NOOK NRS™
Planetary Roller Screws

NOOK™

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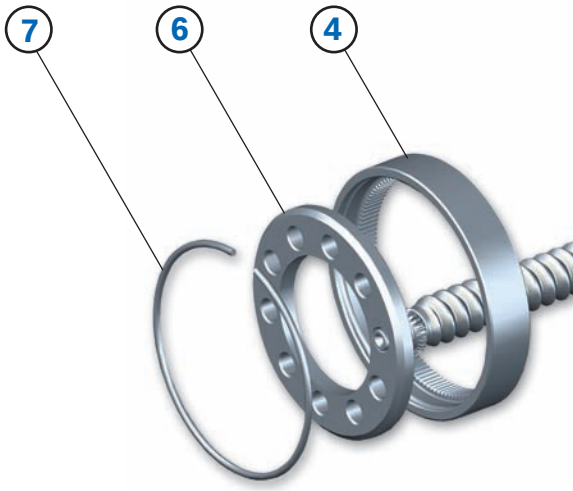
Nook Planetary Roller Screws (NRS), a member of the lead screw family, are remarkable devices designed to convert rotary motion into axial force or vice versa.

The NRS design offers multiple advantages and reliability for the most demanding applications when compared with other lead screw types due to its rolling motion. NRS offer high efficiency even in relatively shallow lead designs. The multitude of contact points can carry large loads and provide very high resolution (small axial movement) when using very shallow leads. NRS produce high rotational speeds with faster acceleration without adverse effects.

NRS planetary roller screws shown in the following pages cover a large spectrum of possibilities and application requirements. Nook engineers are at your disposal to suggest the suitable product for your application requirements.

NRS DESIGN ELEMENTS

NRS planetary roller screws utilize threaded rollers instead of bearing balls as rolling elements. The apparent lead angle of the nut and rollers are identical to prevent axial migration of the rollers. In the exploded screw illustration the basic planetary roller screw is composed of a screw shaft (**1**), nut (**2**) and several planetary rollers (**3**).

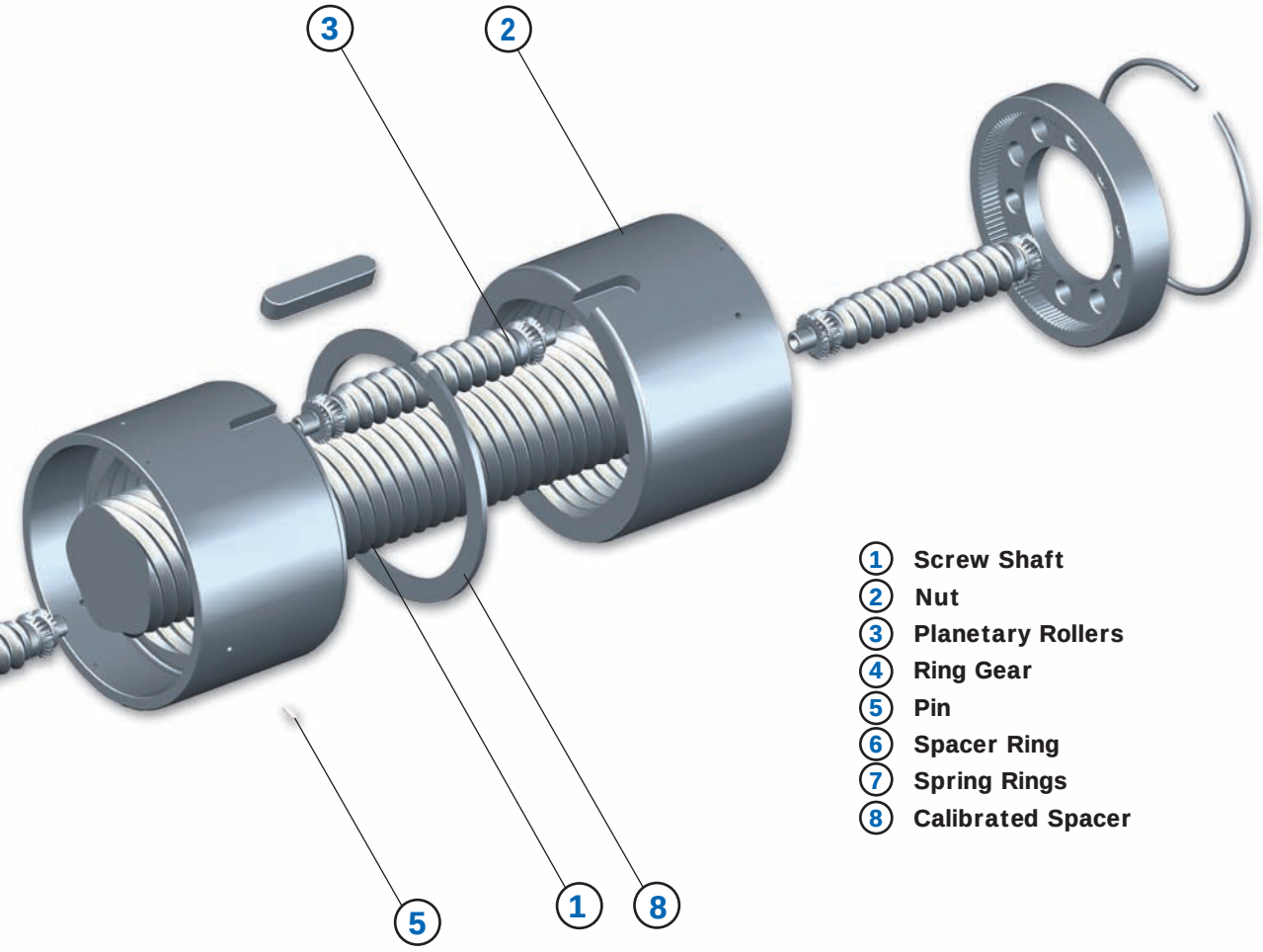


NRS PLANETARY ROLLER SCREWS ARE USED IN:

- AEROSPACE & OUTER SPACE APPLICATIONS
- MACHINE TOOLS
- MEASURING EQUIPMENT
- POSITIONING SYSTEMS
- OPTICAL EQUIPMENT
- PHOTOGRAPHY EQUIPMENT
- ORDNANCE
- HIGH FORCE ACTUATORS
- PLASTIC MACHINERY
- TRANSPORTATION (TRAIN TILT MECHANISMS)

Both screw shaft and nut have a thread profile with straight flanks and both have multi-start threads. The rollers have a single-thread start with the thread profile modified so that the contact is similar to a ball/plane.

The rollers have a gear and a cylindrical journal at each end. The gear at the roller ends meshes with the ring gear (**4**) at each end of the nut. This mesh prevents unwanted roller skewing by maintaining parallel axes of the planetary roller and the screw shaft. Ring gears are timed at assembly and fixed to the nut by pins (**5**). Roller cylindrical journals are inserted into the spacer ring (**6**). The spacer ring is free to rotate and it is retained in the nut by spring rings (**7**). The roller nut can be one-piece (not shown) or split style (as shown). The split nut can be used to reduce the axial lash or to provide a preloaded system. To achieve preload, a calibrated spacer (**8**) is placed between the two nut halves.



1. Screw Shaft
2. Nut
3. Planetary Rollers
4. Ring Gear
5. Pin
6. Spacer Ring
7. Spring Rings
8. Calibrated Spacer

PRELOADED NRS

Split nuts are installed with two halves pushed against each other and the clearance removed for preload. Due to the large number of contacts and great rigidity, a planetary roller screw does not require high preload amounts to perform backlash-free in most application conditions. Split nuts only carry load on a reduced length of thread (half length minus the half-thickness of the calibrated spacer).

NON-PRELOADED NRS

One-piece solid nuts do not have a calibrated spacer to remove backlash. One-piece nuts have larger load ratings since all threads of the nut can carry load.

NRS MATERIALS

NRS planetary roller screws are made of high strength materials. The screw shaft is made of medium carbon induction hardenable alloy steel. The rollers and nut are manufactured from high grade bearing steel. All rolling surfaces are heat treated to a surface hardness not less than 56 HRC with a case depth suitably chosen to carry the load. Other materials, such as stainless steel, can be provided upon request.

