

# EWELLIX

A Schaeffler Company

## Roller screws catalogue



Courtesy of Steven Engineering, Inc - (800) 258-9200 - [sales@steveneng.com](mailto:sales@steveneng.com) - [www.stevenengineering.com](http://www.stevenengineering.com)



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# The heritage of innovation

Ewellix is a global innovator and manufacturer of linear motion and actuation solutions. Our state-of-the-art linear solutions are designed to increase machine performance, maximise uptime, reduce maintenance, improve safety and save energy. We engineer solutions for assembly automation, medical equipment, mobile machinery, distribution and a wide range of other industrial applications.

## Technology leadership

We earned our reputation through decades of engineering excellence. Our journey began over 50 years ago as part of the SKF Group, a leading global technology provider. Our history provided us with the expertise to continuously develop new technologies and use them to create cutting edge products that offer our customers a competitive advantage.

In 2019, we became independent and changed our name to Ewellix. We are proud of our heritage. This gives us a unique foundation on which to build an agile business with engineering excellence and innovation as our core strengths.

## Global presence and local support

With our global presence, we are uniquely positioned to deliver standard components and custom-engineered solutions, with full technical and applications support around the world. Our skilled engineers provide total life-cycle support, helping to optimise the design, operation and maintenance of equipment thus improving productivity and reliability while reducing costs. At Ewellix, we don't just provide products; we engineer integrated solutions that help customers realise their ambitions.



## Schaeffler Group – We pioneer motion

Ewellix is since 2023 owned by the Schaeffler Group.

As a leading global supplier to the automotive and industrial sectors, the Schaeffler Group has been driving forward groundbreaking inventions and developments in the fields of motion and mobility for over 75 years.

With innovative technologies, products, and services for electric mobility, CO<sub>2</sub>-efficient drives, Industry 4.0, digitalization, and renewable energies, the company is a reliable partner for making motion and mobility more efficient, intelligent, and sustainable.

Schaeffler manufactures high-precision components and systems for powertrain and chassis applications as well as rolling and plain bearing solutions for a large number of industrial applications.



# Trusted engineering expertise

Our industry is in motion; pushing towards solutions that reduce environmental impact and leverage new technology. We provide technical and manufacturing expertise to overcome our customers' challenges.

## Engineering for the future

We work in a **wide range of industries**, where our solutions provide key functionality for business critical applications.

For the **medical industry**, we provide precision components for use in core medical equipment.

Our unparalleled understanding of **assembly automation** systems is based on decades of research into advanced automation components and techniques.

Our deep knowledge of **mobile machinery** provides powerful and reliable electromechanical solutions for the harshest conditions. In an **industrial distribution** setting, we supply linear expertise to our partners, empowering them to serve customers with greater efficiency.

## We offer excellence

We have a **unique understanding of linear equipment** and how it's integrated in customers' applications to provide the best performance and machine efficiency.

**We assist our customers** by creating equipment that runs faster, longer and that is safe and sustainable.

We provide a wide variety of **linear motion components** and **electromechanical actuators** for equipping any automation application, thus helping our customers **increase productivity, reduce their footprint, energy use and maintenance**.

### Actuation systems

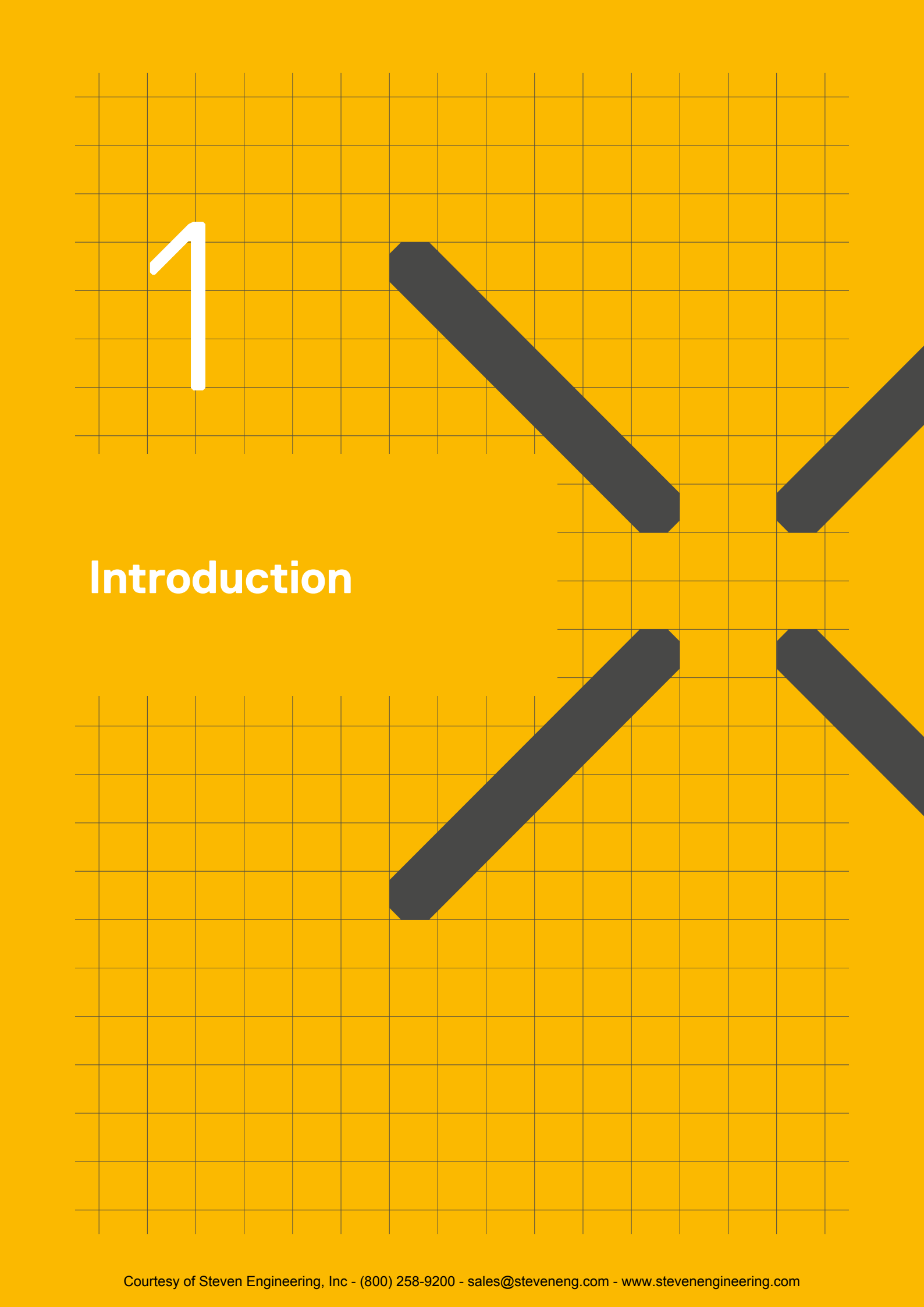


### Ball and roller screws



### Linear guides and systems





1

# Introduction

# Introduction to roller screws

## Ewellix roller screws, high performance driving solutions

A wide assortment of industries rely on Ewellix roller screws for their actuation requirements. Leading the trend to move from traditional forms of linear actuation, Ewellix roller screws represent the state of the art driving force for powerful electro-mechanical actuation.

Ewellix is a pioneer in the technology of roller screws and offers high quality, high performance and the widest assortment of roller screws available on the market.

The Ewellix in-house highly integrated manufacturing process uses the latest machining technology including soft and hard machining, heat treatment (induction and through hardening), grinding and assembly operations. Ewellix manufacturing facilities also house laboratories dedicated to life tests, tribology, noise measurement and metallurgy. Beyond the standard assortment made from high grade bearing steel, Ewellix offers special variants with stainless steel and high temperature steel combined with coatings, etc. to respond to the most demanding applications.

Ewellix offers three main variants of planetary roller screws that do not require roller recirculation:

- The traditional SR assortment with threaded rollers synchronized to the nut, thanks to identical helix angle for the rollers and the nut
- The HR Ultra Power roller screws with increased capabilities compared to the SR assortment
- The ISR inverted roller screws with threaded rollers synchronized to the screw shaft, thanks to identical helix angle for the rollers and the shaft.

In addition, Ewellix offers special variants of planetary roller screws:

- The SRR rotating nut roller screws
- Zero lead roller screws that can advantageously replace a traditional thrust bearing solution when extreme axial load carrying capacity, low weight and compactness are required.

Ewellix offers a wide assortment of recirculating roller screws. Since the rollers are circumferentially grooved, after each complete revolution around the nut, the grooved rollers must be recirculated back to their starting point on one side of the nut, with the help of cams and axial groove inside the nut.

Small leads are possible with a relatively larger thread pitch on the shaft and nut. This feature offers the ideal combination of small lead, high load carrying capacity, a high degree of stiffness and precision.

Nevertheless, the recirculating roller screws present lower speed and acceleration capabilities than planetary roller screws.

# Product overview



## Planetary roller screws SR

- Wide assortment of diameters and leads for numerous applications
- Reliable driving solution with high loads and speeds capabilities



## Ultra Power planetary roller screws HR

- Extreme load carrying capacity
- Robustness and long service life for highly demanding applications



## Inverted planetary roller screws ISR

- All the features and benefits of the planetary roller screw design
- Plus small leads, high load carrying capacity within a compact design



## Rotating nut planetary roller screws SRR

- Operation similar to electro-mechanical cylinders
- Compact, integrated support bearing and roller screw nut functions



## Zero lead roller screws

- Thrust bearing solution for special applications
- High thrust carrying capacity with compactness



## Recirculating roller screws SV

- Small leads associated with high load carrying capacity
- Fine resolution and stiffness for ultra precision applications

| Expectations with electro-mechanical actuation                                                | Ewellix roller screw solutions                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Increased productivity for industrial grade applications with operational duty cycle over 70% | High load carrying capacity and cycling capability<br>Accommodate high accelerations and high speeds                                                                                                                           |
| Up to 70% energy savings compared to hydraulic and pneumatic actuation technologies           | Mechanical efficiency usually greater than 80%                                                                                                                                                                                 |
| Functionality, flexibility and controllability                                                | Widest assortment of roller screws available on the market<br>Accommodate heavy loads with transportation applications<br>Provide accuracy for positioning applications<br>Custom designs and flexible manufacturing equipment |
| Reliability                                                                                   | By design, the planetary roller screw offers greater reliability than other driving solutions                                                                                                                                  |
| Higher repeatability and process stability                                                    | Limited wear, in particular for screws that have been run in at the factory                                                                                                                                                    |
| Easy integration into work cells and existing systems                                         | High power density                                                                                                                                                                                                             |
| Higher degree of precision                                                                    | High degree of positioning accuracy further increased without backlash or with preload<br>Recirculating roller screws with small leads are recommended for ultra-precision applications                                        |
| Low noise levels                                                                              | Very smooth and quiet operation with planetary roller screws                                                                                                                                                                   |
| Cleanliness                                                                                   | Roller screws consume a very small amount of lubricants                                                                                                                                                                        |
| Lower total cost of ownership (TCO) compared to traditional types of actuation                | Long service life and reliability                                                                                                                                                                                              |

# Preferred range

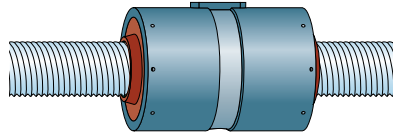
The Ewellix preferred range encompasses the most frequently used sizes of planetary roller screws and recirculating roller screws. Within that assortment, standard size nuts are stocked at Ewellix factories in Europe and North America for improved availability, greater value, and shorter delivery times. Shafts are manufactured according to customer requirements.

|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Design and manufacturing operations</b> | <ul style="list-style-type: none"> <li>• Standard roller screws with standard and maximum load ratings are available with axial play (SR or SV prefix), or without backlash (BR or BV prefix)</li> <li>• Nut dimensions are detailed hereafter</li> <li>• Standard shaft end machining can include turning, milling and grinding operations</li> <li>• End machining is available for Ewellix support bearings</li> </ul>                                                                                                                                                                                                                                                        |
| <b>Materials</b>                           | <ul style="list-style-type: none"> <li>• For the preferred range, shafts and nuts are manufactured with standard high quality roller screw steel, detailed in the present Ewellix catalogue Roller screws</li> <li>• Stainless steel and special treatments are not available with the preferred range</li> </ul>                                                                                                                                                                                                                                                                                                                                                                |
| <b>Capabilities</b>                        | <ul style="list-style-type: none"> <li>• Machining operations such as splines, hollow shaft, etc. are possible, but might require more time to complete</li> <li>• Unless specified, manufacturing tolerances will be according to ISO 3408–3 class 5</li> <li>• Lead precision is G5 according to ISO standards. G3 and G1 also possible on request</li> <li>• Screw assemblies are shipped with a protective rust inhibitor coating</li> <li>• Special documents can be supplied on request: Certificate of conformity to customer drawings # 1969981, lead precision curve</li> <li>• Matching FLRBU support bearings size 2 to 6 can be delivered with the screws</li> </ul> |
| <b>Export note</b>                         | <ul style="list-style-type: none"> <li>• Product for nuclear, aerospace or military applications may be subject to export restrictions and/or licensing requirements. In such cases, delivery time shall be dependent upon securing approvals from the appropriate governmental authority.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                            |

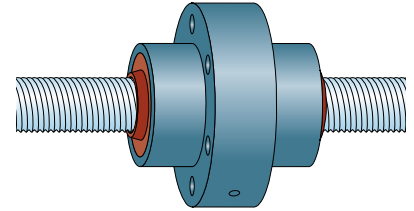
## Planetary roller screws with standard nuts in stock

- SRC cylindrical nut with axial play
- BRC cylindrical nut without backlash
- SRF flanged nut with axial play
- BRF flanged nut without backlash
- SRC/BRC/SRF/BRF nuts with wiper recesses as standard
- Standard wipers supplied on request
- Right handed thread only
- Standard or maximum number of rollers available

SRC/BRC cylindrical nut with wipers



SRF/BRF flanged nut with wipers

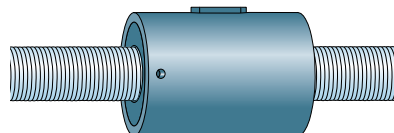


| Nominal diameter | Lead        | Basic load rating |          |            |             | Nut type available | Maximum total shaft length |
|------------------|-------------|-------------------|----------|------------|-------------|--------------------|----------------------------|
| $d_0$<br>mm      | $P_h$<br>mm | $C_a$<br>kN       | $C_{0a}$ | $C_{amax}$ | $C_{0amax}$ |                    | $L_{tp}$<br>mm             |
| 15               | 5           | 26                | 43,6     | 29,7       | 53,3        | SRC/BRC            | 975                        |
| 15               | 8           | 27,4              | 40,8     | 29,4       | 45,3        | SRC/BRC            | 975                        |
| 21               | 5           | 50,6              | 82       | 57,8       | 100         | SRC/BRC/SRF/BRF    | 1 400                      |
| 21               | 8           | 57                | 84,1     | 65,2       | 103         | SRC/BRC            | 1 400                      |
| 21               | 10          | 59,2              | 83       | 63,6       | 92,2        | SRC/BRC/SRF/BRF    | 1 400                      |
| 25               | 5           | 68,4              | 122      | 72,2       | 149         | SRC/BRC            | 1 650                      |
| 25               | 10          | 78,6              | 118      | 89,9       | 145         | SRC/BRC            | 1 650                      |
| 30               | 5           | 92                | 178      | 105        | 218         | SRC/BRC/SRF/BRF    | 2 000                      |
| 30               | 10          | 106               | 174      | 122        | 213         | SRC/BRC/SRF/BRF    | 2 000                      |
| 39               | 5           | 129               | 269      | 148        | 329         | SRC/BRC/SRF/BRF    | 2 650                      |
| 39               | 10          | 153               | 271      | 174        | 331         | SRC/BRC/SRF/BRF    | 2 650                      |
| 48               | 5           | 198               | 482      | 240        | 642         | SRC/BRC/SRF/BRF    | 3 300                      |
| 48               | 10          | 232               | 475      | 265        | 581         | SRC/BRC/SRF/BRF    | 3 300                      |
| 48               | 20          | 266               | 462      | 304        | 565         | SRC/BRC/SRF/BRF    | 3 300                      |
| 60               | 20          | 395               | 787      | 452        | 960         | SRC/BRC/SRF/BRF    | 4 250                      |

## Recirculating roller screws with standard nuts in stock

- SVC cylindrical nut with axial play
- BVC cylindrical nut without backlash
- SVC/BVC nuts without wiper recess,
- no wiper availability

SVC/BVC cylindrical nut



| Nominal diameter | Lead (right hand) | Basic load rating SVC/BVC nut |          | Maximum total shaft length |
|------------------|-------------------|-------------------------------|----------|----------------------------|
| $d_1$<br>mm      | $P_h$<br>mm       | $C_a$<br>kN                   | $C_{0a}$ | $L_{tp}$<br>mm             |
| 20               | 1                 | 18,5                          | 36,6     | 1 300                      |
| 25               | 1                 | 32,9                          | 68,4     | 1 650                      |
| 32               | 1                 | 64,3                          | 159      | 2 150                      |
| 32               | 2                 | 64,3                          | 159      | 2 159                      |

With planetary roller screws, the application load is transmitted from the nut to the shaft through the barrel-shaped surfaces of the rollers. The number of contacts and the total surface area of the contacts between the shaft, the rollers and the nut are substantially increased compared to the ball screw design, resulting in larger dynamic and static load carrying capacities (→ **fig. 1**).

The absence of recirculating element embodies the fundamental conceptual advantage of the planetary roller screws. This feature eliminates the main failure mode of ball screws, that is linked to the recirculation of the balls. Indeed, recirculating heavily loaded balls induces alternate stresses on the balls and shock loads arising from the change of trajectory.

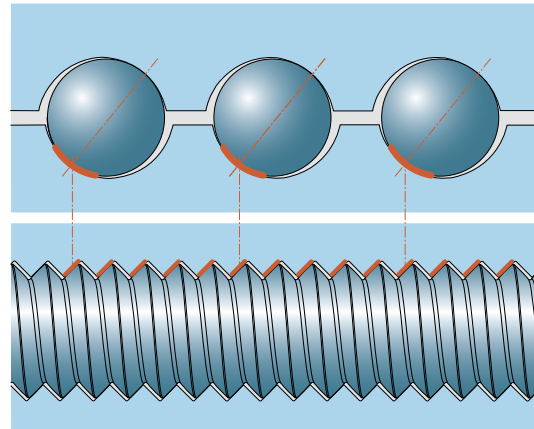
In addition, satellite rollers never come into contact with each other. This is a significant advantage of this product over most ball screw designs. Balls come into contact with each other in most ball screw designs, generating friction and adding a potential failure mode to the ball screw concept.

With recirculating roller screws, the application load transfers from the shaft to the nut through a set of grooved rollers. This design permits very small leads while offering high load carrying capacity and axial stiffness.

This mechanical advantage minimizes input torque and increases application resolution and performance. They can simplify a complete transmission and improve its rigidity. They are often used in applications involving advancing technology where reliable optimum performance is essential.

