8	113.0	-	-	0.6	0.6	0.6	0.6	90.2	115.6	115.6	99.4	0.530	25	37.5	41	2102	14000	10500	320	209	960	316	1910	417	3990	S 61917 E
HY S 61917 E	85	120	18	102.5	10.319	25	96.2		108.8	113.0	-	-	0.6	0.6	0.6	0.6	90.2	115.6	115.6	99.4	0.460	25	37.5	39.5	1466	17500	13500	320	231	960	348	1910	458	2780	HY S 61917 E
SM 61917 C	85	120	18	102.5	10.319	25	96.2		108.8	113.0	-	-	0.6	0.6	0.6	0.6	90.2	115.6	115.6	99.4	0.530	19	29.5	23.4	1201	19500	14500	150	94	440	139	890	184	1680	SM 61917 C
HY SM 61917 C	85	120	18	102.5	10.319	25	96.2		108.8	113.0	-	-	0.6	0.6	0.6	0.6	90.2	115.6	115.6	99.4	0.460	19	29.5	22.4	838	24500	18500	150	104	440	154	890	202	1170	HY SM 61917 C
S 6017 C	85	130	22	107.5	13.494	21	99.3		115.7	121.2	-	-	1.1	0.6	1.0	0.6	92.6	123.6	124.3	103.6	0.890	15	61.5	62.5	3116	16000	12000	310	100	940	164	1880	232	3390	S 6017 C
HY S 6017 C	85	130	22	107.5	13.494	21	99.3		115.7	121.2	-	-	1.1	0.6	1.0	0.6	92.6	123.6	124.3	103.6	0.760	15	61.5	59.5	2173	20000	15000	310	110	940	179	1880	251	2370	HY S 6017 C
S 6017 E	85	130	22	107.5	13.494	21	99.3		115.7	121.2	-	-	1.1	0.6	1.0	0.6	92.6	123.6	124.3	103.6	0.890	25	58.5	59	2958	13500	10000	500	241	1500	366	3000	486	5610	S 6017 E
HY S 6017 E	85	130	22	107.5	13.494	21	99.3		115.7	121.2	-	-	1.1	0.6	1.0	0.6	92.6	123.6	124.3	103.6	0.760	25	58.5	56.5	2062	17000	12500	500	267	1500	403	3000	533	3910	HY S 6017 E
SM 6017 C	85	130	22	107.5	13.494	21	99.3		115.7	121.2	-	-	1.1	0.6	1.0	0.6	92.6	123.6	124.3	103.6	0.890	17	44	33	1648	18500	14000	220	88	670	136	1340	181	2050	SM 6017 C
HY SM 6017 C	85	130	22	107.5	13.494	21	99.3		115.7	121.2	-	-	1.1	0.6	1.0	0.6	92.6	123.6	124.3	103.6	0.760	17	44	31.5	1149	23500	17500	220	98	670	149	1340	198	1430	HY SM 6017 C
d = 90mm																																			**d = 90mm**
S 61918 C	90	125	18	107.5	10.319	26	101.2		113.8	118.0	-	-	0.6	0.6	0.6	0.6	95.2	120.6	120.6	104.4	0.550	15	40.5	45.5	2271	16000	12000	210	90	620	145	1240	203	2470	S 61918 C
HY S 61918 C	90	125	18	107.5	10.319	26	101.2		113.8	118.0	-	-	0.6	0.6	0.6	0.6	95.2	120.6	120.6	104.4	0.485	15	40.5	43.5	1583	20000	15000	210	99	620	158	1240	220	1720	HY S 61918 C
S 61918 E	90	125	18	107.5	10.319	26	101.2		113.8	118.0	-	-	0.6	0.6	0.6	0.6	95.2	120.6	120.6	104.4	0.550	25	38.5	43	2148	13500	10000	320	214	970	325	1940	429	4070	S 61918 E
HY S 61918 E	90	125	18	107.5	10.319	26	101.2		113.8	118.0	-	-	0.6	0.6	0.6	0.6	95.2	120.6	120.6	104.4	0.485	25	38.5	41	1498	17000	12500	320	237	970	358	1940	471	2840	HY S 61918 E
SM 61918 C	90	125	18	107.5	10.319	26	101.2		113.8	118.0	-	-	0.6	0.6	0.6	0.6	95.2	120.6	120.6	104.4	0.550	19	30	24.5	1227	18500	14000	150	96	450	144	910	190	1720	SM 61918 C
HY SM 61918 C	90	125	18	107.5	10.319	26	101.2		113.8	118.0	-	-	0.6	0.6	0.6	0.6	95.2	120.6	120.6	104.4	0.485	19	30	23.4	855	23500	17500	150	106	450	159	910	209	1200	HY SM 61918 C
S 6018 C	90	140	24	115	15.081	20	105.8		124.2	130.3	127.4	131.5	1.5	0.6	1.5	0.6	98.9	132.6	133.6	110.6	1.15	15	74.5	74.5	3615	15000	11000	380	109	1130	178	2270	252	3940	S 6018 C
HY S 6018 C	90	140	24	115	15.081	20	105.8		124.2	130.3	127.4	131.5	1.5	0.6	1.5	0.6	98.9	132.6	133.6	110.6	0.980	15	74.5	71.5	2520	18500	14000	380	119	1130	193	2270	272	2740	HY S 6018 C
S 6018 E	90	140	24	115	15.081	20	105.8		124.2	130.3	127.4	131.5	1.5	0.6	1.5	0.6	98.9	132.6	133.6	110.6	1.15	25	70.5	71	3434	12500	9500	600	260	1790	394	3570	523	6510	S 6018 E
HY S 6018 E	90	140	24	115	15.081	20	105.8		124.2	130.3	127.4	131.5	1.5	0.6	1.5	0.6	98.9	132.6	133.6	110.6	0.980	25	70.5	68	2394	16000	12000	600	287	1790	434	3570	573	4540	HY S 6018 E
SM 6018 C	90	140	24	115	15.081	20	105.8		124.2	130.3	127.4	131.5	1.5	0.6	1.5	0.6	98.9	132.6	133.6	110.6	1.15	17	52	39	1881	17500	13000	270	96	800	145	1590	193	2340	SM 6018 C
HY SM 6018 C	90	140	24	115	15.081	20	105.8		124.2	130.3	127.4	131.5	1.5	0.6	1.5	0.6	98.9	132.6	133.6	110.6	0.980	17	52	37.5	1311	21500	16500	270	106	800	160	1590	211	1630	HY SM 6018 C
KH 6018 C	90	140	24	112.9	11.906	25	105.8	104.1	120.0	125.0	123.2	126.3	1.5	0.6	1.5	0.6	97.9	133.3	134.3	109.5	1.20	17	37.5	31.5	1529	18500	14000	190	86	560	130	1120	172	1900	KH 6018 C
HY KH 6018 C	90	140	24	112.9	11.906	25	105.8	104.1	120.0	125.0	123.2	126.3	1.5	0.6	1.5	0.6	97.9	133.3	134.3	109.5	1.10	17	37.5	30	1066	23500	17500	190	95	560	143	1120	188	1320	HY KH 6018 C
KH 6018 E	90	140	24	112.9	11.906	25	105.8	104.1	120.0	125.0	123.2	126.3	1.5	0.6	1.5	0.6	97.9	133.3	134.3	109.5	1.20	25	36	30	1459	17000	12500	300	181	890	266	1790	344	2770	KH 6018 E
HY KH 6018 E	90	140	24	112.9	11.906	25	105.8	104.1	120.0	125.0	123.2	126.3	1.5	0.6	1.5	0.6	97.9	133.3	134.3	109.5	1.10	25	36	28.5	1017	21000	16000	300	201	890	294	1790	380	1930	HY KH 6018 E

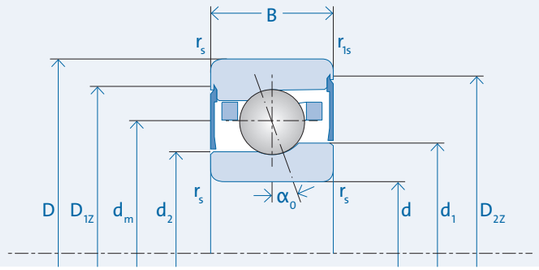
Design S/SM



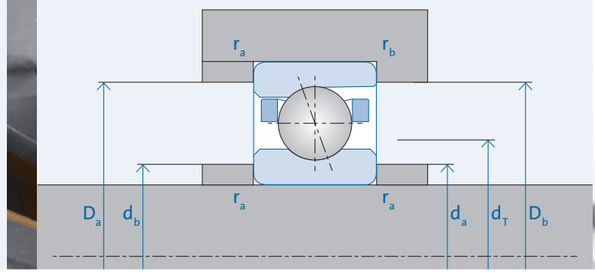
Design S/SM .. 2RZ



Design KH .. 2RZ

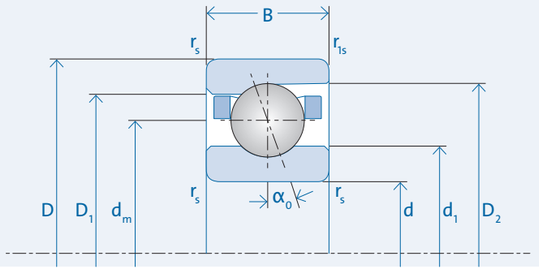


Mounting dimensions

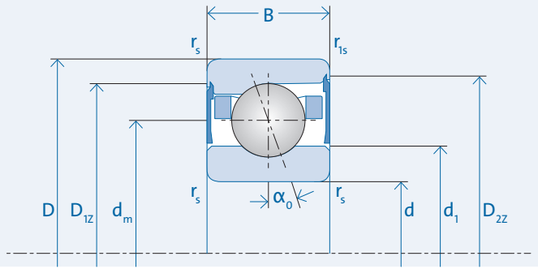


Designation	Boundary dim. d [mm]	D [mm]	B [mm]	Balls d_m [mm]	D_W [mm]	Z [pcs]	Dimensions d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	Mounting dimensions $r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]	$D_{b\,max}$ [mm]	d_T [mm]	Weight m [kg]	CA α_o [°]	Load rating C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	Speed values n_{oil} [1/min]	n_{grease} [1/min]	Preload / Rigidity $F_V L$ [N]	$C_{ax} L$ [N/µm]	$F_V M$ [N]	$C_{ax} M$ [N/µm]	$F_V S$ [N]	$C_{ax} S$ [N/µm]	F_f [N]	Designation
d = 95mm																																			**d = 95mm**
S 61919 C	95	130	18	112.5	10.319	27	106.2		118.8	123.0	-	-	0.6	0.6	0.6	0.6	100.1	125.6	125.6	109.4	0.580	15	41	47.5	2319	15000	11500	210	92	630	149	1250	208	2530	S 61919 C
HY S 61919 C	95	130	18	112.5	10.319	27	106.2		118.8	123.0	-	-	0.6	0.6	0.6	0.6	100.1	125.6	125.6	109.4	0.510	15	41	45.5	1616	19000	14000	210	101	630	162	1250	225	1760	HY S 61919 C
S 61919 E	95	130	18	112.5	10.319	27	106.2		118.8	123.0	-	-	0.6	0.6	0.6	0.6	100.1	125.6	125.6	109.4	0.580	25	39	45	2193	13000	9700	330	222	980	334	1970	442	4160	S 61919 E
HY S 61919 E	95	130	18	112.5	10.319	27	106.2		118.8	123.0	-	-	0.6	0.6	0.6	0.6	100.1	125.6	125.6	109.4	0.510	25	39	43	1529	16000	12000	330	246	980	368	1970	485	2900	HY S 61919 E
SM 61919 C	95	130	18	112.5	10.319	27	106.2		118.8	123.0	-	-	0.6	0.6	0.6	0.6	100.1	125.6	125.6	109.4	0.580	19	30.5	25.5	1252	18000	13500	150	98	460	149	920	195	1750	SM 61919 C
HY SM 61919 C	95	130	18	112.5	10.319	27	106.2		118.8	123.0	-	-	0.6	0.6	0.6	0.6	100.1	125.6	125.6	109.4	0.510	19	30.5	24.4	873	22000	16500	150	109	460	164	920	215	1220	HY SM 61919 C
S 6019 C	95	145	24	120	15.081	21	110.8		129.2	135.3	-	-	1.5	0.6	1.5	0.6	103.9	137.5	138.6	115.6	1.20	15	77	79	3747	14000	10500	390	113	1160	185	2330	262	4080	S 6019 C
HY S 6019 C	95	145	24	120	15.081	21	110.8		129.2	135.3	-	-	1.5	0.6	1.5	0.6	103.9	137.5	138.6	115.6	1.00	15	77	76	2612	17500	13500	390	124	1160	201	2330	283	2850	HY S 6019 C
S 6019 E	95	145	24	120	15.081	21	110.8		129.2	135.3	-	-	1.5	0.6	1.5	0.6	103.9	137.5	138.6	115.6	1.20	25	72	75	3557	12000	9100	610	269	1830	409	3660	544	6740	S 6019 E
HY S 6019 E	95	145	24	120	15.081	21	110.8		129.2	135.3	-	-	1.5	0.6	1.5	0.6	103.9	137.5	138.6	115.6	1.00	25	72	72	2480	15000	11500	610	298	1830	451	3660	596	4700	HY S 6019 E
SM 6019 C	95	145	24	120	15.081	21	110.8		129.2	135.3	-	-	1.5	0.6	1.5	0.6	103.9	137.5	138.6	115.6	1.20	17	53.5	41	1947	16500	12500	270	99	820	151	1640	201	2420	SM 6019 C
HY SM 6019 C	95	145	24	120	15.081	21	110.8		129.2	135.3	-	-	1.5	0.6	1.5	0.6	103.9	137.5	138.6	115.6	1.00	17	53.5	39.5	1358	21000	15500	270	109	820	166	1640	220	1690	HY SM 6019 C
d = 100mm																																			**d = 100mm**
S 61920 C	100	140	20	120	11.906	25	112.8		127.2	132.1	-	-	0.6	0.6	0.6	0.6	105.7	135.2	135.2	116.5	0.790	15	51.5	58	2736	14000	10500	260	99	790	161	1570	225	2980	S 61920 C
HY S 61920 C	100	140	20	120	11.906	25	112.8		127.2	132.1	-	-	0.6	0.6	0.6	0.6	105.7	135.2	135.2	116.5	0.680	15	51.5	55.5	1908	17500	13500	260	108	790	175	1570	243	2080	HY S 61920 C
S 61920 E	100	140	20	120	11.906	25	112.8		127.2	132.1	-	-	0.6	0.6	0.6	0.6	105.7	135.2	135.2	116.5	0.790	25	48.5	54.5	2589	12000	9100	410	238	1230	360	2470	476	4910	S 61920 E
HY S 61920 E	100	140	20	120	11.906	25	112.8		127.2	132.1	-	-	0.6	0.6	0.6	0.6	105.7	135.2	135.2	116.5	0.680	25	48.5	52.5	1805	15000	11500	410	264	1230	397	2470	523	3420	HY S 61920 E
SM 61920 C	100	140	20	120	11.906	25	112.8		127.2	132.1	-	-	0.6	0.6	0.6	0.6	105.7	135.2	135.2	116.5	0.790	19	37.5	31.5	1480	16500	12500	190	106	570	159	1150	210	2070	SM 61920 C
HY SM 61920 C	100	140	20	120	11.906	25	112.8		127.2	132.1	-	-	0.6	0.6	0.6	0.6	105.7	135.2	135.2	116.5	0.680	19	37.5	30	1032	21000	15500	190	118	570	176	1150	231	1440	HY SM 61920 C
S 6020 C	100	150	24	125	15.081	22	115.8		134.2	140.3	-	-	1.5	0.6	1.5	0.6	108.9	142.4	143.5	120.6	1.25	15	78	84	3876	13500	10000	400	118	1190	192	2380	271	4220	S 6020 C
HY S 6020 C	100	150	24	125	15.081	22	115.8		134.2	140.3	-	-	1.5	0.6	1.5	0.6	108.9	142.4	143.5	120.6	1.05	15	78	80	2702	17000	13000	400	129	1190	208	2380	292	2940	HY S 6020 C
S 6020 E	100	150	24	125	15.081	22	115.8		134.2	140.3	-	-	1.5	0.6	1.5	0.6	108.9	142.4	143.5	120.6	1.25	25	74	79	3678	11500	8700	630	281	1880	426	3750	564	6970	S 6020 E
HY S 6020 E	100	150	24	125	15.081	22	115.8		134.2	140.3	-	-	1.5	0.6	1.5	0.6	108.9	142.4	143.5	120.6	1.05	25	74	76	2564	14500	11000	630	310	1880	468	3750	619	4860	HY S 6020 E
SM 6020 C	100	150	24	125	15.081	22	115.8		134.2	140.3	-	-	1.5	0.6	1.5	0.6	108.9	142.4	143.5	120.6	1.25	17	55	43.5	2012	16000	12000	280	103	840	157	1680	209	2500	SM 6020 C
HY SM 6020 C	100	150	24	125	15.081	22	115.8		134.2	140.3	-	-	1.5	0.6	1.5	0.6	108.9	142.4	143.5	120.6	1.05	17	55	41.5	1403	20000	15000	280	114	840	172	1680	229	1740	HY SM 6020 C
KH 6020 C	100	150	24	122.9	11.906	27	115.8	114.1	130.0	135.0	133.2	136.2	1.5	0.6	1.5	0.6	107.8	143.3	144.3	119.5	1.30	17	39	34.5	1600	17000	13000	190	91	580	138	1170	183	1990	KH 6020 C
HY KH 6020 C	100	150	24	122.9	11.906	27	115.8	114.1	130.0	135.0	133.2	136.2	1.5	0.6	1.5	0.6	107.8	143.3	144.3	119.5	1.20	17	39	33	1116	21500	16000	190	100	580	152	1170	201	1390	HY KH 6020 C
KH 6020 E	100	150	24	122.9	11.906	27	115.8	114.1	130.0	135.0	133.2	136.2	1.5	0.6	1.5	0.6	107.8	143.3	144.3	119.5	1.30	25	37.5	32.5	1526	15500	11500	310	192	930	284	1850	366	2890	KH 6020 E
HY KH 6020 E	100	150	24	122.9	11.906	27	115.8	114.1	130.0	135.0	133.2	136.2	1.5	0.6	1.5	0.6	107.8	143.3	144.3	119.5	1.20	25	37.5	31.5	1064	19500	14500	310	213	930	314	1850	404	2020	HY KH 6020 E