CRITERIA FOR SELECTION OF ROLLER SCREWS

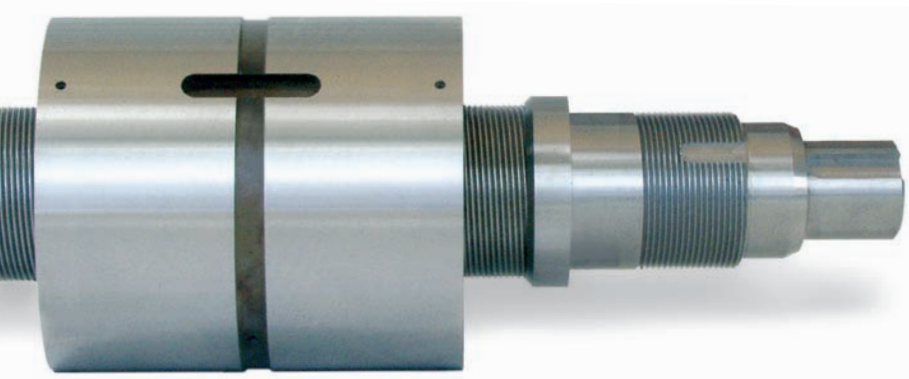
HIGH STATIC LOAD:
Static load ratings as high as 9,500 kN are available

SMALL LEAD APPLICATIONS:
Leads of 1mm are available with a screw diameter of 50mm

HIGH LINEAR SPEEDS:
Linear velocities of 120 m/min or higher are possible with high lead screws

HIGH LINEAR AND ANGULAR ACCELERATION:
Tests have been successfully conducted with angular accelerations of 7,000 radians/s^2

SHOCK LOADS OR ADVERSE ENVIRONMENTAL CONDITIONS:
Roller screws kept operating in tests with poor lubricating conditions and after ingesting ice and sand



CALCULATION AND SELECTION

Basic dynamic load ratings C and L_{10} life

Dynamic load rating is used to calculate the fatigue life of a NRS planetary roller screw. The dynamic load rating is defined as a load, constant in magnitude and direction under which 90% of a statistically significant number of apparently identical planetary roller screws reach an operating life of 10^6 revolutions (L_{10}).

Static load ratings (C_o) and safety factors (S_o)

Static load rating C_o is a load that would cause a permanent deformation at the most heavily loaded contact equal to 0.0001 of the curvature diameter of the rolling element. In order to prevent deformations that could impair the proper function and the operating noise of the planetary roller screw, a safety factor S_o should be used when selecting a roller screw on the basis of its static load rating.

The S_o factor should not be less than 3. For operations with quasi-static load applications (i.e. presses) where the load occurs primarily on the same portion of the stroke, it is recommended to use higher S_o. If size constraints prevent the use of larger screws and the operation of the device is such that the S_o approaches 1, please inquire with our engineering department.

Theoretical life

Theoretical life L_{10} or L_h is the operating time reached by 90% of a group of apparently identical planetary roller screws operating under the same conditions. The theoretical life is calculated as follows:

$$L_{10} = \left(\frac{C}{P}\right)^3$$

If operation reliability higher than 90% is required, than the theoretical life must be corrected by using a reliability factor (a_n) according to the table.

$$L_n = L_{10} \times a_n$$

Reliability (%)	Factor a_n
90	1
95	0.62
96	0.53
97	0.44
98	0.33
99	0.21

Theoretical life, normally expressed in 10^6 revolutions, can be expressed in different operating units, such as hours, as follows

$$L_h = \frac{10^6 \times \left(\frac{C}{P}\right)^3}{(n_{eq} \times 60)}$$

Where:

n_{eq} = screw equivalent rotational speed

Equivalent load

Operating loads can be defined by physical characteristics (i.e. masses, inertia, etc.) that operate on the screw. For systems with varying conditions, such as changes of load magnitude and duration as well as speed, the simple calculation cannot be employed and an equivalent load should be assessed.

The equivalent load is a calculated mean operating load used for determining life and is dependent upon load pattern.

The equivalent load can be computed using the following formula:

$$P = \sqrt[3]{\frac{q_1 x n_1 x F_{ax1}^{\ 3} + q_2 x n_2 x F_{ax2}^{\ 3} + \ldots + q_n x n_n x F_{axn}^{\ 3}}{q_1 x n_1 + q_2 x n_2 + \ldots + q_n x n_n}}$$

The equivalent speed can be computed as follows:

$$n_{eq} = \frac{(q_1 x n_1 + q_2 x n_2 + \ldots + q_n x n_n)}{100}$$

Where:

$F_{ax(1,2,n)}$ = Applied load (N) in the individual time step

$n_{(1,2,n)}$ = screw rotational speed (RPM) in the individual load steps

$q_{(1,2,n)}$ = time step in (%)

Preload

Preloaded nuts are used to eliminate axial lash and to increase system rigidity. Preload is detrimental to the operating life and should be selected carefully. The preload magnitude should be accounted for in the equivalent load calculation so its impact on the system life can be determined.

Preload magnitude should be selected as a function of the operating conditions. In case the varying steps cannot be easily identified, the preload magnitude can be assessed as follows:

$$F_p = \frac{F_{max}}{2.83}$$

F_{max} = maximum axial force (N)

The resulting load (inclusive of preload and operating load) can be calculated as follows:

Loaded nut (or half-nut):

$P = F_p + 0.65 \times F_{ax}$ (for $F_{ax} < 2.83 \times F_p$) (N)

$P = F_{ax}$ (for $F_{ax} \geq 2.83 \times F_p$) (N)

Relieved nut (or half nut):

$P = F_p - 0.35 \times F_{ax}$ (for $F_{ax} < 2.83 \times F_p$)

$P = 0$ (for $F_{ax} \geq 2.83 \times F_p$)

Where:

P = resulting equivalent load (N)

F_p = preload magnitude (N)

F_{ax} = applied load (N)

Rigidity of a roller screw

The rigidity of a roller screw assembly is a function of several parameters, such as: nut rigidity, bearing support rigidity, screw shaft rigidity, mounting housing rigidity as well as the mounting arrangement. If known, all of the parameters can be assembled in a formula as follows:

$$C_{\delta t} = \left(\frac{1}{C_{\delta s}} + \frac{1}{C_{\delta n}} + \frac{1}{C_{\delta b}} + \frac{1}{C_{\delta h}} \right)^{-1}$$

Where:

$C_{\delta t}$ = total system rigidity

$C_{\delta s}$ = screw shaft rigidity

$C_{\delta n}$ = screw nut rigidity

$C_{\delta b}$ = support bearing rigidity

$C_{\delta h}$ = housing rigidity

(N/µm)

The screw rigidity can be calculated as follows:

$$C_{\delta s} = 165 \times d_o^{\,2} \times f_e$$

Where:

$C_{\delta s}$ = rigidity of the screw (N/µm)

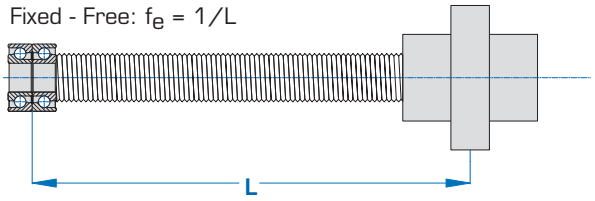
d_o = nominal diameter of the screw (mm)

f_e = factor dependent on end-support configuration (mm^{-1})

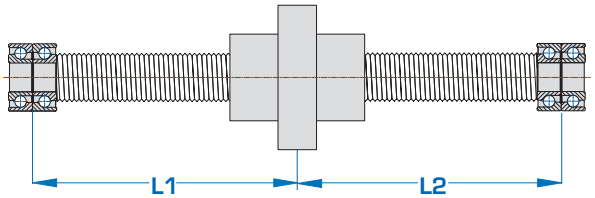
(see illustration below)

RIGIDITY f_e factor

Fixed - Free: $f_e = 1/L$



Fixed - Fixed: $f_e = [1/L1+1/L2]$



The nut rigidity can be calculated as follows:

$$C_{\delta n} = f_n \times \sqrt[3]{F_{ax}}$$

The factor f_n can be supplied upon request.
The customer must determine the rigidity of the bearings and housing.

Column strength

If the screw is subjected to compressive loads, then a verification of its suitability to the loading conditions can be performed as follows:

$$F_{ax\ allowed} = \frac{f_{sc} \times d_o^4 \times 10^4}{L^2}$$

Where:

F_{ax} = compressed load (N)

f_{sc} = factor dependent on end-support configuration (see table below)

d_o = screw nominal diameter (mm)

L = free-length (mm)

Critical speed

The maximum achievable rotational velocity of planetary roller screws is affected by the following parameters:

- Rotational speed capability of the nut (and planetary train)
- Diameter and free length of the screw (for rotating screw shafts)
- End support configuration (for rotating screws)
- Rotation member (nut or screw)

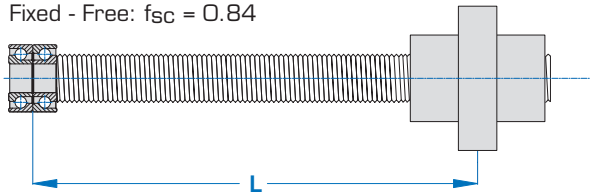
While the rotational capability of the nut can be easily assessed since it depends upon the maximum rotational factor DMn (mean diameter of the planetary train x rotational velocity n), the critical speed of the screw shaft must be calculated for each application. This value is normally considered the threshold at which the screw will start to resonate (1st order). The nut DMn factor equals 140,000.