**Fig. 1**

*Comparison of ball screws and roller screws contact area*



| Roller screw concept                                      | Advantages over a ball screw                                                                                                                           | User benefits                                                                                  |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Large number of contact points                            | High load carrying capacity and up to 10 times longer service life                                                                                     | Lower total cost of ownership (TCO)                                                            |
| Satellite rollers                                         | Roller screw rotational speeds up to 50% higher than a ball screw with similar carrying capacity                                                       | Increased speed of operations                                                                  |
|                                                           | Roller screw acceleration up to 3 times higher                                                                                                         | Higher productivity                                                                            |
|                                                           | Absence of recirculation eliminating a significant failure mode                                                                                        | Higher degree of reliability                                                                   |
| Planetary roller screws with small lead (down to 2,00 mm) | High load carrying capacity compared to ball screws with small lead which are designed with small diameter balls which have low load carrying capacity | High load carrying capacity combined with positioning accuracy and reduced torque requirements |
| Evenly spaced planetary or recirculating rollers          | Good operation in applications with changes of direction, stable friction torque                                                                       | Low noise<br>High degree of reliability                                                        |
| Recirculating roller screws with small lead down to 1 mm  | High load carrying capacity, high axial stiffness that cannot be obtained with a ball screw of similar lead and diameter<br>Very small input torque    | High resolution, high stiffness, long service life, robustness                                 |

# Selection guide

Planetary roller screws SR/BR, HR: Standard and maximum dynamic load carrying capacity  $C_a$  [kN]

| Nominal diameter | Nut type | Lead [mm] |      |      |      |      |      |      |      |       |     |
|------------------|----------|-----------|------|------|------|------|------|------|------|-------|-----|
| $d_0$<br>mm      | –        | 2<br>kN   | 4    | 5    | 6    | 8    | 9    | 10   | 12   | 15    | 18  |
| 8                | SR/BR    | 8,61      | 8,93 |      |      |      |      |      |      |       |     |
| 12               | SR/BR    | –         |      | 14,1 |      |      |      |      |      |       |     |
| 12               | SR/BR    | 13,2      |      | 15,1 |      |      |      |      |      |       |     |
| 15               | SR/BR    | –         |      | 26   |      | 27,4 |      |      |      |       |     |
| 15               | SR/BR    | 23,9      |      | 29,7 |      | 29,4 |      |      |      |       |     |
| 18               | SR/BR    | 30,4      |      | 37,7 |      | 38   |      |      |      |       |     |
| 21               | SR/BR    | –         |      | 50,6 | 52,8 | 57   |      | 59,2 |      |       |     |
| 21               | SR/BR    | 47,4      |      | 57,8 | 60,3 | 65,2 |      | 63,6 |      |       |     |
| 24               | SR/BR    |           |      |      | 42,3 |      |      |      | 47,7 |       |     |
| 24               | SR/BR    |           |      |      | 47,3 |      |      |      | 53,3 |       |     |
| 25               | SR/BR    |           |      | 68,4 |      | 76,1 |      | 78,6 |      | 85,6  |     |
| 25               | SR/BR    |           |      | 78,2 |      | 87   |      | 89,8 |      | 91,9  |     |
| 30               | SR/BR    |           |      | 92   | 95   | 103  |      | 106  |      | 119   |     |
| 30               | SR/BR    |           |      | 105  | 109  | 117  |      | 122  |      | 127   |     |
| 36               | SR/BR    |           |      |      | 90,5 |      | 97,5 |      | 107  |       | 114 |
| 36               | SR/BR    |           |      |      | 106  |      | 115  |      | 125  |       | 128 |
| 39               | SR/BR    |           |      | 129  |      |      |      | 153  |      | 168   |     |
| 39               | SR/BR    |           |      | 148  |      |      |      | 174  |      | 192   |     |
| 44               | SR/BR    |           |      |      |      | 130  |      |      | 144  |       | 158 |
| 44               | SR/BR    |           |      |      |      | 153  |      |      | 169  |       | 185 |
| 48               | SR/BR    |           |      | 198  |      | 218  |      | 232  |      | 258   |     |
| 48               | SR/BR    |           |      | 240  |      | 250  |      | 265  |      | 295   |     |
| 56               | SR/BR    |           |      |      |      |      |      |      | 212  |       |     |
| 56               | SR/BR    |           |      |      |      |      |      |      | 249  |       |     |
| 60               | SR/BR    |           |      |      |      |      |      | 339  |      | 373   |     |
| 60               | SR/BR    |           |      |      |      |      |      | 387  |      | 426   |     |
| 60               | HR       |           |      |      |      |      |      |      |      | 494   |     |
| 64               | SR/BR    |           |      |      |      |      |      |      | –    |       | 317 |
| 64               | SR/BR    |           |      |      |      |      |      |      | 296  |       | 333 |
| 75               | SR       |           |      |      |      |      |      | 505  |      | 561   |     |
| 75               | HR       |           |      |      |      |      |      |      |      | 836   |     |
| 80               | SR       |           |      |      |      |      |      | 365  |      |       | 420 |
| 80               | SR       |           |      |      |      |      |      | 383  |      |       | 441 |
| 87               | HR       |           |      |      |      |      |      |      |      | 1 059 |     |
| 99               | SR       |           |      |      |      |      |      |      |      |       |     |
| 99               | HR       |           |      |      |      |      |      |      |      | 1 277 |     |
| 112,5            | HR       |           |      |      |      |      |      |      |      | 1 396 |     |
| 120              | SR       |           |      |      |      |      |      |      |      |       |     |
| 120              | HR       |           |      |      |      |      |      |      |      | 1 547 |     |
| 135              | HR       |           |      |      |      |      |      |      |      | 1 843 |     |
| 150              | HR       |           |      |      |      |      |      |      |      | 2 200 |     |
| 180              | HR       |           |      |      |      |      |      |      |      | 3 073 |     |
| 210              | HR       |           |      |      |      |      |      |      |      |       |     |
| 240              | HR       |           |      |      |      |      |      |      |      |       |     |

Standard number of rollers  
 Maximum number of rollers, on request  
 Preferred range

| Nominal diameter<br>d <sub>0</sub><br>mm | Nut type<br>– | 20<br>kN | 24  | 25    | 30    | 35    | 36  | 40    | 42  | 50    |
|------------------------------------------|---------------|----------|-----|-------|-------|-------|-----|-------|-----|-------|
| 8                                        | SR/BR         |          |     |       |       |       |     |       |     |       |
| 12                                       | SR/BR         |          |     |       |       |       |     |       |     |       |
| 12                                       | SR/BR         |          |     |       |       |       |     |       |     |       |
| 15                                       | SR/BR         |          |     |       |       |       |     |       |     |       |
| 15                                       | SR/BR         |          |     |       |       |       |     |       |     |       |
| 18                                       | SR/BR         |          |     |       |       |       |     |       |     |       |
| 21                                       | SR/BR         |          |     |       |       |       |     |       |     |       |
| 21                                       | SR/BR         |          |     |       |       |       |     |       |     |       |
| 24                                       | SR/BR         |          |     |       |       |       |     |       |     |       |
| 24                                       | SR/BR         |          |     |       |       |       |     |       |     |       |
| 25                                       | SR/BR         |          |     |       |       |       |     |       |     |       |
| 25                                       | SR/BR         |          |     |       |       |       |     |       |     |       |
| 30                                       | SR/BR         | 123      |     |       |       |       |     |       |     |       |
| 30                                       | SR/BR         | 132      |     |       |       |       |     |       |     |       |
| 36                                       | SR/BR         |          | 124 |       |       |       |     |       |     |       |
| 36                                       | SR/BR         |          | 138 |       |       |       |     |       |     |       |
| 39                                       | SR/BR         | 173      |     | 175   |       |       |     |       |     |       |
| 39                                       | SR/BR         | 198      |     | 188   |       |       |     |       |     |       |
| 44                                       | SR/BR         |          | 168 |       | 166   |       |     |       |     |       |
| 44                                       | SR/BR         |          | 188 |       | 185   |       |     |       |     |       |
| 48                                       | SR/BR         | 266      |     | 286   | 276   |       |     |       |     |       |
| 48                                       | SR/BR         | 304      |     | 327   | 316   |       |     |       |     |       |
| 56                                       | SR/BR         |          | 242 |       |       |       | 258 |       |     |       |
| 56                                       | SR/BR         |          | 284 |       |       |       | 289 |       |     |       |
| 60                                       | SR/BR         | 395      |     |       |       |       |     |       |     |       |
| 60                                       | SR/BR         | 452      |     |       |       |       |     |       |     |       |
| 60                                       | HR            | 515      |     | 530   | 528   |       |     |       |     |       |
| 64                                       | SR/BR         |          | 329 |       | 318   |       | 309 |       |     |       |
| 64                                       | SR/BR         |          | 346 |       | 356   |       | 346 |       |     |       |
| 75                                       | SR            | 572      |     |       |       |       |     |       |     |       |
| 75                                       | HR            | 845      |     | 855   | 852   |       |     |       |     |       |
| 80                                       | SR            |          | 452 |       |       |       |     |       | 398 |       |
| 80                                       | SR            |          | 474 |       |       |       |     |       | 445 |       |
| 87                                       | HR            | 1 061    |     | 1 085 | 1 085 |       |     |       |     |       |
| 99                                       | SR            | 925      |     | 937   |       |       |     |       |     |       |
| 99                                       | HR            | 1 311    |     | 1 328 | 1 330 | 1 329 |     |       |     |       |
| 112,5                                    | HR            | 1 421    |     | 1 446 | 1 455 | 1 461 |     |       |     |       |
| 120                                      | SR            | 1 131    |     | 1 127 |       |       |     |       |     |       |
| 120                                      | HR            | 1 587    |     | 1 585 | 1 614 | 1 640 |     | 1 651 |     |       |
| 135                                      | HR            | 1 858    |     | 1 903 | 1 904 | 1 921 |     | 1 909 |     | 1 944 |
| 150                                      | HR            | 2 240    |     | 2 137 | 2 167 | 2 167 |     | 2 176 |     | 2 189 |
| 180                                      | HR            | 3 123    |     | 3 002 | 3 009 | 3 023 |     | 3 075 |     | 3 128 |
| 210                                      | HR            | 3 371    |     | 3 435 | 3 249 | 3 265 |     | 3 322 |     | 3 381 |
| 240                                      | HR            |          |     | 3 919 | 3 931 | 3 994 |     | 3 808 |     | 3 860 |

SR (C, F or P): Planetary roller screw with axial play  
BR (C, F or P): Planetary roller screw without backlash  
HR (C, F or P): Ultra Power planetary roller screw  
C: Cylindrical nut, F: Centered flange, P: Off-centered flange

**Planetary roller screws PR, with internal preload: Standard and maximum dynamic load carrying capacity  $C_a$  [kN]**

| Nominal diameter | Nut type | Lead [mm] |      |      |      |      |      |      |      |      |      |
|------------------|----------|-----------|------|------|------|------|------|------|------|------|------|
| $d_0$<br>mm      | –        | 2<br>kN   | 4    | 5    | 6    | 8    | 9    | 10   | 12   | 15   | 18   |
| 8                | PR       | 4,74      | 4,92 |      |      |      |      |      |      |      |      |
| 12               | PR       | –         |      | 7,76 |      |      |      |      |      |      |      |
| 12               | PR       | 7,25      |      | 8,32 |      |      |      |      |      |      |      |
| 15               | PR       | –         |      | 14,3 |      | 15,1 |      |      |      |      |      |
| 15               | PR       | 13,1      |      | 16,4 |      | 16,2 |      |      |      |      |      |
| 18               | PR       | 16,8      |      | 20,8 |      | 20,9 |      |      |      |      |      |
| 21               | PR       | –         |      | 27,9 | 29,1 | 31,4 |      | 32,6 |      |      |      |
| 21               | PR       | 26,1      |      | 31,8 | 33,2 | 35,9 |      | 35,0 |      |      |      |
| 24               | PR       |           |      |      | 23,3 |      |      |      | 26,3 |      |      |
| 24               | PR       |           |      |      | 26,1 |      |      |      | 29,4 |      |      |
| 25               | PR       |           |      | 37,7 |      | 41,9 |      | 43,3 |      | 47,2 |      |
| 25               | PR       |           |      | 43,1 |      | 47,9 |      | 49,5 |      | 50,6 |      |
| 30               | PR       |           |      | 50,7 | 52,3 | 56,5 |      | 58,6 |      | 65,4 |      |
| 30               | PR       |           |      | 57,9 | 59,8 | 64,6 |      | 67,0 |      | 70,1 |      |
| 36               | PR       |           |      |      | 49,8 |      | 53,7 |      | 58,7 |      | 62,9 |
| 36               | PR       |           |      |      | 58,5 |      | 63,1 |      | 69,0 |      | 70,3 |
| 39               | PR       |           |      | 71,2 |      |      |      | 84,1 |      | 92,4 |      |
| 39               | PR       |           |      | 81,4 |      |      |      | 96,1 |      | 106  |      |
| 44               | PR       |           |      |      |      | 71,9 |      |      | 79,2 |      | 86,9 |
| 44               | PR       |           |      |      |      | 84,4 |      |      | 93,0 |      | 102  |
| 48               | PR       |           |      | 109  |      | 120  |      | 128  |      | 142  |      |
| 48               | PR       |           |      | 132  |      | 138  |      | 146  |      | 162  |      |
| 56               | PR       |           |      |      |      |      |      |      | 117  |      |      |
| 56               | PR       |           |      |      |      |      |      |      | 137  |      |      |
| 60               | PR       |           |      |      |      |      |      | 187  |      | 206  |      |
| 60               | PR       |           |      |      |      |      |      | 213  |      | 235  |      |
| 64               | PR       |           |      |      |      |      |      |      | –    |      | 177  |
| 64               | PR       |           |      |      |      |      |      |      | 166  |      | 186  |

Standard number of rollers

Maximum number of rollers, on request

PR (U or K): Planetary roller screw with preloaded split nut

U: Cylindrical nut, K: Centered flange

| Nominal<br>diameter<br>d <sub>0</sub><br>mm | Nut<br>type | Lead [mm] |      |      |      |    |     |
|---------------------------------------------|-------------|-----------|------|------|------|----|-----|
|                                             |             | 20<br>kN  | 24   | 25   | 30   | 35 | 36  |
| 8                                           | PR          |           |      |      |      |    |     |
| 12                                          | PR          |           |      |      |      |    |     |
| 12                                          | PR          |           |      |      |      |    |     |
| 15                                          | PR          |           |      |      |      |    |     |
| 15                                          | PR          |           |      |      |      |    |     |
| 18                                          | PR          |           |      |      |      |    |     |
| 21                                          | PR          |           |      |      |      |    |     |
| 21                                          | PR          |           |      |      |      |    |     |
| 24                                          | PR          |           |      |      |      |    |     |
| 24                                          | PR          |           |      |      |      |    |     |
| 25                                          | PR          |           |      |      |      |    |     |
| 25                                          | PR          |           |      |      |      |    |     |
| 30                                          | PR          | 67,9      |      |      |      |    |     |
| 30                                          | PR          | 72,9      |      |      |      |    |     |
| 36                                          | PR          |           | 68,1 |      |      |    |     |
| 36                                          | PR          |           | 76,1 |      |      |    |     |
| 39                                          | PR          | 95,2      |      | 96,3 |      |    |     |
| 39                                          | PR          | 109       |      | 103  |      |    |     |
| 44                                          | PR          |           | 92,5 |      | 91,4 |    |     |
| 44                                          | PR          |           | 103  |      | 102  |    |     |
| 48                                          | PR          | 146       |      | 157  | 152  |    |     |
| 48                                          | PR          | 167       |      | 180  | 174  |    |     |
| 56                                          | PR          |           | 133  |      |      |    | 142 |
| 56                                          | PR          |           | 157  |      |      |    | 159 |
| 60                                          | PR          | 218       |      |      |      |    |     |
| 60                                          | PR          | 249       |      |      |      |    |     |
| 64                                          | PR          |           | 184  |      | 178  |    | 173 |
| 64                                          | PR          |           | 193  |      | 199  |    | 193 |

**Inverted roller screws ISR/IBR: Standard dynamic load carrying capacity  $C_a$  [kN]**

| Nominal diameter<br>$d_0$<br>mm | Nut type | Lead [mm] |      |      |      |      |
|---------------------------------|----------|-----------|------|------|------|------|
|                                 |          | 2,4<br>kN | 3    | 4    | 5    | 6    |
| 18                              | ISR/IBR  | 35,6      | 37,8 | 36,6 | 37,8 | 40,4 |
| 21                              | ISR/IBR  | 55,5      | 59,6 | 63,3 | 61,5 | 64,2 |
| 24                              | ISR/IBR  | 63,7      | 67,2 | 72   | 75,3 | 74,5 |
| 30                              | ISR/IBR  | 93,2      | 99,2 | 105  | 111  | 117  |
| 39                              | ISR/IBR  | 135       | 143  | 153  | 161  | 169  |
| 48                              | ISR/IBR  | 209       | 221  | 234  | 247  | 259  |

ISR: Inverted roller screw with axial play

IBR: Inverted roller screw without backlash

**Rotating nut roller screws SRR/BRR: Standard dynamic load carrying capacity  $C_a$  [kN]**

| Nominal diameter<br>$d_0$<br>mm | Nut type | Lead [mm] |      |      |     |     |
|---------------------------------|----------|-----------|------|------|-----|-----|
|                                 |          | 5<br>kN   | 10   | 15   | 20  | 25  |
| 25                              | SRR/BRR  | 68,4      | 78,5 | 85,6 |     |     |
| 30                              | SRR/BRR  | 91,9      | 106  | 119  | 123 |     |
| 39                              | SRR/BRR  | 129       | 153  | 168  | 173 | 175 |
| 48                              | SRR/BRR  | 198       | 232  | 258  | 266 | 286 |
| 60                              | SRR/BRR  |           | 339  | 373  | 395 |     |

SRR: Rotating nut roller screw with axial play

BRR: Rotating nut roller screw without backlash

Recirculating roller screws SV/BV: Standard dynamic load carrying capacity  $C_a$  [kN]

| Nominal diameter | Nut type | Lead [mm] |      |     |      |     |
|------------------|----------|-----------|------|-----|------|-----|
| $d_1$<br>mm      | –        | 1<br>kN   | 2    | 3   | 4    | 5   |
| 8                | SV/BV    | 8,5       |      |     |      |     |
| 10               | SV/BV    | 8,95      | 8,95 |     |      |     |
| 12               | SV/BV    | 10,3      | 10,3 |     |      |     |
| 16               | SV/BV    | 11,5      | 11,5 |     |      |     |
| 20               | SV/BV    | 18,5      | 18,5 |     |      |     |
| 25               | SV/BV    | 32,9      | 32,9 |     |      |     |
| 32               | SV/BV    | 64,3      | 64,3 |     |      |     |
| 40               | SV/BV    | 79,1      | 49,9 |     |      |     |
| 50               | SV/BV    | 190       | 98,1 | 153 | 98,1 |     |
| 63               | SV/BV    |           | 186  |     | 186  |     |
| 80               | SV/BV    |           |      |     | 325  |     |
| 100              | SV/BV    |           |      |     |      | 469 |
| 125              | SV/BV    |           |      |     |      | 756 |

## ■ Preferred range

SV (C or F): Recirculating roller screw with axial play

BV (C or F): Recirculating roller screw without backlash

C: Cylindrical nut, F: Centered flange

Recirculating roller screws PV, with internal preload: Standard dynamic load carrying capacity  $C_a$  [kN]

| Nominal diameter | Nut type | Lead [mm] |      |    |      |     |
|------------------|----------|-----------|------|----|------|-----|
| $d_1$<br>mm      | –        | 1<br>kN   | 2    | 3  | 4    | 5   |
| 8                | PV       | 4,88      |      |    |      |     |
| 10               | PV       | 5,14      | 5,14 |    |      |     |
| 12               | PV       | 5,96      | 5,96 |    |      |     |
| 16               | PV       | 6,71      | 6,71 |    |      |     |
| 20               | PV       | 10,6      | 10,6 |    |      |     |
| 25               | PV       | 18,9      | 18,9 |    |      |     |
| 32               | PV       | 36,9      | 36,9 |    |      |     |
| 40               | PV       | 45,4      | 28,7 |    |      |     |
| 50               | PV       | 109       | 56,3 | 88 | 56,3 |     |
| 63               | PV       |           | 107  |    | 107  |     |
| 80               | PV       |           |      |    | 187  |     |
| 100              | PV       |           |      |    |      | 269 |
| 125              | PV       |           |      |    |      | 434 |

PV (U or K): Recirculating roller screw with preloaded split nut

U: Cylindrical nut, K: Centered flange

# Typical applications for roller screws

## Application examples

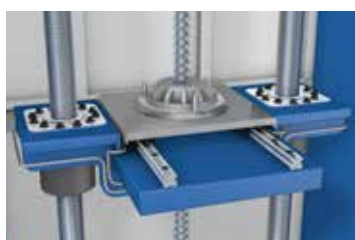
## Why Ewellix customers choose roller screw technology



### Plastic moulding

Injection moulding, blow moulding, thermo-forming

Improved machine productivity, energy savings, cleanliness.