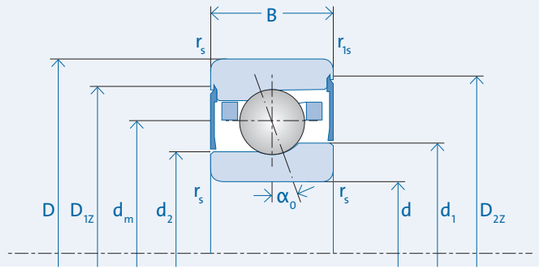
Design S/SM



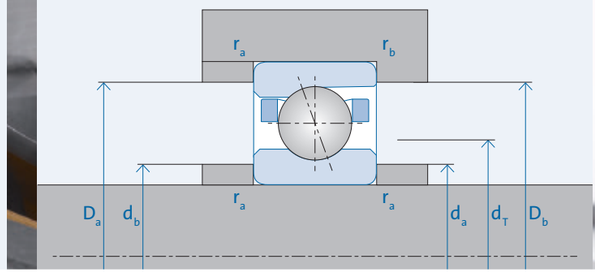
Design S/SM .. 2RZ



Design KH .. 2RZ

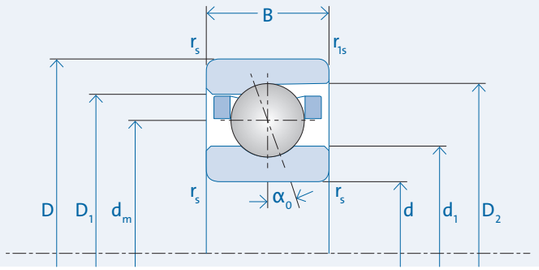


Mounting dimensions

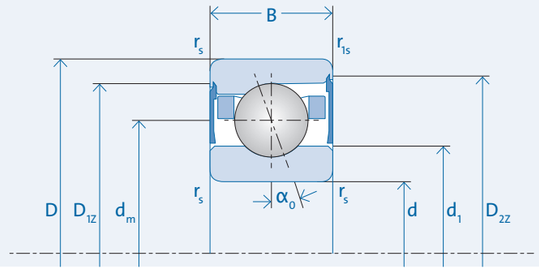


Designation	Boundary dim. d [mm]	D [mm]	B [mm]	Balls d_m [mm]	D_W [mm]	Z [pcs]	Dimensions d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	Mounting dimensions $r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]	$D_{b\,max}$ [mm]	d_T [mm]	Weight m [kg]	CA α_o [°]	Load rating C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	Speed values n_{oil} [1/min]	n_{grease} [1/min]	Preload / Rigidity $F_V L$ [N]	$C_{ax} L$ [N/µm]	$F_V M$ [N]	$C_{ax} M$ [N/µm]	$F_V S$ [N]	$C_{ax} S$ [N/µm]	F_f [N]	Designation
d = 105mm																																			**d = 105mm**
S 61921 C	105	145	20	125	11.906	26	117.8		132.2	137.1	-	-	0.6	0.6	0.6	0.6	110.7	140.2	140.2	121.5	0.820	15	52.5	60.5	2804	13500	10000	270	103	800	165	1600	231	3050	S 61921 C
HY S 61921 C	105	145	20	125	11.906	26	117.8		132.2	137.1	-	-	0.6	0.6	0.6	0.6	110.7	140.2	140.2	121.5	0.710	15	52.5	58	1955	17000	13000	270	113	800	180	1600	250	2130	HY S 61921 C
S 61921 E	105	145	20	125	11.906	26	117.8		132.2	137.1	-	-	0.6	0.6	0.6	0.6	110.7	140.2	140.2	121.5	0.820	25	49.5	57	2652	11500	8700	420	246	1250	371	2510	491	5030	S 61921 E
HY S 61921 E	105	145	20	125	11.906	26	117.8		132.2	137.1	-	-	0.6	0.6	0.6	0.6	110.7	140.2	140.2	121.5	0.710	25	49.5	54.5	1849	14500	11000	420	273	1250	409	2510	539	3510	HY S 61921 E
SM 61921 C	105	145	20	125	11.906	26	117.8		132.2	137.1	-	-	0.6	0.6	0.6	0.6	110.7	140.2	140.2	121.5	0.820	19	38.5	33	1516	16000	12000	200	111	590	165	1170	216	2120	SM 61921 C
HY SM 61921 C	105	145	20	125	11.906	26	117.8		132.2	137.1	-	-	0.6	0.6	0.6	0.6	110.7	140.2	140.2	121.5	0.710	19	38.5	31.5	1057	20000	15000	200	123	590	182	1170	238	1480	HY SM 61921 C
S 6021 C	105	160	26	132.5	15.875	22	122.8		142.2	148.6	-	-	2.0	1.0	2.0	1.0	115.8	150.6	152.2	127.9	1.60	15	86	93	4188	13000	9600	440	124	1310	202	2610	284	4560	S 6021 C
HY S 6021 C	105	160	26	132.5	15.875	22	122.8		142.2	148.6	-	-	2.0	1.0	2.0	1.0	115.8	150.6	152.2	127.9	1.40	15	86	89	2920	16000	12000	440	136	1310	219	2610	307	3180	HY S 6021 C
S 6021 E	105	160	26	132.5	15.875	22	122.8		142.2	148.6	-	-	2.0	1.0	2.0	1.0	115.8	150.6	152.2	127.9	1.60	25	81	88	3974	11000	8200	690	295	2060	447	4120	593	7530	S 6021 E
HY S 6021 E	105	160	26	132.5	15.875	22	122.8		142.2	148.6	-	-	2.0	1.0	2.0	1.0	115.8	150.6	152.2	127.9	1.40	25	81	84	2770	13500	10500	690	326	2060	492	4120	650	5250	HY S 6021 E
SM 6021 C	105	160	26	132.5	15.875	22	122.8		142.2	148.6	-	-	2.0	1.0	2.0	1.0	115.8	150.6	152.2	127.9	1.60	17	60.5	48.5	2192	15000	11500	310	109	930	165	1850	220	2720	SM 6021 C
HY SM 6021 C	105	160	26	132.5	15.875	22	122.8		142.2	148.6	-	-	2.0	1.0	2.0	1.0	115.8	150.6	152.2	127.9	1.40	17	60.5	46.5	1528	19000	14000	310	120	930	182	1850	241	1900	HY SM 6021 C
d = 110mm																																			**d = 110mm**
S 61922 C	110	150	20	130	11.906	27	122.8		137.2	142.1	-	-	0.6	0.6	0.6	0.6	115.6	145.2	145.2	126.5	0.850	15	53.5	63	2870	13000	9800	270	105	810	170	1620	237	3130	S 61922 C
HY S 61922 C	110	150	20	130	11.906	27	122.8		137.2	142.1	-	-	0.6	0.6	0.6	0.6	115.6	145.2	145.2	126.5	0.740	15	53.5	60.5	2001	16500	12500	270	115	810	185	1620	257	2180	HY S 61922 C
S 61922 E	110	150	20	130	11.906	27	122.8		137.2	142.1	-	-	0.6	0.6	0.6	0.6	115.6	145.2	145.2	126.5	0.850	25	50	59.5	2714	11000	8400	420	252	1270	382	2550	505	5140	S 61922 E
HY S 61922 E	110	150	20	130	11.906	27	122.8		137.2	142.1	-	-	0.6	0.6	0.6	0.6	115.6	145.2	145.2	126.5	0.740	25	50	57	1892	14000	10500	420	279	1270	421	2550	554	3590	HY S 61922 E
SM 61922 C	110	150	20	130	11.906	27	122.8		137.2	142.1	-	-	0.6	0.6	0.6	0.6	115.6	145.2	145.2	126.5	0.850	19	39	34	1550	15500	11500	200	114	600	170	1190	223	2170	SM 61922 C
HY SM 61922 C	110	150	20	130	11.906	27	122.8		137.2	142.1	-	-	0.6	0.6	0.6	0.6	115.6	145.2	145.2	126.5	0.740	19	39	32.5	1081	19000	14500	200	126	600	188	1190	245	1510	HY SM 61922 C
S 6022 C	110	170	28	140	17.462	21	129.4		150.6	157.7	-	-	2.0	1.0	2.0	1.0	121.3	160.3	161.9	134.9	2.00	15	99	106	4644	12000	9100	500	129	1510	211	3020	298	5060	S 6022 C
HY S 6022 C	110	170	28	140	17.462	21	129.4		150.6	157.7	-	-	2.0	1.0	2.0	1.0	121.3	160.3	161.9	134.9	1.70	15	99	101	3238	15000	11500	500	141	1510	230	3020	322	3530	HY S 6022 C
S 6022 E	110	170	28	140	17.462	21	129.4		150.6	157.7	-	-	2.0	1.0	2.0	1.0	121.3	160.3	161.9	134.9	2.00	25	94	101	4409	10500	7800	790	308	2380	468	4760	621	8360	S 6022 E
HY S 6022 E	110	170	28	140	17.462	21	129.4		150.6	157.7	-	-	2.0	1.0	2.0	1.0	121.3	160.3	161.9	134.9	1.70	25	94	96	3074	13000	9700	790	341	2380	516	4760	681	5830	HY S 6022 E
SM 6022 C	110	170	28	140	17.462	21	129.4		150.6	157.7	-	-	2.0	1.0	2.0	1.0	121.3	160.3	161.9	134.9	2.00	17	70	55.5	2439	14500	10500	360	114	1070	173	2140	231	3030	SM 6022 C
HY SM 6022 C	110	170	28	140	17.462	21	129.4		150.6	157.7	-	-	2.0	1.0	2.0	1.0	121.3	160.3	161.9	134.9	1.70	17	70	53	1700	18000	13500	360	126	1070	191	2140	253	2110	HY SM 6022 C

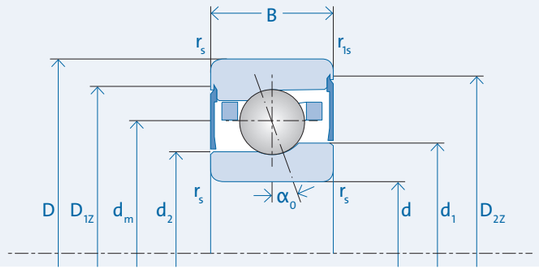
Design S/SM



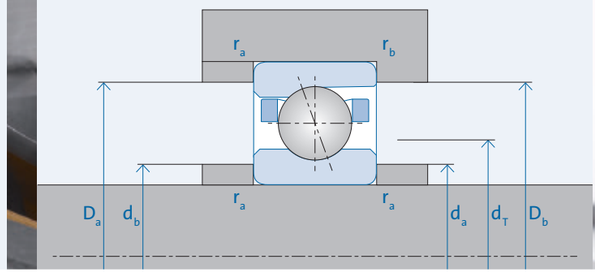
Design S/SM .. 2RZ



Design KH .. 2RZ



Mounting dimensions



Designation	Boundary dim.			Balls			Dimensions								Mounting dimensions						Weight	CA	Load rating			Speed values		Preload / Rigidity							Designation
	d [mm]	D [mm]	B [mm]	d_m [mm]	D_W [mm]	Z [pcs]	d_1 [mm]	d_2 [mm]	D_1 [mm]	D_2 [mm]	D_{1Z} [mm]	D_{2Z} [mm]	$r_{s\,min}$ [mm]	$r_{1s\,min}$ [mm]	$r_{a\,max}$ [mm]	$r_{b\,max}$ [mm]	$d_{a,\,b\,min}$ [mm]	$D_{a\,max}$ [mm]		$D_{b\,max}$ [mm]	d_T [mm]	m [kg]	α_o [°]	C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	n_{oil} [1/min]	n_{grease} [1/min]	F_V L [N]	C_{ax} L [N/µm]	F_V M [N]	C_{ax} M [N/µm]	F_V S [N]	C_{ax} S [N/µm]	F_f [N]	
d = 120mm																																				**d = 120mm**
S 61924 C	120	165	22	142.5	13.494	27	134.3		150.7	156.2	-	-	0.6	0.6	0.6	0.6	126.3	159.7		159.7	138.5	1.15	15	69	84	3642	12000	8900	340	120	1030	196	2060	275	3970	**S 61924 C**
HY S 61924 C	120	165	22	142.5	13.494	27	134.3		150.7	156.2	-	-	0.6	0.6	0.6	0.6	126.3	159.7		159.7	138.5	1.00	15	69	80	2539	15000	11000	340	132	1030	213	2060	297	2770	**HY S 61924 C**
S 61924 E	120	165	22	142.5	13.494	27	134.3		150.7	156.2	-	-	0.6	0.6	0.6	0.6	126.3	159.7		159.7	138.5	1.15	25	65	79	3446	10000	7600	540	291	1620	440	3250	582	6530	**S 61924 E**
HY S 61924 E	120	165	22	142.5	13.494	27	134.3		150.7	156.2	-	-	0.6	0.6	0.6	0.6	126.3	159.7		159.7	138.5	1.00	25	65	76	2402	12500	9500	540	322	1620	484	3250	639	4550	**HY S 61924 E**
SM 61924 C	120	165	22	142.5	13.494	27	134.3		150.7	156.2	-	-	0.6	0.6	0.6	0.6	126.3	159.7		159.7	138.5	1.15	19	49.5	43.5	1896	14000	10500	250	128	750	193	1500	253	2650	**SM 61924 C**
HY SM 61924 C	120	165	22	142.5	13.494	27	134.3		150.7	156.2	-	-	0.6	0.6	0.6	0.6	126.3	159.7		159.7	138.5	1.00	19	49.5	42	1322	17500	13000	250	142	750	212	1500	278	1850	**HY SM 61924 C**
S 6024 C	120	180	28	150	17.462	23	139.4		160.6	167.7	-	-	2.0	1.0	2.0	1.0	131.4	170.1		171.7	144.9	2.15	15	104	117	4976	11500	8500	530	139	1580	226	3170	319	5420	**S 6024 C**
HY S 6024 C	120	180	28	150	17.462	23	139.4		160.6	167.7	-	-	2.0	1.0	2.0	1.0	131.4	170.1		171.7	144.9	1.85	15	104	112	3469	14000	10500	530	153	1580	246	3170	345	3780	**HY S 6024 C**
S 6024 E	120	180	28	150	17.462	23	139.4		160.6	167.7	-	-	2.0	1.0	2.0	1.0	131.4	170.1		171.7	144.9	2.15	25	98	111	4720	9700	7300	830	332	2490	504	4990	668	8950	**S 6024 E**
HY S 6024 E	120	180	28	150	17.462	23	139.4		160.6	167.7	-	-	2.0	1.0	2.0	1.0	131.4	170.1		171.7	144.9	1.85	25	98	107	3290	12000	9100	830	367	2490	555	4990	733	6240	**HY S 6024 E**
SM 6024 C	120	180	28	150	17.462	23	139.4		160.6	167.7	-	-	2.0	1.0	2.0	1.0	131.4	170.1		171.7	144.9	2.15	17	74	61.5	2615	13500	10000	380	123	1130	187	2250	249	3250	**SM 6024 C**
HY SM 6024 C	120	180	28	150	17.462	23	139.4		160.6	167.7	-	-	2.0	1.0	2.0	1.0	131.4	170.1		171.7	144.9	1.85	17	74	59	1823	16500	12500	380	136	1130	206	2250	272	2270	**HY SM 6024 C**



GMN High-precision Deep-groove ball bearings

Standard designs

Custom designs

Materials

Hybrid ball bearings

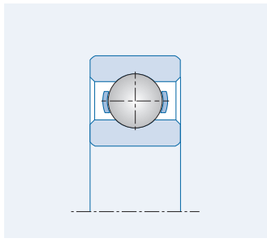
Bearing designation

Bearing data

GMN Deep groove ball bearings

Design, Series 60../62..

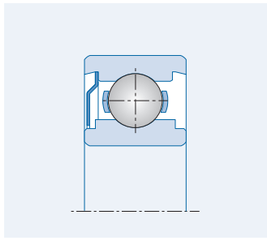
General purpose
Absorbs axial and radial forces in both directions





Design Z

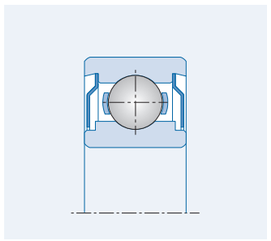
Version with one shield (greased)





Design 2Z

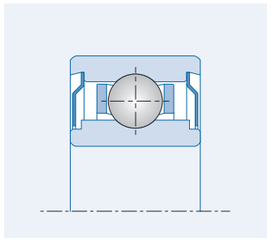
Version with two shields (greased)





Design X2Z

Extra-wide bearing with two shields (greased)



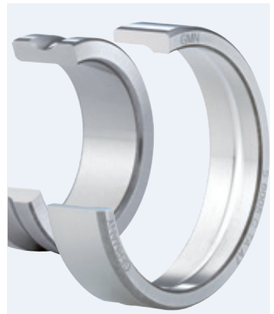


Materials Rings and balls

GMN deep groove ball bearing components are manufactured exclusively from high-quality materials and processing techniques.
The highest standards of quality assure the best possible performance efficiency and optimal service life for GMN products.

Rings and balls (standard material)





Material
Bearing steel (chrome steel) 100 Cr6
Material no. 1.3505, SAE 52100, SUJ2
Special steels on request

Permissible operating temperature
Heat treated for continuous operating temperatures up to 150°C

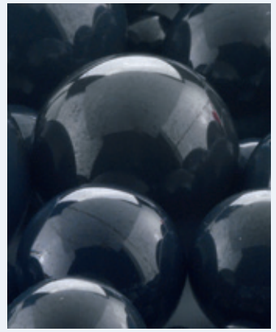
Hardness
60 to 64 HRC, fully hardened; corresponds to 700–800 HV30

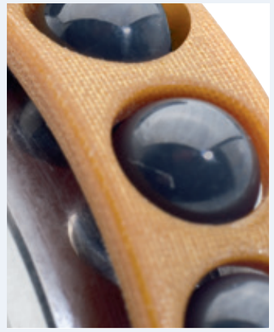
Characteristics
High purity and homogeneity, vacuum-degassed

Hybrid ball bearings

Hybrid ball bearings are characterized by a combination of materials; bearing steel (inner and outer rings) and ceramic (balls). The material-based characteristics of ceramic balls (in comparison to bearings with steel balls) offer clear performance improvements, especially under intense operational conditions in machine utilization.

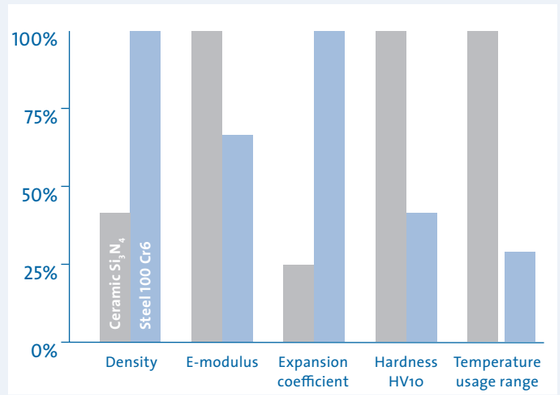
Rings steel, balls ceramic

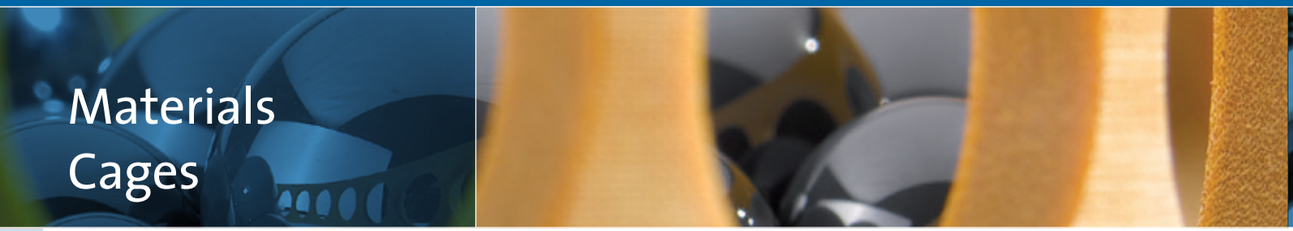




Material
Ceramic (silicon nitride Si_3N_4)

Material characteristics
· Low chemical affinity to 100 Cr6
· Low friction coefficient
· Low heat conductivity
· Corrosion resistance
· Non magnetic
· Electrically insulating





Materials Cages

GMN high precision deep groove ball bearings are equipped with a steel cage or PA cage as standard.

J cage



Material
Sheet steel

Permissible operating temperature 220°C

Fabrication two piece, tab-clamped or riveted

T9H cage



Material
Polyamide (fiberglass reinforced)

Permissible operating temperature 140°C

Fabrication
single piece, crown cage

TBH cage



Material
Laminated phenolic resin

Permissible operating temperature 120°C

Fabrication
single piece, crown cage

TA, TB cages



Material
Laminated phenolic resin

Permissible operating temperature 120°C

Fabrication
two piece, riveted

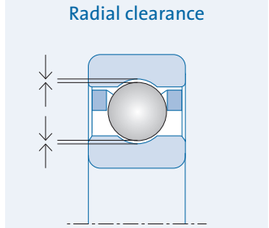


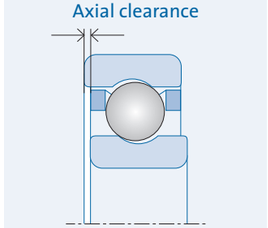
Clearance

The distance by which one bearing ring can be displaced relative to the other is defined as clearance.

