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MOTION & CONTROL™
NSK

BALL SCREWS FOR AUTOMATION

INTERCHANGEABLE- AND PR/LPR-SERIES



BRANDS OF **NSK EUROPE**

NSK

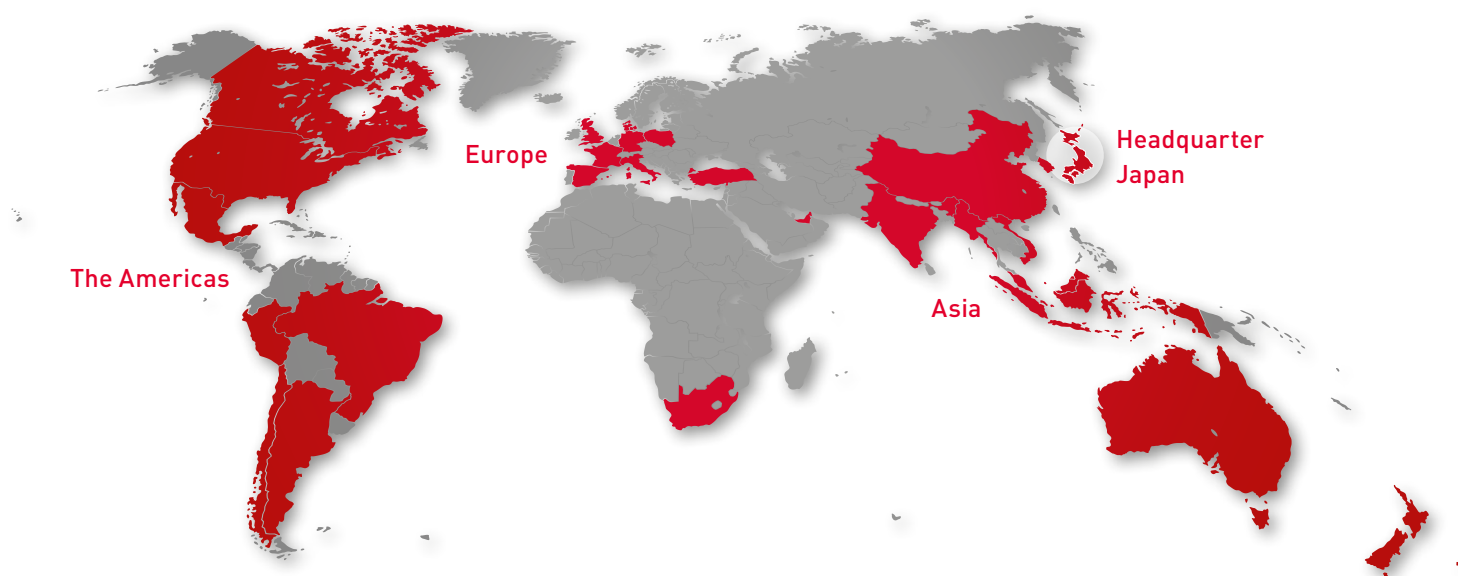
RHP *bearings*



neuweg

OUR MOST IMPORTANT PRODUCT: OUR CUSTOMERS' SATISFACTION

We are among the leading manufacturers for rolling bearings, linear technology components and steering systems worldwide. We can be found on almost every continent – with production facilities, sales offices and technology centres – because our customers appreciate short decision-making channels, prompt deliveries and local service.



The NSK company

NSK commenced operations as the first Japanese manufacturer of rolling bearings back in 1916. Ever since, we have been continuously expanding and improving not only our product portfolio but also our range of services for various industrial sectors. In this context our worldwide research and production facilities are linked together in a global network. Here we concentrate not only on the development of new technologies, but also on the conti-

nuous optimisation of quality – at every process stage. Among other things, our research activities include product design, simulation applications using a variety of analytical systems and the development of different steels and lubricants for rolling bearings.