### Broaching

Automotive and aircraft industries

Smooth continuous cutting operation. A high degree of stiffness provides a better surface finish for the part.



### Electro-mechanical press

Top slide and die cushion for forming press  
Punching press

Dynamic load rating up to 4 000 kN, the force of hydraulic actuation, the speed of pneumatic actuation.



### Factory automation

Gluing, riveting, welding, clinching, joining, bending, clamping, etc.

Accurate and repeatable, faster resetting, energy savings, reduced down-time, cleanliness, compactness.



### Oil & gas industry

Surface and subsea valves, downhole tools, offshore equipment

Robust, compact, high power density and high temperature rating.

## Application examples

## Why Ewellix customers choose roller screw technology



### Aerospace

Aileron, flap, slat, landing gear, wheel steering, ram air door, thrust reverser

Efficiency, reliability, weight saving, compact.



### Railway

Titling actuators, active suspension

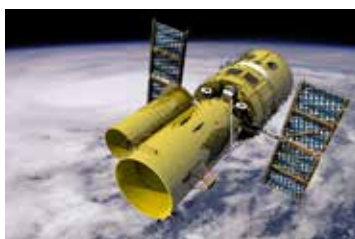
Reliability, robustness, low maintenance.



### Steel industry

Tundish car, ladle turret, continuous casting

High power density, high degree of reliability in extremely harsh environments.



### Space and telescope

Optical focus, mirror shape control, solar arrays release

High resolution, precision and stiffness.



### Simulator

Flight simulator, wave simulator, engineering test benches, entertainment equipment

High speeds and accelerations, fast and accurate positioning and response.



2

## Selection guide

# Technical concepts

## Introduction to Ewellix roller screws

Roller screws convert rotary motion into linear motion and vice-versa. Loads are transferred from the screw shaft to the nut through a roller set, therefore, roller screws relate to general bearing technology. Various types of bearing steel are used to attain the hardness and material fatigue properties required for carrying heavy application loads over extended periods of service. Certain bearing concepts such as load ratings, load cycles, nominal calculated life and service life, stiffness, speed ratings, lubrication requirements, etc. are explained below to guide customers through the roller screw selection process. The selection parameters are included in this chapter. To make the best selection of a roller screw, the designer should consider the following parameters such as the load cycle, the linear or rotational speed, the required life, the rates of acceleration and deceleration, the cycle rate, the environment, the lead accuracy, the stiffness, and any other special requirements.

For additional information about the roller screws selection process, please contact your local Ewellix representative.

## Basic dynamic load carrying capacity $C_a$

The dynamic load carrying capacity is used to compute the nominal fatigue life of roller screws. It corresponds to the axial load, constant in magnitude and direction, concentric with the roller screw axis, under which the calculated nominal fatigue life as defined by ISO 3408-5 reaches one million revolutions.

## Nominal fatigue life $L_{10}$

Nominal fatigue life  $L_{10}$  is, according to the ISO definition, the life attained or exceeded by 90% of a sufficiently large group of identical roller screws, working under identical conditions (alignment, axially and centrally applied load, speed, acceleration, lubrication, temperature and cleanliness).

The nominal life of a roller screw is the statistical number of millions of revolutions which the roller screw is capable of reaching before the first signs of flaking signifying material fatigue occurs on one of the rolling surfaces.

When reliability greater than 90% is required, the calculated nominal life must be corrected. See values for the correction factor in **table 1**. For example, if a reliability of 98% is required,  $L_2 = 0,33 L_{10}$  where  $L_{10}$  is calculated using the formulae in **pages 44 to 50**.

Table 1

| Correction factor for reliability |                   |          |
|-----------------------------------|-------------------|----------|
| Reliability [%]                   | Correction factor | $L_n$    |
| 90                                | 1,00              | $L_{10}$ |
| 95                                | 0,62              | $L_5$    |
| 96                                | 0,53              | $L_4$    |
| 97                                | 0,44              | $L_3$    |
| 98                                | 0,33              | $L_2$    |
| 99                                | 0,21              | $L_1$    |

## Service life

The actual life achieved by a specific roller screw is known as service life. In addition to material fatigue, service life can be reduced by inadequate lubrication, wear, corrosion, contamination and, more generally, loss of the functional characteristics required by the application.

Experience with similar applications will help in selecting the right screw to obtain the desired service life. Structural requirements such as the strength of screw ends and nut attachments should also be considered.

To attain  $L_{10}$  life performance, the maximum cycle operating load  $F_{max}$  should not exceed 80% of  $C_a$  (for SR and SV product assortments) to limit the Hertzian pressure at the rollers/raceways contact points. If  $F_{max}$  exceeds 50% of the  $C_a$  value, please contact your Ewellix representative for validation.

For small strokes (shorter than the nut length) or short oscillations, additional considerations such as the actual total number of loading cycles on any specific area of the shaft, and the false brinelling effect should be taken into account<sup>1)</sup>.

## Equivalent dynamic load $F_m$

The loads acting on the screw can be calculated according to the laws of mechanics if the external forces are known or can be calculated. For product sizing and selection, it is necessary to calculate the equivalent dynamic load: this is the hypothetical load, constant in magnitude and direction, acting axially and centrally on the screw, which, if applied, would have the same influence on the screw life as the actual loading conditions which the screw will be subjected to.

Radial and moment loads must be accommodated by linear guides. It is extremely important to resolve these possible problems early in the design stage. Radial forces are detrimental to the life and expected performance of the screw (→ fig. 2).

Please refer to the chapter entitled Recommendations for assembly.

If misalignment, uneven loading, shock loads, etc. cannot be avoided, they must be taken into account during the sizing of the screw. Their influence on the screw's nominal life can generally be estimated<sup>1)</sup>.

## Basic static load carrying capacity $C_{0a}$

Roller screws should be selected based on the basic static load carrying capacity  $C_{0a}$ , rather than the basic dynamic load carrying capacity, when they are subjected to continu-

ous or intermittent shock loads while operating in stationary conditions for short periods of time.

The permissible load is determined by the permanent deformation caused by the load acting at the contact points. The static load carrying capacity is, according to ISO standards, the purely axially and centrally applied static load which creates, by calculation, a total (rolling element + threaded surface) permanent deformation equal to  $1/10\,000$  of the curvature diameter of the rolling element.

In order to prevent surface damage, to keep smooth running and low noise level, Ewellix recommends that the application loads do not exceed 80% of the static load carrying capacity  $C_{0a}$ , which equals to a static safety factor  $s_0$  of 1,25.

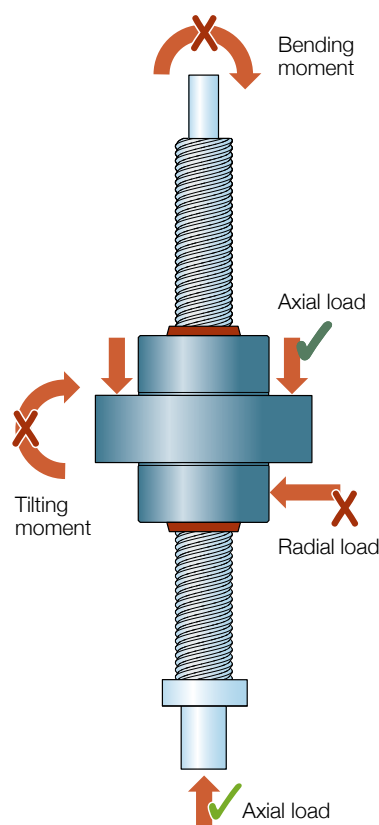
Usually the  $C_{0a}$  value corresponds to a Hertzian contact pressure ranging between 4 500 and 4 800 MPa.

The basic dynamic and static load carrying capacities are related to the material properties, and vary with the material hardness at the contact points. Please refer to the paragraph explaining "materials, heat treatment and coatings" (→ page 26).

The basic static load carrying capacity must be, at a minimum, equal to the product of the maximum applied axial static load and a static safety factor  $s_0$ . Past experience with similar applications and requirements of maximum static load occurrence, running smoothness and noise level will guide the selection of  $s_0$ <sup>1)</sup>.

Fig. 2

Permissible and prohibited loading on roller screw



<sup>1)</sup> For additional information, please contact your local Ewellix representative

For applications requiring high precision, roller screws should operate significantly below the static load carrying capacity, which means operation with a higher value for the static safety factor  $s_0$ .

For heavily loaded applications where precision, noise level and running smoothness are not critical to the performance expectations, roller screws can operate at load levels close to the basic static load carrying capacity. With these conditions, special care must be paid to proper lubrication.

## Critical rotating speed for screw shafts $n_{cr}$

A roller screw with the nut in a given position has a natural frequency of vibration in bending mode. When the screw shaft is rotating, it is important that the rotational speed not excite its natural frequency. If it does, it would result in elastic radial deflection of the shaft. In extreme conditions, without damping, the screw shaft could be bent. The natural frequency of the roller screw changes continuously as the nut moves along the shaft and in relation to the shaft supports. The positive effect of this axial nut displacement is that there is generally no time for the amplitude of the vibration at a given natural frequency to build up.

For calculation of the critical rotating speed, the shaft is the equivalent of a cylinder with an external diameter equal to the root diameter of the thread. The formula uses a parameter whose value is dictated by the mounting of the screw shaft ends, whether the screw shaft end is free, radially supported or fixed.

As a general rule, the nut is not considered to be a support for the screw shaft. Because of the potential inaccuracies in the mounting of the screw assembly, a safety factor of 0,8 is applied to the calculated critical speed.

Calculations where the nut is considered to be a support for the shaft or calculations which reduce the safety factor, require practical tests and possibly optimization of the design.

## Permissible speed limit ( $n_{d0}$ ) and acceleration

The permissible speed limit is the speed that a screw cannot reliably exceed at any time. It corresponds to the limiting speed of the rotation of rollers (SR and ISR types) or of the recirculation of the rollers (SV type) inside the nut. It is expressed as the product of maximum rotational speed  $n$  (r/min) and the nominal diameter  $d_0$  (mm) of the screw shaft. The speed limits quoted in this catalogue are the maximum speeds that may be applied for short periods of time with optimized conditions of alignment, light external load or preload, and with appropriate lubrication.

Permissible speed limits for each technology:

- Planetary roller screw (SR) and inverted roller screw (ISR):  
 $n_{d0} \leq 160\,000$
- Recirculating roller screw (SV):  
 $n_{d1} \leq 30\,000$  for  $d1 \leq 25$  mm  
 $n_{d1} \leq 20\,000$  for  $d1 > 25$  mm

Running a screw continuously at the permissible speed limit may reduce the service life of the nut mechanism.

### Important:

High speeds combined with high loads yield a relatively short nominal life<sup>1)</sup>.

In the case of high accelerations, decelerations or fast movement reversal, Ewellix recommends either working under a nominal external load or applying a light preload to the nut to avoid roller sliding on the shaft.

The preload for screws subjected to high accelerations must be calculated to be sure that the rolling elements do not slide<sup>1)</sup>.

However, excessive preload will generate an unacceptable increase in frictional heat.

Roller screws preloaded for optimum rigidity (PR or PV prefix) should not be operated continuously at high speeds.

Recirculating roller screws should not be operated at permanent high linear speeds or at their maximum speed rating. High speeds will be detrimental to the recirculation cam's life. In addition, noise levels will increase.

<sup>1)</sup> For additional information, please contact your local Ewellix representative

## Efficiency $\eta$

Screw performance depends primarily on the geometry of the contact surfaces, their finish and the helix angle of the thread.

It also depends on the working conditions (load, speed, lubrication, preload, alignment, etc.)

Direct efficiency  $\eta$  is used to define the input torque required to transform the rotation of one component into the translation of another (→ **diagram 2**).

Conversely, indirect efficiency  $\eta'$  is used to define the axial load required to transform the translation of one component into the rotation of another one. It is also used to define the braking torque required to prevent that rotation (→ **diagram 3**).

The reference coefficient of friction  $\mu_{ref}$  would be achievable with perfect operating conditions of lubrication, alignment, etc. and it would result in generating a theoretical direct efficiency  $\eta$ , or a theoretical indirect efficiency  $\eta'$ . Because such laboratory conditions are not encountered with real applications, we define a practical coefficient of friction  $\mu_{prac}$  used to estimate the practical efficiencies  $\eta_p$  and  $\eta'_p$ .

Practical efficiencies range between the starting efficiencies of a newly installed screw and that of a properly run-in screw. These practical values of efficiency are calculated with a practical value for the coefficient of friction  $\mu_{prac}$ .

To account for real installation, running conditions and the experience of real life application, this practical coefficient of friction  $\mu_{prac}$  corresponds to the reference coefficient of friction  $\mu_{ref}$  increased by 30% (→ **diagram 1**).

This calculation method reduces the practical efficiency of the screw versus its theoretical efficiency by about 5%.

Generally, the practical efficiency increases with speed, and over time with running in effect.

### Note:

The helix angle  $\alpha$  can be calculated using formula **page 45**.

Diagram 1

Reference and practical coefficient of friction

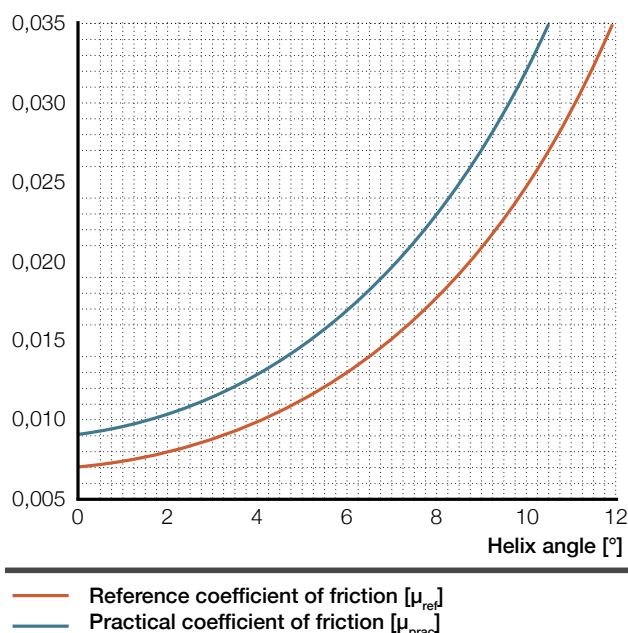


Diagram 2

Theoretical and practical direct efficiency

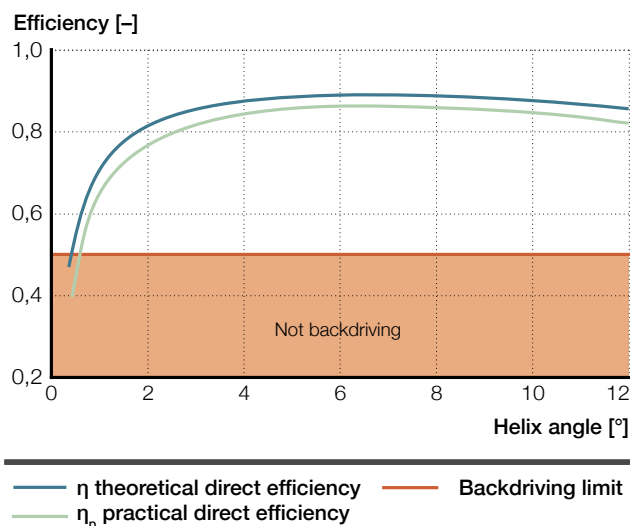
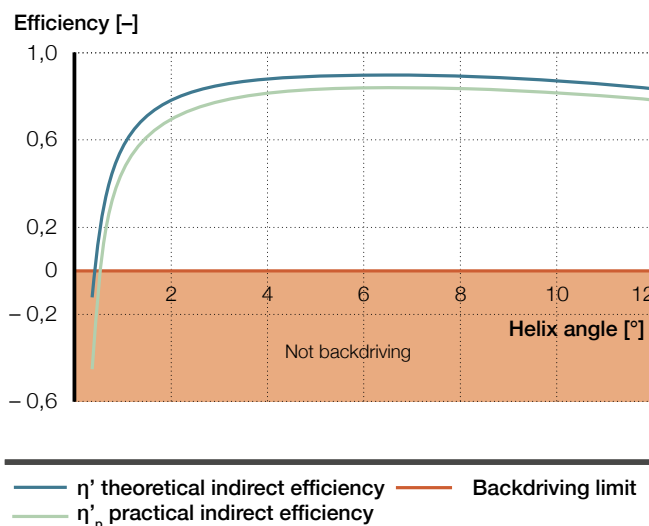


Diagram 3

Theoretical and practical indirect efficiency



## Back-driving and braking torque $T_b$

Except for one specific recirculating roller screw dimension (SV 50x1) and for some specific sizes of inverted roller screws, roller screws are reversible or can be back-driven under most circumstances.

A braking mechanism (gear reducer or brake) must be part of the design if back-driving is to be avoided.

If back-driving is required, special care must be taken to align the whole system. Misalignment significantly increases the coefficient of friction by tilting and, consequently, increases the axial force required to back-drive the mechanism.

### Attention:

Vertical installations and applications presenting a risk of falling loads require special care by designers and users. It is the customer's responsibility to determine the need for back-up locking devices and safety systems.