· Axial clearance: displacement in the axial direction

· Radial clearance: displacement in the radial direction

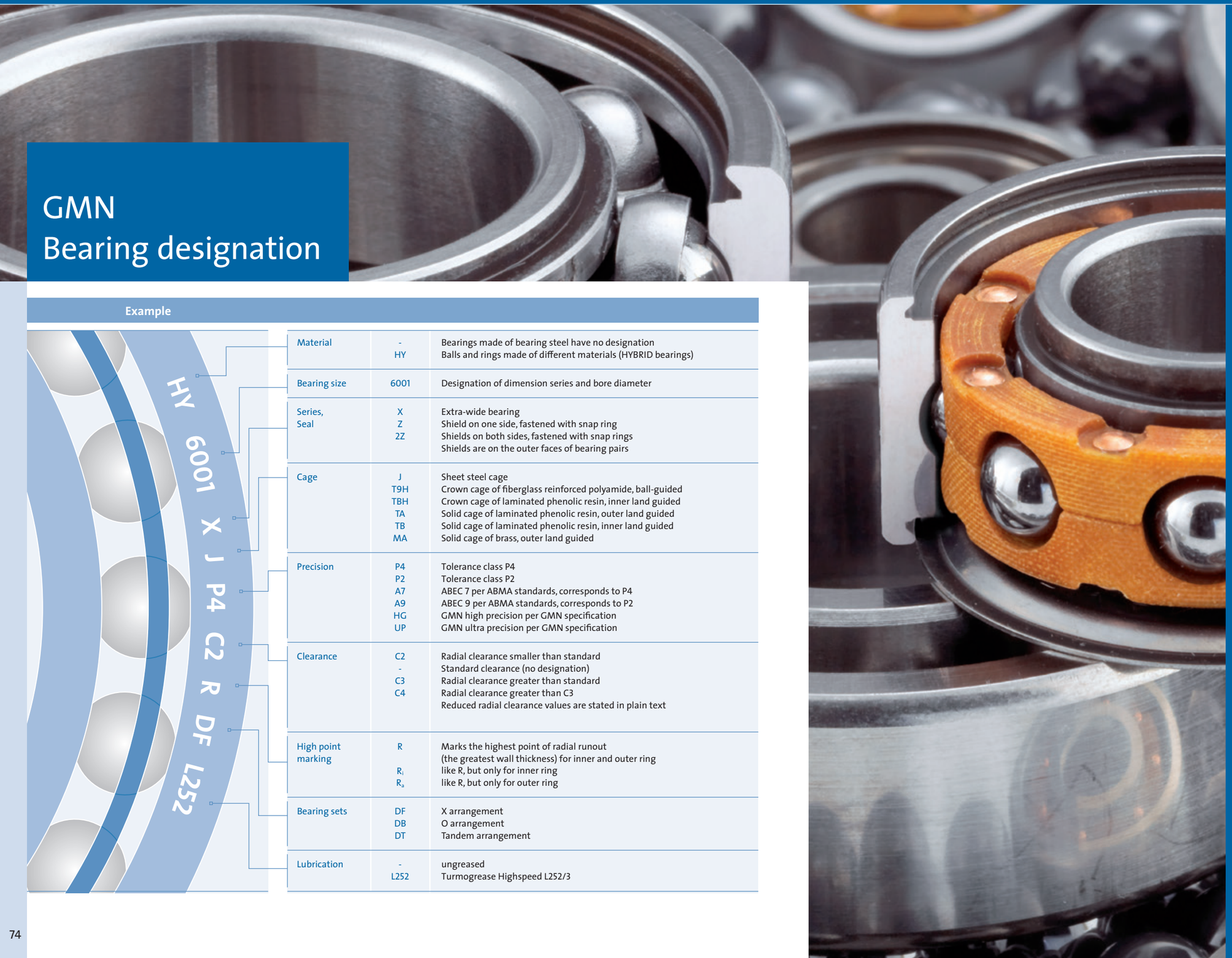




GMN Deep groove ball bearings: Radial clearance (per ISO 5753-1)

Bore diameter d [mm]		Radial clearance [µm]							
		C2		CN		C3		C4	
over	including	min	max	min	max	min	max	min	max
1.5	6	0	7	2	13	8	23	–	–
6	10	0	7	2	13	8	23	14	29
10	18	0	9	3	18	11	25	18	33
18	24	0	10	5	20	13	28	20	36
24	30	1	11	5	20	13	28	23	41
30	40	1	11	6	20	15	33	28	46

Deep groove ball bearings without a clearance specification are fabricated to CN specification (standard clearance).



GMN
Bearing designation

Example

Material	- HY	Bearings made of bearing steel have no designation Balls and rings made of different materials (HYBRID bearings)
Bearing size	6001	Designation of dimension series and bore diameter
Series, Seal	X Z 2Z	Extra-wide bearing Shield on one side, fastened with snap ring Shields on both sides, fastened with snap rings Shields are on the outer faces of bearing pairs
Cage	J T9H TBH TA TB MA	Sheet steel cage Crown cage of fiberglass reinforced polyamide, ball-guided Crown cage of laminated phenolic resin, inner land guided Solid cage of laminated phenolic resin, outer land guided Solid cage of laminated phenolic resin, inner land guided Solid cage of brass, outer land guided
Precision	P4 P2 A7 A9 HG UP	Tolerance class P4 Tolerance class P2 ABEC 7 per ABMA standards, corresponds to P4 ABEC 9 per ABMA standards, corresponds to P2 GMN high precision per GMN specification GMN ultra precision per GMN specification
Clearance	C2 - C3 C4	Radial clearance smaller than standard Standard clearance (no designation) Radial clearance greater than standard Radial clearance greater than C3 Reduced radial clearance values are stated in plain text
High point marking	R R_i R_a	Marks the highest point of radial runout (the greatest wall thickness) for inner and outer ring like R, but only for inner ring like R, but only for outer ring
Bearing sets	DF DB DT	X arrangement O arrangement Tandem arrangement
Lubrication	- L252	ungreased Turmogrease Highspeed L252/3

GMN
High precision deep groove ball bearings
Bearing data

Mounting dimensions

Bore diameter 5 to 40 mm

Boundary dimensions

Ball data

Dimensions

Abutment dimensions

Weight

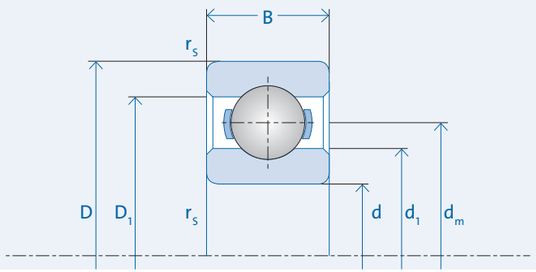
Load rating

Speed value (grease lubrication)

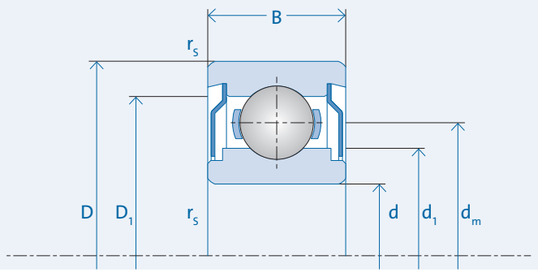


Bearing data
Bore diameter 5 to 40 mm

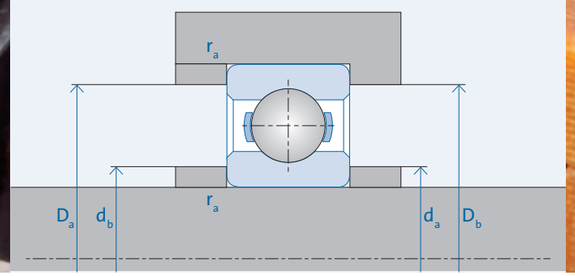
Design, Series 60../62..



Design, Series 60../ 62.. Z/2Z /X2Z



Mounting dimensions



Explanation of symbols

Boundary dimensions

d	[mm]	Bore diameter
D	[mm]	Outer diameter
B	[mm]	Width of single bearing
B-X	[mm]	Width for extra-wide bearing

Balls

d_m	[mm]	Pitch circle diameter
D_W	[mm]	Ball diameter
Z	[pcs]	Number of balls

Dimensions

d_1	[mm]	Outer diameter of inner ring
D_1	[mm]	Inner diameter of outer ring
$r_{s\,min}$	[mm]	min. chamfer dimension

Mounting dimensions

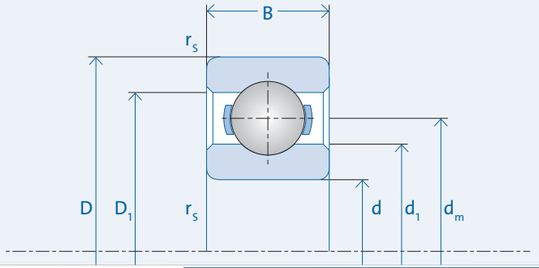
$r_{a\,max}$	[mm]	max. chamfer dimension (back face)
$d_{a\,min}$	[mm]	min. shaft shoulder diameter
$D_{a\,max}$	[mm]	max. diameter housing shoulder (back face)
m	[kg]	Bearing weight

Load ratings

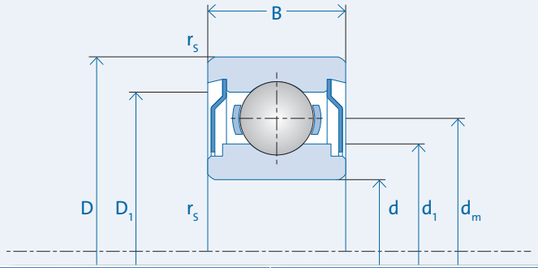
C_r	[kN]	Dynamic load rating, radial
C_{0r}	[kN]	Static load rating, radial
C_{Ur}	[N]	Fatigue load limit, radial
n_{grease}	[1/min]	Speed with grease lubrication (T9H cage)*

*Correction factors: -> *p. 109*

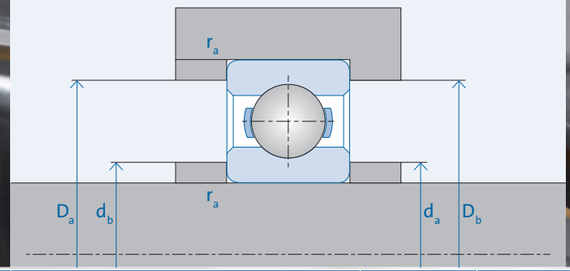
Design, Series 60../62..



Design, Series 60../ 62.. Z/2Z /X2Z

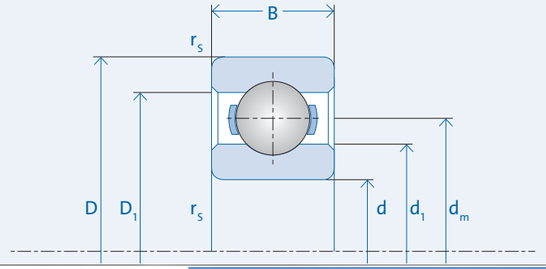


Mounting dimensions

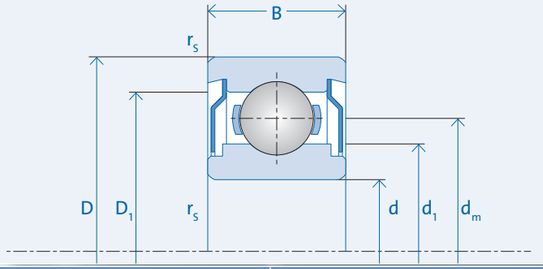


Designation	Boundary dimensions				Balls			Dimensions			Mounting dimensions			Weight	Load rating			Speed	Designation
	d [mm]	D [mm]	B [mm]	B-X [mm]	d_m [mm]	D_W [mm]	Z [pcs]	d_1 [mm]	D_1 [mm]	$r_{s\,min}$ [mm]	$r_{a\,max}$ [mm]	$d_{a\,min}$ [mm]	$D_{a\,max}$ [mm]	m [kg]	C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	n_{grease} [1/min]	
d = 5mm																			**d = 5mm**
625	5	16	5		10	3.175	6	7.7	12.5	0.3	0.3	6.8	14.7	0.005	1.76	0.62	32.5	100000	**625**
HY 625	5	16	5		10	3.175	6	7.7	12.5	0.3	0.3	6.8	14.7	0.004	1.76	0.595	22.5	125000	**HY 625**
d = 6mm																			**d = 6mm**
626	6	19	6		13.3	3.175	8	10.7	15.8	0.3	0.3	8.1	17.6	0.008	2.28	0.96	50	75000	**626**
HY 626	6	19	6		13.3	3.175	8	10.7	15.8	0.3	0.3	8.1	17.6	0.007	2.28	0.92	34.5	94000	**HY 626**
d = 7mm																			**d = 7mm**
607	7	19	6		13.3	3.175	8	10.7	15.8	0.3	0.3	9.0	17.6	0.007	2.28	0.96	50	75000	**607**
HY 607	7	19	6		13.3	3.175	8	10.7	15.8	0.3	0.3	9.0	17.6	0.007	2.28	0.92	34.5	94000	**HY 607**
627	7	22	7		14.7	3.969	7	11.8	17.6	0.3	0.3	9.3	20.5	0.012	2.95	1.17	60.5	68000	**627**
HY 627	7	22	7		14.7	3.969	7	11.8	17.6	0.3	0.3	9.3	20.5	0.011	2.95	1.12	42	85000	**HY 627**
d = 8mm																			**d = 8mm**
608	8	22	7	10.312	14.7	3.969	7	11.8	17.6	0.3	0.3	10.2	20.5	0.012	2.95	1.17	60.5	68000	**608**
HY 608	8	22	7	10.312	14.7	3.969	7	11.8	17.6	0.3	0.3	10.2	20.5	0.011	2.95	1.12	42	85000	**HY 608**
d = 9mm																			**d = 9mm**
609	9	24	7		16.7	3.969	8	13.5	19.9	0.3	0.3	11.2	22.5	0.013	3.3	1.4	73	60000	**609**
HY 609	9	24	7		16.7	3.969	8	13.5	19.9	0.3	0.3	11.2	22.5	0.012	3.3	1.34	51	75000	**HY 609**
629	9	26	8		18	4.762	7	14.7	21.4	0.3	0.3	11.7	24.3	0.019	4.35	1.86	97	56000	**629**
HY 629	9	26	8		18	4.762	7	14.7	21.4	0.3	0.3	11.7	24.3	0.017	4.35	1.78	67.5	69000	**HY 629**
d = 10mm																			**d = 10mm**
6000	10	26	8		18	4.762	7	14.7	21.4	0.3	0.3	12.6	24.3	0.018	4.35	1.86	97	56000	**6000**
HY 6000	10	26	8		18	4.762	7	14.7	21.4	0.3	0.3	12.6	24.3	0.016	4.35	1.78	67.5	69000	**HY 6000**
6200	10	30	9		20	5.556	7	16.0	24.5	0.6	0.6	13.7	27.5	0.028	6	2.65	138	50000	**6200**
HY 6200	10	30	9		20	5.556	7	16.0	24.5	0.6	0.6	13.7	27.5	0.025	6	2.55	96	62000	**HY 6200**
d = 12mm																			**d = 12mm**
6001	12	28	8	11.506	20	4.762	8	16.7	23.4	0.3	0.3	14.6	26.2	0.020	4.85	2.23	116	50000	**6001**
HY 6001	12	28	8	11.506	20	4.762	8	16.7	23.4	0.3	0.3	14.6	26.2	0.018	4.85	2.14	81	63000	**HY 6001**
6201	12	32	10		22	5.953	7	18.3	26.0	0.6	0.6	15.6	29.4	0.035	6.65	3	154	45000	**6201**
HY 6201	12	32	10		22	5.953	7	18.3	26.0	0.6	0.6	15.6	29.4	0.032	6.65	2.85	108	57000	**HY 6201**

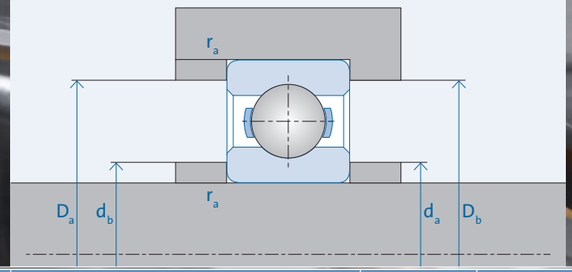
Design, Series 60../62..



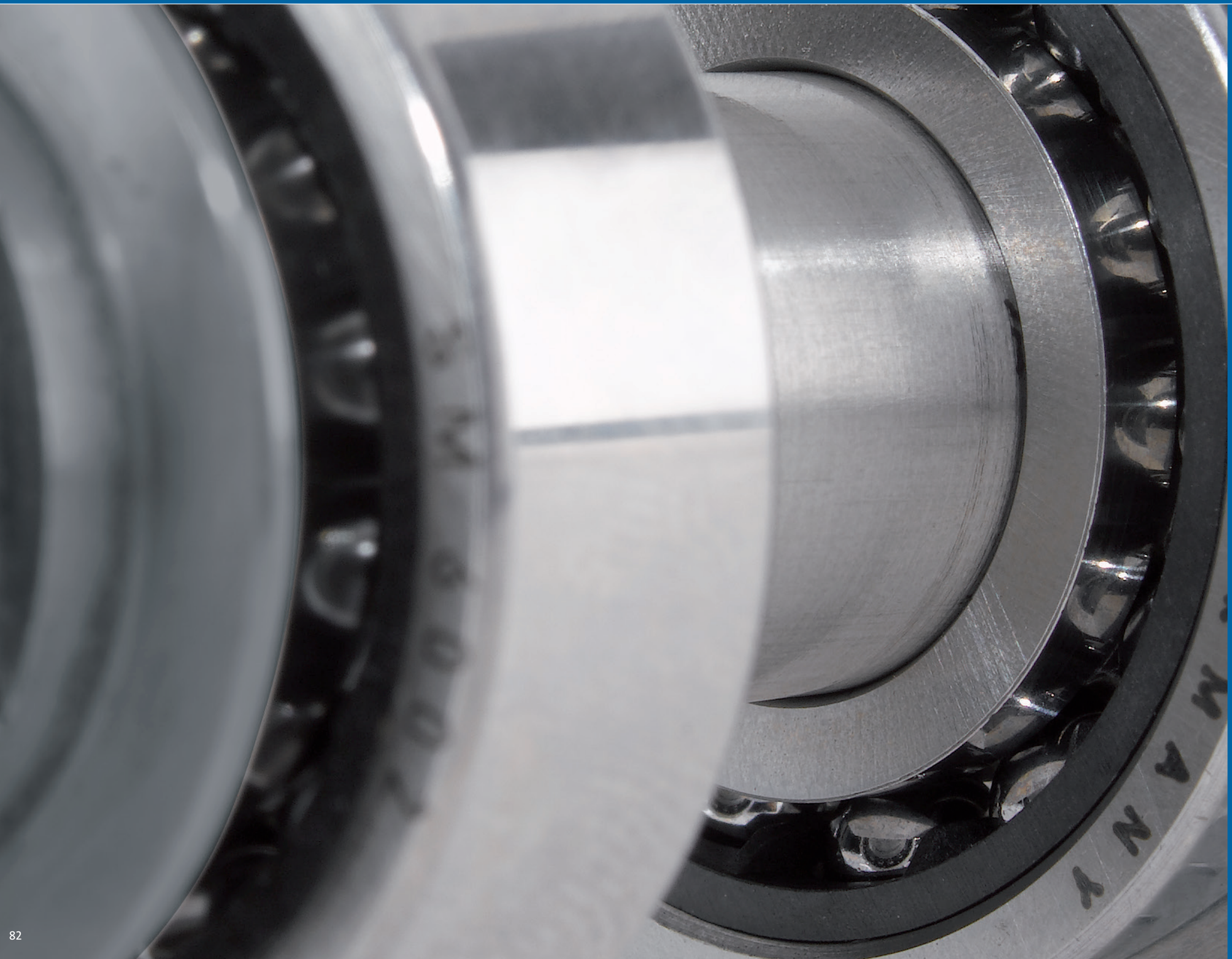
Design, Series 60../ 62.. Z/2Z /X2Z



Mounting dimensions



Designation	Boundary dimensions				Balls			Dimensions			Mounting dimensions			Weight	Load rating			Speed	Designation
	d [mm]	D [mm]	B [mm]	B-X [mm]	d_m [mm]	D_W [mm]	Z [pcs]	d_1 [mm]	D_1 [mm]	$r_{s\,min}$ [mm]	$r_{a\,max}$ [mm]	$d_{a\,min}$ [mm]	$D_{a\,max}$ [mm]	m [kg]	C_r [kN]	C_{0r} [kN]	C_{Ur} [N]	n_{grease} [1/min]	
d = 15mm																			**d = 15mm**
6002	15	32	9		23.5	4.762	9	20.2	26.9	0.3	0.3	17.6	30.2	0.028	5.3	2.7	139	43000	**6002**
HY 6002	15	32	9		23.5	4.762	9	20.2	26.9	0.3	0.3	17.6	30.2	0.026	5.3	2.55	97	53000	**HY 6002**
6202	15	35	11		25.3	5.953	8	21.1	29.0	0.6	0.6	18.6	32.3	0.043	7.4	3.65	188	40000	**6202**
HY 6202	15	35	11		25.3	5.953	8	21.1	29.0	0.6	0.6	18.6	32.3	0.039	7.4	3.5	131	49000	**HY 6202**
d = 17mm																			**d = 17mm**
6003	17	35	10		26	4.762	10	22.7	29.4	0.3	0.3	19.6	33.2	0.038	5.7	3.1	159	38000	**6003**
HY 6003	17	35	10		26	4.762	10	22.7	29.4	0.3	0.3	19.6	33.2	0.035	5.7	2.95	111	48000	**HY 6003**
6203	17	40	12		28.5	6.747	8	24.1	33.0	0.6	0.6	20.9	37.2	0.063	9.4	4.75	245	35000	**6203**
HY 6203	17	40	12		28.5	6.747	8	24.1	33.0	0.6	0.6	20.9	37.2	0.057	9.4	4.55	171	44000	**HY 6203**
d = 20mm																			**d = 20mm**
6004	20	42	12		31	6.35	9	26.6	35.5	0.6	0.6	23.8	39.1	0.064	9.8	5.4	281	32000	**6004**
HY 6004	20	42	12		31	6.35	9	26.6	35.5	0.6	0.6	23.8	39.1	0.058	9.8	5.2	196	40000	**HY 6004**
6204	20	47	14		33.5	7.938	8	28.5	38.6	1.0	1.0	25.1	43.1	0.105	13.9	7.45	388	30000	**6204**
HY 6204	20	47	14		33.5	7.938	8	28.5	38.6	1.0	1.0	25.1	43.1	0.093	13.9	7.15	270	37000	**HY 6204**
d = 25mm																			**d = 25mm**
6005	25	47	12		36	6.35	10	32.2	40.1	0.6	0.6	28.8	44.1	0.077	10.4	6.35	329	28000	**6005**
HY 6005	25	47	12		36	6.35	10	32.2	40.1	0.6	0.6	28.8	44.1	0.071	10.4	6.05	229	35000	**HY 6005**
6205	25	52	15		39.1	7.938	9	34.0	44.1	1.0	1.0	30.2	47.9	0.125	15.2	9	466	25500	**6205**
HY 6205	25	52	15		39.1	7.938	9	34.0	44.1	1.0	1.0	30.2	47.9	0.115	15.2	8.6	325	32000	**HY 6205**
d = 30mm																			**d = 30mm**
6006	30	55	13		42.5	7.144	11	38.1	47.0	1.0	1.0	34.9	50.9	0.115	13.2	8.4	438	23500	**6006**
HY 6006	30	55	13		42.5	7.144	11	38.1	47.0	1.0	1.0	34.9	50.9	0.105	13.2	8.1	305	29500	**HY 6006**
6206	30	62	16		46	9.525	9	40.4	52.1	1.0	1.0	35.8	57.6	0.195	20	11.9	618	21500	**6206**
HY 6206	30	62	16		46	9.525	9	40.4	52.1	1.0	1.0	35.8	57.6	0.175	20	11.4	431	27000	**HY 6206**
d = 35mm																			**d = 35mm**
6207	35	72	17		53.5	11.112	9	47.4	60.6	1.1	1.0	41.9	66.7	0.285	28	17.3	900	18500	**6207**
HY 6207	35	72	17		53.5	11.112	9	47.4	60.6	1.1	1.0	41.9	66.7	0.255	28	16.6	628	23500	**HY 6207**
d = 40mm																			**d = 40mm**
6208	40	80	18		60	11.906	9	52.8	67.6	1.1	1.0	47.0	74.6	0.355	29.5	18.2	944	16500	**6208**
HY 6208	40	80	18		60	11.906	9	52.8	67.6	1.1	1.0	47.0	74.6	0.320	29.5	17.4	658	21000	**HY 6208**



Engineering

Bearing selection

Preloading

Accuracy of associated components

Lubrication

Operating conditions



Bearing selection

Engineering

GMN high precision bearings provide intelligent bearing solutions for peak performance machine components.
The outstanding characteristics of GMN ball bearings are the result of technically sophisticated quality features that attain maximum power limits.