The critical speed is calculated as follows:

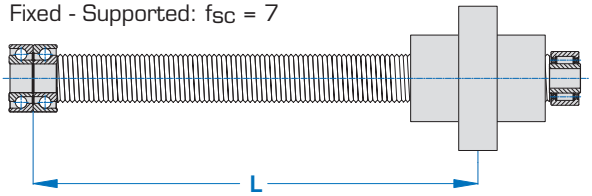
$$n_{max} = \frac{f_{sn} \times d_o \times 10^7}{L^2}\ (RPM)$$

COLUMN STRENGTH f_{sc} factor

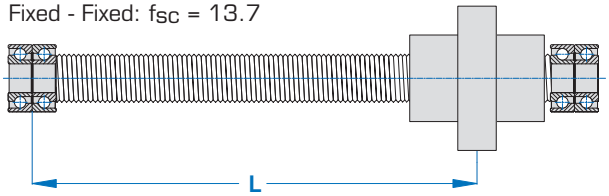
Fixed - Free: f_{sc} = 0.84



Fixed - Supported: f_{sc} = 7

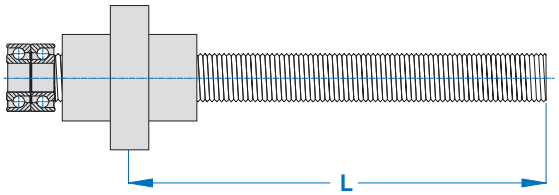


Fixed - Fixed: f_{sc} = 13.7

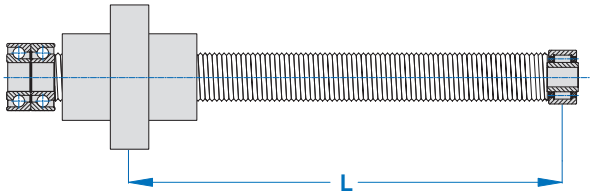


CRITICAL SPEED f_{sn} factor

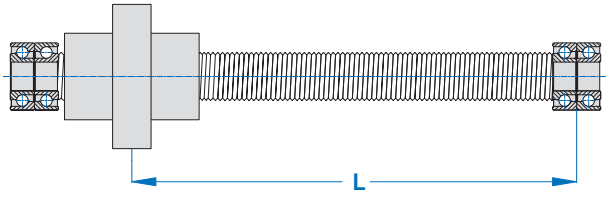
Fixed - Free: f_{sn} = 3.5



Fixed - Supported: f_{sn} = 15.3



Fixed - Fixed: f_{sn} = 22.3



Where:

n_{max} = allowable screw rotational velocity (RPM)

f_{sn} = factor dependent upon the end-support configuration (see table on previous page)

d_o = screw nominal diameter (mm)

L = screw free-length (mm)

Efficiency and driving torque

Efficiency of the NRS planetary roller screw is dependent upon its operating parameters. The friction of the system is dependent upon varying factors that cannot be easily summarized here. To simplify the selection of the screw size, the following formulae can be used.

$$\eta_1 = \frac{1}{1+\left(\frac{f_f \times d_o}{p_{ho}}\right)}$$

for transforming rotary motion in axial motion

$$\eta_2 = 1-\left(\frac{f_f \times d_o}{p_{ho}}\right)$$

for transforming axial motion into rotary motion

Where:

f_f = friction factor (mean value = 0.038)

p_{ho} = screw lead (mm)

Torque required

To move an axial load at constant speed, the screw will require a motor torque and its magnitude can be calculated as follows:

$$M_t = \frac{F_{ax} \times p_{ho} \times 10^{-3}}{2 \times \pi \times \eta_1}$$

M_t = drive torque (N · m)

By contrast, to restrain an axial load, the screw must be equipped with a brake and the restraining torque is calculated as follows:

$$M_b = \frac{F_{ax} \times p_{ho} \times \eta_2 \times 10^{-3}}{2 \times \pi}$$

M_b = brake torque (N · m)

Note: The start-up torque required will be greater than the calculated value M_t above.

LUBRICATION & MAINTENANCE

NRS planetary roller screws, like all rolling element systems, must be lubricated in order to operate properly.

The screws can be lubricated with oil or grease. The application demands will dictate which media is more suited for the task.

Grease lubrication

Nook PAG-1 is available in a 1 lb. can for applications that require grease lubrication (see page 14). High quality greases should be used whenever possible. The grease used must not contain solid additives in any form. Greases suitable for lubricating screws must contain EP additives as well as anti-wear additives.

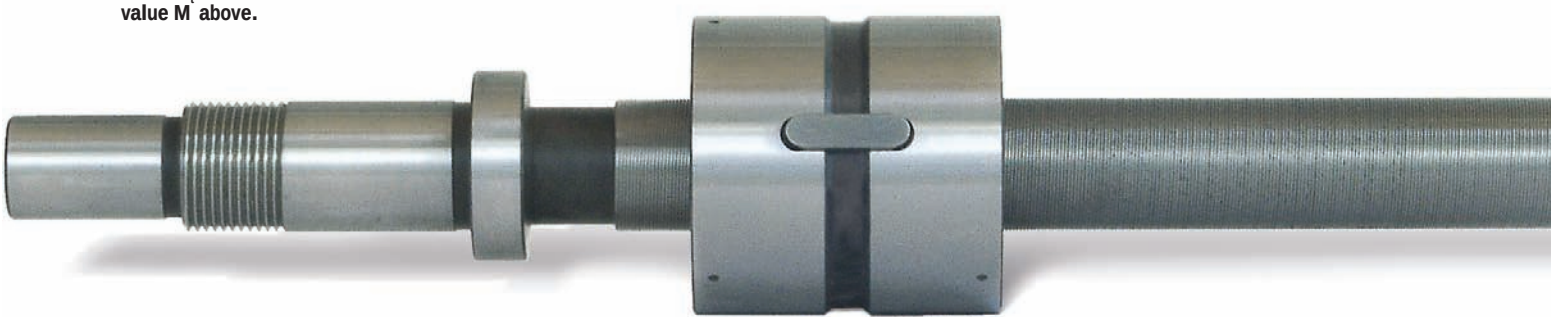
The lubricant characteristics, the amount to be used and its replenishment interval are a function of the application. Factors such as load, stroke length, operating temperature, environment cleanliness, operating speed will impact the lubricant suitability and durability.

Nook engineers will gladly provide guidance on the selection of suitable grease as well as the maintenance interval.

Oil lubrication

Nook E-900L is available in a 32 oz. bottle for applications that require oil lubrication (see page 95). Applications that operate with high loads and continuous motion may operate only with oil lubrication. The basic oil viscosity, the presence of additives and the lubricant flow should be assessed during the design phase.

Nook engineers will gladly provide guidance on the selection of a suitable oil, as well as the proper flow, to insure the system operates as intended.



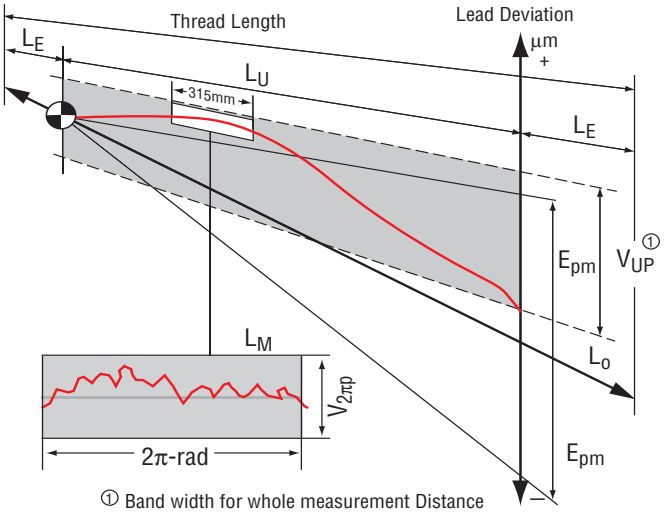
ROLLER SCREW ACCURACY AND INSTALLATION

ACCURACY

NRS planetary roller screws are produced in quality classes according to ISO 1, 3 and 5 standards. The summary of the characteristics and their allowable error are reported below.