## Break away torque $T_x$

This is the amount of torque required to overcome the following forces to start rotation:

- **(a)** The total inertia of all moving parts accelerated by the source of power (including rotational and linear movements)
- **(b)** The internal friction of the screw/nut assembly, bearings and associated guidance systems.

In general, the torque required to overcome inertia **(a)** is greater than the friction torque **(b)**. The coefficient of friction  $\mu_s$  for a high-efficiency screw, when it starts moving, is estimated to reach up to twice the amount of the practical dynamic coefficient of friction  $\mu_{prac}$ , under normal operating conditions.

## Driving torque $T_t$

- This is the total torque required from the electric motor to overcome inertia, external forces, preload, friction, etc. Please see calculation formulae on **pages 44 to 50**.

## Static axial stiffness $R_t$

The static axial stiffness of a complete roller screw assembly is the ratio of the external axial load applied to the system and the axial displacement of the face of the nut in relation to the fixed (anchored) end of the screw shaft. The inverse of the system's overall stiffness is equal to the sum of all inverted values of stiffness for each component (screw shaft, roller nut, support bearings, etc.)

Therefore, the overall stiffness of the system is always lower than the lowest value for stiffness of any individual component.

## Nut stiffness $R_n$

When a preload is applied to a nut, the internal play is eliminated. Additionally, the squeeze load responsible for generating the preload creates initial Hertzian elastic deformation at the contact points. This leads to an increase in stiffness proportionate to the preload value.

The theoretical elastic deformation at the contact points does not take into account machining inaccuracies, actual sharing of the load between the different contact surfaces, or elasticity of the nut and screw shaft.

For this reason, two stiffness values are given in the catalogue:

- **$R_{ng}$** : This is the minimum nominal stiffness reached by any nut and roller assembly. This value, based on laboratory measurements, is a practical value and does not require any correction factor. It takes into account production tolerances, actual load sharing, preload torque tolerance, deflection of the nut body, etc. It can be used to calculate the total stiffness during the roller screw selection process.
- **$R_{nr}$** : This value corresponds to the reference nominal stiffness of a nut and roller assembly with all geometrical dimensions centered within the tolerances. It corresponds to the optimum stiffness level.

$R_{nr}$  is always greater than  $R_{ng}$ . Both values are determined by applying an external axial load, centered on the screw shaft and equal to twice the preload force.

## Shaft stiffness $R_s$

The elastic deformation of the screw shaft is proportional to its length and inversely proportional to the square of its root diameter.

According to the relatively low stiffness of the shaft, an increase of the nut preload (and its stiffness) will, in most cases, not increase significantly the overall stiffness of the system.

Consequently, the preload stated in the catalogue for each screw dimension is the maximum and should not be exceeded.

# Materials, heat treatment and coatings

## Choice of steel material

Standard screw shafts are mainly manufactured from pre-treated 50CrMo4 (otherwise 42CrMo4) which is surface hardened by induction. Through hardened 100Cr6 bearing steel is used for nuts and rollers.

100Cr6 can also be selected for the screw shaft for operation at higher temperature up to 180 °C, or if the application presents a concern for wear.

Material properties are detailed in **table 3**.

Stainless steel can be used for all types of roller screws.

Properties offered by these special steel variants are summarized in **table 2**.

Table 2

| Selection of stainless steels |                                         |                      |                               |
|-------------------------------|-----------------------------------------|----------------------|-------------------------------|
| Steel (ISO standard)          | Description                             | Shaft hardness [HRC] | Relative corrosion resistance |
| X105CrMo17                    | Martensitic stainless steel             | 58–60                | **                            |
| X30Cr13                       | Martensitic stainless steel             | 50–55                | ***                           |
| X12CrNiMoV12–3                | Carburizing stainless steel             | 58–60                | ***                           |
| X40CrMoVN16–2                 | Nitrogen stainless steel                | 58–60                | ****                          |
| X5CrNiCuNb16–4                | Precipitation hardening stainless steel | 38–45                | *****                         |
| X17CrNi16–2                   | Martensitic stainless steel             | 40–45                | *****                         |

Table 3

| Selection of standard steels |                    |                                                                        |                                                  |                                       |                                                           |                                                                                  |
|------------------------------|--------------------|------------------------------------------------------------------------|--------------------------------------------------|---------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------|
| Component                    | Steel              | Supplying state                                                        | Heat treatment                                   | Maximum allowed operating temperature | Surface hardness at standard tempering temperature [HRC ] | Customer benefits                                                                |
| Standard shaft               | 50CrMo4 or 42CrMo4 | Pre-treated Tensile strength 880 to 1 030 MPa Yield strength > 650 MPa | Induction hardening                              | 110 °C                                | 58 to 60                                                  | Good wear resistance Resilience                                                  |
| Standard shaft on request    | 50CrMo4            | Pre-treated Tensile strength 880 to 1 030 MPa Yield strength > 650 MPa | Induction hardening Higher tempering temperature | 150 °C                                | 58 to 60                                                  | Good wear resistance and medium temperature operation Resilience                 |
| Special shaft                | 100Cr6             | Pre-treated Tensile strength 840 to 970 MPa Yield strength > 500 MPa   | Induction hardening                              | 180 °C                                | 59 to 63                                                  | Higher wear resistance, adapted to higher operating temperature but more brittle |
| Nut & rollers                | 100Cr6             | Annealed                                                               | Through hardening                                | 180 °C                                | 58 to 62                                                  | Good wear resistance and high temperature operation                              |

## Effect of surface hardness on roller screw basic load rating

According to the ISO reference calculations, the load ratings provided in the catalogue are given for surface hardness above 654 HV (58 HRC). For materials or treatments resulting in a lower hardness, correction factors should be applied to the dynamic and static load carrying capacities:

$$C_{a \text{ corrected}} = C_a \left( \frac{HV_{\text{actual}}}{654} \right)^2$$

$$C_{0a \text{ corrected}} = C_{0a} \left( \frac{HV_{\text{actual}}}{654} \right)^3$$

### Note:

654 HV is equivalent to 58 HRC

## Surface coatings

Ewellix offers various types of surface coatings for improved roller screw performances:

- Manganese phosphate coating of carbon steels to improve corrosion resistance
- Low friction coating is available on request<sup>1)</sup>.

## Operating temperature

Operating at high temperatures will lower the steel hardness, alter the thread accuracy, may increase the oxidation of the materials and change the lubricant properties.

With operating temperature lower than -20 °C, the core resilience of the material can become critical. The lower the temperature, the more brittle the material becomes, especially with a long or thin screw shaft. Bending stresses or shock loads increase the risk of fractures.

Applications with high cycling rates and high loads can generate excessive amounts of heat. To eliminate excess heat, Ewellix can provide a nut mechanism, with cooling chambers. When connected to a customer supplied water circulation system, temperatures can be stabilized, enabling higher cycling rates and increased productivity.

## Screw shaft buckling or column strength $F_c$

The column loading of a screw shaft must be checked when it is subjected to dynamic or static compression loading.

The maximum permissible compressive load is calculated using the Euler formulae, with a safety factor of 3 to 5, depending on the application. The type of shaft end mounting is critical for selecting the proper coefficient to be used in the Euler formulae.

When the screw shaft has a single diameter along its total length, the root diameter of the threaded shaft is used for the calculation. When the screw shaft comprises different sections with varying diameters, calculation becomes more complex<sup>1)</sup>.



*Through hardening treatment*

<sup>1)</sup> For additional information, please contact your local Ewellix representative

## Shaft design

It is possible to deliver screws with one end larger than the shaft outside diameter  $d_1$ . This design feature is frequently used in conjunction with support bearings with large bore diameter.

To grind the thread efficiently, an undercut with root diameter  $d_2$  and length  $l_2$  is needed (→ fig. 3 and table 4).

### Designing the screw shaft ends

Customers designing their screw shaft ends are responsible for checking their strength against static and dynamic operating conditions.

The simple approach considers the shaft end diameters. Stress concentration factors must be used.

Zone A must be checked for strength against torsion and zone B must be checked for strength against torsion and tension (→ fig. 4).

#### Important:

Application loads reaching the basic load rating  $C_a$  generate very high mechanical stresses on the shaft ends. Ewellix strongly recommends that shaft ends be calculated with extreme care for such applications.

Table 4

| Type of roller screw       | Design conditions                                                                         | Value for $l_2$                                  |
|----------------------------|-------------------------------------------------------------------------------------------|--------------------------------------------------|
| SR, BR, PR, HR, SRR        | $d_3 \leq 1,85 d_1$<br>Lead $P_h \leq 8$ mm                                               | $l_2 \geq 12$ mm                                 |
|                            | $d_3 \leq 1,85 d_1$<br>Lead $P_h > 8$ mm                                                  | $l_2 \geq 1,4 P_h$                               |
| SV, BV, PV                 | $d_3 \leq 1,85 d_1$<br>Lead $P_h = 1$ mm                                                  | $l_2 \geq 12$ mm                                 |
|                            | $d_3 \leq 1,85 d_1$<br>Sizes $d_0 P_h = 40 \times 2$ or $50 \times 2$ or $63 \times 2$ mm | $l_2 \geq 12$ mm                                 |
|                            | $d_3 \leq 1,85 d_1$<br>All other types of recirculating roller screws                     | $l_2 \geq 14$ mm                                 |
| All types of roller screws | $d_3 > 1,85 d_1$                                                                          | Please contact your local Ewellix representative |

Fig. 3

Shaft design with shoulder

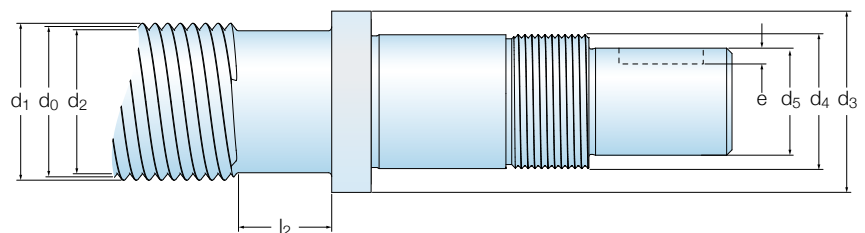
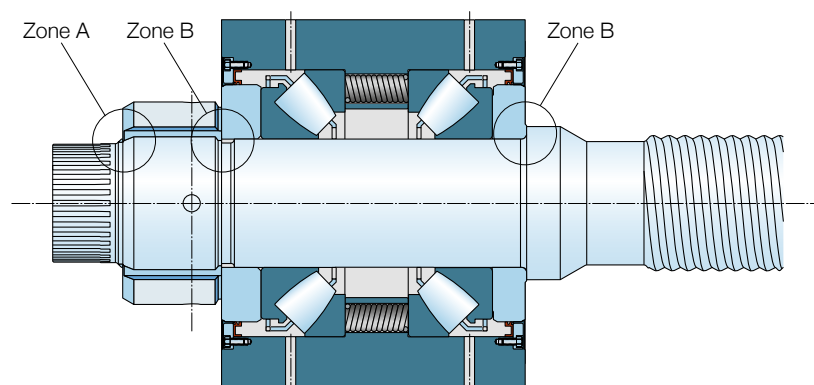


Fig. 4

Shaft end with support bearing



## Zone A: Torsion only

The nominal shear stress  $\tau$  caused by the input torque  $T$  is given by:

$$\tau = \frac{16\,000\,T}{\pi d_5^3}$$

This value is increased by a stress concentration factor  $f_4$  to give the real shear stress  $\tau_p$

$$\tau_p = f_4 \tau$$

According to von Mises, the total stress  $\sigma_t$

$$\sigma_t = 1,73 \tau_p$$

For safety,  $\sigma_t$  should be less than 67% of the yield strength.

If the end diameter  $d_5$  includes a key-way of depth  $e$ , calculate using  $(d_5 - e)$  instead of  $d_5$ .

The angle of twist of the screw shaft is given by

$$\Theta = \frac{7,48\,T\,l}{d_0^4}$$

where

$l$  = length between motor and nut

The linear positioning error,  $\delta$ , caused by this twist is

$$\delta = \frac{P_h \Theta}{360}$$

### Note:

Stress concentration factors  $f_4$  and  $f_5$  are available in all general mechanical literature.

### Units:

$d$ : mm

$\tau$ : N/mm<sup>2</sup> [MPa]

$\sigma$ : N/mm<sup>2</sup> [MPa]

$\Theta$ : degree [°]

$\delta$ : mm

$F$ : N

## Zone B: Axial + torsional stresses

The nominal axial stress caused by the axial load  $F$  is given by

$$\sigma = \frac{4\,F}{\pi d_4^2}$$

This value is increased by a stress concentration factor  $f_5$  to give the real principal stress  $\sigma_p$

$$\sigma_p = f_5 \sigma$$

As for zone A calculation

$$\tau_p = f_4 \tau$$

According to von Mises, the total stress  $\sigma_t$

$$\sigma_t = (\sigma_p^2 + 3 \tau_p^2)^{1/2}$$

For safety,  $\sigma_t$  should be less than 67% of the yield strength.

## Product inspection and certification

Standard or special inspection reports or certificates can be provided on request. The following reports can be supplied with roller screws:

1. Conformity with customer specifications (fl. EN 10204)
2. Conformity with catalogue specifications (fl. EN 10204)
3. List of manufacturing and control operations
4. Preload torque curve or internal friction torque curve
5. Lead precision curve
6. Matching of travel deviation
7. Stiffness curve
8. Raw material chemical analysis
9. Magnetic particle inspection
10. Through hardening heat treatment
11. Induction hardening
12. Carburizing hardening
13. Surface treatment
14. Report for specific dimensions
15. FAIR (First Article Inspection Report) EN9102

## Working environment

As a stand-alone component, the roller screws cannot be ATEX certified.

Use of roller screws for an application in a potentially explosive environment shall be related to a technical file deposit according to european directives relative to ATEX.

# Axial play and preload

## Axial play and preload

Standard roller screws are manufactured with axial play which varies between 0,02 mm and a maximum of 0,1 mm, depending on product size.

Roller screws can be manufactured without backlash or with preload (→ [table 8](#)).

For optimum stiffness and positioning accuracy during reversal of loading direction, or during operation with low external load, internally preloaded nuts are recommended. Under these conditions, preloaded nuts exhibit a much lower axial deflection and much higher stiffness than non-preloaded nuts.

All preloaded roller screws (PR and PV types) are run in before delivery to the customer. This process stabilizes preload and stiffness and virtually eliminates backlash over the service life of the screw.

## Preload and stiffness

Typical load/deflection curves for four different nut designs are shown in **diagram 10**:

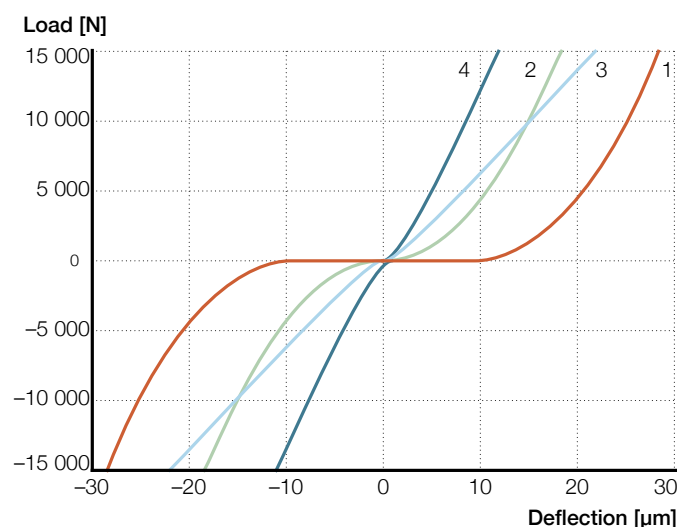
- Curve #1: Single nut with axial play
- Curve #2: Single nut without backlash
- Curve #3: Preloaded split nut
- Curve #4: Preloaded double nut

Table 8

| Nut type |                                                      |
|----------|------------------------------------------------------|
| Prefix   | Internal nut design                                  |
| SR       | Planetary roller screw with axial play               |
| BR       | Planetary roller screw without backlash              |
| PR       | Planetary roller screw with preloaded split nut      |
| PRM      | Planetary roller screw with preloaded double nut     |
| SV       | Recirculating roller screw with axial play           |
| BV       | Recirculating roller screw without backlash          |
| PV       | Recirculating roller screw with preloaded split nut  |
| PVM      | Recirculating roller screw with preloaded double nut |

Diagram 10

Load/deflexion curve for different nut types



The effect of the internal preload in a split nut is shown in **figure 6**. A squeeze load  $F_q$  is applied to the two halves of a split nut. With a precisely ground and calibrated spacer, this squeeze load  $F_q$  generates the internal preload force  $F_{pr}$ .

The application of an external load  $F$  on a preloaded split nut results in different load values on each half of the nut (→ **fig. 7**).

The relative load distribution on the two halves of the preloaded split nut can be described by the **figure 8**:

- At point A: without external load  $F$ , the two nut halves are in equilibrium under preload  $F_{pr}$  (→ **fig. 6**)
- At point B: with external load  $F$  applied to nut half #2 (→ **fig. 7**), the axial force taken by nut half #2 increases to value  $F_2$ , and the preload of nut half #1 is reduced to value  $F_1$ . For all situations where  $F \leq 2,83 F_{pr}$ , the load seen by nut half #2 is greater than the external load. Therefore, increasing the preload would reduce the life of the screw
- At point C, where external load  $F = 2,83 F_{pr}$ , the axial load taken by nut half #2 is equal to  $F$ . At this point, nut half #1 becomes unloaded
- At point D, with  $F = 2,83 F_{pr}$  applied to nut half #1, nut half #2 becomes unloaded.

For a given system, the level of the preload force  $F_{pr}$  corresponds to a few percentage points of its dynamic load carrying capacity  $C_a$ .

With a preloaded split nut design, the external load is taken by one of the two nut halves for a given external load direction. Under high loads, the load carrying capacity and maximum stiffness level of a preloaded split nut are substantially lower than for a one-piece nut. Under low load conditions, a preloaded split nut eliminates backlash and increases the degree of stiffness.

Fig. 6

*Preload in a split nut without external load*

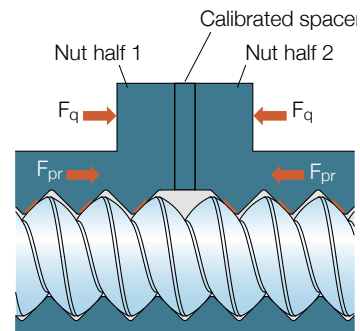
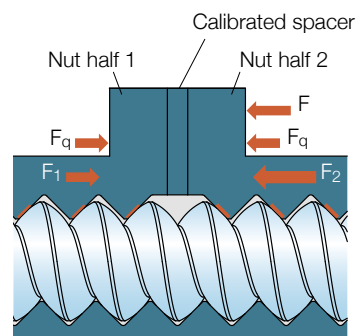


Fig. 7

*Preloaded split nut with external force*



Running in bench

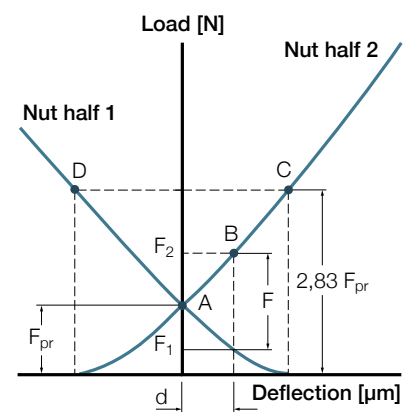


Preload torque test bench



Fig. 8

*Concept of preloaded nut*



Because of the very high load capacity and stiffness of roller screws, a split nut usually offers sufficient capacity for most applications and offers an extremely compact design.

