



NTN-SNR LINEAR MOTION:  
**BALL SCREWS**



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With You

# NTN-SNR THE STRENGTH OF A GROUP

We are one of the largest bearing manufacturers in the world in conjunction with the Japanese company NTN.

NTN-SNR has been established in the linear technology market since 1985 and strives to offer a complete and competitive product range. This position allows us to provide our customers with a high level of added value regarding service, quality and product variety. Our sales support and applications engineers are always on hand to offer you optimal support.

Our sales and application engineers are always available. The consulting and planning service is based on many years of interdisciplinary experience.

That means less design effort and costs on the side of the users.



Our sales and applications engineers will gladly help you with their expertise. We are looking forward to your enquiries. Our goal is to achieve joint, constructive solutions.

Product quality, economic efficiency and high user benefits are the basis of a strategic partnership between

**NTN-SNR** and **you – our customer.**

## Advantages:

- Complete range of linear products
- Production facilities in Europe and Asia
- Optimal support from our technical sales and our application engineers near you - worldwide
- State of the art technology (patented solutions)
- State of the art production methods to ensure highest product quality
- Well organized logistic network to ensure on time delivery
- Customized solutions as "genetic code" in our daily business
- Discovering the most economical solutions together with our valued customers

**NTN-SNR leads you towards reliability and performance.**



**124**

Sales agencies

**76**

Production facilities

**14**

R & D centers

## 4. Maintenance and lubrication

### 4.1 General information



#### Attention!

All maintenance and service work on the Ball Screws must be carried out when it is switched off and secured.

### 4.2 Lubrication

An adequate lubrication is essential for the reliable function of ball screws.

The lubrication should ensure a lubricating film (oil film) between the rolling elements and the raceways of the guiding and drive elements to prevent wear and premature fatigue of the components.

In addition, the metallic surfaces are protected from corrosion. Furthermore, the lubricating film enables the seals to slide smoothly over the surfaces and reduces their wear.

Insufficient lubrication not only increases wear, it also significantly shortens the service life.

An optimal selection of the lubricant has a decisive influence on the function and service life of the Ball Screw. So that the function is not impaired and is maintained over a long period of time, lubrication must be defined according to the environmental conditions and the specific requirements.

Such environmental conditions and influencing factors can e.g. be:

- High or low temperature
- Effects of condensation and water splash
- Radiation exposure
- Strong vibrations
- Use in vacuum and / or clean rooms
- Application of special media (e.g. vapors, acids, etc.)
- High acceleration and velocity
- Permanent short stroke movement ( $< 2 \times$  nut length)
- Effect of dirt or dust

The recommendations in the following chapters enable the selection of the suitable lubricant, the required amount of lubricant and the definition of the lubrication interval.

These recommendations do not release the user from checking the specified lubrication intervals under the specific operating conditions in the application and adjusting them if necessary.

### 4.3 Lubricants

Different lubricants are suitable for lubrication of Ball Screws. The lubricants must fulfill the following tasks:

- Reduction of friction
- Reduction of the starting torque
- Protection against premature wear
- Protection against corrosion
- Noise reduction

For use under normal conditions, lithium soap greases with the classification KP2-K according to DIN 51825 and NLGI class 2 according to DIN 51818 with EP additives must be used. SNR LUB HEAVY DUTY is used as the standard grease.



#### Attention!

Lubricants with solid additives (e.g. graphite or  $\text{MoS}_2$ ) are not suitable.

Specific requirements under special environmental conditions require the selection of a suitable lubricants. Basically, the compatibility of the lubricants with one another or with the anti-corrosion oil must be checked.

### 4.3.1 Anti-corrosion oils

Anti-corrosion oils serve to protect the Ball Screws against corrosion during storage and transport. They are not suitable for lubrication of the Ball Screws during operation.

During start-up and re-lubrication, the compatibility with the existing lubricant must always be checked.

SNR Ball Screws are supplied with the anti-corrosion oil Contrakor Fluid H1. Contrakor Fluid H1 is compatible with the standard lubricant SNR LUB HEAVY DUTY. Preservation may be omitted by agreement for special applications with special lubricants.

### 4.3.2 Lubrication oils

Oil lubrication is usually applied in central lubrication systems. The advantage of an automated, central oil lubrication is that of operator-independent, continuous lubricant supply to the Ball Screw. Lubrication oils also conduct friction heat very well. This is balanced against a very high design and installation effort for lubrication tubes. Lubrication oil also leaks more often from the Ball Screw and is thus lost to the system.

Tilted or vertical arrangements with the Ball Screw nut lubrication connection on the bottom are critical and should be avoided.

Suitable lubrication oils for use in SNR Ball Screws are summarized in Table 4.1.