More about NSK under: www.nskeurope.com

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BALL SCREWS FOR AUTOMATION

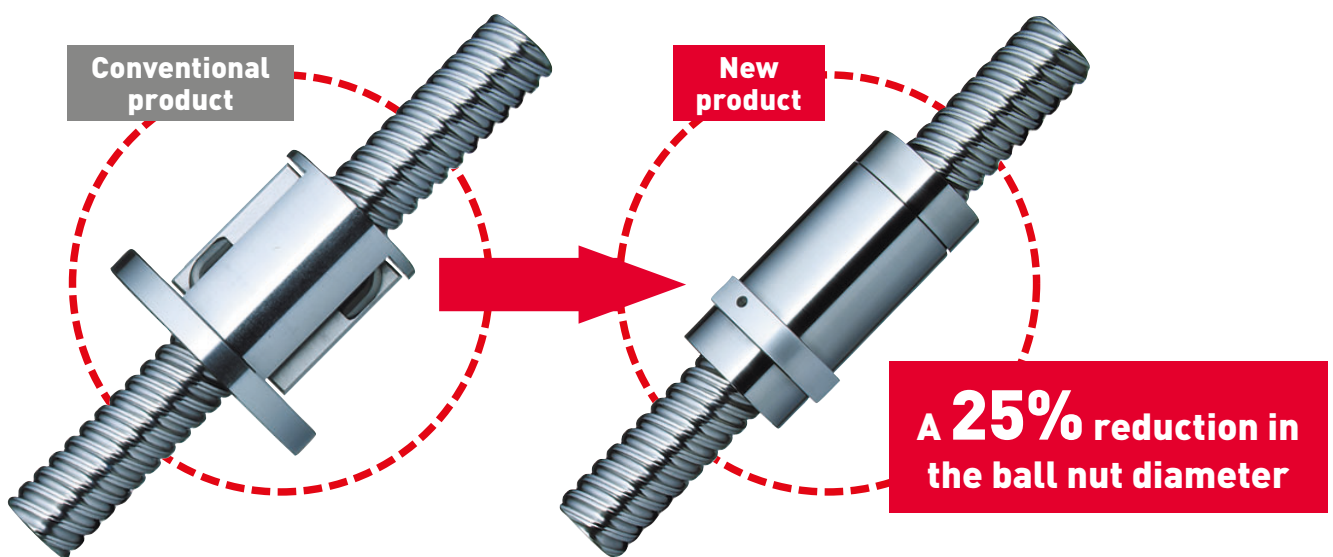
Compact ball nut heralding in the next generation standard

A 25 % reduction in the ball nut diameter compared to the current series

High speed and long stroke operation is possible. Extended maintenance free operation achieved with NSK K1 lubrication unit and new grease retaining seal, thus contributing to total cost reduction.

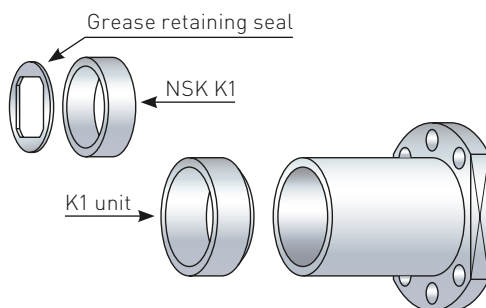
Compact ball nut

- Saves assembly space
- Suitable for rotating ball nut application because of its low inertia and balanced design



Remarkable improvement in sealing performance (introduction of grease retaining seal)

- Grease retention capabilities substantially enhanced
- Assists clean environment maintenance due to minimum grease scattering
- Superb sealing capabilities in contaminated environments



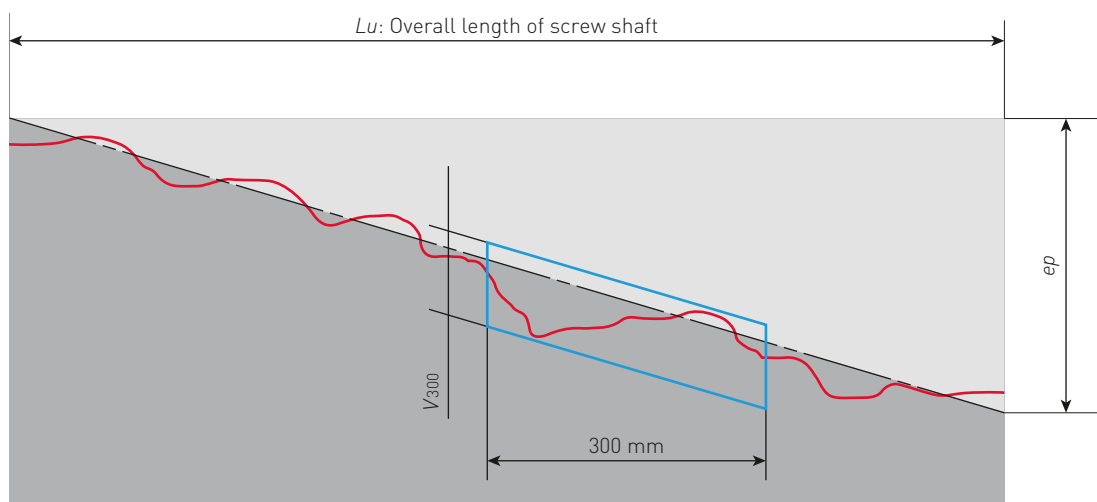
Maintenance free (option: with NSK K1 lubrication unit as a standard feature)

NSK K1 lubrication unit, that is molded from resin and is impregnated with lubrication oil, supplies fresh oil onto the ball rolling surfaces.

In unison with grease it retains the lubricating ability for an extended period of time. Since its first appearance on the market in 1996, it has been widely accepted in many industrial fields.

Accuracy grade

- Accuracy grade of Ct7 is available



ep: Tolerance on specified travel	$ep = \pm \frac{Lu}{300} \cdot V_{300} \text{ (mm)}$ Lu: Overall length of screw shaft	
Travel variation in a 300 mm range (anywhere in useful travel)	0.052 mm	
Clearance	PR / LPR no clearance	Interchangeable max. 0.020 mm

Separate order

- For interchangeable ball screw series the nut and shaft are available separately and are universally exchangeable

Options

- Support unit (sold separately)
- NSK provides the support bearing units to accompany the ball screw shafts
- K1 for PR/LPR
- K1 Kits for interchangeable ball screw

For further details, please contact NSK.