In exceptional cases where the load rating of a preloaded split nut is not sufficient, two single nuts may be preloaded together (→ **fig. 9**). Exact dimensions are available on request by contacting Ewellix.

## Preload torque $T_{pr}$

Preload torque  $T_{pr}$  is the friction torque resulting from the sole preload force  $F_{pr}$ , and is calculated considering the practical efficiency of the selected screw (see calculation formulae **pages 44 to 50**).

## Preload torque tolerances

For preloaded roller screws, an optimum preload torque  $T_{pr}$  has been calculated and is provided in the product tables.

These values correspond to a compromise between the stiffness level and the preload force applied. A higher preload torque would penalize the driving torque, potentially decrease the product life and could generate additional heat, whereas a lower preload torque would decrease the level of stiffness. For specific cases where a different preload torque is required, please contact your local Ewellix representative.

The variation tolerance of preload torque along a screw shaft depends on:

- The helix angle of the screw thread
- The slenderness of the screw shaft (i.e. the ratio  $l_1/d_0$  of threaded length over nominal diameter)
- The lead precision
- The preload torque range.

**Tables 9 and 10** give the tolerances for preload torque variation, with screw thread helix angle less than  $11^\circ$ , and greater than  $11^\circ$  respectively.

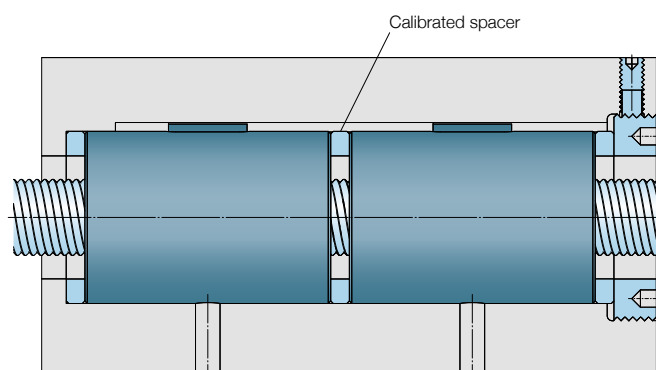
Preload torque is measured at 50 r/min with ISO 68 oil grade for BR and PR screw types and with ISO 220 oil grade for BV and PV screw types.

### Note:

The helix angle  $\alpha$  can be calculated using formulae in **page 45**.

**Fig. 9**

*Double nut with preload*



Example:

Screw PRU 39 x 5R 433/780 G3 WPR has been selected.

According to the information in the product tables, the preload torque is  $T_{pr} = 1,3 \text{ Nm}$ . What is the tolerance of preload torque for G3 lead precision?

The helix angle is  $2,34^\circ$  and the threaded length is 433 mm ( $l_1/d_0 = 11,1 < 40$ ).

**Table 9** gives a variation tolerance of  $\pm 20\%$  for G3. All screws will exhibit a friction torque of  $1,3 \text{ Nm} \pm 20\%$  or 1,04 to 1,56 Nm.

The corresponding minimum nominal nut stiffness is  $R_{ng} = 750 \text{ N}/\mu\text{m}$ , and the nominal reference nut stiffness is  $R_{nr} = 980 \text{ N}/\mu\text{m}$ .

**Diagram 11** presents the above calculated ranges and a typical torque variation measurement. Preload torque or internal friction torque certificates can be supplied on request.

Table 9

Tolerance of preload torque for screws with  $\alpha < 11^\circ$

| $T_{pr}$ over Nm | incl. | G1<br>$l_1/d_0 \leq 40$ and $l_1 \leq 4\,000$<br>$\pm\%$ | G3 | G5 | G1<br>$40 < l_1/d_0 \leq 60$ and $l_1 \leq 4\,000$ | G3 | G5 |
|------------------|-------|----------------------------------------------------------|----|----|----------------------------------------------------|----|----|
| 0                | 0,2   | 35                                                       | 40 | 50 | 40                                                 | 50 | 60 |
| 0,2              | 0,6   | 25                                                       | 30 | 35 | 30                                                 | 35 | 40 |
| 0,6              | 1,0   | 20                                                       | 25 | 30 | 25                                                 | 30 | 35 |
| 1,0              | 2,5   | 15                                                       | 20 | 25 | 20                                                 | 25 | 30 |
| 2,5              | 6,3   | 10                                                       | 15 | 20 | 15                                                 | 20 | 25 |
| 6,3              | 10,0  | 10                                                       | 10 | 15 | 15                                                 | 15 | 20 |

Table 10

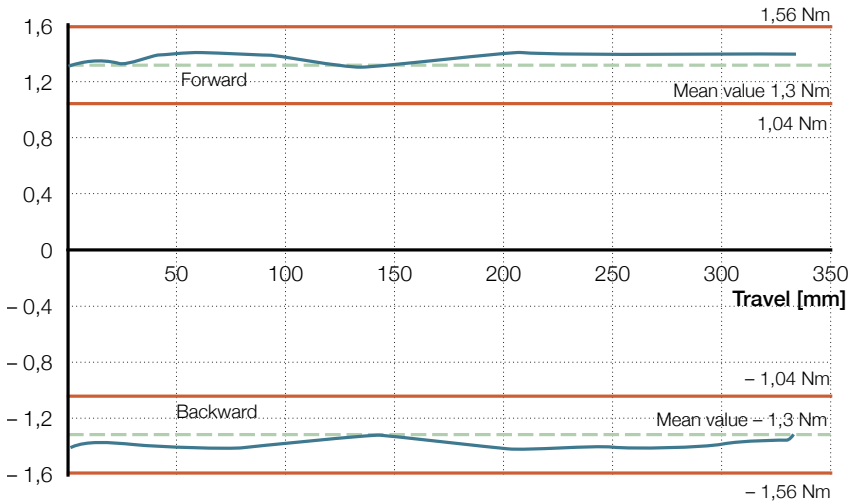
Tolerance of preload torque for screws with  $\alpha \geq 11^\circ$

| $T_{pr}$ over Nm | incl. | G3<br>$l_1 \leq 2\,000$<br>$\pm\%$ | G5 | G3<br>$2\,000 < l_1 \leq 4\,000$ | G5 |
|------------------|-------|------------------------------------|----|----------------------------------|----|
| 0                | 10,0  | 70                                 | 80 | 80                               | 90 |

Planetary roller screws preloaded for optimum stiffness with  $\alpha \geq 11^\circ$  are not available with G1 lead precision

Diagram 11

Preload torque measurement graph



— Example of measurement record for a PRU 39 x 5R 433/780 G3 WPR

# Preload adjustment

## Cylindrical nuts

For cylindrical nuts with preload, the stoppers threaded into the housing must be tightened according to the torque values listed in **table 11** for PRU planetary roller screws (→ **fig. 12**), and in **table 12** for PVU recirculating roller screws (→ **fig. 13**).

Note that torque values in **tables 11** and **12** also apply to single piece nuts such as SRC/BRC (→ **fig. 10**) and SVC/BVC (→ **fig. 11**) nut types respectively.

Standard nuts are made of bearing steel hardened to 58 to 62 HRC. Under certain load conditions, it is necessary to use hardened and ground spacers to avoid imbedding the nut side face into the housing shoulder and into the stopper clamping area. This precautionary measure will diminish the risk that preload and stiffness are reduced.

## Flanged nuts

For flanged nuts with preload, the fixing bolts must be tightened according to the torque values listed in **table 13** for PRK planetary roller screws and PVK recirculating roller screws. (→ **fig. 14**).

SRC/BRC

Fig. 10

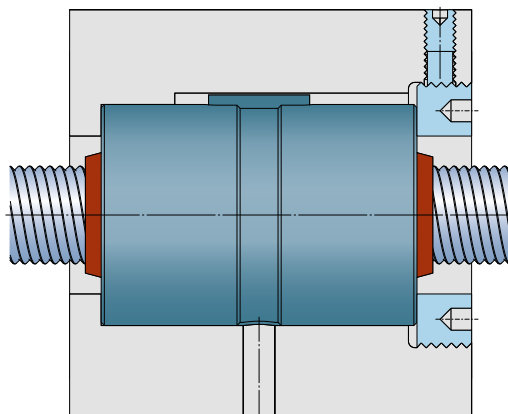
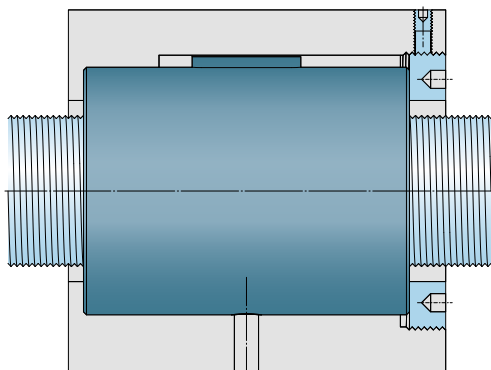


Fig. 11

SVC/BVC



PRU

Fig. 12

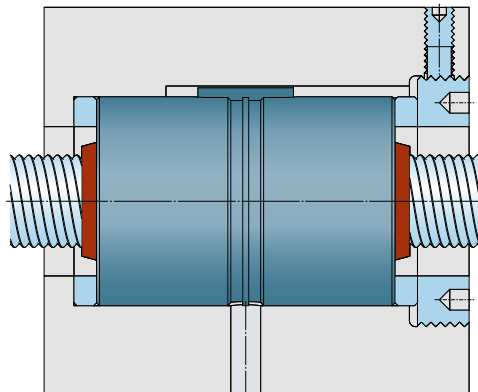
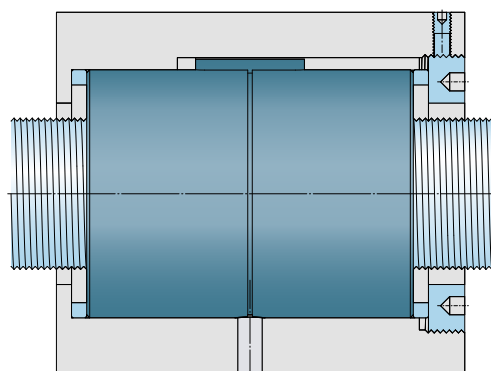


Fig. 13

PVU



PRK/PVK

Fig. 14

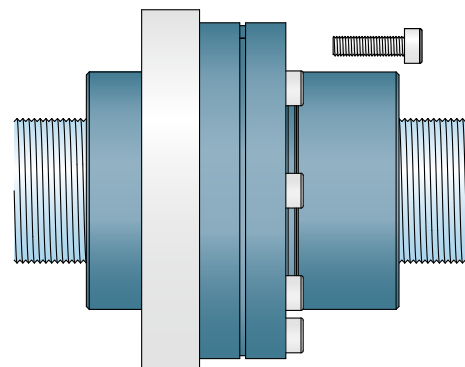


Table 11

SRC/BRC/PRU

| Nominal diameter     | Housing stopper thread | Tightening torque | Squeeze load |
|----------------------|------------------------|-------------------|--------------|
| d <sub>0</sub><br>mm |                        | Nm                | N            |
| 8                    | 30 M1,0                | 20                | 2 700        |
| 12                   | 35 M1,0                | 35                | 4 100        |
| 15                   | 40 M1,0                | 45                | 4 600        |
| 21                   | 50 M1,0                | 65                | 5 500        |
| 25                   | 60 M1,0                | 80                | 5 500        |
| 30                   | 70 M1,5                | 100               | 5 900        |
| 39                   | 90 M1,5                | 140               | 6 400        |
| 44                   | 88 M1,5                | 160               | 7 600        |
| 48                   | 110 M1,5               | 180               | 6 800        |
| 60                   | 130 M2,0               | 230               | 7 400        |
| 64                   | 125 M2,0               | 250               | 8 300        |
| 75                   | 158 M2,0               | 310               | 8 200        |
| 80                   | 148 M2,0               | 340               | 9 600        |
| 99                   | 215 M2,5               | 440               | 8 500        |
| 120                  | 230 M2,5               | 550               | 9 950        |
| 150                  | 340 M2,5               | 730               | 8 950        |

Table 12

SVC/BVC/PVU

| Nominal diameter     | Housing stopper thread | Tightening torque | Squeeze load |
|----------------------|------------------------|-------------------|--------------|
| d <sub>1</sub><br>mm |                        | Nm                | N            |
| 8                    | 25 M1,0                | 20                | 3 250        |
| 10                   | 27 M1,0                | 27                | 4 000        |
| 12                   | 30 M1,0                | 35                | 4 800        |
| 16                   | 35 M1,0                | 48                | 5 600        |
| 20                   | 40 M1,0                | 62                | 6 400        |
| 25                   | 47 M1,0                | 82                | 7 200        |
| 32                   | 60 M1,0                | 110               | 7 600        |
| 40                   | 75 M1,5                | 145               | 8 000        |
| 50                   | 87 M1,5                | 300               | 9 000        |
| 63                   | 108 M2,0               | 300               | 9 600        |
| 80                   | 146 M2,0               | 335               | 9 500        |
| 100                  | 185 M2,5               | 440               | 9 900        |
| 125                  | 230 M2,5               | 580               | 10 000       |

Table 13

PRK/PVK

| Nominal diameter     | Number of screws | Screw size | Tightening torque |
|----------------------|------------------|------------|-------------------|
| d <sub>0</sub><br>mm |                  |            | Nm                |
| 8                    | 6                | M4         | 3                 |
| 10                   | 6                | M4         | 3                 |
| 12                   | 6                | M4         | 3                 |
| 15                   | 6                | M5         | 6                 |
| 16                   | 6                | M4         | 3                 |
| 20                   | 6                | M5         | 6                 |
| 21                   | 6                | M5         | 6                 |
| 25 (PRK)             | 6                | M6         | 10                |
| 25 (PVK)             | 6                | M5         | 6                 |
| 30                   | 6                | M8         | 25                |
| 32                   | 6                | M6         | 10                |
| 36                   | 6                | M8         | 25                |
| 39                   | 6                | M10        | 50                |
| 40                   | 6                | M8         | 25                |
| 44                   | 6                | M10        | 50                |
| 48                   | 6                | M12        | 80                |
| 50                   | 6                | M10        | 50                |
| 56                   | 6                | M12        | 80                |
| 60                   | 6                | M16        | 200               |
| 63                   | 6                | M12        | 80                |
| 64                   | 6                | M16        | 200               |
| 80                   | 8                | M16        | 200               |
| 100                  | 12               | M16        | 200               |
| 125                  | 12               | M18        | 270               |

# Lead precision and manufacturing tolerances

## Lead precision

Generally speaking, the precision indicated defines the lead precision class that complies with ISO 3408–3, e.g. G1, G3 and G5 (→ **tables 14 and 15**).

Standard lead precision is G5. On request, Ewellix can deliver roller screws with G3 or G1 lead precision.

A roller screw lead precision class is primarily defined by the maximum permitted travel variation  $V_{300p}$  over a threaded length of 300 mm (→ **table 14**).

Lead precision characteristics are defined by the permitted lead error  $e_p$ , and the permitted travel variation  $V_{up}$ , measured at 20 °C over the useful stroke  $l_u$  (→ **tables 15, 16 and fig. 15**).

Some customer applications require a travel compensation  $c$  to account for the effect of operating temperature on the lead precision: a temperature variation by 1 °C results in dimensional change of 11,5 µm/m of screw shaft length. Consequently, if needed, a travel compensation  $c$  can be achieved.

- Standard case with  $c = 0$  (→ **fig. 16**)
- Case with customer specific value of  $c$  (→ **fig. 17**)

Lead precision graphs can be supplied on request.

**Table 14**

Maximum permitted travel variation over 300 mm

| G1<br>$V_{300p}$<br>µm | G3<br>$V_{300p}$ | G5<br>$V_{300p}$ |
|------------------------|------------------|------------------|
| 6                      | 12               | 23               |

**Table 15**

Travel deviation and maximum permitted travel variation over the useful travel  $l_u$

| $l_u$<br>over<br>mm | incl. | G1          |          | G3    |          | G5    |          |
|---------------------|-------|-------------|----------|-------|----------|-------|----------|
|                     |       | $e_p$<br>µm | $V_{up}$ | $e_p$ | $V_{up}$ | $e_p$ | $V_{up}$ |
| 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       | 32    | 29       |
| 630                 | 800   | 10          | 8        | 18    | 16       | 36    | 31       |
| 800                 | 1 000 | 11          | 9        | 21    | 17       | 40    | 34       |
| 1 000               | 1 250 | 13          | 10       | 24    | 19       | 47    | 39       |
| 1 250               | 1 600 | 15          | 11       | 29    | 22       | 55    | 44       |
| 1 600               | 2 000 | 18          | 13       | 35    | 25       | 65    | 51       |
| 2 000               | 2 500 | 22          | 15       | 41    | 29       | 78    | 59       |
| 2 500               | 3 150 | 26          | 17       | 50    | 34       | 96    | 69       |
| 3 150               | 4 000 | 32          | 21       | 62    | 41       | 115   | 82       |
| 4 000               | 5 000 |             |          | 76    | 49       | 140   | 99       |
| 5 000               | 6 300 |             |          |       |          | 170   | 119      |

**Table 16**

Useful travel

| Type of roller screw       | Useful travel<br>$l_u = \text{threaded length} - 2 l_e$ where |
|----------------------------|---------------------------------------------------------------|
| Planetary roller screw     | $l_e = 1 \times \text{lead}$                                  |
| Recirculating roller screw | $l_e = 5 \times \text{lead}$                                  |



## Symbols used in figures

|              |                                                                                              |
|--------------|----------------------------------------------------------------------------------------------|
| $l_u$        | useful travel                                                                                |
| $l_e$        | excess travel (no lead precision required)                                                   |
| $l_m$        | actual mean travel (line which best fits the actual travel curve by method of least squares) |
| $l_0$        | nominal travel                                                                               |
| $l_s$        | specified travel                                                                             |
| $c$          | travel compensation (difference between $l_s$ and $l_0$ to be defined by the customer)       |
| $e_p$        | permitted mean travel deviation (lead error) over the specified travel                       |
| $e_a$        | actual (measured) mean travel deviation over the specified travel                            |
| $V$          | travel variation (or permissible band width)                                                 |
| $V_{300p}$   | maximum permitted travel variation over 300 mm                                               |
| $V_{up}$     | maximum permitted travel variation over the useful travel                                    |
| $V_{300a}$   | measured travel variation over 300 mm                                                        |
| $V_{ua}$     | measured travel variation over $l_u$                                                         |
| $V_{2\pi p}$ | maximum permitted travel variation within $2\pi$ rad                                         |
| $V_{2\pi a}$ | actual travel variation measured within $2\pi$ rad                                           |