Table 4.1 \_\_\_ Lubrication oils for Ball Screws

Description	Oil type	Kinematic viscosity according to DIN51562 at 40°C [mm <sup>2</sup> /s]	Density [mg/cm <sup>3</sup> ]	Properties	Application area
Klüberoil GEM 1-100N	Mineral oil	100	880	<ul style="list-style-type: none"> <li>· Good corrosion protection</li> <li>· Good wear protection</li> </ul>	<ul style="list-style-type: none"> <li>· General engineering</li> </ul>
Klüberoil 4 UH1-68N	Polyalpha-olefin	680	860	<ul style="list-style-type: none"> <li>· Good wearing protection</li> <li>· Good ageing resistance</li> <li>· NSF H1 registered*</li> </ul>	<ul style="list-style-type: none"> <li>· Food industry</li> <li>· Pharmaceutical industry</li> </ul>

\* This lubricant has been registered as an H1 product, i.e. it was developed for occasional, technically unavoidable contact with food. Experience has shown that the lubricant can also be used for appropriate applications in the pharmaceutical and cosmetic industry when the conditions in the product information are adhered to. However, no specific test results that might be required for applications in the pharmaceutical industry, e.g. biocompatibility, are available. The systems manufacturer and operator should therefore, perform appropriate risk analyses before applications in this area. Measures to exclude health risks and injuries have to be taken, where required.

(Source: Klüber Lubrication)

### 4.3.3 Low-viscosity greases

The conditions that apply to the use of lubrication oils also apply to the use of low-viscosity greases. Only the tilted or vertical installation position is not critical here, since low-viscosity greases with their lower viscosity do not flow away so easily.

Suitable low-viscosity greases for use in SNR Ball Screws are summarized in in Table 4.2.

Table 4.2\_\_\_\_ Low-viscosity greases for Ball Screws

Description	Base oil / Type of soap	NLGI class DIN51818	Walkpenetration DIN ISO 2137 at 25°C [0,1mm]	Basic oil viscosity DIN 51562 at 40°C [mm <sup>2</sup> /s]	Density [mg/cm <sup>3</sup> ]	Properties	Application area
Isoflex Topas NCA 5051	Synthetic hydrocarbon oil, special calcium soap	0/00	385...415	30	800	· Low friction	· General engineering
Microlobe GB 0"	Mineral oil	0	355...385	400	900	· Particularly pressure resistant · Good wearing protection properties · Very good water resistance	· General engineering · High loads · Short stroke application · Vibrations
Klübersynth UH1 14-1600	Synthetic hydrocarbon oil, special Aluminum complex soap Polyurea	0/00	370...430	ca. 160	850	· Good corrosion protection · Good wear protection · NSF H1 registered*	· Food industry · Pharmaceutical industry

\* This lubricant has been registered as an H1 product, i.e. it was developed for occasional, technically unavoidable contact with food. Experience has shown that the lubricant can also be used for appropriate applications in the pharmaceutical and cosmetic industry when the conditions in the product information are adhered to. However, no specific test results that might be required for applications in the pharmaceutical industry, e.g. biocompatibility, are available. The systems manufacturer and operator should therefore, perform appropriate risk analyses before applications in this area. Measures to exclude health risks and injuries have to be taken, where required.

(Source: Klüber Lubrication)

### 4.3.4 Lubrication greases

Ball screws with grease lubrication are used in most applications. The use of greases provides better noise reduction, better emergency running properties and requires less constructive effort than lubrication oils and low-viscosity greases. For use under normal conditions, lithium soap greases with the classification KP2-K according to DIN 51825 and NLGI class 2 according to DIN 51818 with EP additives must be used. SNR LUB HEAVY DUTY is used as the standard grease.

Specific requirements under special environmental conditions require the selection of a suitable lubricants. Basically, the compatibility of the lubricants with one another or with the anti-corrosion oil must be checked.

Suitable lubrication greases for use in SNR Ball Screws are summarized in in Table 4.3.

Table 4.3 \_\_\_ Lubrication greases for Ball Screws

Description	Base oil / Type of soap	NLGI class DIN51818	Walkpenetration DIN ISO 2137 at 25°C [0,1mm]	Basic oil viscosity DIN 51562 at 40°C [mm <sup>2</sup> /s]	Density [mg/cm <sup>3</sup> ]	Properties	Application area
SNR LUB HEAVY DUTY	Mineral oil / Lithium with EP additives	2	295	app. 115	890	· very high protection against wear and corrosion	· General engineering · High loads
SNR LUB HIGH SPEED+	Ester, SHC / Lithium, Calcium	2	-	25	900	· Very good adhesion properties · Very good water resistance	· High velocity
SNR LUB HIGH TEMP	semi-synthetic oil / Polyurea	2	265...295	160	900	· High temperature resistance · Good corrosion protection · High oxidation resistance	· High temperature range
SNR LUB FOOD	Paraffinic mineral oil, PAO / Aluminum complex	2	265...295	195	920	· Good corrosion protection · Very good adhesion properties · High water resistance · NSF H1 registered*	· Food industry
Microlube GL261	Mineral oil / special Lithium-calcium soap	1	310...340	280	890	· Good wearing protection · Particularly pressure resistant additives against tribocorrosion	· General engineering · High loads · Short stroke application · Vibrations
Klübersynth BEM34-32	Synthetic hydrocarbon oil / special calcium soap	2	265...295	app. 30	890	· Particularly pressure resistant · Good wearing protection · Good ageing resistance · Low starting torque"	· Clean room application
Klübersynth UH1 14-151	Synthetic hydrocarbon oil / ester oil Aluminum complex soap	1	310...340	app. 150	920	· Good corrosion protection · Good ageing resistance · High water resistance · NSF H1 registered*	· Food industry · Pharmaceutical industry