The bearing journal configurations of the screw shaft are provided on the following pages.

Applications

- Woodworking machines, general transporting equipment, feeders, robots, etc.

BALL SCREWS FOR AUTOMATION

Permissible rotational speed

We strongly recommend reviewing the allowable speed of the screw shaft.

The allowable rotational speed of the ball screw shall be checked on the following:

- Permissible d·n value

d·n value, which is involved in damaging the ball re-circulation components

(where, d: shaft diameter measured in mm, n: rotational speed measured in min^{-1}).

Preferably $d \cdot n \leq 180\,000$. Please consult with NSK if your ball screw exceeds the limitation

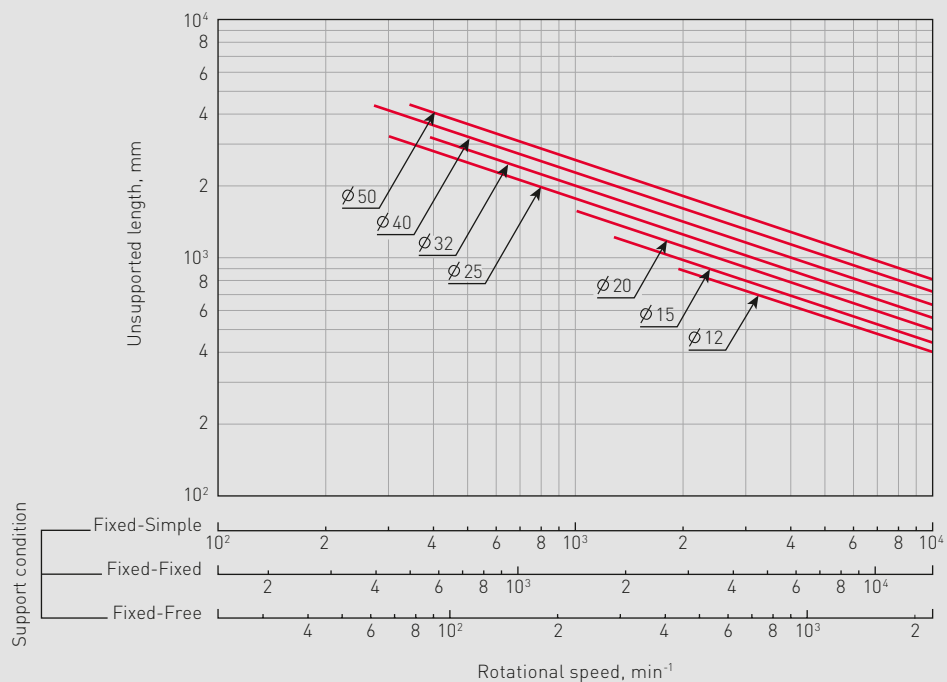
- Critical speed

Critical speed of the screw shaft (caused by the resonance of the screw shaft).

See the chart below.

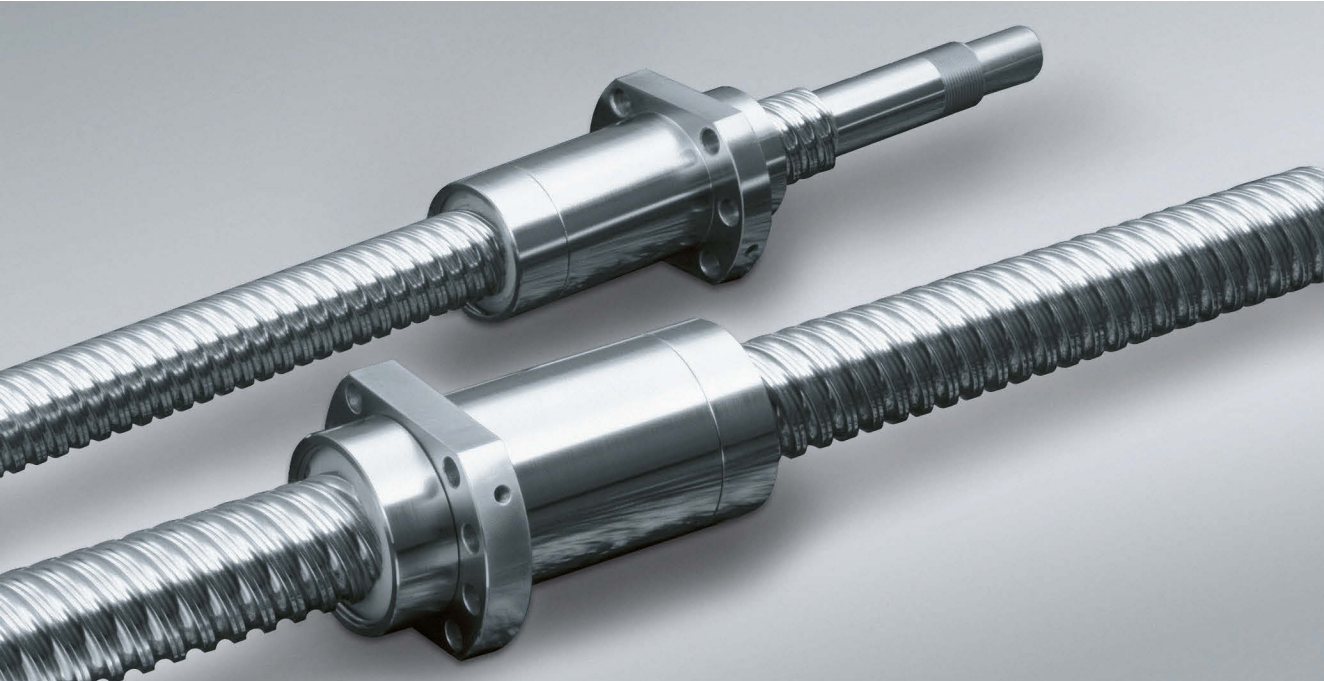
Please consult NSK if the maximum rotational speed exceeds $5\,000\text{ min}^{-1}$, even both the critical speed of the screw shaft rotation and the d·n value are in ranges of the allowable limit.