Definition of lead error measurement

Fig. 15

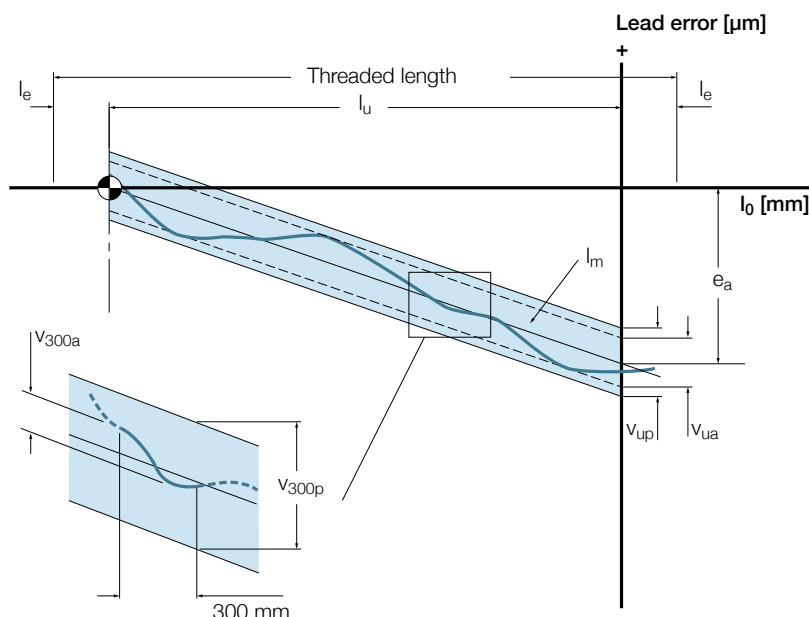


Fig. 16

Case without travel compensation

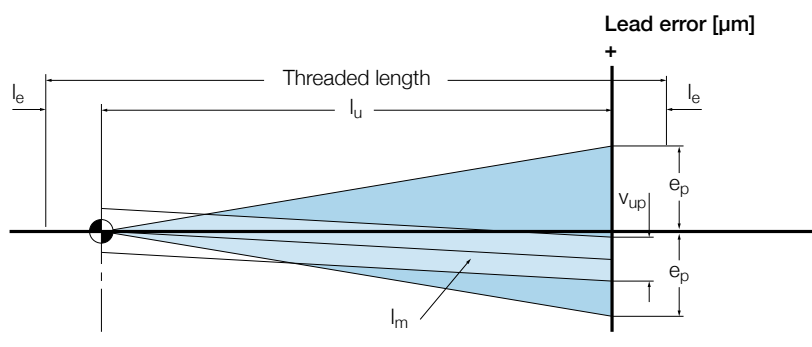
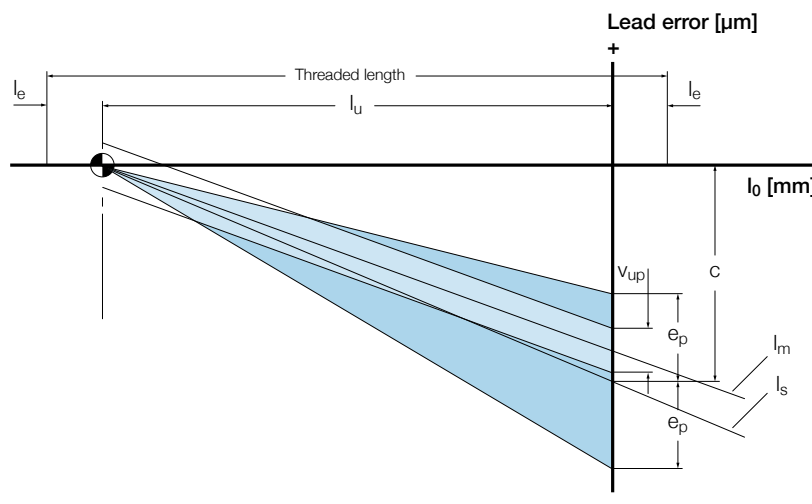


Fig. 17

Case with negative travel compensation



## Permissible travel variation $V_{2\pi p}$ within $2\pi$ rad (one revolution)

The maximum permissible travel variation  $V_{2\pi p}$  over one revolution can be an important parameter for some very high precision applications.

This lead precision parameter  $V_{2\pi p}$  is explained in **figure 18**. Values in accordance with ISO standards 3408-3 are provided in **table 17**.

On request, Ewellix can measure and provide the actual travel variation  $V_{2pa}$  over one revolution, for nominal screw diameters up to 40 mm and screw lengths up to 1 000 mm.

## Matching of travel deviation for screws working in parallel

When 2 or more screws are used together in parallel on one piece of equipment, it's often important to match their lead deviations.

A value M is defined as the maximum difference between the mean travel of any screw in a set. In cases where three or more screws are installed, M represents the maximum difference between the two most extreme mean travels of the set of screws (→ **table 18**).

**Figure 19**, **figure 20** and **figure 21** represent 3 typical application examples.

Table 17

Maximum permitted travel variation within  $2\pi$  rad

| Lead precision grade | $V_{2\pi p}$<br>μm |
|----------------------|--------------------|
| –                    | –                  |
| G1                   | 4                  |
| G3                   | 6                  |
| G5                   | 8                  |

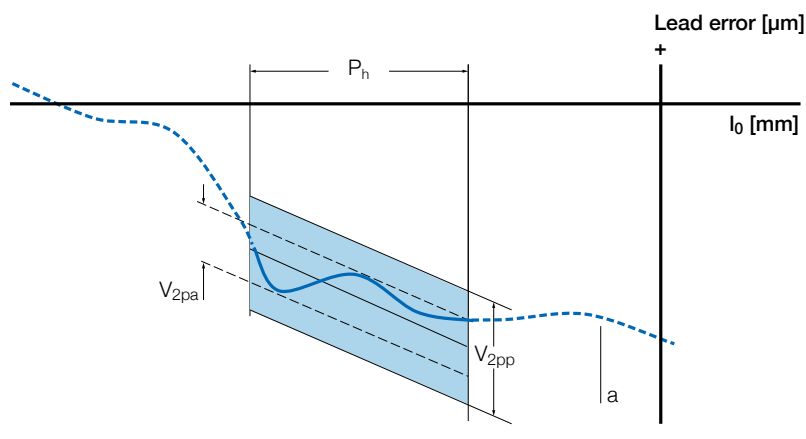
Table 18

Maximum mean travel deviation

| Numbers of screws in a set | M<br>μm      |
|----------------------------|--------------|
| 2                          | $V_{up}$     |
| > 2                        | $1,5 V_{up}$ |

Fig. 18

Travel deviation within  $2\pi$ rad



a is actual travel deviation

### Example 1

Two planetary roller screws of type SRC 25 x 5R 700/900 G3 Z WPR with lead precision G3 are working in parallel.

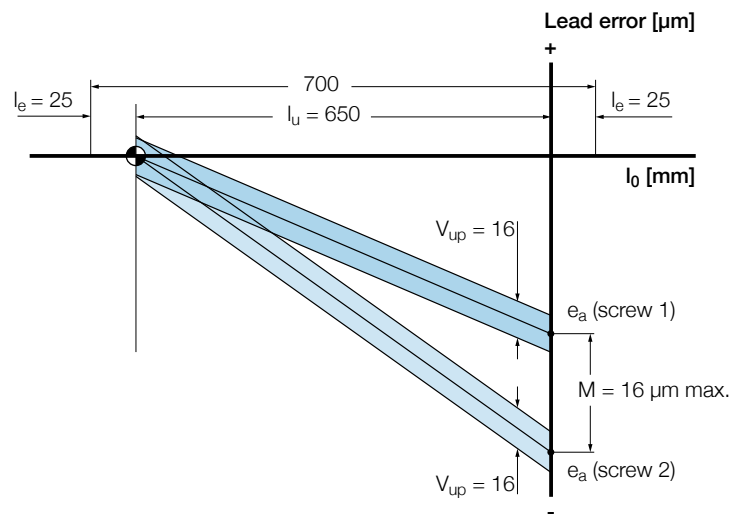
$$e_p = 18 \mu\text{m}$$

$$V_{up} = 16 \mu\text{m}$$

$$M = V_{up} = 16 \mu\text{m}$$

Example 1: Two matched screws

Fig. 19



### Example 2

Two planetary roller screws of type SRC 25 x 5R 700/900 G3 Z WPR with lead precision G3 are working in parallel. The zero position is regulated at the middle position of the travel of the nut.

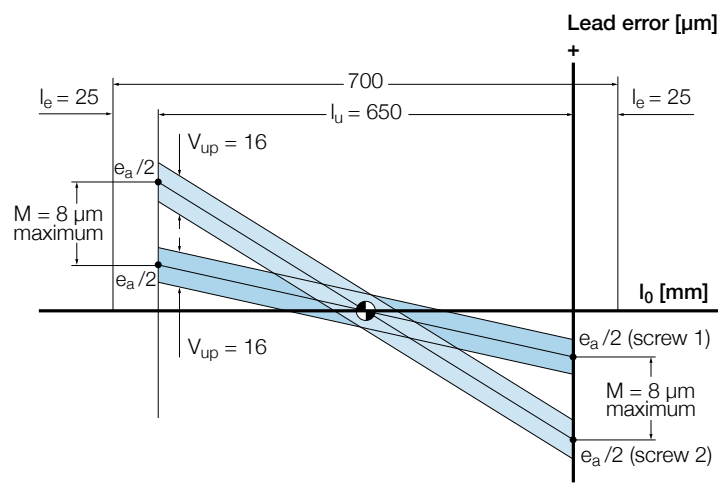
$$e_p = 18 \mu\text{m}$$

$$V_{up} = 16 \mu\text{m}$$

$$M = V_{up} / 2 = 8 \mu\text{m}$$

Example 2: Two matched screws with centered zero position

Fig. 20



### Example 3

Four planetary roller screws of type SRC 25 x 5R 700/900 G3 Z WPR with lead precision G3 are working in parallel.

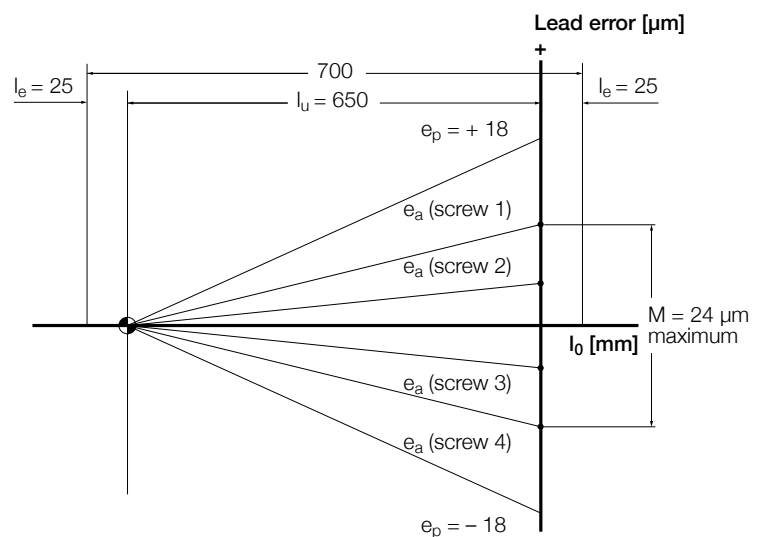
$$e_p = 18 \mu\text{m}$$

$$V_{up} = 16 \mu\text{m}$$

$$M = 1,5 V_{up} = 24 \mu\text{m}$$

Example 3: Four matched screws

Fig. 21



## Manufacturing tolerances

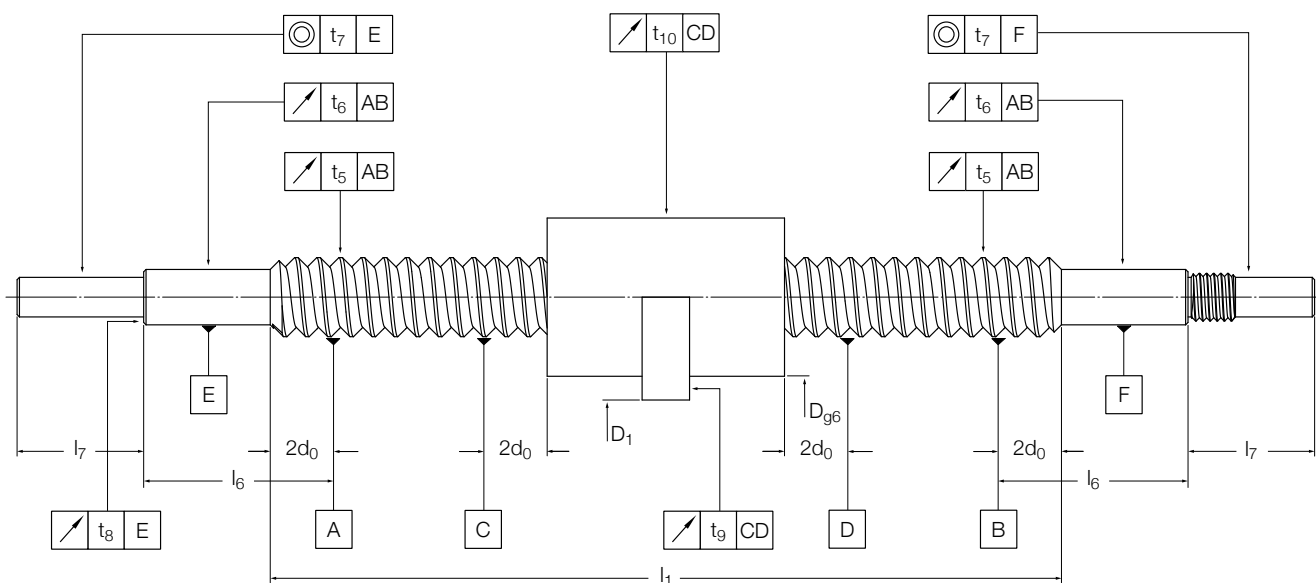
Parameters other than lead precision correspond in standard to class 5 of ISO 3408-3. If the application requires special tolerances, ISO class 3 or ISO class 1, please specify these requirements in the inquiry.

Please refer to **figure 22** and:

- **Tables 19 to 23** for manufacturing tolerances class 5
- **Tables 24 to 28** for manufacturing tolerances class 3
- **Tables 29 to 33** for manufacturing tolerances class 1

Fig. 22

Manufacturing tolerances



### Shaft:

- $t_5$ : straightness
- $t_6$ : radial run-out of journal diameter
- $t_7$ : concentricity of ends/journal diameter
- $t_8$ : axial run-out of bearing support face

### Nut:

- $t_9$ : axial run-out of the nut flange face
- $t_{10}$ : radial run-out of the nut diameter/screw

## Manufacturing tolerances class 5

Table 19

| Nominal diameter    |       | Threaded length $l_1$     | Tolerance                                                 |
|---------------------|-------|---------------------------|-----------------------------------------------------------|
| $d_0$<br>over<br>mm | incl. | $l_{1 \text{ ref}}$<br>mm | if $l_1 \leq l_{1 \text{ ref}}$<br>$t_5$<br>$\mu\text{m}$ |
| 6                   | 12    | 320                       | 32                                                        |
| 12                  | 25    | 640                       | 32                                                        |
| 25                  | 50    | 1 260                     | 32                                                        |
| 50                  | 100   | 2 520                     | 32                                                        |
| 100                 | 200   | 5 000                     | 32                                                        |
| 200                 |       | 1)                        | 1)                                                        |

Table 20

| Ratio                                           | Tolerance              |
|-------------------------------------------------|------------------------|
| if $l_1 > l_{1 \text{ ref}}$<br>$l_1/d_0$ ratio | $t_5$<br>$\mu\text{m}$ |
| $\leq 40$                                       | 64                     |
| $\leq 60$                                       | 96                     |
| $\leq 80$                                       | 160                    |
| $\leq 100$                                      | 256                    |

Table 21

| Nominal diameter    |       | Tolerances             |                      |                   |                      |       |
|---------------------|-------|------------------------|----------------------|-------------------|----------------------|-------|
| $d_0$<br>over<br>mm | incl. | $t_6$<br>$\mu\text{m}$ | $t_{6 \text{ mini}}$ | $t_7$             | $t_{7 \text{ mini}}$ | $t_8$ |
| 6                   | 20    | $0,25 \times l_6$      | 20                   | $0,10 \times l_7$ | 8                    | 5     |
| 20                  | 50    | $0,20 \times l_6$      | 25                   | $0,08 \times l_7$ | 10                   | 5     |
| 50                  | 63    | $0,16 \times l_6$      | 32                   | $0,06 \times l_7$ | 12                   | 5     |
| 63                  | 125   | $0,16 \times l_6$      | 32                   | $0,06 \times l_7$ | 12                   | 6     |
| 125                 | 200   | $0,13 \times l_6$      | 40                   | $0,05 \times l_7$ | 16                   | 8     |
| 200                 |       | 1)                     | 1)                   | 1)                | 1)                   | 1)    |

Table 22

| Nut flange outer diameter |       | Tolerance              |
|---------------------------|-------|------------------------|
| $D_1$<br>over<br>mm       | incl. | $t_9$<br>$\mu\text{m}$ |
| 16                        | 32    | 16                     |
| 32                        | 63    | 20                     |
| 63                        | 125   | 25                     |
| 125                       | 250   | 32                     |
| 250                       | 500   | 40                     |

Table 23

| Nut body outer diameter |       | Tolerance                 |
|-------------------------|-------|---------------------------|
| $D$<br>over<br>mm       | incl. | $t_{10}$<br>$\mu\text{m}$ |
| 16                      | 32    | 16                        |
| 32                      | 63    | 20                        |
| 63                      | 125   | 25                        |
| 125                     | 250   | 32                        |
| 250                     | 500   | 40                        |

Measured by rotating the shaft and nut together

Measured by rotating the nut around the fixed shaft

1) For additional information about tolerances, please contact your local Ewellix representative

## Manufacturing tolerances class 3

Table 24

| Nominal diameter    |       | Threaded length $l_1$     | Tolerance                                                 |
|---------------------|-------|---------------------------|-----------------------------------------------------------|
| $d_0$<br>over<br>mm | incl. | $l_{1 \text{ ref}}$<br>mm | if $l_1 \leq l_{1 \text{ ref}}$<br>$t_5$<br>$\mu\text{m}$ |
| 6                   | 12    | 320                       | 25                                                        |
| 12                  | 25    | 640                       | 25                                                        |
| 25                  | 50    | 1 260                     | 25                                                        |
| 50                  | 100   | 2 520                     | 25                                                        |
| 100                 | 200   | 5 000                     | 25                                                        |
| 200                 |       | 1)                        | 1)                                                        |

Table 25

| Ratio                                           | Tolerance              |
|-------------------------------------------------|------------------------|
| if $l_1 > l_{1 \text{ ref}}$<br>$l_1/d_0$ ratio | $t_5$<br>$\mu\text{m}$ |
| –                                               |                        |
| $\leq 40$                                       | 50                     |
| $\leq 60$                                       | 75                     |
| $\leq 80$                                       | 125                    |
| $\leq 100$                                      | 200                    |