Accuracy class	Tolerance*(µm)
G1	±6
G3	±12
G5	±23

*Measured on a thread length of 315mm



① Band width for whole measurement Distance

EFFECTIVE THREAD LENGTH L_u		ACCURACY CLASS					
		G1		G3		G5	
		($V_{2\pi p}$ = 2µm)		($V_{2\pi p}$ = 2µm)		($V_{2\pi p}$ = 2µm)	
from (mm)	to (mm)	e_{pm} (µm)	V_{up} (µm)	e_{pm} (µm)	V_{up} (µm)	e_{pm} (µm)	V_{up} (µm)
0	315	6	6	12	12	23	23
315	400	7	6	13	12	25	25
400	500	8	7	15	13	27	26
500	630	9	7	16	14	30	29
630	800	10	8	18	16	35	31
800	1000	11	9	21	17	40	35
1000	1250	13	10	24	19	46	39
1250	1600	15	11	29	22	54	44
1600	1800	-	-	35	25	65	51

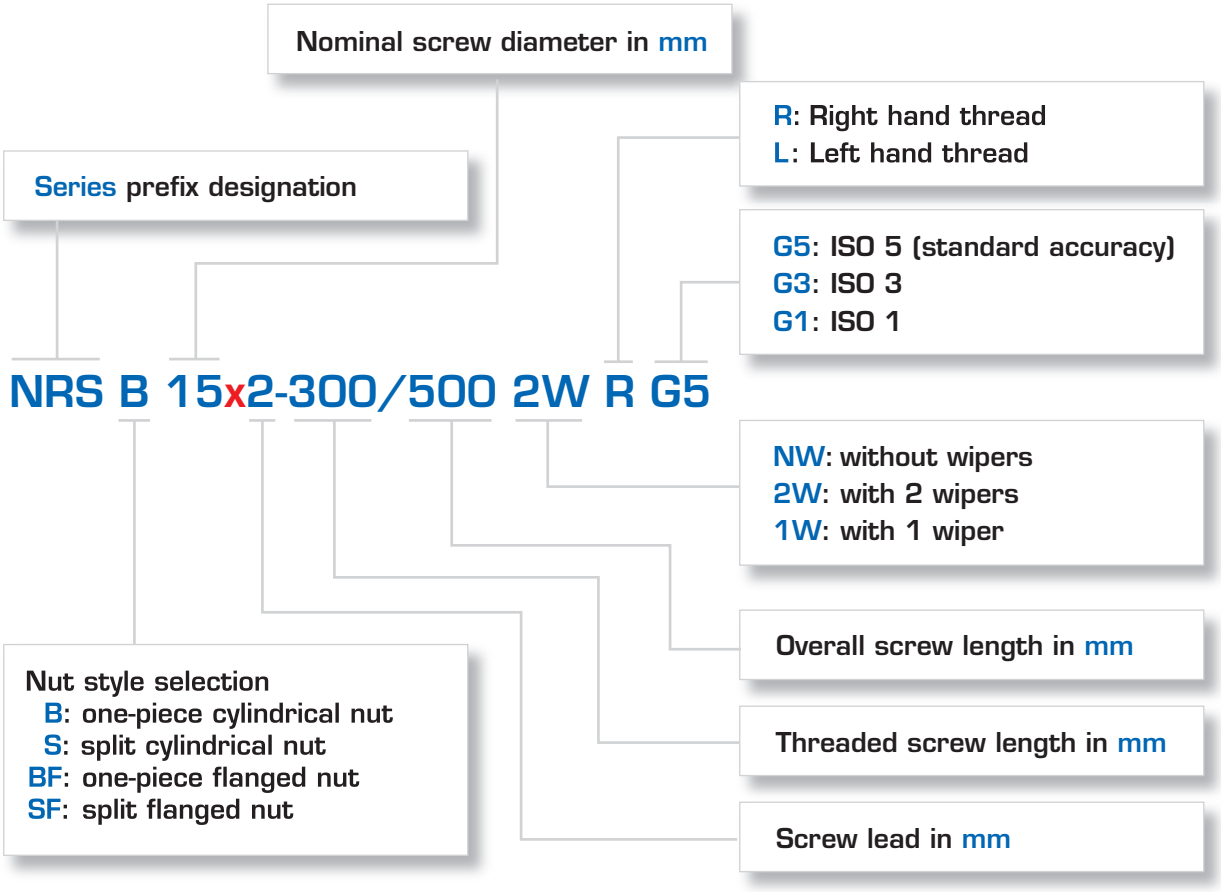
INSTALLATION

NRS planetary roller screws are precision components. They must be handled with care before and during installation to prevent the units from carrying radial loads or moments since either of these will impair the proper functioning and reduce the life of the system.

Nook engineers are at your disposal to address any concerns for the design of the adjacent construction and the bearing arrangement to maximize the usefulness of the NRS planetary roller screws.

HOW TO ORDER

To generate a part number for ordering a NRS planetary roller screw assembly, specify the correct designations from the chart, see examples below. For further assistance contact our engineering department.



Examples:

NRS B 12x5-300/500 2W R G3

12x5 Right Hand Roller Screw, accuracy class of ISO 3, with a One-piece Cylindrical Nut with 2 wipers.
300mm of threaded screw with an overall length of 500mm.

NRS SF 30x25-1200/1600 NW L G1

30x25 Left Hand Roller Screw, accuracy class of ISO 1, with a Split Flanged Nut without wipers.
1200mm of threaded screw with an overall length of 1600mm.

EZRF and MKR:

To order a bearing support unit or a locknut include the part number (pages 192-193) as a line item with quantity specified.

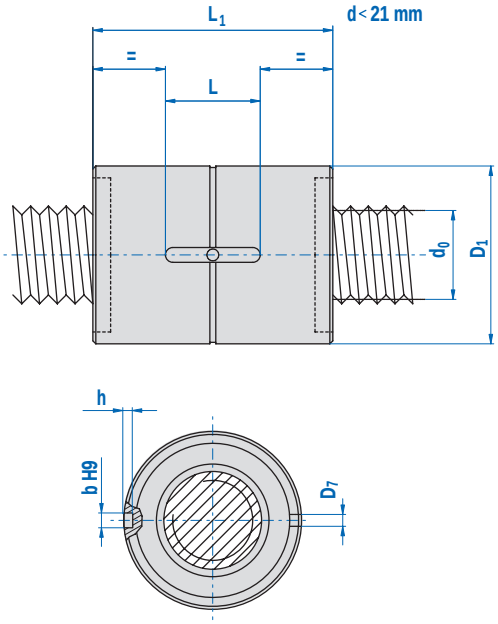
NRS 8x2 to 27x8 ONE-PIECE & SPLIT CYLINDRICAL NUT

new

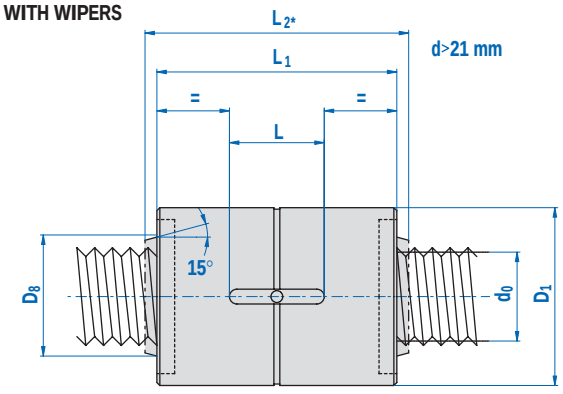
NOOK NRS™ Planetary Roller Screws

Nook Planetary Roller Screws are used in the most demanding and precise linear motion applications. With a greater number of contact points a roller screw provides stiffness and higher load ratings compared to a ball screw.

WITHOUT WIPERS



WITH WIPERS



Nominal Screw Dia. d_0	Dia. x Lead	Lead Ph_0	D_1 g_6	D_7	D_8
8	NRS 8x2	2	21	3	-
	NRS 8x4	4	21	3	-
12	NRS 12x2	2	26	3	-
	NRS 12x4	4	26	3	-
	NRS 12x5	5	26	3	-
15	NRS 15x2	2	34	3	-
	NRS 15x4	4	34	3	-
	NRS 15x5	5	34	3	-
20	NRS 20x2	2	42	3	-
	NRS 20x4	4	42	3	-
	NRS 20x5	5	42	3	-
	NRS 20x6	6	42	3	-
21	NRS 21x5	5	45	5	26
	NRS 21x8	8	45	5	26
	NRS 21x10	10	45	5	26
23	NRS 23x2	2	45	4	30
	NRS 23x4	4	45	5	30
	NRS 23x8	8	45	5	30
25	NRS 25x5	5	53	5	32
	NRS 25x10	10	53	5	32
27	NRS 27x2	2	53	4	35
	NRS 27x4	4	53	5	35
	NRS 27x8	8	53	5	35