\* Dieser Schmierstoff ist als H1-Produkt registriert, d.h. er wurde für den gelegentlichen, technisch unvermeidbaren Kontakt mit Lebensmitteln entwickelt. Erfahrungen haben gezeigt, dass der Schmierstoff unter den in der Produktinformation aufgeführten Voraussetzungen auch für entsprechende Anwendungen in der pharmazeutischen und kosmetischen Industrie verwendet werden kann. Es liegen jedoch keine spezifischen Testergebnisse z.B. zur Biokompatibilität vor, wie sie unter Umständen für Anwendungen im pharmazeutischen Bereich gefordert werden. Daher sollten vor Anwendung in diesem Bereich vom Anlagenhersteller und -betreiber entsprechende Risikoanalysen durchgeführt werden. Bei Bedarf sind Maßnahmen zum Ausschluss von gesundheitlicher Gefährdung und Verletzungen zu treffen.

(Quelle: Klüber Lubrication)

## 4.4 Lubrication methods

SNR Ball Screws can be supplied with lubricant by manual grease guns or central lubrication systems.

In the case of cylindrical nuts, this lubrication hole (Figure 4.1) must be led to a grease nipple via a lubrication channel in the nut housing. Flange type nuts have a threaded hole in the flange (Figure 4.2) to which a grease nipple can be mounted directly.

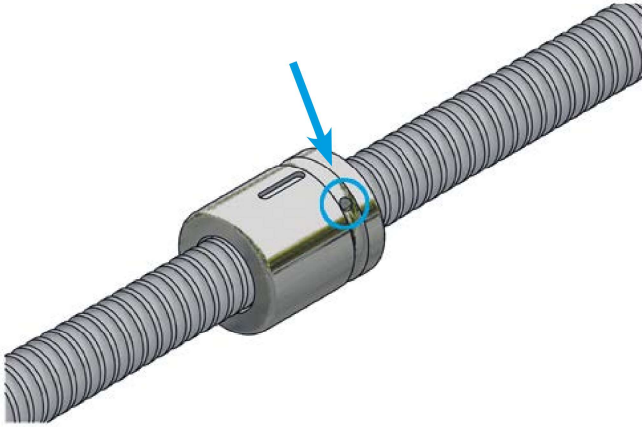


Figure 4.1 \_\_\_ Cylindrical nut with lubrication hole

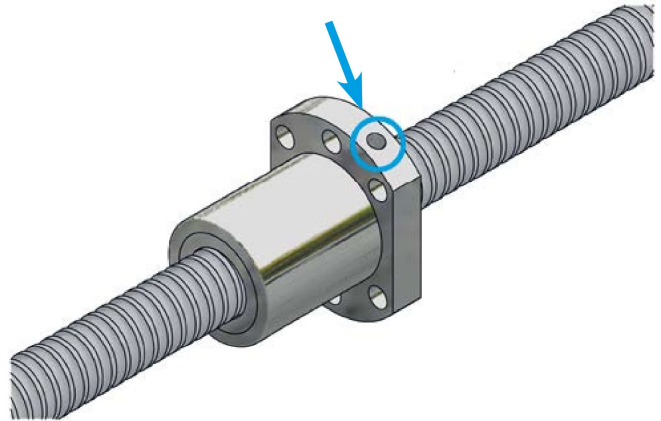


Figure 4.2 \_\_\_ Flange type nut with threaded hole

### 4.4.1 Manual grease gun – SNR - LUB GREASE GUN SET

Ball Screws can be re-lubricated with the SNR manual grease gun (LUB GREASE GUN SET ID number 273018). The LUB GREASE GUN SET includes the manual grease gun, a flexible hose and a nozzle for hydraulic type grease nipples.

The manual grease gun can be operated with one hand. Cartridges or unpackaged greases can be picked up. The grease gun was developed for industrial use with a maximum pressure of 360 bar. A small, controlled amount of grease of 0.5 cm<sup>3</sup> is conveyed per stroke.

When using manual grease guns (Figure 4.3), the nut of the Ball Screw drive is re-lubricated via a lubrication hole.



Figure 4.3 \_\_\_ SNR - LUB GREASE GUN SET

## 4.4.2 Central lubrication system

SNR Ball Screws can be connected to a central lubrication system.

Suitable centralized lubrication systems are SNR-LUBER-CONTROL (Figure 4.4) and SNR-POLYPUMP (Figure 4.5).

SNR – LUBER-CONTROL has six connections for lubrication tubes that can be parameterized individually. Optionally, CONTROL REFILL units with 250 cm<sup>3</sup> and 500 cm<sup>3</sup> lubricant volume can be used. The CONTROL REFILL unit can be exchanged after emptying or refilled factory provided.