The values stated in the bearing data indicate the performance potential of the individual bearing depending on characteristic design and material properties.
Influences due to operating conditions can affect specific bearing characteristics and cause deviations from the stated bearing data.

There are various measures which can be taken to counteract performance restrictions and improve bearing performance.

On the basis of GMN's comprehensive array of products, the specific performance profiles of individual bearing designs can be used to select just the right bearing to meet a given set of requirements.

1. Definition, application

e.g. spindle, motor

2. Requirements profile

Installed location: drawing, space available, bearing arrangement (fixed/floating bearing)
Application profile: precision, rigidity, operating temperature, load capacity, speed, service life
Preload: rigid or with spring

3. Bearing selection

Bearing design (materials, bearing type, series, bearing size, cage)
Precision, contact angle, preload (rigid or with spring)
Installation drawing, fastening, surrounding parts (fits, dimensions of associated components)

4. Lubrication

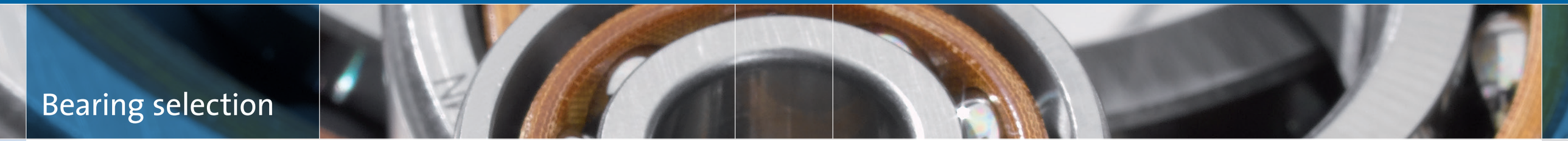
Lubrication: Plan for supply/disposal, quantities/cycles, nozzles or bore holes in outer ring
Grease lubrication: type of grease (viscosity, ndm factor), grease quantity, grease relubrication system if required

5. Calculation/verification

Operational bearing loads (radial/axial loads)
Permissible static load
Speed limits
Determining extended service life
Determining service life of grease

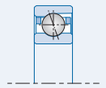
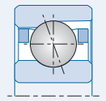
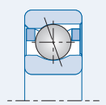
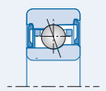
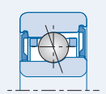
6. Installation

Associated components: shaft, housing, connecting parts;
Tightening force and torque for bearing fastener
Grease distribution run, re-lubrication or oil supply; noise
Check of running accuracy
Checks of preload force, rigidity



Bearing selection

GMN standard series (characteristics)

GMN series/bearing sizes from	to		ISO	Characteristics	Applications
GMN series S (standard)) n · dm = 1.7 x 10^6 mm/min*					
S 61800 d=10mm	**S 61808** d=40mm		18	Very thin-walled, very compact size, very smooth (starting) running, high-speed suitability, limited load capacity	e.g. instrumentation
S 619/5 d=5mm	**S 61924** d=120mm		19	Thin-walled, compact size, very smooth (starting) running, high-speed suitability, medium load capacity,	General purpose, e.g. precision tools, machine tool spindles, with moderate loads
S 605 d=5mm	**S 6024** d=120mm		10	smooth (starting) running, good ratio to load capacity and speed	General purpose, e.g. precision tools, machine tool spindles, with large loads
S 625 d=5mm	**S 6213** d=65mm		02	Thick-walled, very high load capacity, limited speed suitability	aircraft generators/starters, machine tool spindles, high load capacity, limited speed
GMN series SM (high speed) n · dm = 2.0 x 10^6 mm/min*					
SM 619/8 d=8mm	**SM 61924** d=120mm		19	Speed suitability + approx. 20%, lower load capacity**, good compensation of temperature differences IR – AR	High speed precision tools, machine tool spindles, moderate load capacity
SM 605 d=5mm	**SM 6024** d=120mm		10	Speed suitability + approx. 20%, lower load capacity**, good compensation of temperature differences IR - AR	High-frequency (HF) spindle for grinding and milling operations
GMN series KH (highest speed) n · dm = 2.1 x 10^6 mm/min*					
KH 61900 d=10mm	**KH 61914** d=70mm		19	Speed suitability + approx. 25%, lower load capacity**	Spindles for woodworking, bearing covered, bearing sealed
KH 6000 d=10mm	**KH 6020** d=100mm		10	Speed suitability + approx. 25%, lower load capacity**	Ultra high frequency spindles for grinding, open bearing, Oil-air lubrication

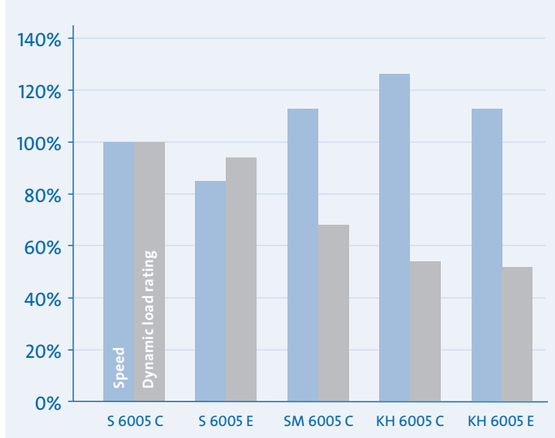
*The specific speed characteristics (n · dm values) are reference values for bearings with steel balls
**Compared to design S

GMN ball bearings (performance comparison)

GMN has developed various bearing series that exhibit optimized characteristics with respect to individual performance features (e.g. speed, load rating, axial or radial rigidity).

GMN has reliable and durable ball bearing solutions at its disposal with outstanding performance features that fulfill versatile requirement profiles.

Bearing versions in comparison: Speed/dynamic load rating



Bearing versions in comparison: Axial/radial rigidity





Preload

Preload is defined as a continuously acting axial force exerted on a ball bearing which produces elastic deformation in the contact area of balls and raceways.

The installation of ball bearings with rigid or with spring preload optimizes numerous performance characteristics for bearing operation.

· Reduced spring action establishes definable radial and axial rigidity (see diagram)

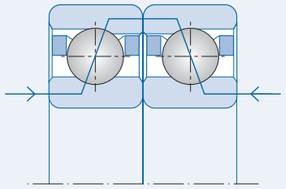
· High running accuracy/processing accuracy even under changing load conditions

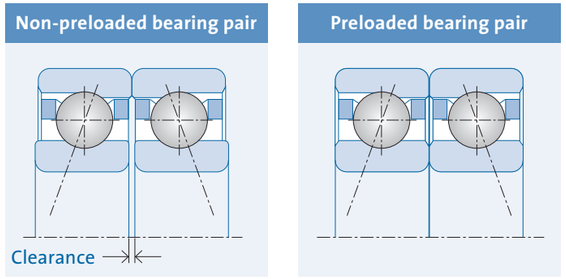
· Reduced vibrations and running noise

· Prevention of slippage and mixed friction for rolling element contact at high speeds and high acceleration

· Reduced amounts of sliding friction at high speeds (reduced contact angle change between inner and outer ring)

· Increase of load capacity (by external loads and speeds) with longer service life



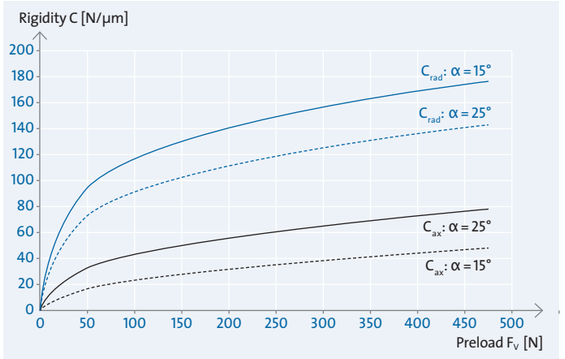


Rigidity

Rigidity is defined as the magnitude of axial force [N] on a ball bearing which causes the bearing's rings to be displaced toward one another by 1 µm.

Appropriate preload increases bearing rigidity and supports the bearing's loading capacity against applied forces.

Preload, rigidity



Lift-off force

The force at which a bearing becomes free of load by an axial load acting centrally on a bearing set is defined as lift-off force.

If the external axial load exceeds the lift-off force ...

... balls and raceways of the relieved ball bearing are no longer in permanent contact

... wear is caused by sliding friction

-> *p. 91*

Spring preloading

Structural features:

· Bearing 1 (work side) is axially fixed in the housing
Bearing 2 is axially floating
(fixed position of the inner rings on the shaft)

· The spring force on the outer ring of bearing 2 produces a constant preload on both bearings.

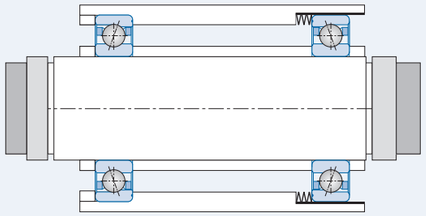
· The required spring preload is adjusted via the spring travel (travel-force function corresponding to the spring characteristic)

· To achieve perfect preload results, sufficient axial freedom of motion is required for the floating bearing's outer ring

· The positioning spring is adjusted in the effective direction of the external axial load

· If single bearings are used: < ~> , unmatched bearings can be applied

· If the bearings are arranged in tandem arrangement: << ~>>, matched bearings (L, M, or S) must be applied to ensure even load distribution



Characteristics:

· The preload results – independent of speed and temperature – solely from the spring force

· The spring force exerts a constant preload on the bearing and counter bearing

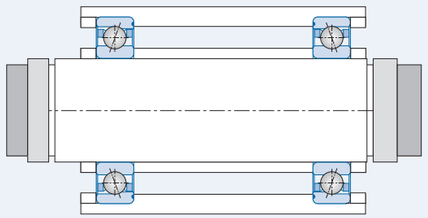
· Thermal expansion of the shaft and housing have no influence on preload

· Spring preloaded bearing systems permit the greatest speeds



Preload

Rigid preload: Single bearings



Structural features:

- Bearing 1 (work side) and bearing 2 have axially and radially fixed positions (inner rings sit firmly on the shaft and outer rings in the housing)
- The contact surfaces of associated components to the inner and outer ring have equal length and are plane parallel
- To achieve the predefined preload, it is necessary for the respective bearings to be matched

Characteristics:

- Substantially increased axial and radial rigidity (in comparison to spring preload)
- As friction heat increases as a consequence of increased speed, preload increases to reduce maximum speed (in comparison to spring preload)
- The theoretical maximum speed can be estimated on the basis of speed correction factors
- Temperature differences between shaft (inner ring) and housing (outer ring) lead to preload changes due to thermal expansion
  If the shaft's temperature is higher than that of the housing, the bearing's radial clearance decreases
  Very high temperature differences and small contact angles can cause radial tension
- With small bearing spacing, a temperature gradient from shaft to housing causes an increase of preload
- With large bearing spacing, a temperature gradient from shaft to housing causes a decrease of preload
- The change of preload under operating conditions must be considered in the design

The GMN Service offers for the complex calculation of bearing preloads in spring-preloaded or rigid systems its assistance with the software **GMNShaft**.

Rigid preload: Bearing sets

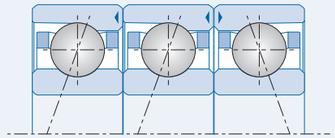
Multiple arrangements of bearings to form bearing sets increase load capacity, rigidity and lift-off force.

Rigidity

Radial rigidity for all arrangements:

at $\alpha = 15°$ → $C_{rad} \approx 6 \cdot C_{ax}$
at $\alpha = 17°$ → $C_{rad} \approx 5.2 \cdot C_{ax}$
at $\alpha = 18°$ → $C_{rad} \approx 4.8 \cdot C_{ax}$
at $\alpha = 19°$ → $C_{rad} \approx 4.4 \cdot C_{ax}$
at $\alpha = 20°$ → $C_{rad} \approx 4.0 \cdot C_{ax}$
at $\alpha = 22°$ → $C_{rad} \approx 3.2 \cdot C_{ax}$
at $\alpha = 25°$ → $C_{rad} \approx 2.0 \cdot C_{ax}$

(All values are approximate and nominal)



Bearing arrangement		Effective Nominal preload F_{Veff}*[N]	Axial rigidity C_{axeff}* [N/µm]	Lift-off force F_a max [N]
< > or > <	DB, DF	F_V	C_{ax}	$2.85 \cdot F_V$
<< >	TBT	$1.35 \cdot F_V$	$1.45 \cdot C_{ax}$	$5.65 \cdot F_V$
<< >>	QBC	$2 \cdot F_V$	$2 \cdot C_{ax}$	$5.65 \cdot F_V$
<<< >	QBT	$1.6 \cdot F_V$	$1.8 \cdot C_{ax}$	$8.5 \cdot F_V$

* Reference values for bearing pairs in O or X arrangement (see bearing data).
Influences due to operating conditions (e.g. speed, load) are not taken into account.



Bearing arrangements

Bearing pairs
(multiple arrangements with 2 bearings)

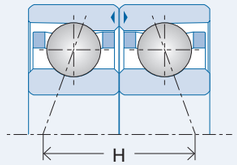
For rigid bearing preload, matched bearing pairs in O, X or tandem arrangement provide an effective economic and technical solution to a large number of applications.

O-arrangement (DB)

Pressure lines diverge in the direction of the bearing's axis

· Wide support base (H) and high rigidity against tilting moments

· Axial force absorption in both directions



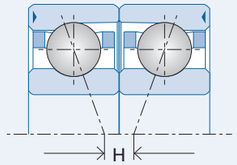
X-arrangement (DF)

Pressure lines converge in the direction of the bearing's axis

· Insensitive to misalignment

· Reduced support base size and tilt rigidity

· Axial force absorption in both directions

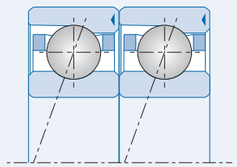


Tandem-arrangement (DT)

Arranged parallel to load direction

· Higher axial load capacity (factor 2) than a single bearing

· Both bearings have the same contact angle and are placed against a third bearing



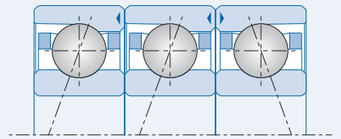
◀ = marked face on outer ring
to identify the bearing arrangement.

Bearing sets
(multiple arrangements with 3 or more bearings)

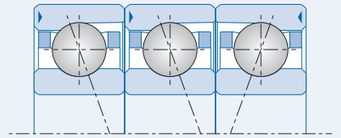
Where there are maximum demands on system rigidity or high loading, the X, O or Tandem arrangements with 3 or more bearings are able to attain outstanding performance characteristics.

Arrangements with 3 bearings

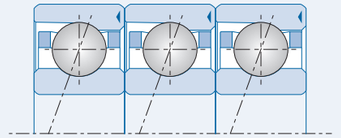
TBT arrangement <◀>



TFT arrangement >>◀

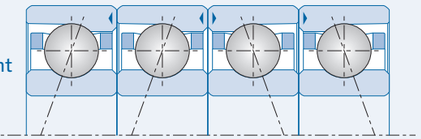


TT arrangement <<◀

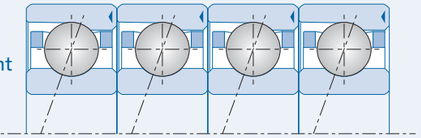


Arrangements with 4 bearings

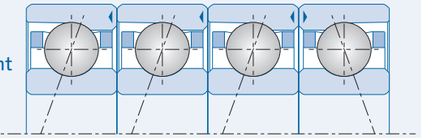
QBC arrangement <◀>▶



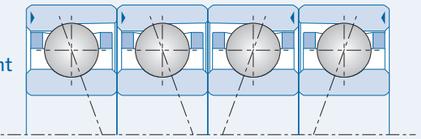
QT arrangement ◀◀◀◀



QBT arrangement ◀◀◀▶



QFC arrangement >>◀◀

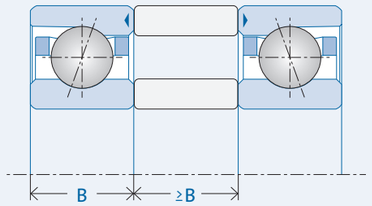




Spacers

Distinct optimization of individual quality features with paired bearings can be achieved by the installation of spacers.
The width of the spacer must be at least as wide as a single bearing.

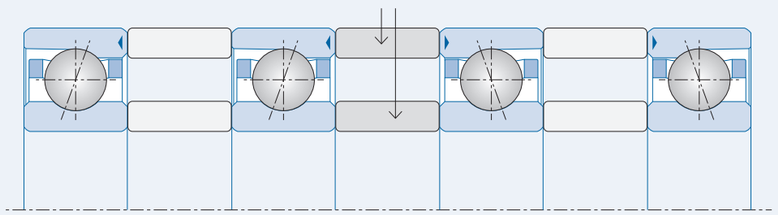
Spacer width



Characteristics:

· Enlarge the support base (H) and increase tilting rigidity
· Optimize thermal dissipation
· Improve bearing lubrication by optimized oil flow
· Change of preload with matched bearings is possible
· If the width of the shaft spacer is smaller than the width of the housing spacer then ...
  ... preload will be increased with the O-arrangement
  ... preload will be decreased with X-arrangement
· For bearing sets with several spacers (e.g. <||<||>||>), only the spacer between different pressure line courses must be ground off

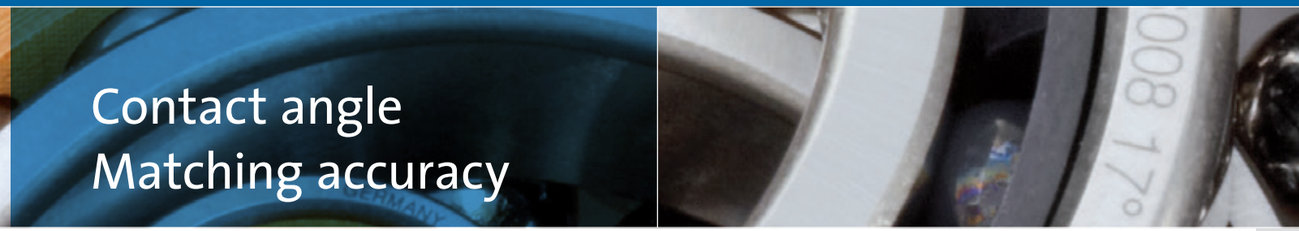
Spacer between differing pressure line courses



Structural features:

· Material: 100 Cr6, or other, hardened (>=45 HRC)
· The required plane parallelism of outer and inner spacer is guaranteed by surface grinding both rings in one clamping operation

Detailed information on the difference in size between the spacers:
-> Preload change L-M-S
-> Downloads ball bearings - GMN



Contact angle
Matching accuracy

Contact angle α_0

The angle of the lines between contact points:
Inner ring raceway – Ball – Outer ring raceway and the radial plane define the contact angle.