*Note: Dimensions with wipers available by request.
kN x 224.82 = lbs

**Note: All dimensions are in mm unless otherwise indicated.

NRS NUT STYLES

Keyway			B: one-piece cylindrical nut			S: split cylindrical nut			
			Dynamic Load Ratings	Static Load Ratings	backlash	Dynamic Load Ratings	Static Load Ratings		
L x b x h	L_1	L_{2*}	C_a	C_{oa}		C_a	C_{oa}	Locknut	EZZE-Mount
	h_{12}	h_{12}	kN	kN	mm	kN	kN		
10 x 3 x 3	31	41	6.98	17.91	0.02	4.19	8.90	–	–
10 x 3 x 3	31	41	5.43	18.63	0.02	3.26	9.31	–	
10 x 3 x 3	31	41	10.24	26.72	0.02	6.14	13.36	–	–
10 x 3 x 3	31	41	8.92	27.74	0.02	5.35	13.87	–	–
10 x 3 x 3	31	41	8.31	31.00	0.02	4.88	15.50	–	–
14 x 4 x 4	35	51	13.47	31.74	0.02	8.08	15.87	MKR 12x1	EZRF-3012
14 x 4 x 4	35	51	11.94	33.00	0.02	7.16	16.50	MKR 12x1	EZRF-3012
14 x 4 x 4	35	51	11.20	36.90	0.02	6.72	18.45	MKR 12x1	EZRF-3012
20 x 4 x 4	55	65	33.00	66.00	0.02	19.80	33.00	MKR 15x1	EZRF-3015
20 x 4 x 4	55	65	29.54	68.63	0.02	17.72	34.31	MKR 15x1	EZRF-3015
20 x 4 x 4	55	65	27.80	76.73	0.02	16.68	38.37	MKR 15x1	EZRF-3015
20 x 4 x 4	55	65	26.42	79.14	0.02	15.91	39.13	MKR 15x1	EZRF-3015
20 x 5 x 5	64	72	40.70	68.70	0.02	24.40	34.20	MKR 17x1	EZRF-3017
20 x 5 x 5	64	72	44.20	69.00	0.02	26.50	34.50	MKR 17x1	EZRF-3017
20 x 5 x 5	64	72	47.90	69.50	0.02	28.70	35.00	MKR 17x1	EZRF-3017
20 x 5 x 5	55	65	40.89	66.80	0.02	24.63	33.40	MKR 17x1	EZRF-3017
20 x 5 x 5	55	65	40.12	64.38	0.02	24.17	32.19	MKR 17x1	EZRF-3017
20 x 5 x 5	55	65	38.41	69.02	0.04	23.14	34.51	MKR 17x1	EZRF-3017
25 x 6 x 6	78	90	52.70	92.00	0.02	31.60	46.00	MKR 20x1	EZRF-3020
25 x 6 x 6	78	90	60.50	89.50	0.04	36.30	44.70	MKR 20x1	EZRF-3020
20 x 5 x 5	55	69	44.32	77.66	0.02	26.70	38.83	MKR 25x1.5	EZRF-3025
20 x 5 x 5	55	69	40.34	80.76	0.02	24.30	40.38	MKR 25x1.5	EZRF-3025
20 x 5 x 5	55	69	42.10	99.26	0.04	25.36	49.63	MKR 25x1.5	EZRF-3025

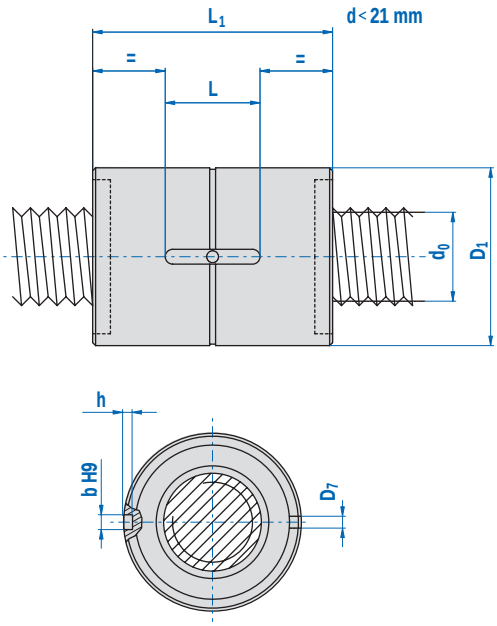
NRS 30x2 to 75x30 ONE-PIECE & SPLIT CYLINDRICAL NUT

new

NOOK NRS™ Planetary Roller Screws

Nook Planetary Roller Screws are used in the most demanding and precise linear motion applications. With a greater number of contact points a roller screw provides stiffness and higher load ratings compared to a ball screw.

WITHOUT WIPERS



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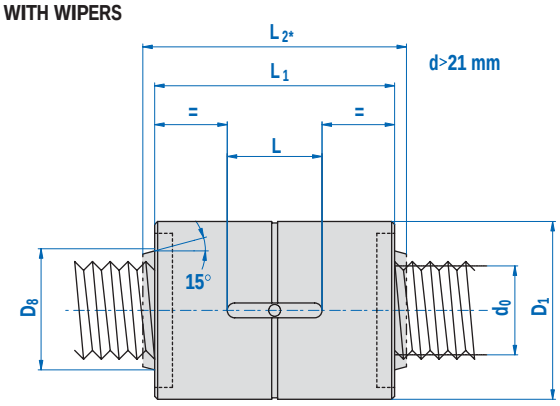


Nominal Screw Dia. d_0	Dia. x Lead	Lead Ph_0	D_1 g_6	D_7	D_8
30	NRS 30x2	2	64	5	38
	NRS 30x5	5	64	5	38
	NRS 30x10	10	64	5	38
	NRS 30x15	15	64	5	38
	NRS 30x20	20	64	5	38
	NRS 30x25	25	64	5	38
39	NRS 39x5	5	80	7	50
	NRS 39x10	10	80	7	50
	NRS 39x15	15	80	7	50
	NRS 39x20	20	80	7	50
44	NRS 44x12	12	80	7	56
	NRS 44x18	18	80	7	56
	NRS 44x24	24	80	7	56
	NRS 44x30	30	80	7	56
48	NRS 48x05	5	100	7	60
	NRS 48x10	10	100	7	60
	NRS 48x20	20	100	7	60
60	NRS 60x10	10	130	8.0	77
	NRS 60x15	15	130	8.0	77
	NRS 60x20	20	130	8.0	77
64	NRS 64x30	30	115	7	75
	NRS 64x36	36	115	7	75
	NRS 64x42	42	115	7	75
75	NRS 75x10	10	150	10.5	87
	NRS 75x20	20	150	10.5	87
	NRS 75x30	30	150	10.5	87

*Note: Dimensions with wipers available by request.
kN x 224.82 = lbs

**Note: All dimensions are in mm unless otherwise indicated.

NRS NUT STYLES

Keyway			B: one-piece cylindrical nut			S: split cylindrical nut			
			Dynamic Load Ratings	Static Load Ratings	backlash	Dynamic Load Ratings	Static Load Ratings	Locknut	EZZE-Mount
L x b x h	L_1	L_{2*}	C_a	C_{oa}		C_a	C_{oa}		
	h_{12}	h_{12}	kN	kN	mm	kN	kN		
32 x 6 x 6	85	99	58.70	133.00	0.02	35.20	66.50	MKR 25x1.5	EZRF-3025
32 x 6 x 6	85	99	76.70	151.50	0.02	46.00	75.70	MKR 25x1.5	EZRF-3025
32 x 6 x 6	85	99	88.60	148.20	0.04	53.20	74.10	MKR 25x1.5	EZRF-3025
32 x 6 x 6	85	99	96.40	150.30	0.07	57.80	75.10	MKR 25x1.5	EZRF-3025
32 x 6 x 6	85	99	99.80	146.40	0.07	59.80	73.20	MKR 25x1.5	EZRF-3025
32 x 6 x 6	85	99	102.40	143.20	0.07	61.40	71.60	MKR 25x1.5	EZRF-3025
40 x 8 x 7	100	116	107.70	228.50	0.02	64.60	114.30	MKR 35x1.5	EZRF-3035
40 x 8 x 7	100	116	127.30	230.30	0.04	76.30	115.10	MKR 35x1.5	EZRF-3035
40 x 8 x 7	100	116	138.30	228.10	0.04	82.80	114.00	MKR 35x1.5	EZRF-3035
40 x 8 x 7	100	116	144.70	218.60	0.04	86.70	109.20	MKR 35x1.5	EZRF-3035
32 x 6 x 6	90	106	115.90	217.20	0.04	69.50	108.60	MKR 40x1.5	EZRF-3040
32 x 6 x 6	90	106	127.40	218.60	0.07	76.40	109.30	MKR 40x1.5	EZRF-3040
32 x 6 x 6	90	106	136.50	221.40	0.07	81.90	110.70	MKR 40x1.5	EZRF-3040
32 x 6 x 6	90	106	133.80	206.30	0.07	80.20	103.10	MKR 40x1.5	EZRF-3040
45 x 8 x 7	127	145	165.10	409.30	0.02	99.00	204.60	MKR 45x1.5	EZRF-3045
45 x 8 x 7	127	145	193.00	403.80	0.04	115.80	201.90	MKR 45x1.5	EZRF-3045
45 x 8 x 7	127	145	215.10	381.90	0.07	129.00	190.90	MKR 45x1.5	EZRF-3045
45 x 10 x 8	162	180	282.30	662.60	0.04	169.40	331.30	MKR 55x1.5	EZRF-3055
45 x 10 x 8	162	180	307.00	656.30	0.07	184.20	328.20	MKR 55x1.5	EZRF-3055
45 x 10 x 8	162	180	325.00	653.00	0.07	195.00	326.50	MKR 55x1.5	EZRF-3055
45 x 8 x 7	129	151	260.90	515.00	0.07	156.50	257.50	MKR 60x1.5	EZRF-3060
45 x 8 x 7	129	151	260.00	493.10	0.07	156.00	246.50	MKR 60x1.5	EZRF-3060
45 x 8 x 7	129	151	258.20	471.40	0.07	154.90	235.70	MKR 60x1.5	EZRF-3060
63 x 10 x 8	191	211	411.10	1235.00	0.04	246.00	617.50	MKR 70x1.5	EZRF-3070
63 x 10 x 8	191	211	483.40	1243.00	0.07	290.00	621.50	MKR 70x1.5	EZRF-3070
63 x 10 x 8	191	211	461.40	1137.30	0.07	276.80	568.60	MKR 70x1.5	EZRF-3070