SNR-POLYPUMP is a powerful central lubrication system that is easy to set up. It enables to lubricate 1 to 35 lubrication points at the same time in the simplest possible way. Various lubrication points can be supplied with different amounts of a lubricant with one system via pump elements. The storage container can easily be filled with standard refill cartridges. The connection to the existing machine control is quick and easy.



Figure 4.4 \_\_\_ SNR-LUBER-CONTROL



Figure 4.5 \_\_\_ SNR-POLYPUMP



## 4.5 Lubricant amounts

The respective minimum lubrication amount for Ball Screws depend on the type of lubricant, nut type and size.

During maintenance of Ball Screws, a distinction between:

- Lubrication during start-up
- Re-lubrication during operation

Nuts supplied separately for SNR Ball Screws are preserved with anti-corrosion oil on delivery and do not have an initial lubrication. Fully assembled Ball Screws are supplied with initial greasing, unless nothing else has been specified.

Tables 4.4 to 4.11 contain the minimum lubricant amount of the various lubricants for start-up and with which SNR Ball Screws are to be re-lubricated during operation. The corresponding amount of lubricant is to be supplied in 3 ... 4 small partial amounts with the nut moving in the meantime over at least twice the nut length.

Differing amounts of lubricant can be determined depending on the operating conditions.

Miniature Ball Screws with a diameter of less than 12 mm are only suitable for oil lubrication.

Our NTN-SNR application engineers are available for further information.

Table 4.4\_\_\_\_ Lubrication amount for Ball Screw nuts type CD

Type	Grease lubrication		Liquid grease lubrication		Oil lubrication	
	Initial greasing [cm <sup>3</sup> ]	Re-greasing [cm <sup>3</sup> ]	Initial greasing [cm <sup>3</sup> ]	Re-greasing [cm <sup>3</sup> ]	Initial greasing [ml]	Re-greasing [ml]
BNU01605_CD_5,8	1,8	0,9	1,8	0,9	0,36	0,07
BNU01610_CD_2,8	1,8	0,9	1,8	0,9	0,36	0,07
BNU01616_CD_1,8	1,8	0,9	1,8	0,9	0,36	0,07
BNU02005_CD_4,8	2,1	1,1	2,1	1,1	0,42	0,08
BNU02020_CD_2,8	4,5	2,3	4,5	2,3	0,90	0,18
BNU02505_CD_4,8	3,2	1,6	3,2	1,6	0,63	0,13
BNU02510_CD_3,8	3,9	1,9	3,9	1,9	0,77	0,15
BNU02525_CD_2,8	6,2	3,1	6,2	3,1	1,25	0,25
BNU03205_CD_5,8	4,3	2,2	4,3	2,2	0,86	0,17
BNU03210_CD_5,8	6,9	3,5	6,9	3,5	1,39	0,28
BNU03220_CD_2,8	6,9	3,5	6,9	3,5	1,39	0,28
BNU03232_CD_2,8	10,1	5,0	10,1	5,0	2,02	0,40

Table 4.5\_\_\_ Lubrication amount for Ball Screw nuts CI

Type	Grease lubrication		Liquid grease lubrication		Oil lubrication	
	Initial greasing [cm <sup>3</sup> ]	Re-greasing [cm <sup>3</sup> ]	Initial greasing [cm <sup>3</sup> ]	Re-greasing [cm <sup>3</sup> ]	Initial greasing [ml]	Re-greasing [ml]
BNU01205_CI_3	1,0	0,5	1,0	0,5	0,17	0,03
BNU01604_CI_4	1,6	0,8	1,6	0,8	0,32	0,06
BNU01605_CI_4	1,8	0,9	1,8	0,9	0,36	0,07
BNU02004_CI_4	2,0	1,0	2,0	1,0	0,40	0,08
BNU02005_CI_4	2,3	1,1	2,3	1,1	0,45	0,09
BNU02504_CI_4	2,8	1,4	2,8	1,4	0,56	0,11
BNU02505_CI_4	3,2	1,6	3,2	1,6	0,63	0,13
BNU02510_CI_4	6,0	3,0	6,0	3,0	1,19	0,24
BNU03204_CI_4	3,6	1,8	3,6	1,8	0,72	0,14
BNU03205_CI_4	4,1	2,0	4,1	2,0	0,81	0,16
BNU03210_CI_4	7,7	3,8	7,7	3,8	1,53	0,31
BNU04005_CI_4	5,4	2,7	5,4	2,7	1,08	0,22
BNU04010_CI_4	17,0	8,5	17,0	8,5	3,40	0,68
BNU05010_CI_4	23,8	11,9	23,8	11,9	4,76	0,95
BNU06310_CI_4	23,8	11,9	23,8	11,9	4,76	0,95
BNU08010_CI_4	34,0	17,0	34,0	17,0	6,80	1,36