The contact angle is determined by design as a function of radial clearance and the curvature form of the raceways.

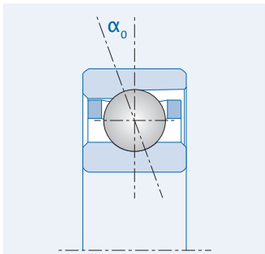
Load transmissions curvature between both bearing rings take place over the contact points formed by the raceways and the balls.

Uniform load distribution on individual bearings of bearing arrangements presupposes the same contact angle of all loaded bearings.

The contact angle changes due to operating conditions by ...
... external forces
... internal forces
(centrifugal force of inner ring and balls at high speeds)
... inner ring fits
... temperature differences between inner and outer ring.

Deviations of the contact angle induce changes in bearing characteristics which influence bearing operation.

With increasing contact angle ...
... axial rigidity increases
... maximum permissible speed decreases
... radial rigidity decreases



Standard contact angle
C (15°) and E (25°)

Deviating contact angles:

Bearing designation	Sign	Contact angle
SM 61907 - SM 61911	C	17°
SM 61912 - SM 61924	C	19°
SM 6015 - SM 6024	C	17°
KH 619xx and KH 60xx	C	17°

Other contact angles can be delivered on request.

Matching accuracy

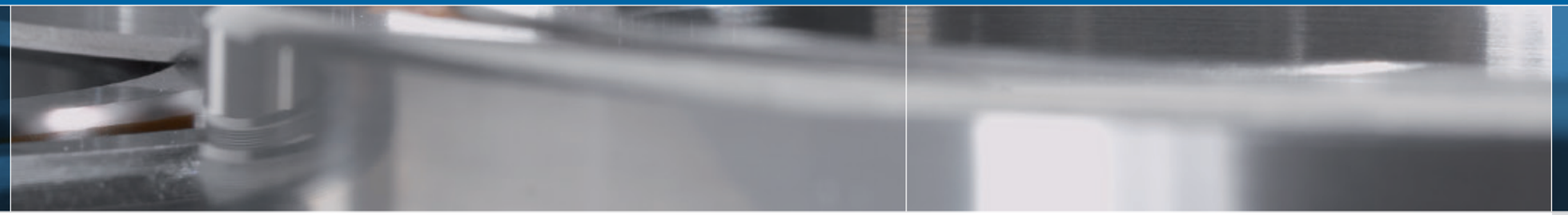
General matching

Universal matching of paired bearings:
In multiple arrangements, the universal matching accuracy of ± 2 µm per single bearing enables a more uniform load distribution and a more consistent operating temperature.

Optimized matching

A highly precise accuracy of ± 1 µm per single bearing equalizes the preload in the bearing set even further. Addition to order designation: X-opt., O-opt. or T-opt.

Precision classes P4+ and UP+ Tolerances



The dimensional, form and running accuracies of GMN high-precision ball bearings are specified in accordance with the bearing-specific characteristics set out in ISO 492. Accuracy classes P4 and P2 correspond to the tolerances and dimensional deviations of 'Tolerance Class 4 and 2' as defined in ISO 492. The GMN accuracy class P4+ features GMN-specific tolerances for form and running accuracy, and is the GMN standard for applications in machine spindles (running accuracy to ISO 2 / DIN P2; dimensional accuracy to ISO 4 / DIN P4). Bearings in precision class UP+ offer the possibility of meeting special requirements (dimensional and running accuracy in accordance with ISO 2 / DIN P2 or better).

Inner ring d Nominal bore diameter [mm]	over including	2.5 10	10 18	18 30	30 50	50 80	80 120
Inner ring tolerances		(dimensions in µm)					
Δ_{dmp} Deviation of mean bore diameter in one plane	P4	0 / -4.0	0 / -4.0	0 / -5.0	0 / -6.0	0 / -7.0	0 / -8.0
	P4+	0 / -4.0	0 / -4.0	0 / -5.0	0 / -6.0	0 / -7.0	0 / -8.0
	UP+	0 / -3.0	0 / -3.0	0 / -3.0	0 / -3.0	0 / -4.0	-
	P2	0 / -2.5	0 / -2.5	0 / -2.5	0 / -2.5	0 / -4.0	0 / -5.0
Δ_{ds} bearing series 60, 62 Difference between a single bore diameter and the nominal value of the bore	P4	0 / -4.0	0 / -4.0	0 / -5.0	0 / -6.0	0 / -7.0	0 / -8.0
	P4+	0 / -4.0	0 / -4.0	0 / -5.0	0 / -6.0	0 / -7.0	0 / -8.0
	UP+	0 / -3.0	0 / -3.0	0 / -3.0	0 / -3.0	0 / -4.0	-
	P2	0 / -2.5	0 / -2.5	0 / -2.5	0 / -2.5	0 / -4.0	0 / -5.0
$V_{dp\ max}$ bearing series 618, 619 Difference between largest and smallest bore diameter in one plane – out of roundness	P4	4.0	4.0	5.0	6.0	7.0	8.0
	P4+	2.5	2.5	2.5	2.5	2.5	5.0
	UP+	-	-	-	-	-	-
	P2	2.5	2.5	2.5	2.5	4.0	5.0
$V_{dp\ max}$ bearing series 60, 62 Difference between largest and smallest bore diameter in one plane – out of roundness	P4	3.0	3.0	4.0	5.0	5.0	6.0
	P4+	2.5	2.5	2.5	2.5	4.0	5.0
	UP+	2.0	2.0	2.0	2.0	3.0	-
	P2	2.5	2.5	2.5	2.5	4.0	5.0
$V_{dmp\ max}$ Difference between largest and smallest mean bore diameter in different planes – conicity	P4	2.0	2.0	2.5	3.0	3.5	4.0
	P4+	1.5	1.5	1.5	1.5	2.0	2.5
	UP+	1.5	1.5	1.5	1.5	2.0	-
	P2	1.5	1.5	1.5	1.5	2.0	2.5
$K_{ia\ max}$ True running of the inner ring in the assembled bearing – radial runout	P4	2.5	2.5	3.0	4.0	4.0	5.0
	P4+	1.5	1.5	2.5	2.5	2.5	2.5
	UP+	1.5	1.5	1.5	2.0	2.0	-
	P2	1.5	1.5	2.5	2.5	2.5	2.5
$S_{d\ max}$ Plane running of the face side with respect to the bore – face runout	P4	3.0	3.0	4.0	4.0	5.0	5.0
	P4+	1.5	1.5	1.5	1.5	1.5	2.5
	UP+	1.5	1.5	1.5	1.5	1.5	-
	P2	1.5	1.5	1.5	1.5	1.5	2.5
$S_{ia\ max}$ Plane running of the face side with respect to the raceway, in the assembled bearing – axial runout	P4	3.0	3.0	4.0	4.0	5.0	5.0
	P4+	1.5	1.5	2.5	2.5	2.5	2.5
	UP+	1.5	1.5	2.5	2.5	2.5	-
	P2	1.5	1.5	2.5	2.5	2.5	2.5
Δ_{BS} single bearing (not matched) Deviation of a single inner ring width from nominal dimension – width tolerance	P4	0 / -40	0 / - 80	0 / -120	0 / -120	0 / -150	0 / -200
	P4+	0 / -40	0 / - 80	0 / -120	0 / -120	0 / -150	0 / -200
	UP+	0 / -40	0 / - 80	0 / -120	0 / -120	0 / -150	-
	P2	0 / -40	0 / - 80	0 / -120	0 / -120	0 / -150	0 / -200
Δ_{BS} paired bearing (matched) Deviation of a single inner ring width from nominal dimension – width tolerance	P4	0 / -250	0 / -250	0 / -250	0 / -250	0 / -250	0 / -380
	P4+	0 / -250	0 / -250	0 / -250	0 / -250	0 / -250	0 / -380
	UP+	0 / -250	0 / -250	0 / -250	0 / -250	0 / -250	-
	P2	0 / -250	0 / -250	0 / -250	0 / -250	0 / -250	0 / -380
$V_{BS\ max}$ Variation of inner ring width – width variation	P4	2.5	2.5	2.5	3.0	4.0	4.0
	P4+	1.5	1.5	1.5	1.5	1.5	2.5
	UP+	1.5	1.5	1.5	1.5	1.5	-
	P2	1.5	1.5	1.5	1.5	1.5	2.5

Comparison of international tolerance standards	ISO 492	DIN 620	ABMA
(tolerance symbols per DIN ISO 1132-1)	class 4	P4	ABEC 7
	class 2	P2	ABEC 9

Outer ring D Nominal outside diameter [mm]	over including	6 18	18 30	30 50	50 80	80 120	120 150	150 180
Outer ring tolerances		(dimensions in µm)						
Δ_{Dmp} Deviation of mean outer diameter in one plane	P4	0 / -4.0	0 / -5.0	0 / -6.0	0 / -7.0	0 / -8.0	0 / -9.0	0 / -10.0
	P4+	0 / -4.0	0 / -5.0	0 / -6.0	0 / -7.0	0 / -8.0	0 / -9.0	0 / -10.0
	UP+	0 / -3.0	0 / -3.0	0 / -3.0	0 / -4.0	0 / -5.0	-	-
	P2	0 / -2.5	0 / -4.0	0 / -4.0	0 / -4.0	0 / -5.0	0 / -5.0	0 / -7.0
Δ_{Ds} bearing series 60, 62 Difference between a single outer diameter and the nominal value	P4	0 / -4.0	0 / -5.0	0 / -6.0	0 / -7.0	0 / -8.0	0 / -9.0	0 / -10.0
	P4+	0 / -4.0	0 / -5.0	0 / -6.0	0 / -7.0	0 / -8.0	0 / -9.0	0 / -10.0
	UP+	0 / -3.0	0 / -3.0	0 / -3.0	0 / -4.0	0 / -5.0	-	-
	P2	0 / -2.5	0 / -4.0	0 / -4.0	0 / -4.0	0 / -5.0	0 / -5.0	0 / -7.0
$V_{Dp\ max}$ bearing series 618, 619 Difference between largest and smallest outer diameter in one plane – out of roundness	P4	4.0	5.0	6.0	7.0	8.0	9.0	10.0
	P4+	2.5	4.0	4.0	4.0	5.0	5.0	7.0
	UP+	-	-	-	-	-	-	-
	P2	2.5	4.0	4.0	4.0	5.0	5.0	7.0
$V_{Dp\ max}$ bearing series 60, 62 Difference between largest and smallest outer diameter in one plane – out of roundness	P4	3.0	4.0	5.0	5.0	6.0	7.0	8.0
	P4+	2.5	4.0	4.0	4.0	5.0	5.0	7.0
	UP+	2.0	2.0	2.5	3.0	3.0	-	-
	P2	2.5	4.0	4.0	4.0	5.0	5.0	7.0
$V_{Dmp\ max}$ Difference between largest and smallest mean outer diameter in different planes – conicity	P4	2.0	2.5	3.0	3.5	4.0	5.0	5.0
	P4+	1.5	2.0	2.0	2.0	2.5	2.5	3.5
	UP+	1.0	1.5	1.5	2.0	2.0	-	-
	P2	1.5	2.0	2.0	2.0	2.5	2.5	3.5
$K_{ea\ max}$ True running of the outer ring in the assembled bearing – radial runout	P4	3.0	4.0	5.0	5.0	6.0	7.0	8.0
	P4+	1.5	2.5	2.5	4.0	5.0	5.0	5.0
	UP+	1.5	2.0	2.0	3.0	3.0	-	-
	P2	1.5	2.5	2.5	4.0	5.0	5.0	5.0
$S_{D\ max}$ (1) Perpendicularity of the mantle plane with respect to the side surface – face runout	P4	2.0	2.0	2.0	2.0	2.5	2.5	2.5
	P4+	0.75	0.75	0.75	0.75	1.25	1.25	1.25
	UP+	0.75	0.75	0.75	0.75	1.25	-	-
	P2	0.75	0.75	0.75	0.75	1.25	1.25	1.25
$S_{ea\ max}$ Plane running of the face side with respect to the raceway, in the assembled bearing – axial runout	P4	5.0	5.0	5.0	5.0	6.0	7.0	8.0
	P4+	1.5	2.5	2.5	4.0	5.0	5.0	5.0
	UP+	1.5	2.5	2.5	4.0	5.0	-	-
	P2	1.5	2.5	2.5	4.0	5.0	5.0	5.0
Δ_{CS} single bearing Deviation of a single outer ring width from nominal dimension – width tolerance	P4 P4+ UP+ P2	Identical to Δ_{BS} of the inner ring of the same bearing						
Δ_{CS} paired bearing Deviation of a single outer ring width from nominal dimension – width tolerance	P4 P4+ UP+ P2	Identical to Δ_{BS} of the inner ring of the same bearing						
$V_{CS\ max}$ Variation of outer ring width – width variation	P4	2.5	2.5	2.5	3.0	3.0	3.0	5.0
	P4+	1.5	1.5	1.5	1.5	1.5	1.5	2.5
	UP+	1.5	1.5	1.5	1.5	1.5	1.5	-
	P2	1.5	1.5	1.5	1.5	1.5	1.5	2.5

(1) Due to a change in the measurement procedure in ISO 492, the values for the outer ring have been halved.

Precision of associated components



Installation preparation

The processing quality of bearing seats and the precision of the selected fits decisively influence the performance of the installed bearing.
Operational availability of maximum ball bearing performance increases with the precision of the relevant machine environment.

Careful installation preparations on decisive machine components ensure necessary surface quality and guarantee compliance with the tolerances for shape and position of bearing seats. Long-term and extensive practical experience has revealed specific guidelines with respect to necessary precision tolerances for associated components that will permit optimal bearing utilization.

Optimization of fit: shaft - IR

at high speeds

With increasing speeds (starting at approximately $n \cdot d_m = 1.0 \cdot 10^6$ mm/min), the progressively rising centrifugal force causes the inner ring to expand, which leads to functional impairments.

- Inner ring slippage on the shaft and contact surfaces
- Fretting corrosion
- Vibrations

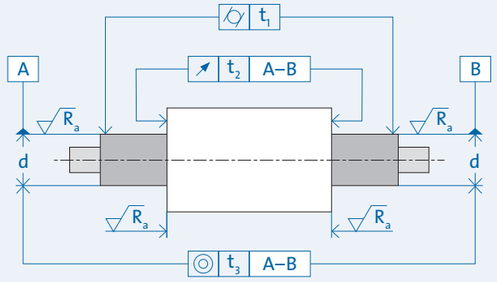
A tighter fit is recommended to prevent the inner ring from lifting off.

Bore code	Bore diameter	Recommended interference: K_1 [µm] at $n \cdot d_m$ factor [10^6 mm/min]								
	d [mm]	1.0	1.25	1.5	1.75	2.0	2.25	2.5	2.75	3.0
00	10	0	1	1	1	2	2	3	3	4
01	12	1	1	1	2	2	3	4	4	5
02	15	1	1	2	2	3	4	5	6	7
03	17	1	1	2	3	4	5	6	7	8
04	20	1	2	2	3	4	5	6	8	9
05	25	1	2	3	4	5	7	9	10	12
06	30	2	3	4	5	7	8	10	13	15
07	35	2	3	4	6	8	10	12	15	18
08	40	2	4	5	7	9	12	15	18	21
09	45	3	4	6	8	11	13	17	20	24
10	50	3	5	7	9	12	15	19	23	27
11	55	3	5	8	10	13	17	21	25	30
12	60	4	6	8	11	15	19	23	28	33
13	65	4	6	9	13	16	21	26	31	37
14	70	4	7	10	13	17	21	26	32	38
15	75	5	7	10	14	18	23	29	35	42
16	80	5	8	11	15	19	25	30	37	44
17	85	5	8	12	16	21	26	33	40	47
18	90	5	9	12	17	22	28	34	41	49
19	95	6	9	13	18	23	30	37	44	53
20	100	6	10	14	19	25	31	39	47	56
21	105	7	10	15	20	26	33	41	49	59
22	110	7	11	15	21	27	34	42	51	61
24	120	8	12	17	23	30	38	47	57	68

Guidelines for shaft and housing fits / shape and position tolerances (DIN EN ISO 1101)

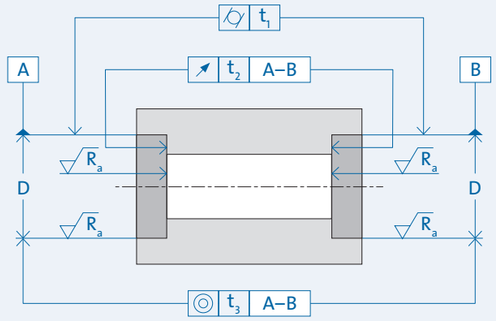
Shaft

Nominal diameter d			[mm] over / including	3 / 6	6 / 10	10 / 18	18 / 30	30 / 50	50 / 80	80 / 120
Dimensions			[µm]	+2 / -2	+2 / -2	+3 / -3	+3 / -3	+4 / -4	+4 / -4	+5 / -5
Cylindricity	⌭	t_1		1	1	1.2	1.5	1.7	2	2.5
Axial runout	↗	t_2		1	1	1.2	1.5	1.7	2	2.5
Coaxiality	◎	t_3		1	1	1.2	1.5	1.7	2	2.5
Mean surface roughness	R_a	R_a		0.2	0.2	0.2	0.2	0.2	0.2	0.2



Housing

Nominal diameter D			[mm] over / including	10 / 18	18 / 30	30 / 50	50 / 80	80 / 120	120 / 180
Dimensions Fixed bearings			[µm]	+5 / +0	+6 / +0	+7 / +0	+8 / +0	+9 / +0	+9 / +0
Dimensions Floating bearing				+7 / +2	+8 / +2	+9 / +3	+10 / +3	+11 / +4	+12 / +4
Cylindricity	⌭	t_1		1.2	1.5	1.5	2	2.5	3.5
Axial runout	↗	t_2		1.2	1.5	1.5	2	2.5	3.5
Coaxiality	◎	t_3		1.2	1.5	1.5	2	2.5	3.5
Mean surface roughness	R_a	R_a		0.4	0.4	0.4	0.4	0.4	0.4



Design/Series	Correction factor K2
S/SM 60..	1
S/SM 619..	1.10
KH 60..	1.06
KH 619..	1.14

Correction factor		K3
solid shaft	di = 0	1
hollow shaft	di = 50%	0.8

Recommended interference shaft - inner ring = $K_1 \cdot K_2 \cdot K_3$ [µm]
(Guideline values; exact calculation on request)

Further information on the n · dm factor: -> p. 86/100



Bearing lubrication

Grease lubrication

Lubricant selection

In order to fully exploit the performance capacity of GMN high precision bearings in machine operation, it is especially important to consider suitable bearing lubrication.

Maximum speeds as well as maximum service life are based on the formation of a friction-reducing lubricant film between rolling and sliding bearing parts.

Other objectives of lubrication are:

- Attenuation of structure noise and vibrations
- Thermal dissipation
- Sealing effect
- Corrosion protection

The increasing speed viability of modern high-speed lubricants permits greater utilization of the user-friendly, economic advantages of grease lubrication.

Operational requirements which exceed the performance capability of grease lubricants can be handled by oil-lubricated bearings to obtain maximum service life at the highest speed and temperature ranges.

Criteria for lubrication type selection

Lubricant	Grease	Oil
Speed suitability up to about $n \cdot d_m$ [10^6 mm/min]	+++ 2.0	+++++ 3–4
Service life	+++	+++++
Design/system costs	+++++	+
Operating costs	+++++	+
Heat dissipation	++	++++
Running in procedure	++	++++
Pollution	+++++	+

+++++: very good · +: poor

Speed suitability of greases

Selection of a suitable grease for high precision bearings is essentially based on the bearing's maximum operating speed.

The speed factor $n \cdot dm$ describes the lubricant's suitability for high speeds. It also serves as a specific parameter for comparing bearings of different sizes.

Accommodation of the speed factor when selecting a grease precludes degradation of bearing performance due to deficient lubrication.

A speed-induced break-down of the lubrication film can lead to mixed friction, heating, and increased wear on the bearing.