Permissible rotational speed vs. critical speed



BALL SCREWS FOR AUTOMATION

PR SERIES/LPR SERIES

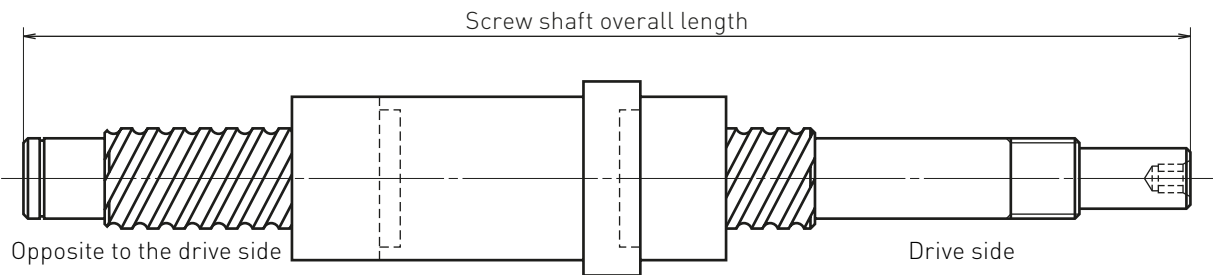


Specification number

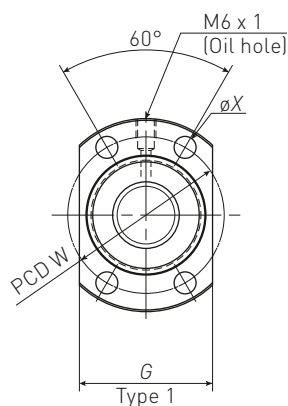
For ordering, please quote the specification number.

Example: **V S P 40 40 K 1 D 2002**

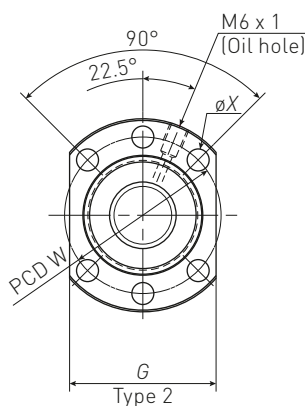
V	Accuracy grade and axial play VSP (Ct7, axial play 0 mm)
S	
P	
40	Screw shaft diameter (mm)
40	Lead (mm)
K	K: Equipped with NSK K1 unit N: No NSK K1 unit (Equipped with grease retaining seal only)
1	Number of nut
D	Position of ball nut flange D: Screw shaft drive side S: Opposite to drive side
2002	Overall length of screw shaft If the length is less than 1000 mm, enter 0 to the forth digit.



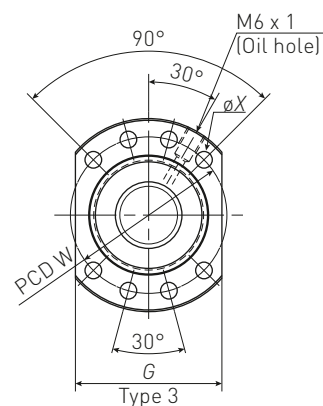
BALL SCREWS FOR AUTOMATION PR SERIES/LPR SERIES



Shaft diameter:
 $\phi 12$ mm



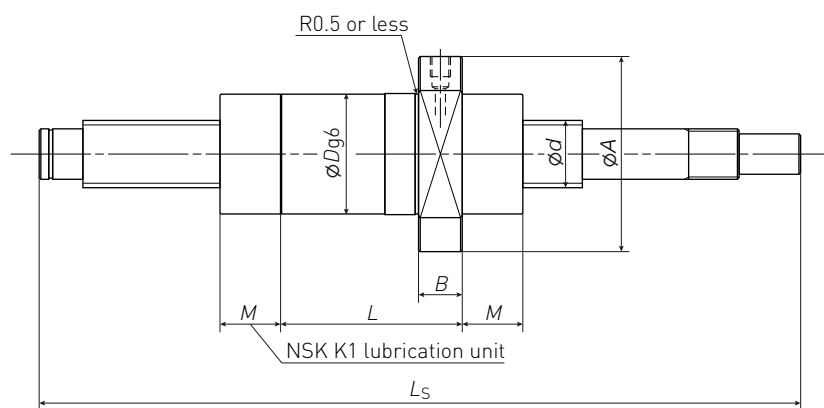
Shaft diameter:
 $\phi 15$, $\phi 20$ $\phi 25$ and $\phi 32$ mm