Table 4.6\_\_\_ Lubrication amount for Ball Screw nuts DC

Type	Grease lubrication		Liquid grease lubrication		Oil lubrication	
	Initial greasing [cm <sup>3</sup> ]	Re-greasing [cm <sup>3</sup> ]	Initial greasing [cm <sup>3</sup> ]	Re-greasing [cm <sup>3</sup> ]	Initial greasing [ml]	Re-greasing [ml]
BNU01605_DC_3,8	2,9	1,5	2,9	1,5	0,58	0,12
BNU01610_DC_2,8	3,9	1,9	3,9	1,9	0,78	0,16
BNU02005_DC_3,8	3,8	1,9	3,8	1,9	0,75	0,15
BNU02010_DC_3,8	6,0	3,0	6,0	3,0	1,20	0,24
BNU02505_DC_3,8	5,3	2,6	5,3	2,6	1,05	0,21
BNU02510_DC_3,8	8,5	4,3	8,5	4,3	1,71	0,34
BNU03205_DC_3,8	7,4	3,7	7,4	3,7	1,48	0,30
BNU03210_DC_3,8	11,0	5,5	11,0	5,5	2,20	0,44
BNU03220_DC_2,8	14,4	7,2	14,4	7,2	2,88	0,58
BNU04005_DC_3,8	10,2	5,1	10,2	5,1	2,04	0,41
BNU04010_DC_3,8	24,6	12,3	24,6	12,3	4,92	0,98
BNU04020_DC_2,8	32,4	16,2	32,4	16,2	6,48	1,30
BNU05005_DC_3,8	15,3	7,7	15,3	7,7	3,06	0,61
BNU05010_DC_3,8	33,1	16,6	33,1	16,6	6,62	1,32
BNU05020_DC_3,8	61,0	30,5	61,0	30,5	12,21	2,44

Table 4.7 \_\_\_\_ Lubrication amount for Ball Screw nuts SC

Type	Grease lubrication		Liquid grease lubrication		Oil lubrication	
	Initial greasing [cm <sup>3</sup> ]	Re-greasing [cm <sup>3</sup> ]	Initial greasing [cm <sup>3</sup> ]	Re-greasing [cm <sup>3</sup> ]	Initial greasing [ml]	Re-greasing [ml]
BNU01205_SC_2,8	0,9	0,5	0,9	0,5	0,15	0,03
BNU01210_SC_2,8	1,4	0,7	1,4	0,7	0,23	0,05
BNU01605_SC_3,8	1,5	0,7	1,5	0,7	0,30	0,06
BNU01610_SC_2,8	1,9	0,9	1,9	0,9	0,38	0,08
BNU01616_SC_1,8	1,8	0,9	1,8	0,9	0,36	0,07
BNU01616_SC_2,8	2,4	1,2	2,4	1,2	0,49	0,10
BNU01620_SC_1,8	2,3	1,1	2,3	1,1	0,46	0,09
BNU02005_SC_3,8	0,9	1,9	0,9	0,4	0,07	0,18
BNU02010_SC_3,8	1,4	2,9	1,4	0,6	0,11	0,46
BNU02020_SC_1,8	1,6	3,2	1,6	0,6	0,13	0,52
BNU02020_SC_2,8	2,3	4,6	2,3	0,9	0,18	0,86
BNU02505_SC_3,8	2,6	1,3	2,6	1,3	0,52	0,10
BNU02510_SC_3,8	4,0	2,0	4,0	2,0	0,80	0,16
BNU02525_SC_1,8	4,6	2,3	4,6	2,3	0,91	0,18
BNU02525_SC_2,8	6,7	3,3	6,7	3,3	1,33	0,27
BNU03205_SC_3,8	3,8	1,9	3,8	1,9	0,76	0,15
BNU03210_SC_3,8	5,4	2,7	5,4	2,7	1,08	0,22
BNU03220_SC_2,8	7,2	3,6	7,2	3,6	1,44	0,29
BNU03232_SC_1,8	7,4	3,7	7,4	3,7	1,48	0,30
BNU03232_SC_2,8	10,4	5,2	10,4	5,2	2,09	0,42
BNU04005_SC_3,8	5,4	2,7	5,4	2,7	1,08	0,22
BNU04010_SC_3,8	12,6	6,3	12,6	6,3	2,52	0,50
BNU04020_SC_2,8	16,4	8,2	16,4	8,2	3,28	0,66
BNU04040_SC_1,8	21,0	10,5	21,0	10,5	4,20	0,84
BNU04040_SC_2,8	29,0	14,5	29,0	14,5	5,80	1,16
BNU05005_SC_3,8	8,1	4,1	8,1	4,1	1,62	0,32
BNU05010_SC_3,8	16,3	8,2	16,3	8,2	3,26	0,65
BNU05020_SC_3,8	25,9	13,0	25,9	13,0	5,18	1,04
BNU05050_SC_1,8	30,0	15,0	30,0	15,0	6,00	1,20
BNU05050_SC_2,8	30,0	15,0	30,0	15,0	6,00	1,20