Speed factor: $n \cdot d_m$*

$n \cdot dm$ bearing $= n \cdot (D + d)/2$ [mm/min]

n: Bearing operating speed [1/min]
d: Bearing bore diameter [mm]
D: Bearing outer diameter [mm]

*$n \cdot dm$: -> *p. 86*

Numerous lubricant manufacturers offer a comprehensive range of greases developed for use with high speed or heavily loaded ball bearings.
Particular characteristics, such as protection against wear, low noise level and temperature resistance, are specifically emphasized during production by an application-oriented combination or processing of the base oil, thickener and additives.

Grease-lubricated GMN ball bearings

All GMN high-precision ball bearings are available greased

Standard grease for spindle and deep groove ball bearings
LUBCON TURMOGREASE Highspeed L 252 (T274)

Standard filling quantities

S / SM without 2RZ	30%
S / SM with 2RZ	20%
KH	25%
Deep groove ball bearings	30%

(±5% of free space)

Commonly used greases

Manufacturer Designation	Thickener	Base oil	Density at 20°C [g/ml]	GMN Density group	Consistence class DIN 51818 [NLGI]	Kinematic viscosity of base oil DIN 515 [mm²/s] 40°C	100°C	Operational temperature range [°C]	Speed factor $n \cdot d_m$ [mm/min]	Comments on application
LUBCON TURMOGREASE Highspeed L 252 *GMN-Code T274*	Special Lithium	Ester + synth. hydro-carbon	0.94	II	2/3	25	6	-40 to +120	2,200,000	High speed grease; very good wear protection; especially suitable for hybrid bearings with ceramic balls; good corrosion protection; for bearing diameters d ≥ 30mm; standard grease in KH bearings
LUBCON TURMOGREASE Highspeed L 182 *GMN-Code T272*	Special Lithium	Ester + synth.	0.94	II	2	18	4.5	-70 to +120	2,500,000	High speed grease; very good wear protection; especially suitable for hybrid bearings with ceramic balls; good corrosion protection; where low viscosity is required
LUBCON TURMOGREASE Li 802 EP *GMN-Code T286*	Lithium	synth. hydro-carbon + mineral oil	0.87	0	2	82	12.5	-35 to +140	1,000,000	Resistant to corrosion and aging; compatible with non-ferrous metals; good pressure absorption; good long-term stability; low noise
KLÜBERSPEED BF 72-23 *GMN-Code T290*	Polyurea	Ester + synth. hydro-carbon	0.93	I	3	22	5	-50 to +120	2,100,000	High-speed grease; very good wear protection; particularly suitable for hybrid bearings with ceramic balls;
KLÜBER ASONIC GLY 32 *GMN-Code T176*	Lithium	Ester + synth. hydro-carbon	0.94	II	2	25	5	-50 to +140	1,000,000	Suitable for low temperatures; low noise; low frictional moment; standard grease in shielded deep groove ball bearings (as well as L252)
KLÜBER ISOFLEX NCA 15 *GMN-Code T249*	Special calcium	Ester + mineral oil	0.94	II	2	23	4.7	-50 to +120	1,300,000	Very good wear protection; very low frictional moment; especially suitable for hybrid bearings with ceramic balls; good corrosion protection; good resistance to water and media; resistant to aging and oxidation

Other greases are available on request.

Detailed information on the specific amount of grease for each bearing type:
-> Downloads ball bearings – GMN /Grease

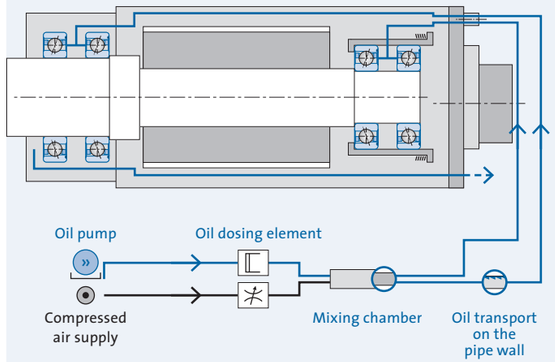
Bearings without grease are supplied with standard preservation.

For grease re-lubrication trough the OR:
-> p. 18 and
-> Downloads ball bearings – GMN /Grease re-lubrication



Oil lubrication

Oil air lubrication (block diagram)



Oil lubrication systems

Compared to grease-lubricated bearings, the application of lubricating oils enables long-term reliable operation at maximum speeds.

Oil-air lubrication (minimum quantity lubrication) is primarily used to supply oil to high-speed bearings.

Oil air lubrication provides specific as well as volume-regulated lubricant delivery to the rolling and sliding surfaces in the bearing.

The oil is transported by means of an air stream that form streaks along the inner wall of the transparent supply hose and released uniformly at lubricating points in specified intervals.

Oil air lubrication guarantees utmost effectiveness with respect to consumption and lubricating effect at maximum speeds:

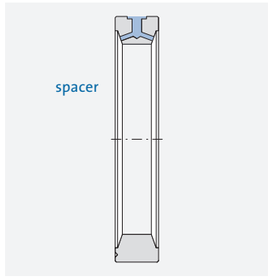
· Reduced flexing work
· Minimum friction losses
· Reduced heat generation
· High operating security
· Specific, volume-regulated lubricant supply
· Low oil consumption
· Low oil fog formation
· Very good lubricating effect
· Environmentally friendly and highly economical

For an optimal oil-air supply, the Prelub GP PLUS lubrication device is available from GMN:

-> www.gmn.de/en/spindles/accessories/cooling-and-lubrication-units/

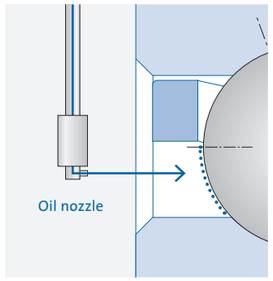
Oil supply

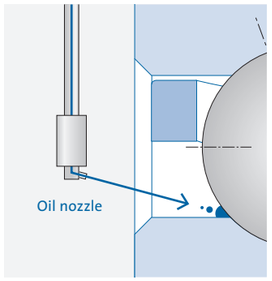
In conventional bearing lubrication systems, the oil injection nozzles are in an intermediate sleeve or spacer ring between two bearings.



A nozzle position aligned parallel to the spindle axis is sufficient for applications in high speed ranges.

A nozzle position aligned at an angle increases bearing speed suitability (more accurate lubricant supply in the rolling area).





Direct oil lubrication via the OR, data sheet
-> www.gmn.de/kugellager/service-desk/download/

Length and bore diameter of the oil nozzle:
With a nozzle length/nozzle bore diameter ratio of more than 3 and less than 5, a sufficient lubricant supply is guaranteed (pressure of the oil-air flow greater than the counteracting pressure caused by turbulence in the bearing).

Oil for high-precision spindles:
Hydraulic oil with kinematic viscosity VG 32 or VG 46 or VG 68 (mm^2/s)

Oil filtration:
Purity class 15/13/10 according to ISO 4406 (particle size < 5 µm)

Oil quantity per bearing (guideline values):
Bore diameter Ø · 3 ... 6 mm^3/h (examples):
· S 619/8 -> 8 · 6 = 48 mm^3/h
· S 6008 -> 40 · 4 = 160 mm^3/h
· S 6014 -> 70 · 3.5 = 250 mm^3/h
· S 6024 -> 120 · 3 = 360 mm^3/h
(depending on speed, feed, flow rate, position)

Cycle time:
Depends on: d, n, lubrication pulse; usually ≤ 20 min

Number of nozzles:
At least 1 per bearing

Nozzle diameter: 0.5–1.5 mm

Nozzle position:
Between cage and IR shoulder (dT -> *bearing tables from p. 25*)

Oil supply, oil drain:
Transparent hose, 2–4 mm depending on distributor

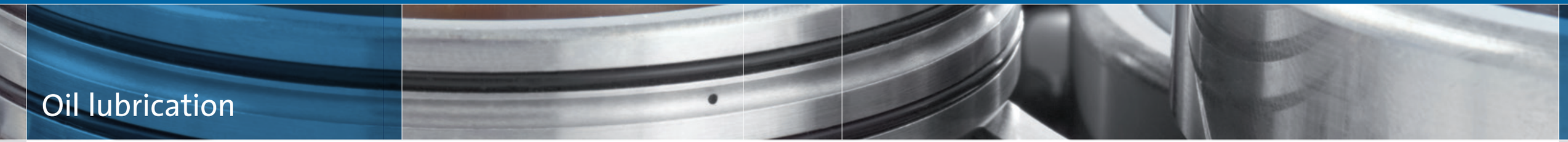
Air pressure upstream of the spindle:
0.6 to 3 bar

Air volume:
Depending on lubrication unit

Air quality:
ISO 8573:
Particle size < 5µm,
Particle concentration < 5 mg/m^3
Dew point < 3°C
Oil concentration < 1 mg/m^3

Start-up:
Start up the spindle after ensuring the oil supply.

Guideline values. The actual values must be coordinated with the requirements of the application and the oil-air lubricator by the spindle manufacturer.



Oil lubrication

Lubricating oils

The following oils can be used for lubricating machine tool spindles:

Oils of viscosity class ISO VG 32

Hydraulic oil	DIN 51524 - HLP - D 32
Hydraulic oil	DIN 51524 - HLP 32
Industrial oil	ISO 6743/4 - HM 32

Oils of viscosity class ISO VG 46

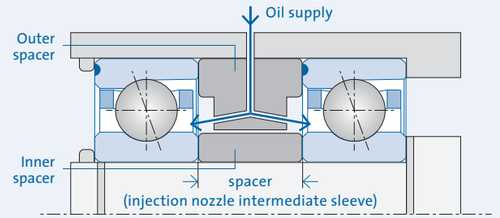
Hydraulic oil	DIN 51524 - HLP - D 46
Hydraulic oil	DIN 51524 - HLP 46
Industrial oil	ISO 6743/4 - HM 46
Lubrication oil	DIN 51517 - CLP 46

Oils of viscosity class ISO VG 68

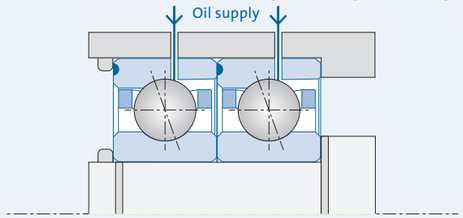
Hydraulic oil	DIN 51524 - HLP - D 68
Hydraulic oil	DIN 51524 - HLP 68
Industrial oil	ISO 6743/4 - HM 68
Lubrication oil	DIN 51517 - CLP 68

Comparison: oil air lubrication / direct oil air lubrication

Oil air lubrication through spacer



Oil air direct lubrication through bearing outer ring



Direct oil lubrication

GMN special designs for direct oil lubrication enable compact bearing dimensions because of an oil supply bore in the outer ring (no spacer for oil supply required) which also permits economical lubricant regulation.

- saves installation space and costs (no axial injection nozzle/intermediate sleeve required)
- Reduced consumption of compressed air and oil (better dosage of lubricant volume)
- Separate lubricant volume regulation per single bearing
- Targeted lubricant supply to the rolling contact via 2 holes à 0,5 mm, opposite
- Less sensitive to axial air current (in comparison to conventional oil air lubrication)

GMN offers special designs for direct oil lubrication which provide versatile and effective solutions with respect to oil supply and effective sealing.

- Oil supply through outer ring, open side
- Oil supply through outer ring, closed side
- O-rings in outer ring (sealing)
- Broadened groove for expanded oil supply potential, tolerance compensation

Direct oil lubrication via outer ring
-> p. 6 and www.gmn.de/en/ball-bearings/service-desk/download/

For an optimal oil-air supply, the oil-air lubrication unit “Prelub GP PLUS” in combination with the premium oil VG 32 is available from GMN
-> www.gmn.de/en/spindles/accessories/cooling-and-lubrication-units/



Oil lubrication

Lubricant supply through the outer ring

GMN offers special designs for direct oil lubrication, which provide versatile and effective solutions in terms of oil supply and sealing.

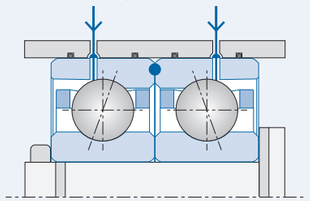
· Oil supply through outer ring, open side

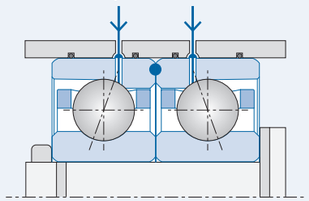
· Oil supply through outer ring, closed side

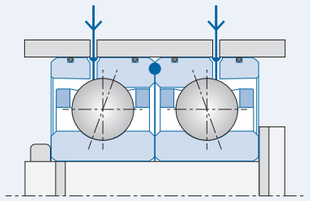
· O-rings in outer ring (sealing)

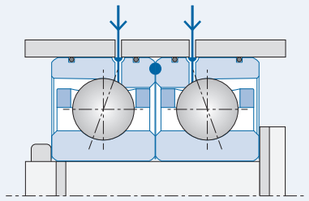
· Widening of the groove to increase the tolerance for the oil supply

Oil supply/sealing	**Oil supply via open side** No overrun of oil supply at high axial loads	**Oil supply via closed side** Oil supply directly to rolling contact Maximum speed suitability
Special versions A, AB Seal in the housing · Maximum bearing stability	GMN Special Edition A	GMN Special Edition AB
Special versions L, LB Seal in the bearing outer ring · No housing adaption required	GMN Special Edition L	GMN Special Edition LB



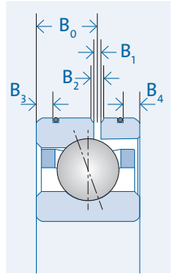






Direct oil lubrication through the outer ring - DirectLub bearings

DirectLub bearings are used when the installation space or lubricant quantity for each individual bearing needs to be optimized in spindles with oil-air lubrication.
The most common design for direct oil lubrication via the outer ring is variant L.



Designation example:
HY SML 6008 C TA P4+ UL

Design S/SM: Series 60..

d	Size	B_0	B_1	B_2	B_3	B_4
17	6003	6.1	0.5	1.6	1.4	1.4
20	6004	6.8	0.5	1.6	2.0	2.0
25	6005	6.8	0.5	1.6	3.0	2.0
30	6006	7.4	0.5	1.6	4.0	3.0
35	6007	8.2	0.5	1.6	4.0	3.0
40	6008	8.7	0.5	1.6	4.0	3.0
45	6009	9.3	0.5	1.6	4.0	3.0
50	6010	9.3	0.5	1.6	4.0	3.0
55	6011	10.2	0.5	1.6	4.5	4.0
60	6012	10.2	0.5	1.6	4.5	4.0
65	6013	10.4	0.5	1.6	4.5	4.0
70	6014	11.7	0.5	1.6	4.5	4.0
75	6015	11.5	0.5	1.6	4.5	3.0
80	6016	12.5	0.5	2.5	4.5	3.0
85	6017	12.5	0.5	2.5	4.5	3.0
90	6018	14.3	0.5	2.5	5.0	3.0
95	6019	14.3	0.5	2.5	5.0	3.0
100	6020	14.3	0.5	2.5	5.0	3.0
105	6021	15.4	0.5	2.5	6.0	4.0
110	6022	16.6	0.5	2.5	6.0	4.0
120	6024	16.6	0.5	2.5	6.0	4.0

Design S/SM: Series 619..

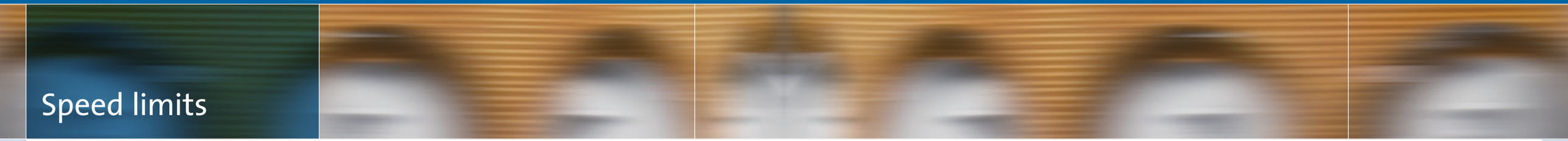
d	Size	B_0	B_1	B_2	B_3	B_4
35	61907	5.8	0.5	1.6	2.6	1.6
40	61908	6.9	0.5	1.6	3.0	2.0
45	61909	6.9	0.5	1.6	3.0	2.0
50	61910	6.9	0.5	1.6	3.0	2.0
55	61911	7.5	0.5	1.6	4.0	2.0
60	61912	7.6	0.5	1.6	4.0	2.0
65	61913	7.6	0.5	1.6	4.0	2.0
70	61914	9.4	0.5	1.6	4.0	2.0
75	61915	9.4	0.5	1.6	3.0	2.0
80	61916	9.4	0.5	1.6	3.0	2.0
85	61917	10.4	0.5	2.5	3.0	3.0
90	61918	10.5	0.5	2.5	3.0	3.0
95	61919	10.5	0.5	2.5	3.0	3.0
100	61920	11.9	0.5	2.5	3.0	3.0
105	61921	11.9	0.5	2.5	3.0	3.0
110	61922	12.4	0.5	2.5	3.0	3.0
120	61924	13.1	0.5	2.5	3.0	3.0

Design KH: Series 60..

d	Size	B_0	B_1	B_2	B_3	B_4
17	6003	6.2	0.5	1.6	1.4	1.4
20	6004	7.0	0.5	1.6	2.0	2.0
25	6005	7.1	0.5	1.6	3.0	2.0
30	6006	7.4	0.5	1.6	4.0	3.0
35	6007	8.2	0.5	1.6	4.0	3.0
40	6008	8.7	0.5	1.6	4.0	3.0
45	6009	9.4	0.5	1.6	4.0	3.0
50	6010	9.4	0.5	1.6	4.0	3.0
55	6011	10.3	0.5	1.6	4.5	4.0
60	6012	10.3	0.5	1.6	4.5	4.0
65	6013	10.5	0.5	1.6	4.5	4.0
70	6014	11.7	0.5	1.6	4.5	4.0

Design KH: Series 619..

d	Size	B_0	B_1	B_2	B_3	B_4
20	61904	5.4	0.5	1.4	1.2	1.2
25	61905	5.4	0.5	1.4	1.2	1.2
30	61906	5.4	0.5	1.4	1.2	1.2
35	61907	5.9	0.5	1.6	2.5	1.5
40	61908	7.0	0.5	1.6	3.0	2.0
45	61909	7.0	0.5	1.6	3.0	2.0
50	61910	7.0	0.5	1.6	3.0	2.0
55	61911	7.6	0.5	1.6	4.0	2.0
60	61912	7.6	0.5	1.6	4.0	2.0
65	61913	7.7	0.5	1.6	4.0	2.0
70	61914	9.3	0.5	1.6	4.0	2.0



Speed limits

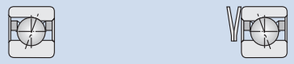
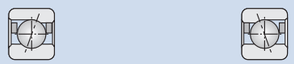
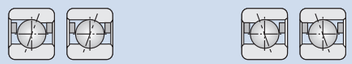
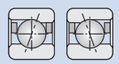
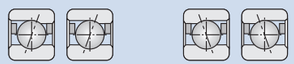
GMN develops ball bearings for highest speed and maximum load to optimize the efficiency and service life of machines. A bearing's speed limit is a decisive quantity. As speed increases, the running friction – and thus bearing temperature – rises progressively in the area of contact surfaces between balls and rings.

The friction generated in the bearing is decisively influenced by:
- Speed
- Bearing load
- Lubricant viscosity
- Lubricant quantity

Speed limits: GMN spindle bearings

Permissible speed = speed value $n^* \cdot f_{n1} \cdot f_{n2}$

Correction factors

			bearing preload		
		F	L	M	S
f_{n1}: bearing arrangement/ pairing	single bearing with spring preload 	1.0			
	rigid preload 		0.8	0.7	0.5
			0.75	0.6	0.4
			0.7	0.6	0.4
			0.6	0.5	0.3
			0.65	0.5	0.3
f_{n2}: kinematics	rotating inner ring	1.0			
	rotating outer ring	0.6			

The speed ability of the bearings with or without 2RZ sealings is the same
* Speed values n: -> from p. 25*

The speed values provided in the bearing tables are nominal speed limits for a spring-preloaded bearing under normal operating conditions.

- Good heat dissipation
- Low external load
- Rotating inner ring
- Good shape and position accuracy of associated parts
- Good alignment of associated parts
- Good balancing of rotating parts
- Use of suitable oil or grease
- Cleanliness in assembly and operation

If operating conditions deviate from the conditions stated then correction factors must be taken into account.
(Correction factors and speed values are only guidelines)

GMN stands ready to answer questions about your special application on the basis of its broad experience.