Shaft diameter:
 $\phi 40$ and $\phi 50$ mm

Modell-No.	Shaft dia.	Lead	Effective turns of balls	Basic load rating (N)		Dimensions				
	d	l		Dynamic load rating C_a	Static load rating C_{0a}	D	A	G	B	L
PR1205	12	5	2.7 x 1	3 200	5 860	24	40	26	11	30
PR1505	15	5	2.7 x 1	5 460	10 200	28	48	40	11	30
PR1510	15	10	2.7 x 1	5 460	10 200	28	48	40	11	43
PR2005	20	5	2.7 x 1	8 790	18 500	36	58	44	13	31
PR2010	20	10	2.7 x 1	8 790	18 500	36	58	44	13	45
PR2505	25	5	4.7 x 1	15 700	40 900	40	62	48	12	42
PR2510	25	10	3.7 x 1	12 800	32 300	40	62	48	12	56
PR3210	32	10	3.7 x 1	19 000	51 500	50	80	62	12	59
PR3220	32	20	3.7 x 1	19 000	51 500	50	80	62	12	98
PR4010	40	10	3.7 x 1	33 800	89 900	63	93	70	14	60

Modell-No.	Shaft dia.	Lead	Effective turns of balls	Basic load rating (N)		Dimensions				
	d	l		Dynamic load rating C_a	Static load rating C_{0a}	D	A	G	B	L
LPR2020	20	20	1.7 x 2	9 890	21 600	36	58	44	13	54
LPR2525	25	25	1.7 x 2	11 000	27 500	40	62	48	12	63
LPR3232	32	32	1.7 x 2	16 300	43 900	50	80	62	14	79
LPR4040	40	40	1.7 x 2	29 000	76 200	63	93	70	16	94
LPR5050	50	50	1.7 x 2	32 200	96 200	75	110	85	18	115



Unit: mm

Type	Dimensions			Maximum screw shaft length <i>Ct7</i>	
	<i>W</i>	<i>X</i>	<i>M</i>	Standard	On request
1	32	4.5	(18)	200 – 900	-1 500
2	38	5.5	(18)	200 – 1 200	-1 500
2	38	5.5	(18)	200 – 1 200	-1 500
2	47	6.6	(18)	300 – 1 600	-2 000
2	47	6.6	(18)	300 – 1 600	-2 000
2	51	6.6	(21)	300 – 3 200	-
2	51	6.6	(21)	300 – 3 200	-
2	65	9	(21)	300 – 3 200	-4 000
2	65	9	(21)	300 – 3 200	-4 000
3	78	9	(21)	500 – 3 200	-

Unit: mm

Type	Dimensions			Maximum screw shaft length <i>Ct7</i>	
	<i>W</i>	<i>X</i>	<i>M</i>	Standard	On request
2	47	6.6	(18)	300 – 1 600	-2 000
2	51	6.6	(21)	300 – 3 200	-
2	65	9	(21)	300 – 3 200	-4 000
3	78	9	(21)	500 – 4 500	-6 500
3	93	11	(21)	500 – 4 500	-6 500

BALL SCREWS FOR AUTOMATION INTERCHANGEABLE SERIES



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**New
Product**

Specification number

For ordering, please quote the specification number.

Example: **F C S 15 10 S A 1 4 8 6**

F	Accuracy	F: C7
C	Specification	C: Interchangeable
S	Item	S: Shaft
15	Spindle diameter (mm)	
10	Lead (mm)	
S	Clearance	S: Less than 0.020 mm
A	Specification	A, D: Internal design
1 4 8 6	Shaft total length	1486: lenght shaft



Specification number

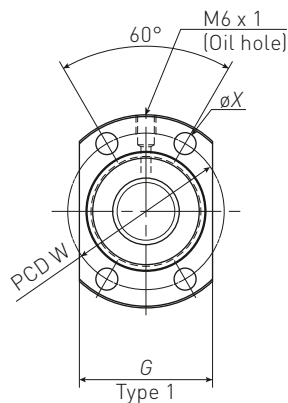
For ordering, please quote the specification number.