Table 4.8 \_\_\_\_ Lubrication amount for Ball Screw nuts SH

Type	Grease lubrication		Liquid grease lubrication		Oil lubrication	
	Initial greasing [cm <sup>3</sup> ]	Re-greasing [cm <sup>3</sup> ]	Initial greasing [cm <sup>3</sup> ]	Re-greasing [cm <sup>3</sup> ]	Initial greasing [ml]	Re-greasing [ml]
BNU00802.5_SH_2,5					0,05	0,01
BNU01002_SH_3,5					0,07	0,01
BNU01004_SH_2,5					0,10	0,02
BNU01204_SH_3,5	1,0	0,5	1,0	0,5	0,17	0,03
BNU01205_SH_3,5	1,2	0,6	1,2	0,6	0,20	0,04
BNU01404_SH_3,5	1,4	0,7	1,4	0,7	0,28	0,06
BNU01604_SH_3	1,3	0,6	1,3	0,6	0,26	0,05
BNU01605_SH_3	1,7	0,8	1,7	0,8	0,34	0,07
BNU02005_SH_3	2,3	1,1	2,3	1,1	0,45	0,09
BNU02505_SH_4	4,8	2,4	4,8	2,4	0,97	0,19

Table 4.9 \_\_\_ Lubrication amount for Ball Screw nuts SK

Type	Grease lubrication		Liquid grease lubrication		Oil lubrication	
	Initial greasing [cm <sup>3</sup> ]	Re-greasing [cm <sup>3</sup> ]	Initial greasing [cm <sup>3</sup> ]	Re-greasing [cm <sup>3</sup> ]	Initial greasing [ml]	Re-greasing [ml]
BNU00601_SK_3					0,02	0,00
BNU00801_SK_4					0,03	0,01
BNU00802_SK_3					0,03	0,01
BNU00802.5_SK_3					0,05	0,01
BNU01002_SK_3					0,08	0,02
BNU01004_SK_3					0,10	0,02
BNU01202_SK_4	0,8	0,4	0,8	0,4	0,14	0,03
BNU01204_SK_3	0,8	0,4	0,8	0,4	0,14	0,03
BNU01205_SK_3	0,8	0,4	0,8	0,4	0,14	0,03
BNU01402_SK_4	0,8	0,4	0,8	0,4	0,14	0,03

Table 4.10 \_\_\_ Lubrication amount for Ball Screw nuts SU

Type	Grease lubrication		Liquid grease lubrication		Oil lubrication	
	Initial greasing [cm <sup>3</sup> ]	Re-greasing [cm <sup>3</sup> ]	Initial greasing [cm <sup>3</sup> ]	Re-greasing [cm <sup>3</sup> ]	Initial greasing [ml]	Re-greasing [ml]
BNU01605_SU_4	1,8	0,9	1,8	0,9	0,36	0,07
BNU01610_SU_3	2,3	1,1	2,3	1,1	0,46	0,09
BNU02005_SU_4	2,6	1,3	2,6	1,3	0,51	0,10
BNU02505_SU_4	3,6	1,8	3,6	1,8	0,71	0,14
BNU02510_SU_4	5,6	2,8	5,6	2,8	1,12	0,22
BNU03205_SU_4	4,7	2,3	4,7	2,3	0,94	0,19
BNU03210_SU_4	7,7	3,8	7,7	3,8	1,53	0,31
BNU04005_SU_4	6,6	3,3	6,6	3,3	1,32	0,26
BNU04010_SU_4	17,6	8,8	17,6	8,8	3,52	0,70
BNU05010_SU_4	21,1	10,6	21,1	10,6	4,22	0,84
BNU06310_SU_4	26,0	13,0	26,0	13,0	5,21	1,04
BNU06320_SU_4	39,0	25,0	39,0	25,0	7,30	1,60
BNU08010_SU_4	37,2	18,6	37,2	18,6	7,44	1,49
BNU08020_SU_4	55,0	27,0	55,0	27,0	11,00	2,30

Table 4.11 Lubrication amount for Ball Screw nuts TW

Type	Grease lubrication		Liquid grease lubrication		Oil lubrication	
	Initial greasing [cm <sup>3</sup> ]	Re-greasing [cm <sup>3</sup> ]	Initial greasing [cm <sup>3</sup> ]	Re-greasing [cm <sup>3</sup> ]	Initial greasing [ml]	Re-greasing [ml]
BNU01605_TW_4	3,0	1,5	3,0	1,5	0,60	0,12
BNU02005_TW_4	4,3	2,1	4,3	2,1	0,85	0,17
BNU02505_TW_4	6,0	3,0	6,0	3,0	1,20	0,24
BNU02510_TW_4	9,1	4,6	9,1	4,6	1,82	0,36
BNU03205_TW_4	7,8	3,9	7,8	3,9	1,57	0,31
BNU03210_TW_4	13,1	6,5	13,1	6,5	2,61	0,52
BNU04005_TW_4	10,8	5,4	10,8	5,4	2,16	0,43
BNU04010_TW_4	29,6	14,8	29,6	14,8	5,92	1,18
BNU05010_TW_4	35,5	17,8	35,5	17,8	7,10	1,42
BNU06310_TW_4	42,8	21,4	42,8	21,4	8,57	1,71
BNU08010_TW_4	61,2	30,6	61,2	30,6	12,24	2,45

## 4.6 Lubrication intervals

The re-lubrication intervals are influenced by many factors (Chapter 4.2). The greatest influence usually has the load and the existing contamination. Exact re-lubrication intervals can only be determined after determination under real operating conditions and assessment over a sufficiently long period for a specific application.