Speed limits: GMN deep groove ball bearings

Permissible speed = speed value $n \cdot f_{n1} \cdot f_{n2} \cdot f_{n3} \cdot f_{n4}$

correction factors

f_{n1}: lubrication	grease lubrication (observe the grease's n · dm factor)	1
	oil air lubrication	1.15
f_{n2}: cage	T9H	1.0
	J	0.6
	TBH	0.8
	TA	1.1
	TB	1.0
	MA	0.9
f_{n3}: kinematics	rotating inner ring	1.0
	rotating outer ring	0.6
f_{n4}: bearing arrangement/pairing	single bearing with spring preload	1.0
	pairs per DF, DB, DT, DUA, DUO, DUV	0.8

The speed ability of the bearings with or without 2Z sealings is the same
* Speed values n: -> *from p. 79*



Handling of bearings

Storage

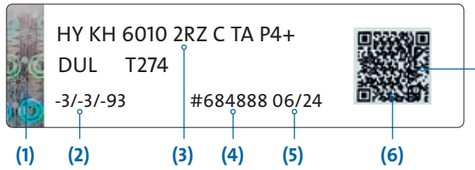
Appropriate storage of GMN products assures their bearing-specific performance features until installation.

· Store ball bearings in their original packaging at 5° to 25°C.
· Protect from dust and moisture.
· Protect from temperature and humidity fluctuations.
· Protect from vibrations of any kind.
· Protect from aggressive media.
· Protect from direct sunlight

Shelf life of preserved and grease-lubricated ball bearings:
max. 2 years (when stored properly)

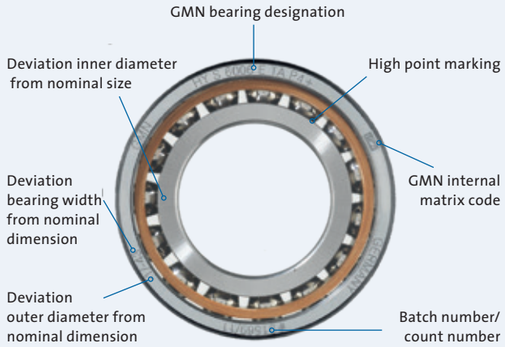
Bearing identification

Every original GMN product comes with an individual label that confirms its authenticity and provides detailed technical information.



(1) Hologramm: GMN certificate of authenticity
(2) Deviations from nominal dimensions d/D/B
(3) Bearing designation/bearing design: -> p. 20
(4) Production lot/batch no.
(5) Packing date: month/year
(6) QR code: for direct processing of bearing data in databases

Bearing marking



QR code on the box (for accuracy classes P4+ and UP+)

QR code scanned:
684888 0001;-2;-3;-44;-1; 684888 0031;-3;-5;-49;-1;
HY KH 6010 2RZ C TA P4+

Bearing 1	Bearing 2	Bearing designation
684888 0001;-2;-3;-44;-1	..0031;-3;-5;-49;-1	HY KH 6010 2RZ C TA P4+

Deviation "preload" or sag [µm]
Deviation width B [µm]
Deviation outer diameter D [µm]
Deviation inner diameter d [µm]
Consecutive bearing number
Batch no.

Sorting of diameters for accuracy classes P4+ and UP+

Deviation of bore and outer diameters from the nominal dimension within a bearing pair/set:
1/3 of the permissible diameter tolerance according to ISO 492

Example: HY KH 6010 2RZ C TA P4+ DUL T274
Δ_{dmp} = 0 / -6 µm
Δ_{Dmp} = 0 / -7 µm
–> maximum deviation within bearing pair: 2 µm

Example: HY SM 6008 C TA UP+ DUL
Δ_{dmp} = 0 / -3 µm
Δ_{Dmp} = 0 / -4 µm
–> maximum deviation within bearing pair: 1 µm

Packaging labeling

For accuracy classes P4+ and UP+

Single bearing
Example: HY SM 6008 C TXM UP+ UL

	d [µm]	D [µm]	B [µm]
	-1	-2	-58

Bearing pair
d = smallest value within the bearing pair
D = largest value within the bearing pair
B = total width deviation within the bearing pair

Example: HY KH 6010 2RZ C TA P4+ DUL T274

	d [µm]	D [µm]	B [µm]
Bearing 1:	-3	-2	-45
Bearing 2:	-2	-3	-48

Installation preparation

Careful preparation of the installation environment and relevant components assure unrestricted utilization of GMN ball bearing performance characteristics.

Preparation of the installation environment
· Keep the installation environment clean and free of dust and compressed air
· Have necessary measuring and assembly tools at hand
· Allow all parts to adapt to the prevailing temperature
· Clean associated components
· Check condition and dimensions of associated components

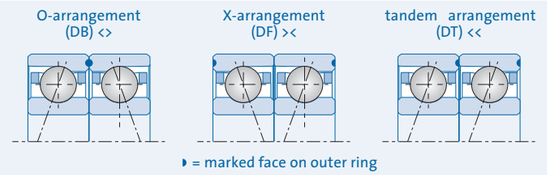
Preparing components
· Unpack ball bearings just before installation
· Do not rinse out ball bearings. Most greases and lubricating oils are entirely compatible with the bearing's preservative oil.

Preparation for grease lubrication:
· Have the necessary type and quantity (precision scale) of grease at hand
· Spread grease on both sides of the balls / raceways with a dosing syringe.

Bearing installation

· Match the dimensions of the bearings and associated components to one another (fits)
· Push or pull ball bearings in the axial direction precisely (do not tilt)
· Do not transmit installation force through the ball
· If the fit is tight, heat the inner ring (maximum 100°C). (note axial shrinkage due to cooling)

Installation instructions



Universally matched bearings can be used in O, X, or Tandem arrangements. Bearing sets with more than two bearings can also be assembled



Tightening torque for precision nuts

Fastening of bearings

The use of «precision nuts» for clamping bearings (sets) ensures optimal utilization of the performance capacity inherent to GMN high precision ball bearings.

Fastening the inner rings on the shaft:
Careful installation with precision nuts prevents contact corrosion caused by micro movements.

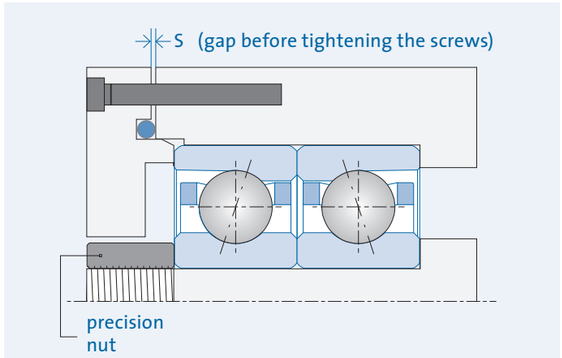
- Grind the plane sides of the nut at a right angle to the nut's thread and the shaft to prevent bearing tilt or bending of the shaft (max. 2 µm)
- Lock the precision nut on the shaft (against loosening)
- Intermediate spacers / sleeves must be made plane parallel (max. 2 µm)

Sufficient axial clamping force fixes the bearing securely into its specified position and ensures necessary bearing preload, precision and rigidity.

Installation:

Lightly oil the thread.
First tighten the precision nut to 2 to 3 times the reference torque, then loosen it again and finally tighten it to the specified reference torque.
This procedure compensates for temperature-induced dimensional changes in the rings and for effects of settling.
The initially higher torque overcomes the radial frictional resistance caused by the bearing's press fit on the shaft and ensures the required axial preload for multiple bearings.

Fastening the outer rings on the fixed bearing side
If the outer rings are secured in the housing with the front bearing cover, a gap (S = 0.01 to 0.03 mm) should be set between the bearing cover and the housing before tightening the screws. To ensure an even clamping force at all points on the outer ring, components must be of high precision (plane ≤ 2 µm). The screws must be tightened to the torques specified in the standard.



Clamping forces / Tightening torques (guidelines)*

Bore diameter [mm]	Bore code number	Clamping force [kN]				Tightening torque [Nm]				Precision nut
		Series				Series				
		618..	619..	60..	62..	618..	619..	60..	62..	
5	/5	-	0.6	0.7	0.8	-	0.4	0.5	0.6	M 5 x 0.5
6	/6	-	0.8	0.8	1.4	-	0.7	0.7	1.3	M 6 x 0.5
7	/7	-	0.9	1.1	1.6	-	0.8	1.2	1.6	M 7 x 0.5
8	/8	-	0.9	1.3	-	-	1.0	1.5	-	M 8 x 0.75
9	/9	-	1.0	1.4	1.9	-	1.3	1.9	2.6	M 9 x 0.75
10	00	1.0	1.1	1.6	2.1	1.4	1.6	2.3	3.1	M 10 x 0.75
12	01	1.1	1.2	1.6	2.3	1.7	2.0	2.7	4.1	M 12 x 1
15	02	1.3	1.5	2.0	2.4	2.6	3.0	4.2	5.0	M 15 x 1
17	03	1.4	1.8	2.4	3.0	3.2	3.9	5.5	7.0	M 17 x 1
20	04	2.2	2.4	3.1	4.2	5.6	6.4	8.3	15	M 20 x 1
25	05	2.5	3.1	3.8	4.7	8.2	15	15	20	M 25 x 1.5
30	06	3.0	3.1	4.5	6.0	15	15	20	25	M 30 x 1.5
35	07	3.1	4.1	5.0	8.0	15	20	25	40	M 35 x 1.5
40	08	3.4	4.6	6.5	9.0	20	25	35	50	M 40 x 1.5
45	09	-	5.5	7.5	9.5	-	30	45	60	M 45 x 1.5
50	10	-	4.7	8.0	10.0	-	30	50	65	M 50 x 1.5
55	11	-	6.0	10.0	12.0	-	45	75	90	M 55 x 2
60	12	-	6.0	11.0	16.0	-	45	85	120	M 60 x 2
65	13	-	6.0	11.0	19.0	-	50	95	160	M 65 x 2
70	14	-	9.0	13.0	-	-	80	120	-	M 70 x 2
75	15	-	9.5	13.0	-	-	90	130	-	M 75 x 2
80	16	-	9.5	16.0	-	-	95	170	-	M 80 x 2
85	17	-	13.0	17.0	-	-	140	180	-	M 85 x 2
90	18	-	13.0	19.0	-	-	150	220	-	M 90 x 2
95	19	-	13.0	20.0	-	-	160	240	-	M 95 x 2
100	20	-	16.0	20.0	-	-	210	260	-	M 100 x 2
105	21	-	17.0	22.0	-	-	220	300	-	M 105 x 2
110	22	-	17.0	26.0	-	-	230	360	-	M 110 x 2
120	24	-	21.0	27.0	-	-	310	410	-	M 120 x 2

* Clamping force values and tightening torques are guidelines based on experience and may deviate according to application.



Grease distribution run

The required grease distribution run ensures uniform bearing lubrication and optimizes the distribution of the grease in the bearing (grease thickener removed from the ball roll zone and the base oil evenly wets the lubrication point).

· Reduced kneading work

· Low bearing temperature

· Utilization of the n · dm factor of the grease

· High operational reliability

· Long grease and bearing service life

Instructions for the grease distribution run

· Shaft position horizontal

· Avoid external loads

· Acceleration to partial speed in approx. 20 seconds

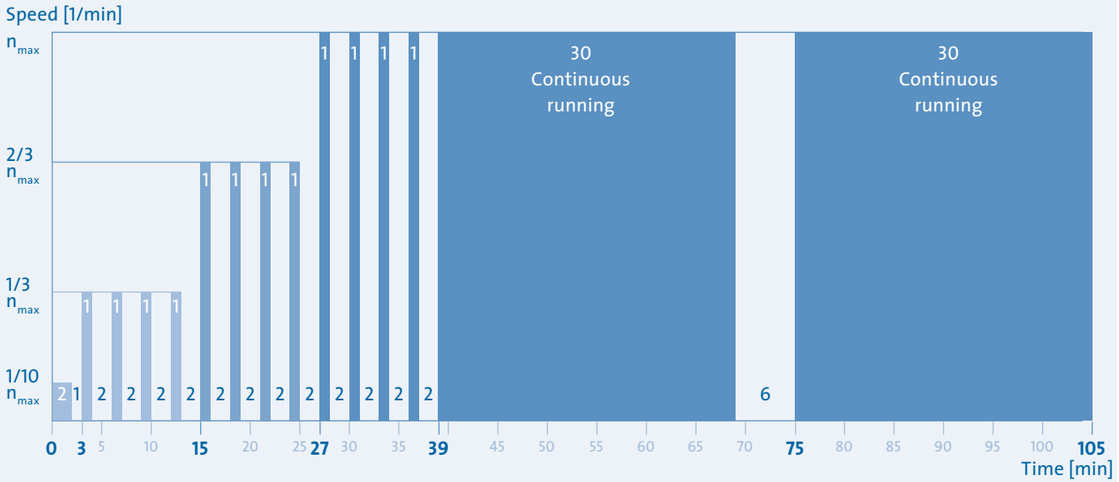
· Take into account the influence of grease quantity, grease properties (viscosity, NLGI) and cage type.

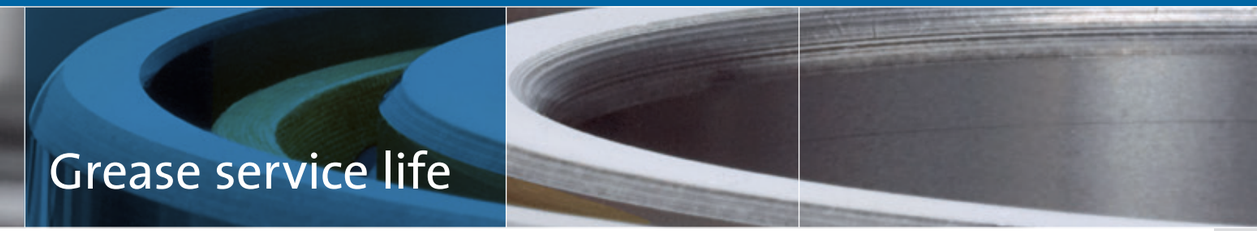
· Monitor temperature and noise development (If the housing temperature exceeds 60°C or if extreme noise occurs: stop the grease distribution run andcontinue after a rest period)

· The most important indicator of a proper grease distribution run is the temperature behavior.

· Smooth running and stable temperatures confirm that the grease distribution run has been successfully completed.

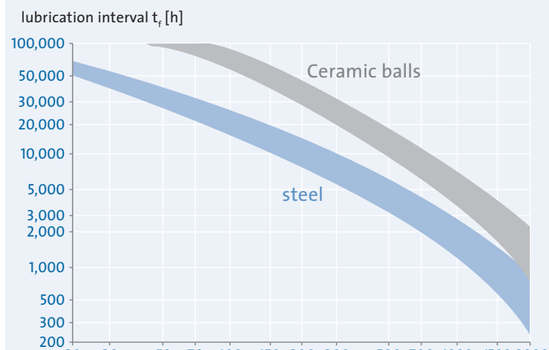
Machine running intervals for grease distribution run





Grease service life

Lubrication interval (steel/ceramic balls)



k_f = 0.75 for spindle bearings with contact angle 15°
k_f = 0.90 for spindle bearings with contact angle 25°
k_f = 0.9 – 1.1 for deep groove ball bearings

GMN ›GLOBUS‹ calculation software

GMN provides the ›GLOBUS‹ software for download to determine the service life of grease:
-> www.gmn.de/en/ball-bearings/service-desk/download/

The ›GLOBUS‹ calculation software also supports:

· Bearing selection and simplified calculation

· Data sheet generator

· Bearing frequencies -> *see also page 120*

Lubricating interval

Taking into account the required lubricant service life (lubrication interval) is essential for the long-term reliable operation of grease-lubricated bearings. Under favorable operating conditions, the lubrication interval can exceed 5 years.

The lubrication interval (t_f) is calculated taking into account the lubricant properties and the operating-related bearing loads.

· Grease type, grease quantity, grease distribution

· Design and bearing type

· Assembly conditions (cleanliness)

· Operating conditions (speed, speed, factor, loads, temperature, etc.)

Operating conditions* for lubrication interval guidelines t_f

· Standard lithium soap-based greases

· Operating temperature up to 70°C

· Bearing load (P/C < 0.1)

· Favorable environmental conditions with regard to....
... dust
... humidity
... air currents through the bearing

*(according to GfT worksheet 3, roller bearing lubrication, Sept. 2006)

Higher operating temperatures cause a reduction of the lubrication interval. (At operating temperatures above 70°C, a temperature increase of 15° Kelvin can halve the originally determined lubrication interval.) For higher bearing loads (P/C > 0.1), shock loads, and vibrations, appropriate corrections to the lubrication interval t_f are required. For exceptional operating conditions, GMN provides advice on special greases optimized for specific requirements.



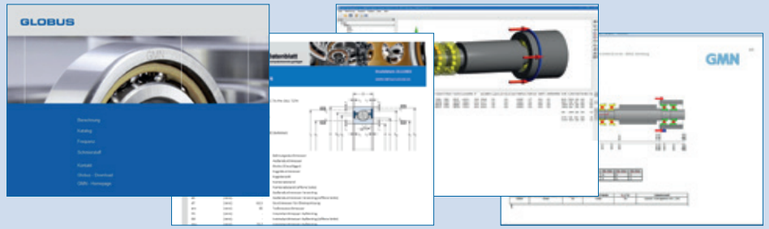
Bearing calculation

The service life calculation assesses a bearing solution with consideration for bearing material fatigue under defined operating conditions.
Calculation methods per DIN ISO 76 (static load rating) and DIN ISO 281 (dynamic load rating and service life)

Bearing calculation software GLOBUS and GMNShaft

With the **GLOBUS** ball bearing calculation program, GMN enables the preselection of suitable bearings for a specific load or requirement profile.

With the **GMNShaft** ball bearing calculation program, GMN checks the bearing design and determines optimization.



Bearing service life calculation

1. Extended service life L_{nmh}

$L_{nmh} = a_1 \cdot f_t \cdot a_{ISO} \cdot L_{10h}$

a_1 : Factor for the probability of failure
f_t : Factor for operating temperature
a_{ISO} : Life adjustment factor → 7.
L_{10h} : Nominal service life [h] → 2.

Failure-probability	10%	5%	4%	3%	2%	1%
Factor a_1	1	0.64	0.55	0.47	0.37	0.25

Maximum operating temperature	150°C	200°C	250°C	300°C
Factor f_t	1	0.73	0.42	0.22

2. Nominal service life L_{10h}

$$L_{10h} = \frac{10^6}{60 \cdot n} \cdot \left(\frac{C_r}{P}\right)^3 \text{ [h]}$$

n : Speed [1/min]
C_r : Dynamic load rating, radial [N] → 3.
P : Equivalent bearing load [N] → 5.

3. Dynamic load rating C_r

for two or more spindle bearings in X, O or Tandem arrangement:

$C_r = i^{0.7} \cdot C_{r\,single}$ [N]

i: Number of bearings
$C_{r\,single}$: Load rating of the single bearing [N]

4. Axial loading F_a

$F_a = K_a$ [N] (if $K_a > 3 \cdot F_V$)
$F_a = F_V + 0.67 \cdot K_a$ [N] (if $K_a \leq 3 \cdot F_V$)
K_a: External axial force [N]
F_V: Preload [N]

5. Equivalent bearing load P

$P = X \cdot F_r + Y \cdot F_a$ [N]

F_r F_a : Radial load, axial load [N] → 4.
X, Y : Radial factor, axial factor → 6.

The equivalent bearing load is an auxiliary variable. It is used to take into account and standardize different operating conditions and load conditions.