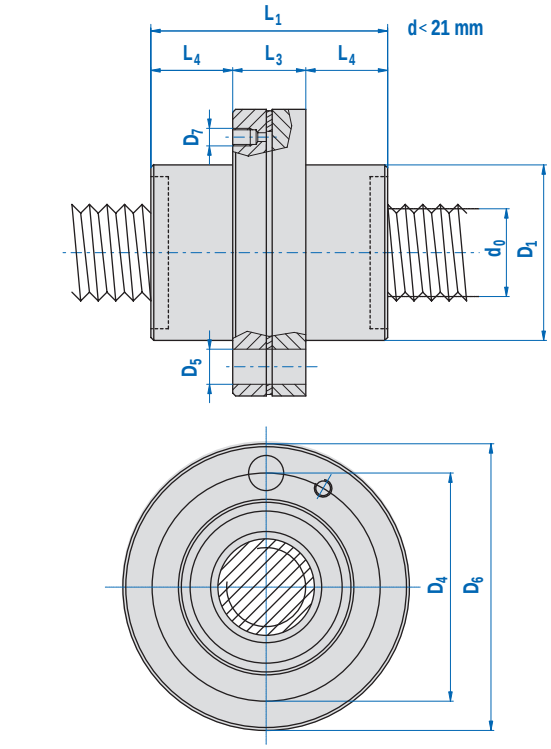
NRS 8x2 to 27x8 ONE-PIECE & SPLIT FLANGED NUT

new

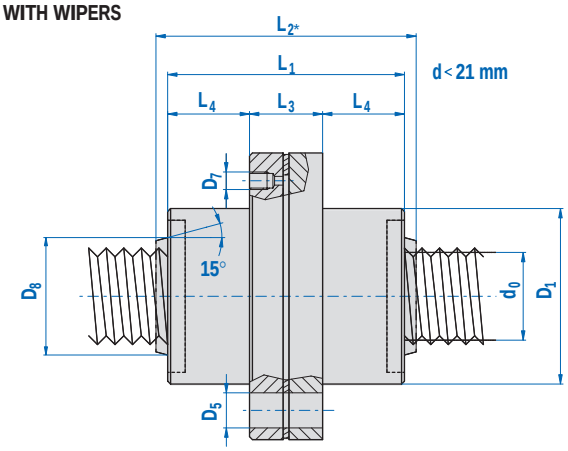
NOOK NRS™ Planetary Roller Screws

Nook Planetary Roller Screws are used in the most demanding and precise linear motion applications. With a greater number of contact points a roller screw provides stiffness and higher load ratings compared to a ball screw.

WITHOUT WIPERS



WITH WIPERS



Nominal Screw Dia. d_0	Dia. x Lead	Lead Ph_0	D_1 g_6	D_4	n x D_5
8	NRS 8x2	2	21	31	6 x 4.5
	NRS 8x4	4	21	31	6 x 4.5
12	NRS 12x2	2	26	36	6 x 4.5
	NRS 12x4	4	26	36	6 x 4.5
	NRS 12x5	5	26	36	6 x 4.5
15	NRS 15x2	2	34	45	6 x 5
	NRS 15x4	4	34	45	6 x 5
	NRS 15x5	5	34	45	6 x 5
20	NRS 20x2	2	42	53	6 x 6
	NRS 20x4	4	42	53	6 x 6
	NRS 20x5	5	42	53	6 x 6
	NRS 20x6	6	42	53	6 x 6
21	NRS 21x5	5	45	56	6 x 6
	NRS 21x8	8	45	56	6 x 6
	NRS 21x10	10	45	56	6 x 6
23	NRS 23x2	2	45	56	6 x 7
	NRS 23x4	4	45	56	6 x 7
	NRS 23x8	8	45	56	6 x 7
25	NRS 25x5	5	53	70	6 x 7
	NRS 25x10	10	53	70	6 x 7
27	NRS 27x2	2	53	68	6 x 7
	NRS 27x4	4	53	68	6 x 7
	NRS 27x8	8	53	68	6 x 7

*Note: Dimensions with wipers available by request.
kN x 224.82 = lbs

**Note: All dimensions are in mm unless otherwise indicated.

NRS NUT STYLES

							BF: one-piece flanged nut			SF: split flanged nut			
D_6	D_7	D_8	L_1 h_{12}	L_{2*} h_{12}	L_3	L_4	Dynamic Load Ratings C_a kN	Static Load Ratings C_{oa} kN	backlash mm	Dynamic Load Ratings C_a kN	Static Load Ratings C_{oa} kN	Locknut	EZZE-Mount
41	M4	-	41	41	13	14	6.98	17.91	0.02	4.19	8.90	–	–
41	M4	-	41	41	13	14	5.43	18.63	0.02	3.26	9.31	–	–
46	M4	-	41	41	13	14	10.24	26.72	0.02	6.14	13.36	–	–
46	M4	-	41	41	13	14	8.92	27.74	0.02	5.35	13.87	–	–
46	M4	-	41	41	13	14	8.31	31.00	0.02	4.88	15.50	–	–
56	M5	-	51	51	18	16.5	13.47	31.74	0.02	8.80	15.87	MKR 12x1	EZRF-3012
56	M5	-	51	51	18	16.5	11.94	33.00	0.02	7.16	16.50	MKR 12x1	EZRF-3012
56	M5	-	51	51	18	16.5	11.20	36.90	0.02	6.72	18.45	MKR 12x1	EZRF-3012
64	M6	-	65	65	20	22.5	33.00	66.00	0.02	19.80	33.00	MKR 15x1	EZRF-3015
64	M6	-	65	65	20	22.5	29.54	68.63	0.02	17.72	34.31	MKR 15x1	EZRF-3015
64	M6	-	65	65	20	22.5	27.80	76.73	0.02	16.68	38.37	MKR 15x1	EZRF-3015
64	M6	-	65	65	20	22.5	26.42	79.14	0.02	15.91	39.13	MKR 15x1	EZRF-3015
68	M6	26	64	72	18	23	40.70	68.70	0.02	24.40	34.20	MKR 17x1	EZRF-3017
68	M6	26	64	72	18	23	44.20	69.00	0.02	26.50	34.50	MKR 17x1	EZRF-3017
68	M6	26	64	72	18	23	47.90	69.50	0.02	28.70	35.00	MKR 17x1	EZRF-3017
67	M6	30	65	65	20	22.5	24.63	33.40	0.02	24.63	33.40	MKR 17x1	EZRF-3017
67	M6	30	65	65	20	22.5	24.17	32.19	0.02	24.17	32.19	MKR 17x1	EZRF-3017
67	M6	30	65	65	20	22.5	23.14	34.51	0.04	23.14	34.51	MKR 17x1	EZRF-3017
84	M6	32	78	90	20	29	52.70	92.00	0.02	31.60	46.00	MKR 20x1	EZRF-3020
84	M6	32	78	90	20	29	60.50	89.50	0.04	36.30	44.70	MKR 20x1	EZRF-3020
83	M6	35	69	69	22	23.5	44.32	77.66	0.02	26.70	38.83	MKR 25x1.5	EZRF-3025
83	M6	35	69	69	22	23.5	40.34	80.76	0.02	24.30	40.38	MKR 25x1.5	EZRF-3025
83	M6	35	69	69	22	23.5	42.10	99.26	0.04	25.36	49.63	MKR 25x1.5	EZRF-3025

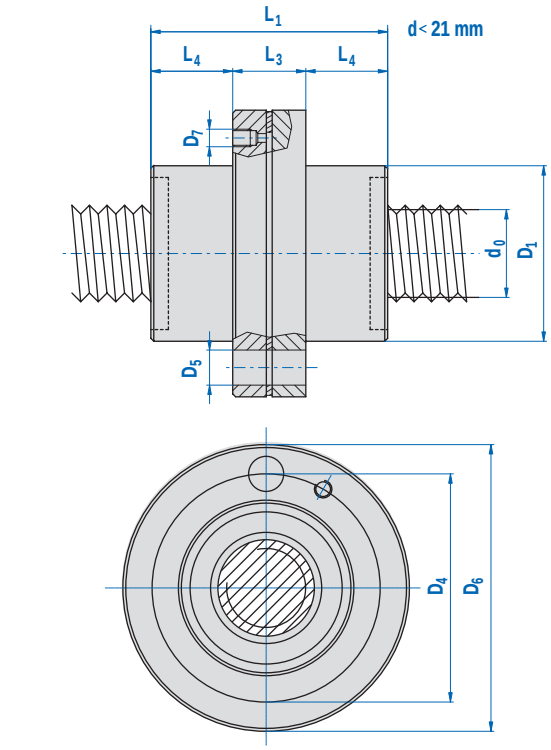
NRS 30x2 to 75x30 ONE-PIECE & SPLIT FLANGED NUT

new

NOOK NRS™ Planetary Roller Screws

Nook Planetary Roller Screws are used in the most demanding and precise linear motion applications. With a greater number of contact points a roller screw provides stiffness and higher load ratings compared to a ball screw.