The diagrams in Figures 4.5 and 4.6 serve as a guideline for determining the re-lubrication interval under normal pollution conditions for Ball Screws with low-viscosity grease or grease lubrication.

The re-lubrication intervals are shown as the number of revolutions ( $s_{\#}$ ) of the Ball Screw as a function of the ratio of the mean axial load ( $F_m$ ) to the dynamic load rating ( $C_a$ ) for the respective nominal diameter ( $d_0$ ).

Under real operating conditions, it is easier to determine the re-lubrication interval according to the mileage in kilometers than according to the number of revolutions.

The mileage in kilometers is calculated using the Formula [4.1].

$$s = \frac{s_{\#} \times P}{10^6}$$

[Formula 4.1]

- s** Re-lubrication interval [km]
- $s_{\#}$**  Re-lubrication interval [revolution]
- P** Pitch [mm]

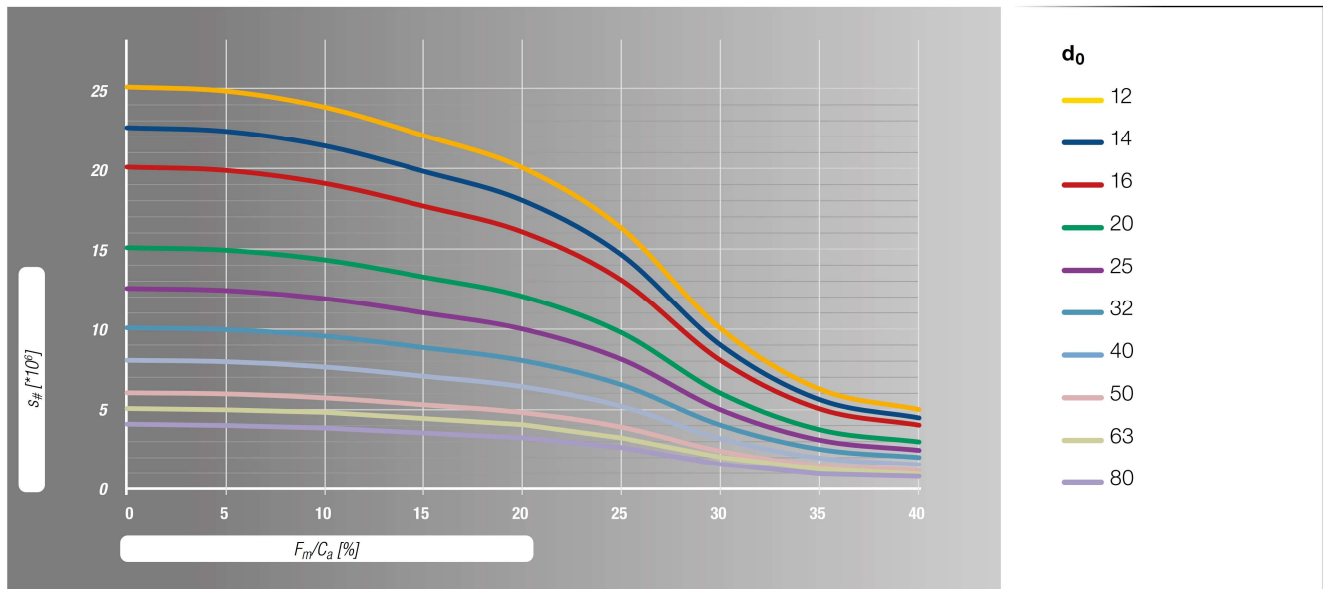


Figure 4.6 \_\_\_ Re-lubrication interval for Ball Screws with grease lubrication