6. X and Y factors

	Relative axial load	Single bearing Tandem arrangement					Bearing pair in X or O arrangement			
		e	$F_a/F_r \leq e$		$F_a/F_r > e$		$F_a/F_r \leq e$		$F_a/F_r > e$	
	$i \cdot F_a/C_{0r}$		X	Y	X	Y	X	Y	X	Y
Spindle bearing										
Contact angle 15°	0.015	0.38				1.47		1.65		2.39
	0.029	0.40				1.40		1.57		2.28
	0.058	0.43				1.30		1.46		2.11
	0.087	0.46				1.23		1.38		2.00
	0.120	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	0.170	0.50				1.12		1.26		1.82
	0.290	0.55				1.02		1.14		1.66
	0.440	0.56				1.00		1.12		1.63
	0.580	0.56				1.00		1.12		1.63
Contact angle 20°		0.57	1	0	0.43	1.00	1	1.09	0.7	1.63
Contact angle 25°		0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
Deep groove ball bearings										
Radial clearance CN → p.73	0.014	0.23				2.30		2.78		3.74
	0.028	0.26				1.99		2.40		3.23
	0.056	0.30				1.71		2.07		2.78
	0.085	0.34				1.55		1.87		2.52
	0.110	0.36	1	0	0.56	1.45	1	1.75	0.78	2.36
	0.170	0.40				1.31		1.58		2.13
	0.280	0.45				1.15		1.39		1.87
	0.420	0.50				1.04		1.26		1.69
	0.560	0.52				1.00		1.21		1.63
Radial clearance C3 → p.73	0.014	0.29				1.88		2.18		3.06
	0.029	0.32				1.71		1.98		2.78
	0.057	0.36				1.52		1.76		2.47
	0.086	0.38				1.41		1.63		2.29
	0.110	0.40	1	0	0.46	1.34	1	1.55	0.75	2.18
	0.170	0.44				1.23		1.42		2.00
	0.290	0.49				1.10		1.27		1.79
	0.430	0.54				1.01		1.17		1.64
	0.570	0.54				1.00		1.16		1.63

C_{0r} : static load rating [N]
e : Limiting value of Fa/Fr (axial/radial load ratio)
F_r F : Radial load, axial load [N]
X, Y : Radial factor, axial factor

For Tandem arrangement: i = 1; C_{0r} and F_a : Use single bearing values



Bearing calculation

7. Life adjustment factor a_{ISO}

$$a_{ISO} = f\left(\frac{e_C \cdot C_{Ur}}{P}, \kappa\right)$$

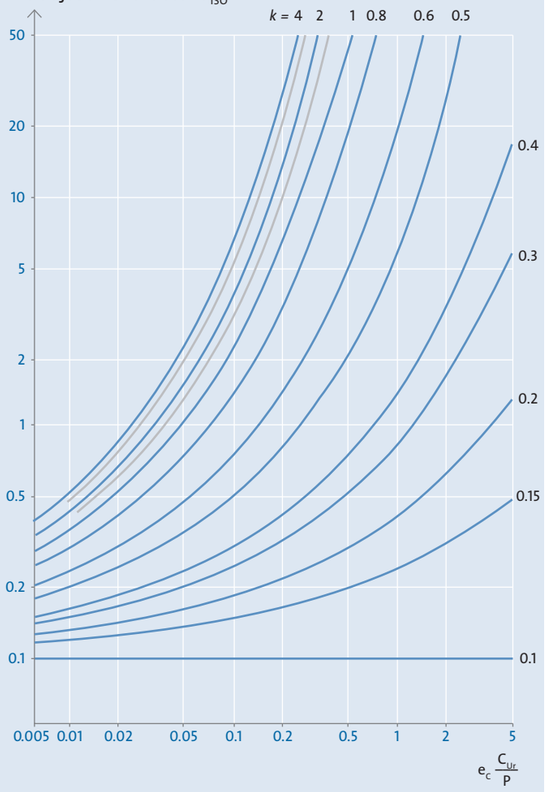
e_C : Contamination factor → 7.2

C_{Ur} : Fatigue limit load, radial

P : Equivalent bearing load → 5.
(For grease lubrication: v = viscosity of the base oil)

κ : Viscosity ratio → 7.1

Life adjustment factor a_{ISO}



7.1 Viscosity ratio κ

$$k = \frac{v}{v_1}$$

v : Operating viscosity → 7.1.1

v_1 : Reference viscosity → 7.1.2

(good lubrication: κ = 2.5 to 4.0)

For κ < 0.1 an extended service life calculation is not possible

7.1.1 Operating viscosity v

$$v(T_b, v_{40}, v_{100}) := v_{40} \cdot e^{\left(\frac{1948.1}{T_b + 273.2} - 6.22\right) \cdot \ln\left(\frac{v_{40}}{v_{100}}\right)}$$

T_b : Operating temperature = 0.6 ... 130 [°C]

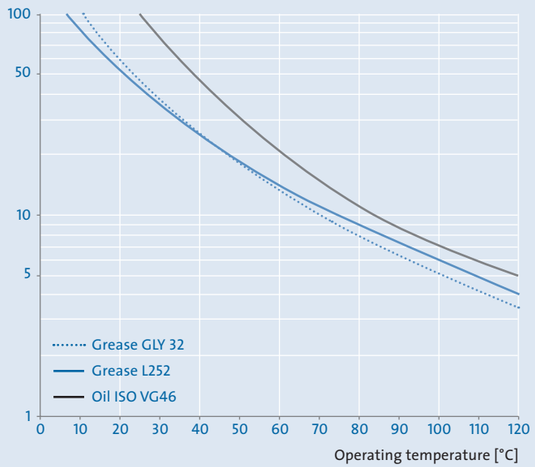
v_{40} : Lubricant operating viscosity at 40°C

v_{100} : Lubricant operating viscosity at 100°C

(For grease lubrication: v = viscosity of the base oil)

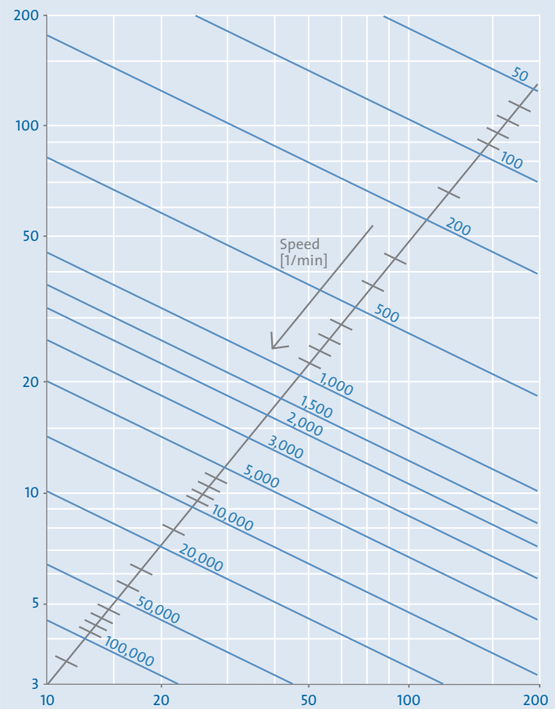
Lubricant (Examples)	Operating viscosity v [cSt] or [mm2/s] at 40°C	at 100°C
Klueber Isoflex GLY 32	25	5
Lubcon Turmogrease Highspeed L252	25	6
Mineral oil	46	6.8

Operating viscosity [mm²/sec]



7.1.2 Reference viscosity v_1

Reference viscosity v_1 [mm²/sec]



$$d_m = \frac{D + d}{2}$$

7.2 Contamination factor e_c

Contamination factor	d_m < 100 mm	$d_m \geq$ 100 mm
Extreme cleanliness Particle size on the order of magnitude of lubricating film height (laboratory conditions)	1	1
High cleanliness Very fine filtering of the oil supply; typical conditions for a shielded bearing with lifetime grease lubrication	0.8 to 0.6	0.9 to 0.8
Normal cleanliness Oil filtered through a fine filter; typical conditions for a shielded bearing with lifetime grease lubrication	0.6 to 0.5	0.8 to 0.6
Slight contamination Slight contamination in the lubricant	0.5 to 0.3	0.6 to 0.4
Moderate contamination Typical conditions for bearings without an installed seal; rough filtration; wear particles and foreign particles from the environment	0.3 to 0.1	0.4 to 0.2
Severe contamination Bearing environment heavily polluted and bearing arrangement not adequately sealed	0.1 to 0	0.1 to 0
Very severe contamination	0	0

d_m : Pitch circle diameter



Static load capacity

Sufficient static load capacity ensures the material-related form stabilityof the bearing components under high loads whilst the machine is at a standstill (tool change) or when rotating at extremely low speeds (DIN ISO 76).

The static load capacity (static coefficient f_s) is determined by taking into account the bearing characteristics and operating conditions.
Adequate static load capacity of the bearing is given if the static coefficient f_s is greater than 2.5, (for steel balls) or 3 (for ceramic balls), sufficient static load carrying capacity of the bearing is guaranteed (no plastic deformation).

Static coefficient f_s

$f_s = i \cdot C_{0r} / P_0$

i : Number of bearings
C_{0r} : Static load rating [N]
P_0 : Static equivalent load [N]

The static equivalent bearing load Po is a reference value which accommodates various operating and load conditions in a standardized manner for use in the calculation of the static coefficient f_s.

Static equivalent load P_0 [N]

$P_0 = X_0 \cdot F_r + Y_0 \cdot F_a$ [N]
if $P_0 < F_r$ then $P_0 = F_r$

X_0 : Radial factor
Y_0 : Axial factor
F_r : Radial force [N]
F_a : Axial force [N]

The influences of bearing type, contact angle and bearing arrangement on bearing stability are incorporated by way of the radial/axial factors.

	Single bearing Tandem arrangement		Bearing pair X or O arrangment	
Radial/axial factor	X_0	Y_0	X_0	Y_0
Spindle bearing α=15°	0.5	0.46	1	0.92
Spindle bearing α=25°	0.5	0.38	1	0.76
Deep groove ball bearing	0.6	0.5	-	-

Upon request, GMN's technical application consulting service will determine the actual static load capacity.

Bearing frequencies

Structure-borne noise

The design and geometry of the individual components, as well as the design of the entire bearing, determine bearing frequencies. The characteristic structure-borne noise level of a ball bearing is composed of the sum of all bearing frequencies.

Structure-borne noise relevant factors:

· Form accuracy and surface grade of raceways and balls

· Cage version

· Cleanliness and type of lubrication

On the basis of structure-borne noise tests, bearing vibrations can be determined and conclusions drawn about the surface condition (waviness) of bearing rings and balls.

Low noise levels are the result of smooth running and low friction which indicate high performance and long service life of the bearing.

Calculation of bearing-specific frequencies

Ball passing frequency f_{OR} on outer ring:

$$f_{OR} = \frac{Z}{2} \cdot f_i \cdot \left(1 - \frac{D_W}{d_m} \cos \alpha_0\right) \text{ [1/sec]}$$

Ball passing frequency f_{iR} on inner ring:

$$f_{iR} = \frac{Z}{2} \cdot f_i \cdot \left(1 + \frac{D_W}{d_m} \cos \alpha_0\right) \text{ [1/sec]}$$

Ball circulation frequency f_W :

$$f_W = \frac{f_i}{2} \cdot \left(\frac{d_m}{D_W} - \frac{D_W}{d_m} \cos^2 \alpha_0\right) \text{ [1/sec]}$$

Cage frequency f_K :

$$f_K = \frac{fi}{2} \cdot \left(1 - \frac{D_W}{d_m} \cos \alpha_0\right) \text{ [1/sec]}$$

f_i = Shaft frequency [1/sec]
D_W = Ball diameter [mm]
d_m = Pitch circle diameter [mm]
Z = Number of balls
α_0 = Contact angle

Rapid and simple calculation of bearing-specific frequencies:
By using "GLOBUS":
-> *www.gmn.de/en/ball-bearings/service-desk/download/*

Service

GMN bearing analysis

More than 50 % of all bearing damage results from inadequate lu- brication, more than 40 % is caused by faulty design, installation defects and contamination.
Less than 1 % of all bearings fail due to material or manufacturing defects.

Bearing analyses performed by GMN permit conclusions to be drawn about the causes of impairment and provide solutions which enable reliable operation of the bearing application.

· Assessment of cause(s) of bearing damage or inadequate processing results

· Consultation about cause elimination

· Prevention of same or similar damage

· Optimization of the bearing with respect to machine duty cycle, processing accuracy and performance

· Use of analysis results for product improvements

GMN offers comprehensive investigative methods for bearing analysis.

· Noise test

· Metrological investigation
(bearing and component measurements)

· Microscopic investigation (including SEM)

· Lubricant analysis

· Calculation review (e.g. check of preload)

· Weak-point analysis

In order to achieve specific and meaningful results in bearing analysis, the following approach should be pursued:

· Remove the bearing immediately after the damage event or operating abnormality

· Mark the installation position
(fixed/floating bearing, load direction, drawing/sketch)

· Return the bearing uncleaned with all parts

· Inform us about the application, operating conditions, load, speed, failure symptoms and time installed

Consulting

Based on many years of experience in the practical application of machine components, GMN provides comprehensive consulting and competent services in the field of high-precision ball bearings, supporting the successful design and long-term economical operation of machine systems.

· Bearing selection, bearing calculation, service life calculationCharacteristic values, bearing frequencies, installation dimensions ...

· Tribology, lubrication, lubricant selection, grease service life calculation

· Conversion of competitor products

· Optimizations for special applications

· Special solutions

· Damage analysis

Training

GMN offers training courses covering both the theory and practice of high-precision ball bearings and their applications, either at the customer's premises or at GMN.
The content of the courses can be tailored to individual customer requirements.

· Basics: Products, designs, materials, accuracies and tolerances

· Engineering: Nomenclature, bearing selection, bearing arrangements, preload, adjustment, lubrication, calculation

· Assembly: Workstation design, tools, control measurements, lubrication, assembly, grease distribution

· Bearing analyses: Reasons for bearing analysis, procedure, investigation options at GMN



Special applications

GMN develops special bearings and complete bearing units for applications in which standard bearings no longer meet the requirements in terms of geometry, precision, tribology, and application-related requirements.

From the initial idea to the system solution to series production, GMN develops individual, tailor-made new products of the highest quality in direct dialogue with customers. All of GMN's expertise and state-of-the-art machinery from across all its product divisions are available to support the realization of these projects.

GMN's key competencies, such as perfect engineering, simulation calculations, precision manufacturing, precision measurements, test facilities, and special technologies such as CBN grinding or hard turning, ensure the development of high-performance bearing solutions.

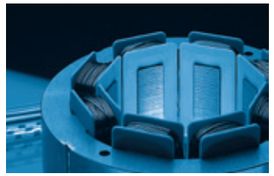
Other specific manufacturing technologies optimize GMN bearing solutions for individual operating requirements:

· Production of samples under series conditions
· Plasma cleaning · Dispersion greasing
· PVD sputtering (physical vapor deposition with e.g. Au, Ag, Pb – with layer thickness measurement)
· Tungsten disulfide coating WS2-Dicronite
· DLC coating (diamond-like carbon)
· Brazing and electroplating

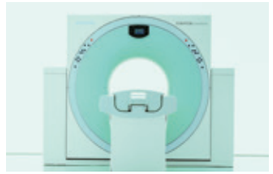
GMN ball bearing solutions have successfully established themselves in numerous industries and meet demanding requirements for:

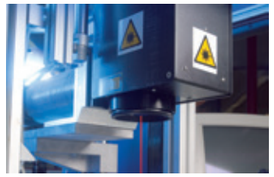
· Touch down bearing systems
· Vacuum technology/turbo molecular pumps
· Medical technology/X-ray
· Bearing systems
· Measurement and navigation technology
· Mechanical engineering

Once the innovation cycle is up and running, the team and the customer's personal contact are on hand to answer any questions, including those relating to product improvements and further developments.















Touchdown bearings
· Full complement bearings
· Economic 3-bearing systems for limited installation space
· Robust 4-bearing systems
· High acceleration to final speed
· High number of touchdowns and "touch-and-goes"



Vacuum technology / turbo molecular pumps
· High speeds
· Optimized lubrication
· Long service life
· Low noise level
· Cleanliness
· Materials suitable for vacuum



Medical technology / X-ray
· Dry lubrication
· Temperature insensitive up to 550°C
· Ultra-high vacuum (10–7 to 10–9 mbar)
· No particles or contamination
· Low operating noise
· High surface pressure



Bearing systems
· Production and engineering from a single source
· Low vibration operation
· Optimal adaptation to connection points
· High running accuracy



Instrument and navigation technology
· Maximum running accuracy
· Ready-to-install preloaded bearing systems
· Low frictional moments
· Associated components of utmost precision
· Matched bearings with lifetime lubrication



Machine tool applications
· Special series optimized for specific requirements
· High speeds
· Special materials
· Lifetime lubrication
· Optimized design
(radial clearance, matching, special lubrication)



Index

Bearing analysis 121

Bearing arrangements 92–94

Bearing clearance Deep groove ball bearings 73

Bearing data
· Spindle ball bearings 24
· Deep groove ball bearings 78

Bearing designation
· Deep groove ball bearings 74
· Spindle ball bearings 20

Bearing designs Direct oil lubrication 6, 16,103
· +A
· +AB
· +L
· +LB

Bearing design Grease relubrication 6, 18
· +AG

Bearing frequencies 120

Bearing installation 98, 110–113

Bearing lubrication 100–107

Bearing properties 86

Bearing selection 85–87

Bearing sets 91–93

Cages for Deep groove ball bearings 72
· T9H
· J
· TBH
· TA ; TB

Cages for Spindle ball bearings 10
· TA
· TXM

Clamping force 112–113

Consulting 121

Contact angle 20, 88, 95

Designs - Deep groove ball bearings 7, 69, 75
· Series 60../ 62..
· Z/2Z
· X-2Z

Designs - Spindle ball bearings 6, 14
· S
· SM
· KH

Direct lubrication
· Grease 6, 13–14, 18
· Oil 6, 16, 103

Direct oil lubrication 6, 16, 105–107

Fits 98–99

Fixed bearings 89, 98, 112

Floating bearings 89, 98

Form and position tolerances 98

Grease distribution run 114

Grease filling quantities 100

Grease lubrication 13, 18, 100, 111

Grease relubrication 7, 18, 101

Handling of bearings 110

Hybrid ball bearings 12

Index 124

Internet, Downloads 126

Lift-off force 88, 91

Lubrication of bearings 100

Main dimensions 9

Matching accuracy 95

Materials
· Spindle ball bearings 10–13
· Deep groove ball bearings 71–72

n · dm Speed factor 7, 86, 100

Nut tightening torque 112–113

Oil lubrication 6, 16, 102–104

Precision classes 96–97

Precision nuts 112

Precision of associated components 98

Preload
· Spring 23–67, 89
· Rigid 23–67, 90–94

Quality management 126

Rigidity 13, 23, 87–95

Sealed Bearigs 14

Series 9

Service 121

Service life calculation 116–119

Service life of grease 115

Spacer 94

Special applications 122

Speed correction factors
· Spindle ball bearings 108
· Deep groove ball bearings 109

Speed factor, specific n · dm 7, 86, 100

Speed limits
· Spindle ball bearings 108
· Deep groove ball bearings 109

Speed value 23, 77, 108

Static load capacity 120

Speeds
· Spindle ball bearings 23–67
· Deep groove ball bearings 77–81

Tightening torque 85, 112

Training courses 121

Tolerances of associated components 98–99

Tolerances of bearings 96–97



Internet

At our Internet site www.gmn.de we provide comprehensive product information that can be downloaded.

GMN

GMN Paul Müller Industrie GmbH & Co. KG manufactures high precision ball bearings, machine spindles, freewheel clutches and seals for a broad spectrum of applications at its Nuremberg, Germany plant.

On the basis of long experience in the development and production of machine components, GMN has specialized in the manufacture of high quality products in the field of high precision ball bearings and, beyond a comprehensive standard product line, also offers customer-oriented special solutions.
A global GMN service network offers competent customer consultation and individualized solutions.





GMN Quality management – tested and certified.

GMN guarantees utmost quality for its products and services that is based on long-term reliability. Highly modern development and production methods ensure products that always represent state-of-the-art technology. All GMN corporate divisions are structured for transparency and clear organizational workflows to ensure customer-oriented services and economic security.

All GMN corporate divisions are certified to DIN ISO 9001 and ISO 50001.

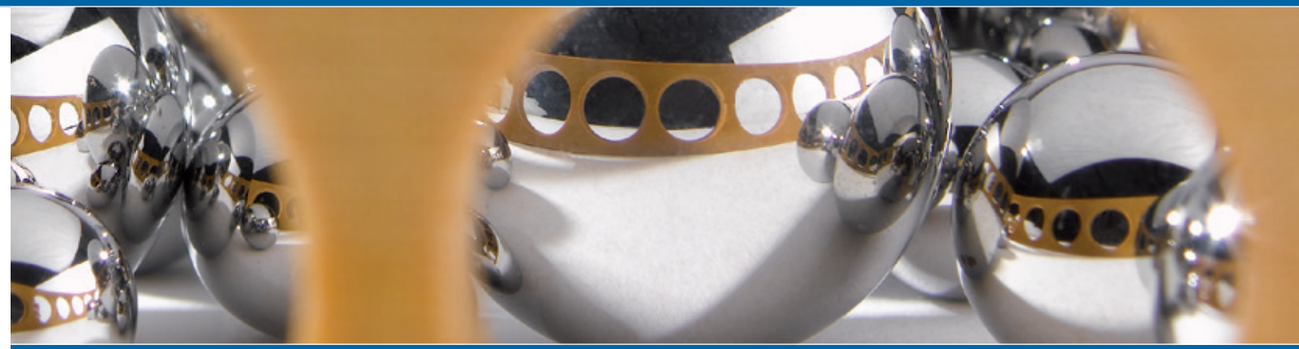


GMN – safeguarding the future.

For GMN, progress means the best possible customer support combined with performance-oriented optimization of its technical products.
This claim is realized at GMN under especially strict observance of national and international environmental standards with regard to efficient, responsible utilization of ecological resources.

This catalog is current to the time of printing.
No liability is accepted for technical revisions, inadvertent mistakes and printing errors.

Design: ©2026 LMmedia, Nuremberg, Germany



GMN

High precision ball bearings
Spindle technology
Freewheel clutches
Seals