Example: **F C N 15 10 S D 3**

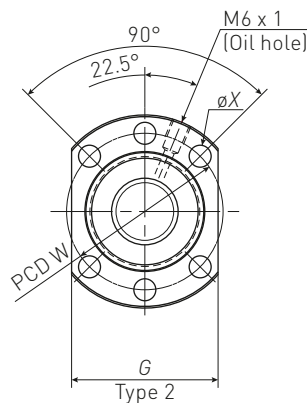
F	Accuracy	F: C7
C	Specification	C: Interchangeable
N	Item	N: Nut
15	Spindle diameter (mm)	
10	Lead (mm)	
S	Clearance	S: Less than 0.020 mm
D	Specification	D: DIN dimensions
3	2, 3, 4, 5: Nut turn	

BALL SCREWS FOR AUTOMATION INTERCHANGEABLE SERIES

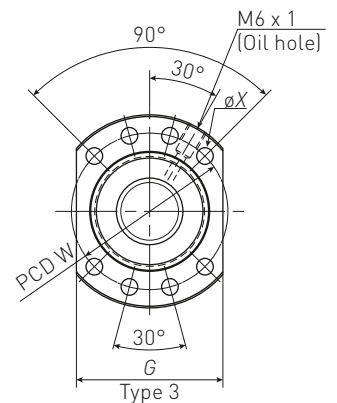
Ball nut dimensions



Shaft diameter:
ø12 mm



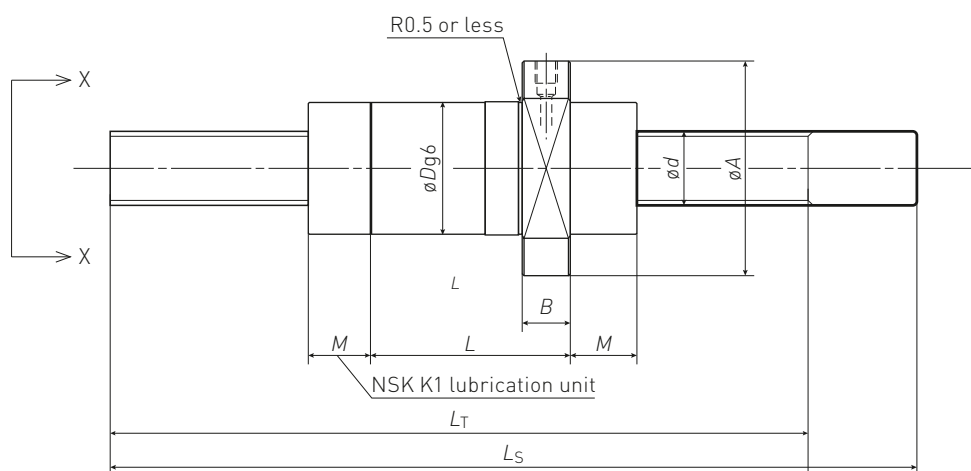
Shaft diameter:
ø15, ø20 ø25 and ø32 mm



Shaft diameter:
ø40 mm

Specification number

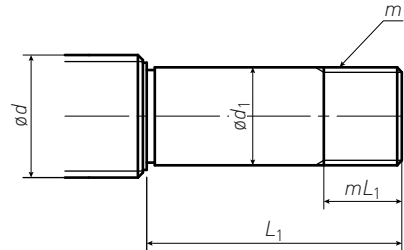
Model No.	Shaft OD [mm]	Lead [mm]	Turns	C_a [N]	C_{oa} [N]	D [mm]	A [mm]	G [mm]	B [mm]	L [mm]
FCN1205	12	5	3	3 750	5 810	24	40	26	11	30
FCN1210	12	10	3	3 750	5 780	24	40	26	11	43
FCN1505	15	5	3	6 410	10 100	28	48	40	11	30
FCN1510	15	10	3	6 530	10 200	28	48	40	11	43
FCN1520	15	20	2	5 660	8 700	32	52	40	11	54
FCN2005	20	5	3	10 400	18 500	36	58	44	13	31
FCN2010	20	10	3	10 200	18 600	36	58	44	13	45
FCN2020	20	20	2	6 790	11 800	36	58	44	13	54
FCN2505	25	5	5	18 500	40 900	40	62	48	12	42
FCN2510	25	10	4	15 000	32 400	40	62	48	12	56
FCN2520	25	20	2	7 650	14 800	40	62	48	12	54
FCN2525	25	25	2	7 490	14 600	40	62	48	12	63
FCN3205	32	5	4	16 800	41 700	50	80	62	12	44
FCN3210	32	10	4	23 000	51 300	50	80	62	12	59
FCN3220	32	20	4	22 600	51 100	50	80	62	12	98
FCN4010	40	10	4	39 800	90 700	63	93	70	14	60



Type	W	X	M	Short version (on stock available)		Long version (on demand)	
No.	[mm]	[mm]	[mm]	Thread length L_T	Total length L_S	Thread length L_T	Total length L_S
1	32	4.5	[18]	617	800	–	–
1	32	4.5	[18]	617	800	–	–
2	38	5.5	[18]	1 303	1 486	1 760	1 900
2	38	5.5	[18]	1 303	1 486	1 760	1 900
2	42	5.5	[18]	1 293	1 476	1 760	1 900
2	47	6.6	[18]	1 303	1 486	1 760	1 900
2	47	6.6	[18]	1 303	1 486	1 760	1 900
2	47	6.6	[18]	1 293	1 476	1 760	1 900
2	51	6.6	[21]	1 303	1 486	1 760	1 900
2	51	6.6	[21]	1 303	1 486	1 760	1 900
2	51	6.6	[21]	1 293	1 476	1 760	1 900
2	51	6.6	[21]	1 288	1 471	1 760	1 900
2	65	9	[21]	1 303	1 486	1 760	1 900
2	65	9	[21]	1 303	1 486	1 760	1 900
2	65	9	[21]	1 293	1 476	1 760	1 900
3	78	9	[21]	1 303	1 486	1 760	1 900