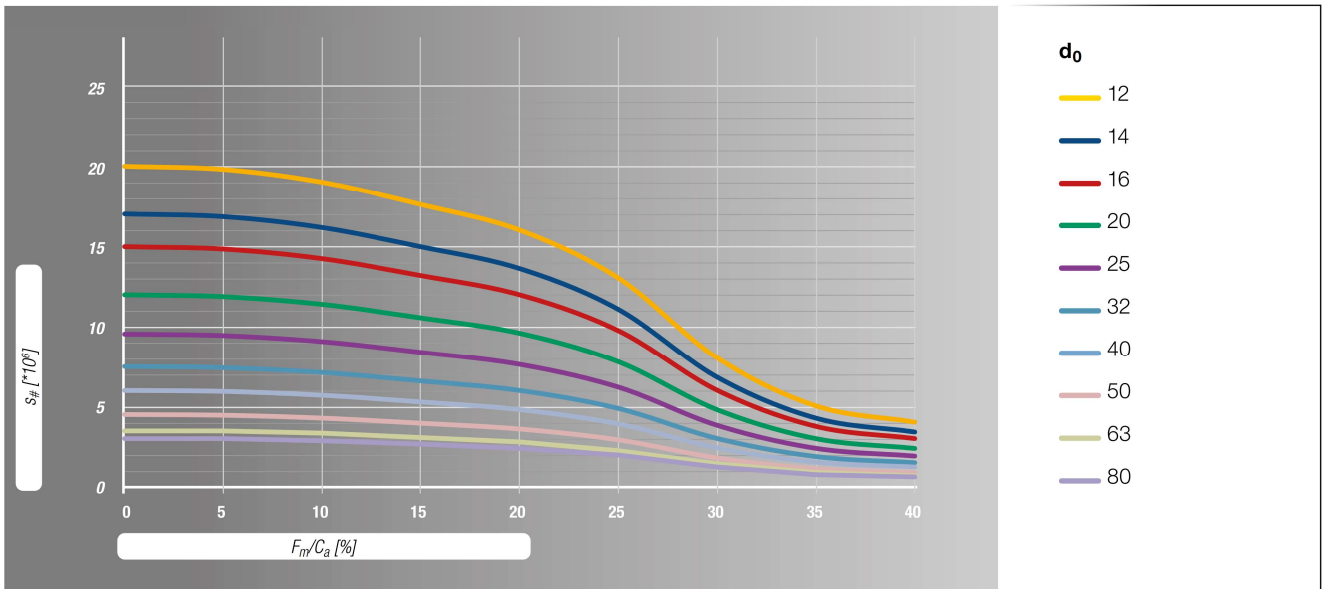


Figure 4.7 \_\_\_ Re-lubrication interval for Ball Screws with low-viscosity grease lubrication

The diagram in Figures 4.7 serve as a guideline for determining the re-lubrication interval under normal pollution conditions for Ball Screws with oil lubrication.

In addition to the re-lubrication interval as the number of revolutions ( $s_{\#}$ ), the re-lubrication interval in operating hours ( $s_T$ ) must also be considered for oil lubrication because the oils with little movements flow out by gravity from the contact area. The criterion that is reached first determines the re-lubrication interval.

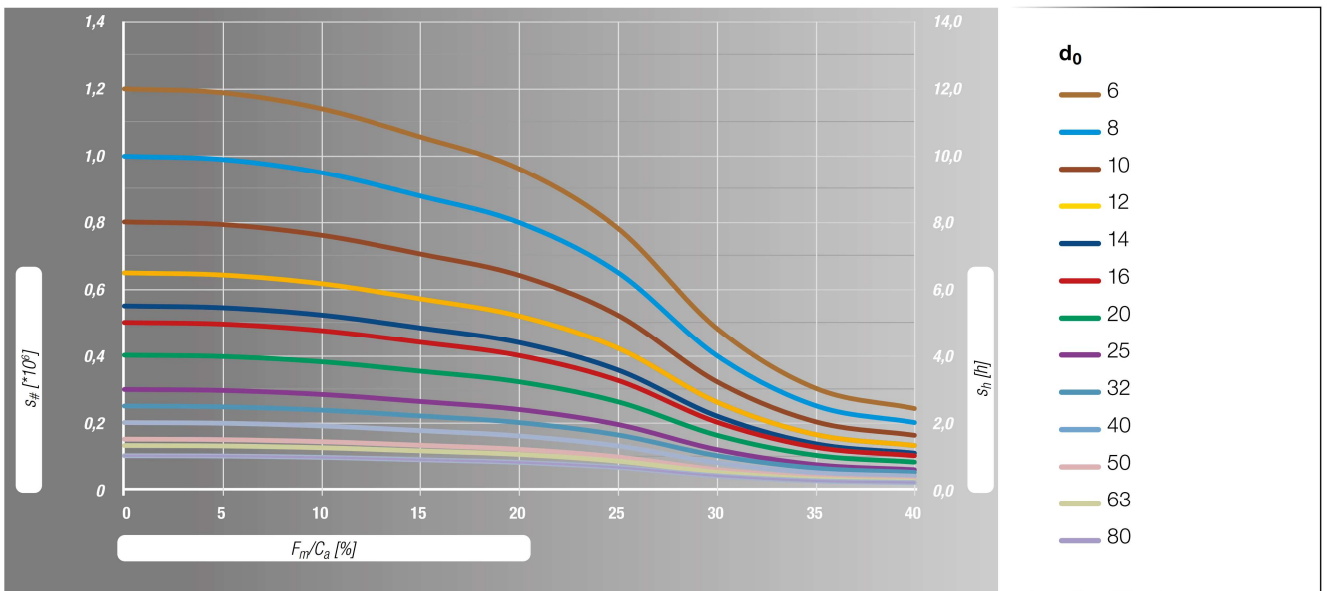


Figure 4.8 \_\_\_ Re-lubrication interval for Ball Screws with oil lubrication

Here, too, the mileage in kilometers can be calculated using the Formula [4.1]. If the operating hours ( $s_T$ ) are the first criterion that occurs, the number of revolutions ( $s_{\#}$ ) on the opposite axis must be used for the calculation.

For short stroke applications (stroke  $\leq$  nut length) it is recommended to shorten the re-lubrication intervals.

Our NTN-SNR application engineers are available for further information.



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