Table 26

| Nominal diameter    |       | Tolerances             |                      |                   |                      |       |
|---------------------|-------|------------------------|----------------------|-------------------|----------------------|-------|
| $d_0$<br>over<br>mm | incl. | $t_6$<br>$\mu\text{m}$ | $t_{6 \text{ mini}}$ | $t_7$             | $t_{7 \text{ mini}}$ | $t_8$ |
| 6                   | 20    | $0,15 \times l_6$      | 12                   | $0,08 \times l_7$ | 6                    | 4     |
| 20                  | 50    | $0,13 \times l_6$      | 16                   | $0,06 \times l_7$ | 8                    | 4     |
| 50                  | 63    | $0,10 \times l_6$      | 20                   | $0,05 \times l_7$ | 10                   | 4     |
| 63                  | 125   | $0,10 \times l_6$      | 20                   | $0,05 \times l_7$ | 10                   | 5     |
| 125                 | 200   | $0,08 \times l_6$      | 25                   | $0,04 \times l_7$ | 12                   | 6     |
| 200                 |       | 1)                     | 1)                   | 1)                | 1)                   | 1)    |

Table 27

| Nut flange outer diameter |       | Tolerance              |
|---------------------------|-------|------------------------|
| $D_1$<br>over<br>mm       | incl. | $t_9$<br>$\mu\text{m}$ |
| 16                        | 32    | 12                     |
| 32                        | 63    | 16                     |
| 63                        | 125   | 20                     |
| 125                       | 250   | 25                     |
| 250                       | 500   | 32                     |

Measured by rotating the shaft and nut together

Table 28

| Nut body outer diameter |       | Tolerance                 |
|-------------------------|-------|---------------------------|
| $D$<br>over<br>mm       | incl. | $t_{10}$<br>$\mu\text{m}$ |
| 16                      | 32    | 12                        |
| 32                      | 63    | 16                        |
| 63                      | 125   | 20                        |
| 125                     | 250   | 25                        |
| 250                     | 500   | 32                        |

Measured by rotating the nut around the fixed shaft

1) For additional information about tolerances, please contact your local Ewellix representative

## Manufacturing tolerances class 1

Table 29

| Nominal diameter    |       | Threaded length $l_1$     | Tolerance                                                 |
|---------------------|-------|---------------------------|-----------------------------------------------------------|
| $d_0$<br>over<br>mm | incl. | $l_{1 \text{ ref}}$<br>mm | if $l_1 \leq l_{1 \text{ ref}}$<br>$t_5$<br>$\mu\text{m}$ |
| 6                   | 12    | 320                       | 20                                                        |
| 12                  | 25    | 640                       | 20                                                        |
| 25                  | 50    | 1 260                     | 20                                                        |
| 50                  | 100   | 2 520                     | 20                                                        |
| 100                 | 200   | 5 000                     | 20                                                        |
| 200                 |       | 1)                        | 1)                                                        |

Table 30

| Ratio                                           | Tolerance              |
|-------------------------------------------------|------------------------|
| if $l_1 > l_{1 \text{ ref}}$<br>$l_1/d_0$ ratio | $t_5$<br>$\mu\text{m}$ |
| –                                               |                        |
| $\leq 40$                                       | 40                     |
| $\leq 60$                                       | 65                     |
| $\leq 80$                                       | 100                    |
| $\leq 100$                                      | 160                    |

Table 31

| Nominal diameter    |       | Tolerances             |                    |                   |                    |       |
|---------------------|-------|------------------------|--------------------|-------------------|--------------------|-------|
| $d_0$<br>over<br>mm | incl. | $t_6$<br>$\mu\text{m}$ | $t_6 \text{ mini}$ | $t_7$             | $t_7 \text{ mini}$ | $t_8$ |
| 6                   | 20    | $0,12 \times l_6$      | 10                 | $0,06 \times l_7$ | 5                  | 3     |
| 20                  | 50    | $0,10 \times l_6$      | 12                 | $0,05 \times l_7$ | 6                  | 3     |
| 50                  | 63    | $0,08 \times l_6$      | 16                 | $0,04 \times l_7$ | 8                  | 3     |
| 63                  | 125   | $0,08 \times l_6$      | 16                 | $0,04 \times l_7$ | 8                  | 4     |
| 125                 | 200   | 1)                     | 1)                 | 1)                | 1)                 | 1)    |
| 200                 | 240   | 1)                     | 1)                 | 1)                | 1)                 | 1)    |

Table 32

| Nut flange outer diameter |       | Tolerance              |
|---------------------------|-------|------------------------|
| $D_1$<br>over<br>mm       | incl. | $t_9$<br>$\mu\text{m}$ |
| 16                        | 32    | 10                     |
| 32                        | 63    | 12                     |
| 63                        | 125   | 16                     |
| 125                       | 250   | 20                     |
| 250                       | 500   | 1)                     |

Measured by rotating the shaft and nut together

Table 33

| Nut body outer diameter |       | Tolerance                 |
|-------------------------|-------|---------------------------|
| D<br>over<br>mm         | incl. | $t_{10}$<br>$\mu\text{m}$ |
| 16                      | 32    | 10                        |
| 32                      | 63    | 12                        |
| 63                      | 125   | 16                        |
| 125                     | 250   | 20                        |
| 250                     | 500   | 1)                        |

Measured by rotating the nut around the fixed shaft

1) For additional information about tolerances, please contact your local Ewellix representative

# Calculation formulae

## Basic life rating

$$L_{10} = \left( \frac{C_a}{F_m} \right)^3$$

## Required load rating

$$C_{req} = F_m (L_{10req})^{1/3}$$

where

$L_{10}$  = basic rating life [million revolutions]

$C_a$  = basic dynamic load rating [N]

$C_{req}$  = required dynamic load rating [N]

$F_m$  = cubic mean load [N]

$L_{10req}$  = required life [million revolutions]

## Equivalent mean load

- Duty cycle with step loading

$$F_m = \left( \frac{\sum F_i^3 l_i}{\sum l_i} \right)^{1/3}$$

where

$l_i$  = length of stroke segment  $i$

$F_i$  = load during stroke  $i$

$F_i$  can be either a fixed value, or a calculation for continuous load varying cycles

- Duty cycle with continuous load variation

$$F_m = \frac{F_{min} + 2 F_{max}}{3}$$

where

$F_{min}$  = minimum load

$F_{max}$  = maximum load

## Critical speed of screw shaft (no safety factor)

$$n_{cr} = 49 \times 10^6 \frac{f_1 d_2}{l_{cr}^2}$$

where

$n_{cr}$  = critical speed [r/min]

$d_2$  = screw shaft root diameter [mm]

$l_{cr}$  = free length, or distance between the two supports [mm]

$f_1$  = mounting factor

0,9 ●—● fixed, free (→ fig. 25)

2,5 ●—● radial support, radial support (→ fig. 26)

3,8 ●—● fixed, radial support (→ fig. 27)

5,6 ●—● fixed, fixed (→ fig. 28)

### Notes:

- For each particular application, the most unfavorable conditions must be considered
- It is generally recommended to apply a safety factor of 0,8 to the calculated value of the critical speed  $n_{cr}$  of the screw shaft.

### Speed limit of the mechanism (maximal speed applied through very short periods)

$n d_0 \leq 160\,000$  for all types of planetary roller screws

$n d_1 \leq 30\,000$  for SV, BV, PV with  $d_1 \leq 25$  mm

$n d_1 \leq 20\,000$  for SV, BV, PV with  $d_1 > 25$  mm

where

$n$  = rotational speed [r/min]

$d_0$  = screw shaft nominal diameter for all types of planetary roller screws [mm]

$d_1$  = screw shaft nominal diameter for recirculating roller screws [mm]

Maximum permissible acceleration:

12 000 rad/s<sup>2</sup> for all types of planetary roller screws

4 000 rad/s<sup>2</sup> for all types of recirculating roller screws

Fig. 25

Mounting factor  $f_1 = 0,9$

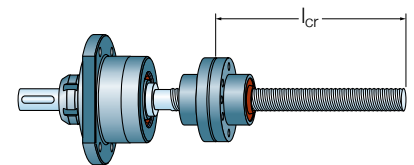


Fig. 26

Mounting factor  $f_1 = 2,5$

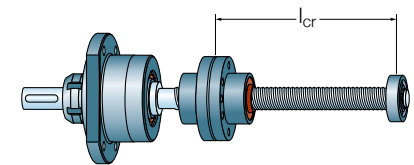


Fig. 27

Mounting factor  $f_1 = 3,8$

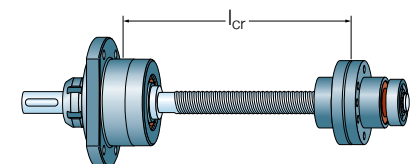
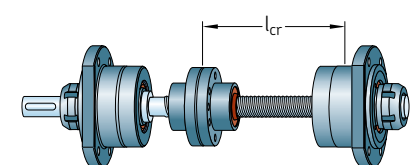


Fig. 28

Mounting factor  $f_1 = 5,6$



## Buckling strength with safety factor 3

$$F_c = \frac{34 \times 10^3 f_3 d_2^4}{l_{Fc}^2}$$

where

$F_c$  = buckling strength [N]

$d_2$  = screw shaft root diameter [mm]

$l_{Fc}$  = distance between the fixed support bearing and the extended position of the nut [mm]

$f_3$  = mounting factor

0,25  fixed, free  
( $\rightarrow$  fig. 29)

2  fixed, radial  
support ( $\rightarrow$  fig. 30)

4  fixed, fixed  
( $\rightarrow$  fig. 31)

## Helix angle

$$\alpha = \text{Atan} \left( \frac{P_h}{\pi d} \right)$$

where

$d$  = nominal diameter of screw shaft [mm]

- $d_0$  for SR planetary roller screws
- $d_1$  for SV recirculating roller screws
- $D_0$  for ISR inverted roller screws

$P_h$  = lead [mm]

## Theoretical efficiencies

Direct ( $\rightarrow$  diagram 2, page 24)

$$\eta = \frac{1}{1 + \frac{\pi d}{P_h} \mu_{ref}}$$

where

$\mu_{ref}$  is extracted from the coefficient of friction diagram ( $\rightarrow$  diagram 1 page 24)

$\alpha$  = helix angle [°]

$d$  = nominal diameter of screw shaft [mm]

- $d_0$  for SR planetary roller screws
- $d_1$  for SV recirculating roller screws
- $D_0$  for ISR inverted roller screws

$P_h$  = lead [mm]

Indirect ( $\rightarrow$  diagram 3, page 24)

$$\eta' = 2 - \frac{1}{\eta}$$

## Practical efficiencies

Direct ( $\rightarrow$  diagram 2, page 24)

$$\eta_p = \frac{1}{1 + \frac{\pi d}{P_h} \mu_{prac}}$$

where

$\mu_{prac}$  is extracted from the coefficient of friction diagram ( $\rightarrow$  diagram 1, page 24)

$\alpha$  = helix angle [°]

$d$  = nominal diameter of screw shaft [mm]

- $d_0$  for SR planetary roller screws
- $d_1$  for SV recirculating roller screws
- $D_0$  for ISR inverted roller screws

$P_h$  = lead [mm]

Indirect ( $\rightarrow$  diagram 3, page 24)

$$\eta' = 2 - \frac{1}{\eta_p}$$

## Input torque in a steady state

$$T = \frac{F P_h}{2000 \pi \eta_p}$$

where

$T$  = input torque [Nm]

$F$  = external load [N]

$P_h$  = lead [mm]

$\eta_p$  = practical direct efficiency

## Power requirement in a steady state

$$P = \frac{F n P_h}{60000 \eta_p}$$

where

$P$  = power required [W]

$n$  = revolutions per minute [r/min]

## Preload torque

$$T_{pr} = \frac{F_{pr} P_h}{1000 \pi} \left( \frac{1}{\eta_p} - 1 \right)$$

where

$T_{pr}$  = preload torque [N]

$F_{pr}$  = preload force [N]

## Braking torque (the restraining torque considered in a back-driving system)

$$T_b = \frac{F P_h \eta'}{2000 \pi}$$

where

$T_b$  = braking torque [Nm]

$F$  = external load [N]

To consider the worst case conditions, we use the theoretical indirect efficiency.

Fig. 29

Mounting factor  $f_3 = 0,25$

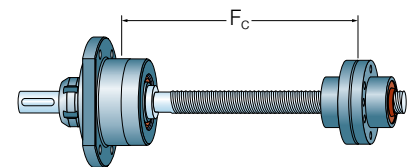


Fig. 30

Mounting factor  $f_3 = 2$

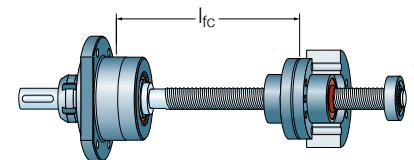
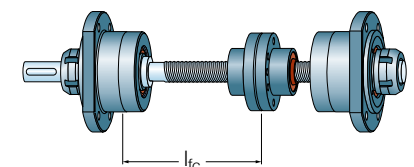


Fig. 31

Mounting factor  $f_3 = 4$



## Nominal motor torque during acceleration

For a horizontal screw

$$T_t = T_f + T_{pr} + \frac{P_h(F + m_L \mu_f g)}{2000 \pi \eta_p} + \dot{\omega} \Sigma I$$

For a vertical screw

$$T_t = T_f + T_{pr} + \frac{P_h(F + m_L g)}{2000 \pi \eta_p} + \dot{\omega} \Sigma I$$

where

$T_t$  = driving torque [Nm]

$T_f$  = friction torque in support bearings, motors, seals, etc... [Nm]

$T_{pr}$  = preload torque [Nm]

$\mu_f$  = coefficient of friction of guidance systems

$\omega$  = angular acceleration [rad/s<sup>2</sup>]

$m_L$  = mass in movement [kg]

$g$  = acceleration of gravity [9,8 m/s<sup>2</sup>]

$\Sigma I$  =  $I_M + I_L + I_S \cdot 10^{-9}$

where

$$I_L = m_L \left( \frac{P_h}{2\pi} \right)^2 10^{-6}$$

where

$I_M$  = inertia of motor [kgm<sup>2</sup>]

$I_S$  = inertia of screw shaft per meter [kgmm<sup>2</sup>/m]

$I$  = length of screw shaft [mm]

For a hollow shaft, the actual inertia is calculated as follows:

$$I_{S \text{ actual}} = I_S \cdot 10^{-9} \left( \frac{d_0^4 - d_b^4}{d_0^4} \right)$$

where

$d_b$  = bore diameter of the shaft [mm]

## Nominal braking torque during deceleration

For a horizontal screw

$$T'_b = \frac{P_h \eta' [F + m_L \mu_f g]}{2000 \pi} + \dot{\omega} \Sigma I - T_f - T_{pr}$$

For a vertical screw

$$T'_b = \frac{P_h \eta' [F + m_L g]}{2000 \pi} + \dot{\omega} \Sigma I - T_f - T_{pr}$$

where

$T'_b$  = braking torque during deceleration [Nm]

## Static axial stiffness of a complete roller screw assembly

$$\frac{1}{R_t} = \frac{1}{R_s} + \frac{1}{R_n} + \frac{1}{R_p}$$

where

$R_t$  = stiffness of a complete assembly [N/μm]

$R_s$  = shaft stiffness [N/μm]

$R_n$  = nut stiffness [N/μm]

$R_p$  = support bearings stiffness [N/μm]

## Shaft stiffness

Fixed-free or fixed-radial support

(→ fig. 32)

$$R_s = 165 \frac{d_2^2}{I_{s1}}$$

Fixed-fixed assembly

(→ fig. 33)

$$R_s = \frac{165 d_2^2 I_s}{I_{s1} (I_s - I_{s1})}$$

## Note:

The lowest stiffness is reached when the nut is in central position

$$I_{s1} = \frac{I_s}{2} \rightarrow R_s = \frac{165 d_2^2}{I_s} \times 4$$

where

$I_{s1}$  = distance between center of fixed support bearing and center of nut [mm]

$I_s$  = distance between centers of fixed support bearings

For additional information, please contact your local Ewellix representative.

Fig. 32

Configuration with fixed support and radial support for stiffness calculation

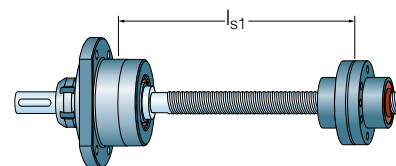
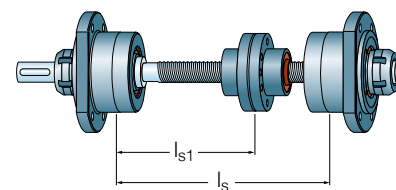


Fig. 33

Configuration with two fixed supports for stiffness calculation



## Calculation example

- Customer wishes to select a planetary roller screw for his application
- To achieve the required linear speed of the application, customer has preselected a lead of 20 mm. Screw rotational speed is 600 r/min during the operation cycle
- Nut type should be flanged for assembly purposes
- Roller screw shaft is horizontally mounted, with one fixed end on the start position, and the other end on radial support
- Load cycle is shown in **diagram 12**
- Operation is 1 cycle/minute, 7 hours/day, 260 days /year for 5 years minimum

### Calculation of equivalent mean load $F_m$

$$F_1 = 50\,000 \text{ N} \quad \text{on } L_1 = 1\,500 \text{ mm}$$

$$F_{2m} = \frac{2F_1 + F_2}{3} = 45\,833 \text{ N} \quad \text{on } L_2 = 1\,000 \text{ mm}$$

$$F_{3m} = 37\,500 \text{ N} \quad \text{on } L_3 = 1\,250 \text{ mm}$$

$$F_{4m} = 20\,500 \text{ N} \quad \text{on } L_3 = 1\,250 \text{ mm}$$

$$F_m = \sqrt[3]{\frac{50\,000^3 \times 1\,500 + 45\,833^3 \times 1\,000 + 37\,500^3 \times 1\,250 + 20\,000^3 \times 1\,250}{1\,500 + 1\,000 + 1\,250 + 1\,250}}$$

$$F_m = 41\,590 \text{ N}$$

### Calculation of required dynamic carrying capacity $C_{a \text{ req}}$

With consideration to the operational cycle:

With the preselection of lead  $P_h = 20 \text{ mm}$

Minimum  $L_{10} = 60 \times 7 \times 260 \times 5 = 546\,000 \text{ cycles}$

$$L_{10} = 546\,000 \frac{1\,500 + 1\,000 + 1\,250 + 1\,250}{20}$$

$$= 136,5 \times 106 \text{ revolutions}$$

$$C_{a \text{ req}} = F_m (L_{10})^{1/3} = 41\,590 (136,5)^{1/3} = 214\,141 \text{ N}$$

Looking at the product tables, we find that:

SRF 48 x 20R with  $C_a = 265\,690 \text{ N}$  satisfies the requirement of minimum dynamic carrying capacity

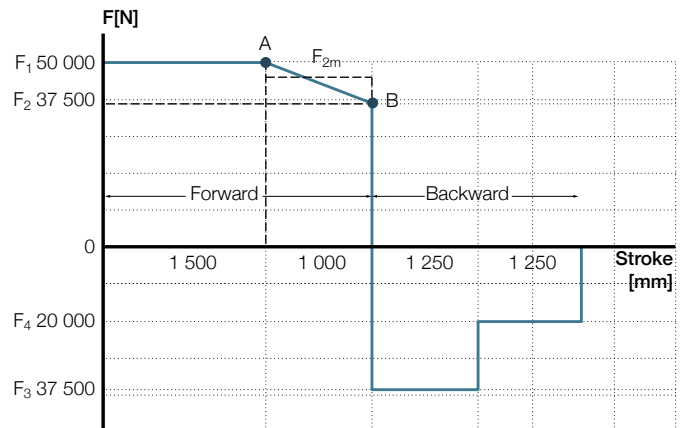
### Selection of support bearing

The table on **page 109** indicates that support bearing size FLRBU7 is recommended for screw type SRF 48 x 20R.