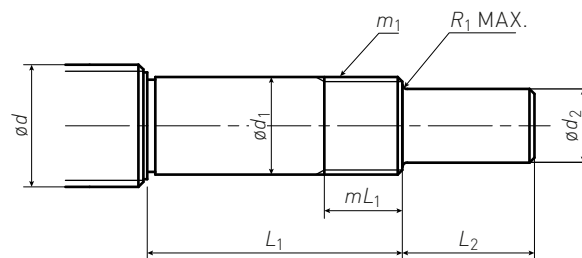
RECOMMENDED SCREW SHAFT END CONFIGURATION

Basic 1



to use WBK						
Screw shaft	Support unit		Bearing journal		Lock nut thread	
d	Square type	Round type	d_1 g6	L_1	m_1	mL_1
12	WBK08-01A	WBK08-11	8	27	M8 x 1	9
15	WBK12-01A	WBK12-11	12	30	M12 x 1	10
20	WBK15-01A	WBK15-11	15	40	M15 x 1	15
25	WBK20-01	WBK20-11	20	53	M20 x 1	16
32	WBK25-01	WBK25-11	25	89	M25 x 1.5	20
40	–	WBK30DF-31H	30	89	M30 x 1.5	26
50	–	WBK35DF-31H	35	92	M30 x 1.5	30

Basic 2



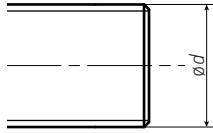
to use WBK						
Screw shaft	Support unit		Bearing journal		Lock nut thread	
d	Square type	Round type	d_1 g6	L_1	m_1	mL_1
12	WBK08-01A	WBK08-11	8	27	M8 x 1	9
15	WBK12-01A	WBK12-11	12	30	M12 x 1	10
20	WBK15-01A	WBK15-11	15	40	M15 x 1	15
25	WBK20-01	WBK20-11	20	53	M20 x 1	16
32	WBK25-01	WBK25-11	25	89	M25 x 1.5	20
40	–	WBK30DF-31H	30	89	M30 x 1.5	26
50	–	WBK35DF-31H	35	92	M30 x 1.5	30

to use BSBD					
Screw shaft	Bearing journal			Lock nut thread	
d	$d_1 g6$	L_1 (Single BSF/BSN)	L_1 (DT BSF/BSN)	m_1	mL_1
12	–	–	–	–	–
15	12	33	–	M12 x 1	10
20	15	38	–	M15 x 1	15
25	20	42	–	M20 x 1	16
32	25	46	–	M25 x 1.5	20
40	30	52	80	M30 x 1.5	26
50	35	60	94	M35 x 1.5	30

to use BSBD							
Screw shaft	Bearing journal			Lock nut thread		Drive section	
d	$d_1 g6$	L_1 (Single BSF/BSN)	L_1 (DT BSF/BSN)	m_1	mL_1	$d_2 h7$	L_2
12	–	–	–	–	–	–	–
15	12	33	–	M12 x 1	10	10	15
20	15	38	–	M15 x 1	15	12	20
25	20	42	–	M20 x 1	16	15	27
32	25	46	–	M25 x 1.5	20	20	33
40	30	52	80	M30 x 1.5	26	25	61
50	35	60	94	M35 x 1.5	30	30	63

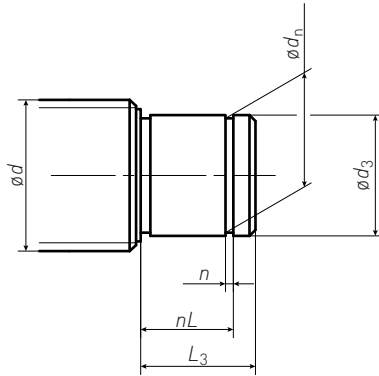
RECOMMENDED SCREW SHAFT END CONFIGURATION

Basic 3



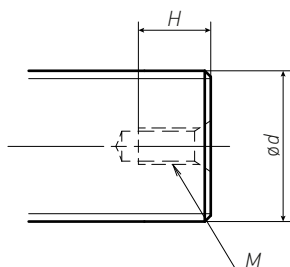
Screw shaft
d
12
15
20
25
32
40
50

Basic 4



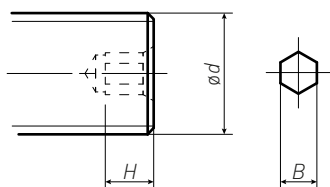
Screw shaft	Snap ring groove			Bearing journal	
d	n	d_n	nL	$d_3 g6$	L_3
12	0.8 ^{+0.1} ₀	5.7 ⁰ _{-0.06}	6.8	6	9
15	1.15 ^{+0.14} ₀	9.6 ⁰ _{-0.09}	9.15	10	12
20	1.15 ^{+0.14} ₀	14.3 ⁰ _{-0.11}	10.15	15	13
25	1.35 ^{+0.14} ₀	19 ⁰ _{-0.21}	15.35	20	19
32	1.35 ^{+0.14} ₀	23.9 ⁰ _{-0.21}	16.35	25	20
40	1.75 ^{+0.14} ₀	28.6 ⁰ _{-0.21}	17.75	30	22
50	1.75 ^{+0.14} ₀	33 ⁰ _{-0.21}	18.75	35	25