WITHOUT WIPERS



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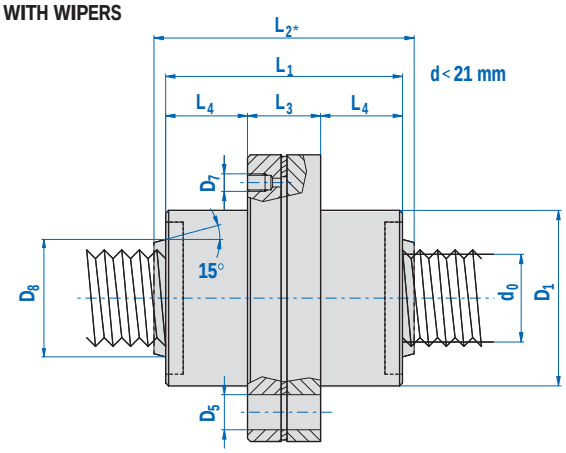


Nominal Screw Dia. d_0	Dia. x Lead	Lead Ph_0	D_1 g_6	D_4	n x D_5
30	NRS 30x2	2	64	81	6 x 9
	NRS 30x5	5	64	81	6 x 9
	NRS 30x10	10	64	81	6 x 9
	NRS 30x15	15	64	81	6 x 9
	NRS 30x20	20	64	81	6 x 9
	NRS 30x25	25	64	81	6 x 9
39	NRS 39x5	5	80	102	6 x 11
	NRS 39x10	10	80	102	6 x 11
	NRS 39x15	15	80	102	6 x 11
	NRS 39x20	20	80	102	6 x 11
44	NRS 44x12	12	80	102	6 x 11
	NRS 44x18	18	80	102	6 x 11
	NRS 44x24	24	80	102	6 x 11
	NRS 44x30	30	80	102	6 x 11
48	NRS 48x5	5	100	127	6 x 13.5
	NRS 48x10	10	100	127	6 x 13.5
	NRS 48x20	20	100	127	6 x 13.5
60	NRS 60x10	10	130	160	6 x 16.75
	NRS 60x15	15	130	160	6 x 16.75
	NRS 60x20	20	130	160	6 x 16.75
64	NRS 64x30	30	115	150	6 x 17.5
	NRS 64x36	36	115	150	6 x 17.5
	NRS 64x42	42	115	150	6 x 17.5
75	NRS 75x10	10	150	180	8 x 17.5
	NRS 75x20	20	150	180	8 x 17.5
	NRS 75x30	30	150	180	8 x 17.5

*Note: Dimensions with wipers available by request.
kN x 224.82 = lbs

**Note: All dimensions are in mm unless otherwise indicated.

NOOK NRS™ Planetary Roller Screws

new

NRS 30x2 to 75x30 ONE-PIECE & SPLIT FLANGED NUT

ROLLER SCREW ASSEMBLIES

PLANETARY ROLLER SCREW AND NUT TECHNICAL DATA

NRS NUT STYLES

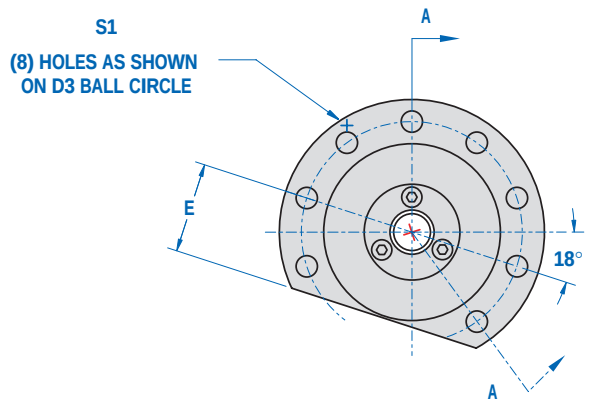
							BF: one-piece flanged nut			SF: split flanged nut			
D_6	D_7	D_8	L_1 h_{12}	L_{2*} h_{12}	L_3	L_4	Dynamic Load Ratings C_a kN	Static Load Ratings C_{oa} kN	backlash mm	Dynamic Load Ratings C_a kN	Static Load Ratings C_{oa} kN	Locknut	EZZE-Mount
98	M6	38	85	99	27	29	58.70	133.00	0.02	35.20	66.50	MKR 25x1.5	EZRF-3025
98	M6	38	85	99	27	29	76.70	151.50	0.02	46.00	75.70	MKR 25x1.5	EZRF-3025
98	M6	38	85	99	27	29	88.60	148.20	0.04	53.20	74.10	MKR 25x1.5	EZRF-3025
98	M6	38	85	99	27	29	96.40	150.30	0.07	57.80	75.10	MKR 25x1.5	EZRF-3025
98	M6	38	85	99	27	29	99.80	146.40	0.07	59.80	73.20	MKR 25x1.5	EZRF-3025
98	M6	38	85	99	27	29	102.40	143.20	0.07	61.40	71.60	MKR 25x1.5	EZRF-3025
124	M6	50	100	116	33	33.5	107.70	228.50	0.02	64.60	114.30	MKR 35x1.5	EZRF-3035
124	M6	50	100	116	33	33.5	127.30	230.30	0.04	76.30	115.10	MKR 35x1.5	EZRF-3035
124	M6	50	100	116	33	33.5	138.30	228.10	0.04	82.80	114.00	MKR 35x1.5	EZRF-3035
124	M6	50	100	116	33	33.5	144.70	218.60	0.04	86.70	109.20	MKR 35x1.5	EZRF-3035
124	M8 x 1	56	90	106	33	28.5	115.90	217.20	0.04	69.50	108.60	MKR 40x1.5	EZRF-3040
124	M8 x 1	56	90	106	33	28.5	127.40	218.60	0.07	76.40	109.30	MKR 40x1.5	EZRF-3040
124	M8 x 1	56	90	106	33	33.5	136.50	221.40	0.07	81.90	110.70	MKR 40x1.5	EZRF-3040
124	M8 x 1	56	90	106	33	33.5	133.80	206.30	0.07	80.20	103.10	MKR 40x1.5	EZRF-3040
150	M8 x 1	60	127	145	37	45	165.10	409.30	0.02	99.00	204.60	MKR 45x1.5	EZRF-3045
150	M8 x 1	60	127	145	37	45	193.00	403.80	0.04	115.80	201.90	MKR 45x1.5	EZRF-3045
150	M8 x 1	60	127	145	37	45	215.10	381.90	0.07	129.00	109.90	MKR 45x1.5	EZRF-3045
190	M8 x 1	79	162	180	45	58.5	282.30	662.60	0.04	169.40	331.30	MKR 55x1.5	EZRF-3055
190	M8 x 1	79	162	180	45	58.5	307.00	656.30	0.07	184.20	328.20	MKR 55x1.5	EZRF-3055
190	M8 x 1	79	162	180	45	58.5	325.00	653.00	0.07	195.00	326.50	MKR 55x1.5	EZRF-3055
180	M8 x 1	75	129	151	45	42	260.90	515.00	0.07	156.50	257.50	MKR 60x1.5	EZRF-3060
180	M8 x 1	75	129	151	45	42	260.00	493.10	0.07	156.00	246.50	MKR 60x1.5	EZRF-3060
180	M8 x 1	75	129	151	45	42	258.20	471.40	0.07	154.90	235.70	MKR 60x1.5	EZRF-3060
210	M8 x 1	87	191	211	45	73	411.10	1235.00	0.04	246.00	617.50	MKR 70x1.5	EZRF-3070
210	M8 x 1	87	191	211	45	73	483.40	1243.00	0.07	290.00	621.50	MKR 70x1.5	EZRF-3070
210	M8 x 1	87	191	211	45	73	461.40	1137.30	0.07	276.80	568.60	MKR 70x1.5	EZRF-3070