Option 1



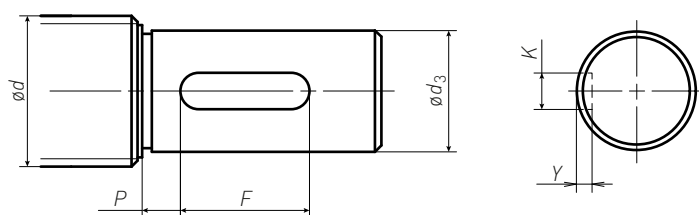
d	M	H
12	M3 x 0.5	9
15	M4 x 0.7	10
20	M6 x 1	12
25	M6 x 1	12
32	M6 x 1	12
40	M8 x 1.25	16
50	M8 x 1.25	16

Option 2



Screw shaft	Hexagon hole	
d	$B^{+0.2}_0$	H
12	–	–
15	4	6
20	5	7
25	6	8
32	8	10
40	10	12
50	12	14

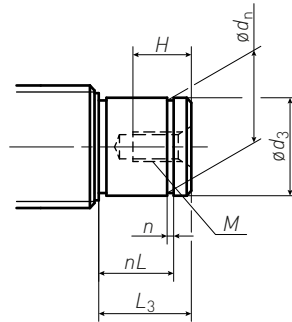
Option 3



Screw shaft	Key way				
d	$K N9$	$P^{+0.1}_0$	Y	F	$d_3 g6$
12	–	–	–	–	–
15	4	3	2.5	10	12
20	5	3	3	15	15
25	6	4	3.5	20	20
32	8	4	4	25	25
40	8	5	4	30	30
50	10	5	5	35	35

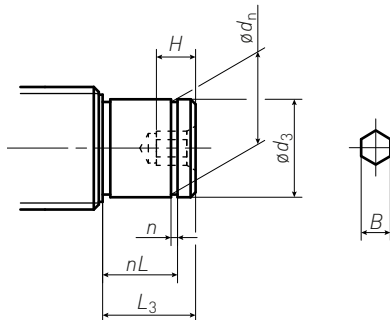
RECOMMENDED SCREW SHAFT END CONFIGURATION

Option 4



Screw shaft	Bearing journal	Snap ring groove			Tap hole		
d	$d_3 g6$	n	d_n	nL	M	H	L_3
12	6	$0.8^{+0.1}_0$	$5.7^{0}_{-0.06}$	6.8	M3 x 0.5	9	9
15	10	$1.15^{+0.14}_0$	$9.6^{0}_{-0.09}$	9.15	M4 x 0.7	10	12
20	15	$1.15^{+0.14}_0$	$14.3^{0}_{-0.11}$	10.15	M6 x 1	12	13
25	20	$1.35^{+0.14}_0$	$19^{0}_{-0.21}$	15.35	M6 x 1	12	19
32	25	$1.35^{+0.14}_0$	$23.9^{0}_{-0.21}$	16.35	M6 x 1	12	20
40	30	$1.75^{+0.14}_0$	$28.6^{0}_{-0.21}$	17.75	M8 x 1.25	16	22
50	35	$1.75^{+0.14}_0$	$33^{0}_{-0.21}$	18.75	M8 x 1.25	16	25

Option 5



Screw shaft	Bearing journal	Snap ring groove			Hexagon hole		
d	$d_3 g6$	n	d_n	nL	$B^{+0.2}_0$	H	L_3
12	6	$0.8^{+0.1}_0$	$5.7^{0}_{-0.06}$	6.8	–	–	9
15	10	$1.15^{+0.14}_0$	$9.6^{0}_{-0.09}$	9.15	4	6	12
20	15	$1.15^{+0.14}_0$	$14.3^{0}_{-0.11}$	10.15	5	7	13
25	20	$1.35^{+0.14}_0$	$19^{0}_{-0.21}$	15.35	6	8	19
32	25	$1.35^{+0.14}_0$	$23.9^{0}_{-0.21}$	16.35	8	10	20
40	30	$1.75^{+0.14}_0$	$28.6^{0}_{-0.21}$	17.75	10	12	22
50	35	$1.75^{+0.14}_0$	$33^{0}_{-0.21}$	18.75	12	14	25

Screw shaft end configuration service

It is possible to have customised modifications of our ball screws implemented quickly and reliably by our service.

The following services can be provided as an alternative:

- Modification of ball screws based on a desired configuration
- End machining
- Change in preload
- Fitting of wipers and lubrication systems
- Fit holes
- Tap holes
- Coatings
- Special packing
- Production even in the smallest lot sizes of 1–50 units
- Individual and special production

Please request these optional services from NSK separately.



NSK Sales Offices – Europe, Middle East and Africa

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