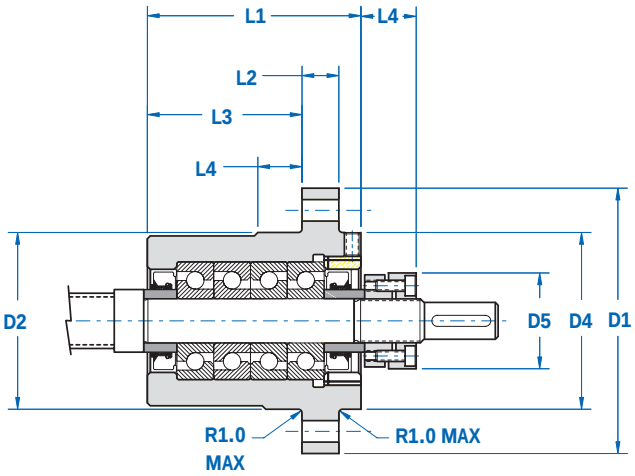
EZRF BEARING SUPPORT UNITS FOR NRS 15x2 to 75x30

new

NOOK NRS™ Planetary Roller Screws

Roller screw high load ratings and extreme performance characteristics place large demands on end support units, Nook Industries has developed support units capable of handling these demands. Nook series EZRF end support units are matched to the roller screw (see dimension table below) and are designed to provide high load carrying capacity, precision, speed, rigidity, low friction, and ease of maintenance and installation. EZRF supports include a MKR locknut.



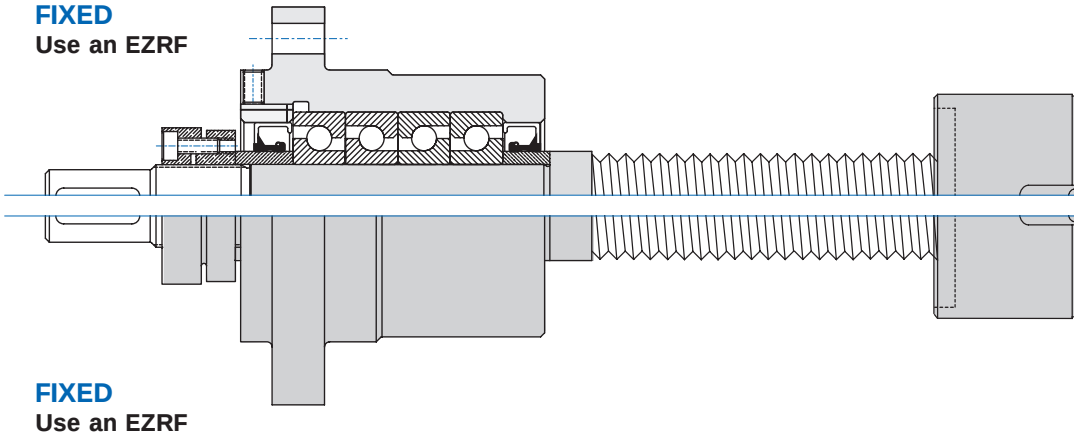


Part No.	Roller Screw	L1	L2	L3	L4	L5	D1	D2 g6	D3	D4	D5	E	S
EZRF-3012	NRS 15	67	10	51	14	15	72	48	60	48	26	25	5.8
EZRF-3015	NRS 20	72	10	55.5	15	17	82	54	68	54	33	28	6.8
EZRF-3017	NRS 21	78	12	59	16	19	92	64	78	64	35	33	6.8
	NRS 23	78	12	59	16	19	92	64	78	64	35	33	6.8
EZRF-3020	NRS 25	82	12	62	17	19	100	64	82	64	40	33	8.8
EZRF-3025	NRS 27	93	15	69.5	19	21	116	80	98	80	45	41	8.8
	NRS 30	93	15	69.5	19	21	116	80	98	80	45	41	8.8
EZRF-3035	NRS 39	110	20	78.5	23	23	140	100	120	100	53	51	10.8
EZRF-3040	NRS 44	120	20	85.5	25	23	160	112	136	112	58	57	12.8
EZRF-3045	NRS 48	130	20	94.5	27	23	174	125	150	125	68	63.5	12.8
EZRF-3055	NRS 60	152	25	111.5	31	26	214	150	182	150	75	76	16.8
EZRF-3060	NRS 64	164	25	122.5	33	27	226	162	194	162	84	82	16.8
EZRF-3070	NRS 75	186	30	137.5	37	29	268	188	228	188	95	95	20.8

*Note: All dimensions are in mm unless otherwise indicated.

END FIXITY

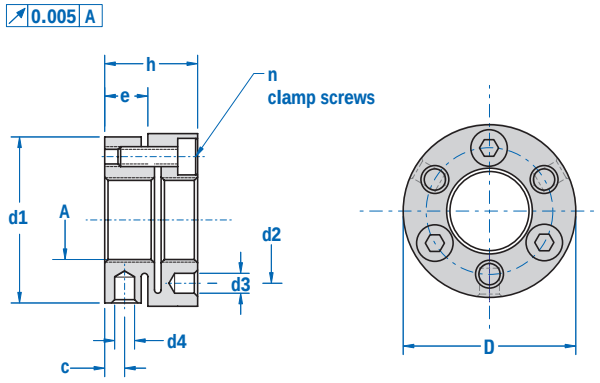
FIXED
Use an EZRF



FIXED
Use an EZRF

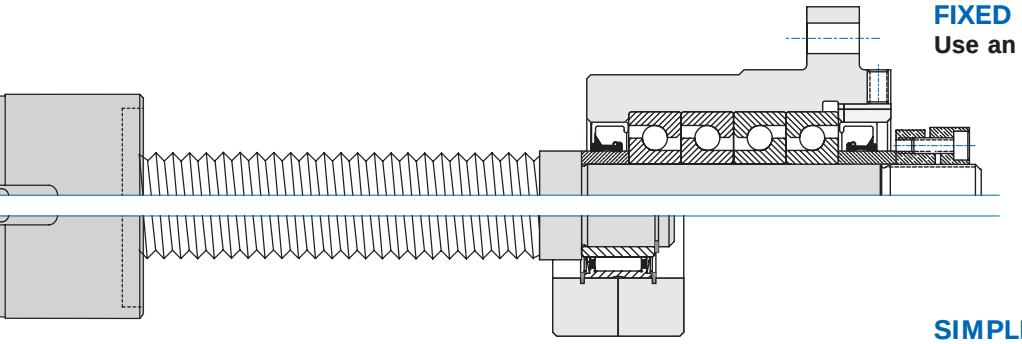
MKR locknuts for NRS 15x2➤75x30

Conventional locknuts may not be suitable in a typical roller screw application due to the high axial load generated. Nook series MKR locknuts are designed to carry high axial forces while minimizing the rotational inertia, an important benefit in high dynamic applications. MKR locknuts are designed to carry high axial load, have high loosening torque and are manufactured with high accuracy to optimize the load on the thread interface.



Part No. Size x Pitch	Roller Screw	Dimensions in mm D	h	e	d1	d2	d3	d4	c	Clamp Screws size	qty n	Tightening Torque N•m	Allowable Axial Load Dyn. kN	Stat. kN
MKR 12x1	NRS 15	26	14	6.5	25	19	3.2	3	3	M3 x 10	3	2	14	19
MKR 15x1	NRS 20	33	16	7	31	23.5	4.3	4	3	M4 x 10	3	2.9	19	25
MKR 17x1	NRS 21	35	18	-	-	25.5	4.3	4	5	M4 x 12	4	2.9	19	25
	NRS 23	35	18	-	-	25.5	4.3	4	5	M4 x 12	4	2.9	19	25
MKR 20x1	NRS 25	40	18	-	-	30.5	4.3	4	5	M4 x 12	4	2.9	22	29
MKR 25x1.5	NRS 27	45	20	-	-	36.5	4.3	5	6.5	M4 x 12	4	2.9	33	47
	NRS 30	45	20	-	-	36.5	4.3	5	6.5	M4 x 12	4	2.9	33	47
MKR 35x1.5	NRS 39	53	22	-	-	45.5	4.3	5	7	M4 x 16	4	2.9	47	66
MKR 40x1.5	NRS 44	58	22	-	-	50.5	4.3	5	7	M4 x 16	4	2.9	49	66
MKR 45x1.5	NRS 48	68	22	-	-	58	4.3	6	6.5	M4 x 16	6	2.9	53	84
MKR 55x1.5	NRS 60	75	25	-	-	66.5	4.3	6	9	M4 x 16	6	2.9	72	96
MKR 60x1.5	NRS 64	84	26	-	-	74.5	5.3	6	9	M5 x 16	6	6	123	163
MKR 70x1.5	NRS 75	95	28	-	-	85	5.3	8	9.5	M5 x 20	6	6	153	203

*Note: All dimensions are in mm unless otherwise indicated.



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