In the following calculations, we will assume that the radial support at the other end of the screw shaft has a total width of 50 mm.

Diagram 12

Application load cycle



## Efficiencies

### Theoretical direct efficiency

$$\alpha = \text{Atan} \left( \frac{P_h}{\mu d_0} \right) = 7,55^\circ$$

Taken from the coefficient of friction reference diagram ( $\rightarrow$  **diagram 1, page 24**)

where

$$\mu_{\text{ref}} = 0,016$$

$$\mu_{\text{prac}} = 0,021$$

$$\eta = \frac{1}{1 + \frac{\pi d_0}{P_h} \mu_{\text{ref}}} = 0,892$$

## Theoretical indirect efficiency

$$\eta' = 2 - \frac{1}{\eta} = 0,879$$

## Practical direct efficiency

We consider the practical coefficient of friction  $\mu_{\text{prac}} = 0,021$

$$\eta_p = \frac{1}{1 + \frac{\pi d_0 \mu_{\text{prac}}}{P_h}} = 0,863$$

## Input torque in a steady state

Phase 1 has the highest application load  $F_{\text{max}} = 50\,000\text{ N}$

$$T = \frac{F P_h}{2\,000 \pi \eta_p} = \frac{50\,000 \times 20}{2\,000 \pi \times 0,863} = 184,4\text{ Nm}$$

## Power requirement in a steady state

Phase 1 has the highest application load  $F_{\text{max}} = 50\,000\text{ N}$

Rotational speed is 600 r/min

$$P = \frac{50\,000 \times 600 \times 20}{60\,000 \times 0,863} = 11\,587\text{ W}$$

## Braking torque

Phase 1 has the highest application load  $F_{\text{max}} = 50\,000\text{ N}$

$$T_b = \frac{50\,000 \times 20 \times 0,879}{2\,000 \pi} = 139,9\text{ Nm}$$

## Critical speed of screw shaft

For the critical speed evaluation, we have to consider the most critical configurations for the screw, where we encounter the longest shaft free length. In the present case study, the two most critical configurations are:

**A)** Nut at start position (zero stroke) that gives a free length of 2 608,5 mm between the center of the nut and the center of the radial support at the end of the shaft (→ page 49 and fig. 34).

In this configuration, the mounting conditions are supported/supported with a corresponding factor  $f_1 = 2,5$   
The root diameter  $d_2 = 45,5\text{ mm}$ , the calculated critical speed is:

$$n_{\text{cr}} = 49 \times 10^6 \frac{2,5 \times 45,5}{2\,608,5^2} = 819\text{ r/min}$$

By applied a safety factor of 0,8:

$$n_{\text{cr}} \times 0,8 = 819 \times 0,8 = 655\text{ r/min} > 600\text{ r/min} \rightarrow \text{Ok}$$

**B)** Nut at full stroke of 2 500 mm that gives a free length of 2 719,5 mm between the center of the nut and the center of the fixed support bearing (→ page 49, fig. 35).

In this configuration, the mounting conditions are fixed/supported with corresponding factor  $f_1 = 3,8$

The calculation is:

$$n_{\text{cr}} = 49 \times 10^6 \frac{3,8 \times 45,5}{2\,719,5^2} = 1\,146\text{ r/min}$$

$$n_{\text{cr}} \times 0,8 = 1146 \times 0,8 = 917\text{ r/min} > 600\text{ r/min} \rightarrow \text{Ok}$$

## Speed limit

$$n d_0 = 600 \times 48 = 28\,000 < 160\,000 \rightarrow \text{Ok}$$

## Buckling strength with safety factor = 3

We must consider two critical situations for calculating the buckling strength.

Point **(A)** (→ diagram 12, page 47) with maximum application load at end of phase 1 (travel = 1 500 mm) (→ fig. 36, page 49).

In this configuration, the mounting conditions are fixed/supported with corresponding factor  $f_3 = 2$

$$F_{\text{cr}} = \frac{34 \times 10^3 \times 2 \times 45,5^4}{1\,719,5^2} = 98\,571\text{ N} > F_1 = 50\,000\text{ N} \rightarrow \text{Ok}$$

Point **(B)** (→ diagram 12, page 47) with lower application load and longer total travel of 2 500 mm at end of phase 2 (→ fig. 37, page 49)

$$F_{\text{c}} = \frac{34 \times 10^3 \times 2 \times 45,5^4}{2\,719,5^2} = 39\,407\text{ N} > F_2 = 37\,500\text{ N} \rightarrow \text{Ok}$$

## Same case with customer selecting a preloaded roller screw

Should the customer prefer a preloaded roller screw for the application in order to have a stiffer assembly, then the initial selection would be:

PRK 60 x 20R with  $C_a = 217\,610\text{ N}$

Now check this screw against all dimensioning parameters.

## Efficiencies

### Theoretical direct efficiency

$$\alpha = \text{Atan} \left( \frac{P_h}{\pi d_0} \right) = 6,05^\circ$$

Taken from the coefficient of friction reference diagram

(→ diagram 1, page 24)

where

$$\mu_{\text{ref}} = 0,013$$

$$\mu_{\text{prac}} = 0,017$$

$$\eta = \frac{1}{1 + \frac{\pi d_0 \mu_{\text{ref}}}{P_h}} = 0,891$$

### Theoretical indirect efficiency

### Practical direct efficiency

$$\eta' = 2 - \frac{1}{\eta} = 0,877$$

We consider the practical coefficient of friction

$$m_{\text{prac}} = 0,017$$

$$\eta = \frac{1}{1 + \frac{\pi d_0 \mu_{\text{prac}}}{P_h}} = 0,862$$

### Input torque in a steady state

Phase 1 has the highest application load  $F_{\text{max}} = 50\,000\text{ N}$

$$T = \frac{50\,000 \times 20}{2\,000 \pi 0,862} = 184,6\text{ Nm}$$

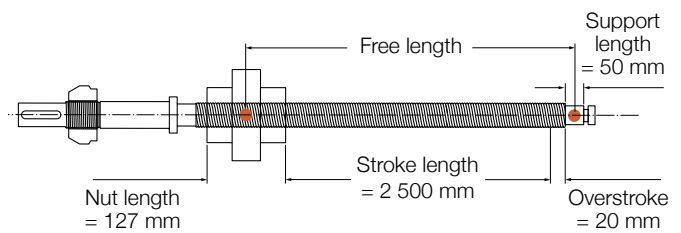
### Power requirement in a steady state

Phase 1 has the highest application load  $F_{\text{max}} = 50\,000\text{ N}$

Rotational speed is 600 r/min

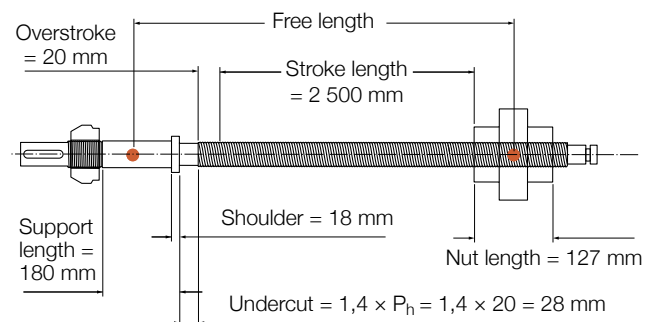
$$P = \frac{50\,000 \times 600 \times 20}{60\,000 \times 0,862} = 11\,600\text{ W}$$

Fig. 34



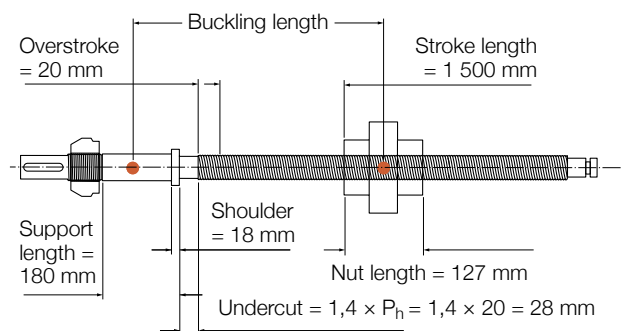
$$\text{Free length} = 127/2 + 2\,500 + 20 + 50/2 = 2\,608,50$$

Fig. 35



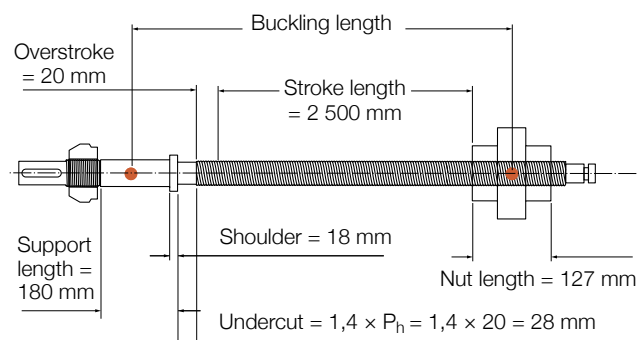
$$\text{Free length} = 127/2 + 2\,500 + 20 + 28 + 18 + 180/2 = 2\,719,50$$

Fig. 36



$$\text{Buckling length} = 127/2 + 1\,500 + 20 + 28 + 18 + 180/2 = 1\,719,50$$

Fig. 37



$$\text{Buckling length} = 127/2 + 2\,500 + 20 + 28 + 18 + 180/2 = 2\,719,50$$

## Braking torque

Phase 1 has the highest application load  $F_{\max} = 50\,000\text{ N}$

$$T_b = \frac{F P_h \eta'}{2\,000 \pi} = \frac{50\,000 \times 20 \times 0,877}{2\,000 \pi} = 139,6\text{ Nm}$$

## Critical speed of screw shaft

Screw type PRK 60 x 20R has a larger nominal diameter and a larger root diameter than screw type SRF 48 x 20R that was already calculated. Therefore, the critical speed will not be a problem for screw size PRK 60 x 20R.

## Axial stiffness

In product table on **page 75**, we find that nominal preload  $F_{pr} = 2\,326\text{ N}$

First, we confirm that the internal preload is appropriate for the application:

- Minimum application load in phase 4:  
 $F_4 = 20\,000\text{ N}$
- $F_4$  is greater than  $2,83 \times 2\,326\text{ N} = 6\,583\text{ N}$

This is to make sure that the nut half that does not carry the load is completely unloaded and does not face marginal loading with risk of sliding. Nominal preload  $F_{pr} = 2\,326\text{ N}$  is OK for the application.

Under this nominal preload conditions ( $F_{pr} = 2\,326\text{ N}$ ), the minimum nominal stiffness of the nut is  $R_{ng} = 700\text{ N}/\mu\text{m}$  (product table on **page 75**).

Total axial stiffness of the roller screw is:

$$\frac{1}{R_t} = \frac{1}{R_s} + \frac{1}{R_{ng}}$$

At point **(B)** (→ **diagram 12, page 47**), full stroke:

With  $d_2 = 57,5\text{ mm}$  for roller screw size PRK 60 x 20R

$$R_s = 165 \frac{57,5^2}{2719,5} = 201\text{ N}/\mu\text{m}$$

$$\frac{1}{R_t} = \frac{1}{201} + \frac{1}{700} \rightarrow R_t = 156\text{ N}/\mu\text{m at full stroke}$$

If we include the axial stiffness of the fixed support bearing FLRBU7, we calculate the total system stiffness:

R support bearing =  $1\,250\text{ N}/\mu\text{m}$

$$\frac{1}{R_{\text{total system}}} = \frac{1}{R_2} + \frac{1}{R_{ng}} + \frac{1}{R_{\text{bearing}}} = \frac{1}{201} + \frac{1}{700} + \frac{1}{1\,250}$$

→ R total system =  $139\text{ N}/\mu\text{m at full stroke}$



3

**Product range**

# Planetary roller screws SR

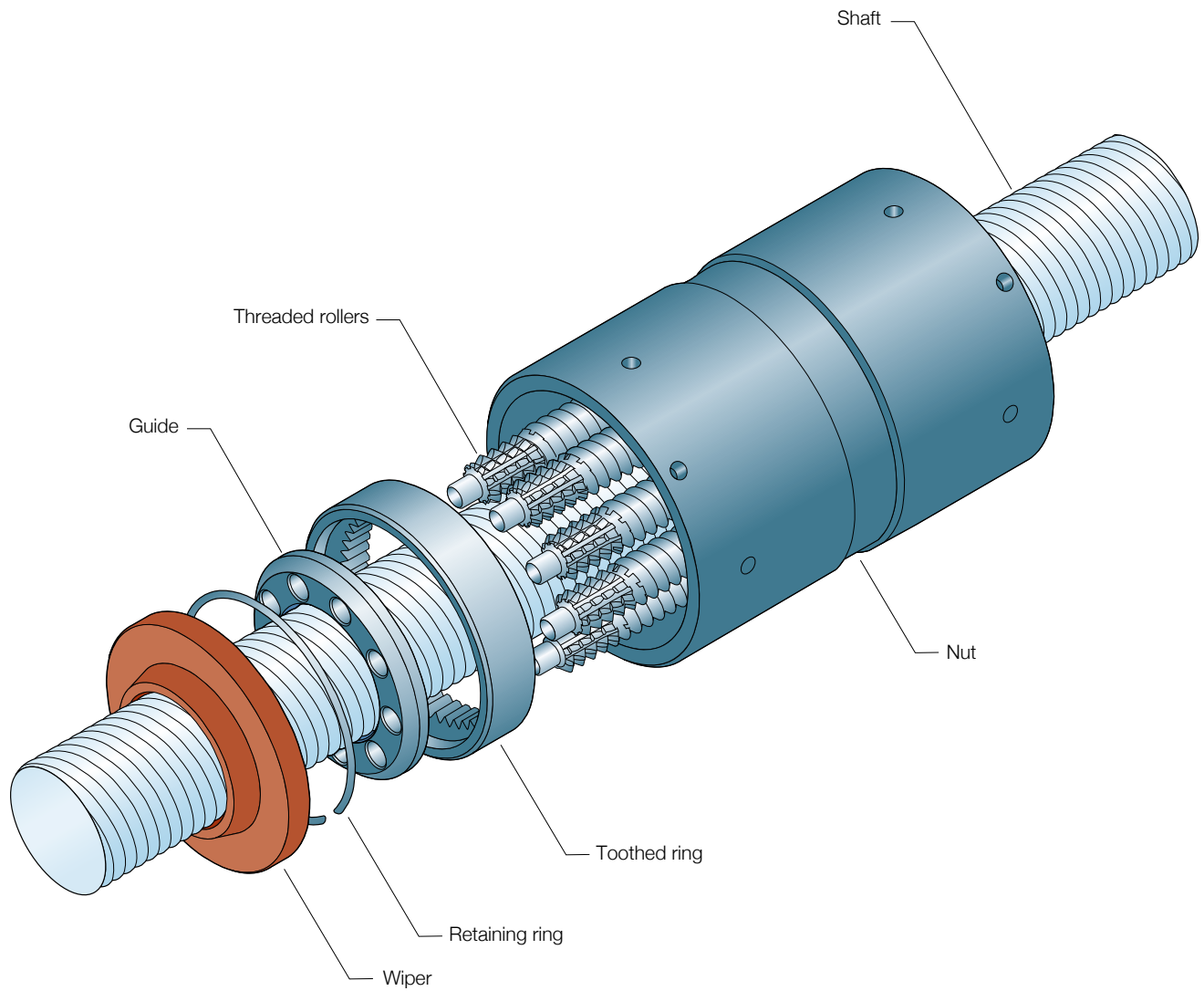
## Concept

Planetary roller screws operating without recirculation provide the high level of robustness, load carrying capacity, speed and acceleration, service life and reliability for ultimate driving performance.

## Application examples

- Presses for plastic injection moulding and blow moulding
- Electro-mechanical presses
- Broaching machines
- Large machine tools
- Car assembly lines (spot welding, gluing, riveting, etc.)
- Factory automation
- Off-highway vehicles
- Oil & gas
- Aerospace
- Steel industry
- Test benches

| Design features                                                                                                                                                                    | User benefits                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Satellite rollers without recirculation                                                                                                                                            | Maximum reliability, high speed capability, low noise                                                                                                                                                        |
| Evenly spaced, guided and synchronized rollers                                                                                                                                     | Robustness, resistance to shocks<br>Very well adapted for operation with frequent changes of direction without friction torque singularities<br>Operation within contaminated environments<br>Smooth running |
| Absence of miniature parts                                                                                                                                                         | Very robust and durable                                                                                                                                                                                      |
| Nominal diameters from 8 to 120 mm                                                                                                                                                 | Wide standard assortment to fit most customer applications                                                                                                                                                   |
| Long leads up to 42 mm                                                                                                                                                             | High linear speeds up to 1,8 m/s for size 44 x 30                                                                                                                                                            |
| Small leads down to 2 mm                                                                                                                                                           | Ideal combination of precise positioning accuracy, increased load carrying capacity, axial stiffness, high speed and low torque requirements                                                                 |
| Shaft length up to 8 000 mm                                                                                                                                                        | For additional information about longer shaft lengths, please contact your local Ewellix representative                                                                                                      |
| Maximum $n_{d0} = 160\,000$<br>Acceleration up to $12\,000 \text{ rad/s}^2$ for standard SR screws, and can be higher for special variants                                         | High speed rating of rolling screw, improving customer productivity                                                                                                                                          |
| High dynamic load carrying capacity up to 1 131 kN for SR assortment                                                                                                               | Long service life                                                                                                                                                                                            |
| High static load carrying capacity up to 4 038 kN for SR assortment                                                                                                                | Ability to accommodate heavy shock loads without raceway damage                                                                                                                                              |
| High axial stiffness, further increased with a preloaded version                                                                                                                   | High positioning accuracy                                                                                                                                                                                    |
| Roller retention for nut and shaft disassembly                                                                                                                                     | Easy roller screw assembly into customer machinery, no need of sleeve like for ball screws                                                                                                                   |
| Optional support bearings                                                                                                                                                          | Complete support bearings ready to use, simplified application design and assembly, easy ordering process                                                                                                    |
| Three standard versions are available:<br>SR with axial play<br>BR without backlash (for $d_0 \leq 64 \text{ mm}$ )<br>PR with preloaded split nut (for $d_0 \leq 64 \text{ mm}$ ) | Equipment stiffness and accuracy further increased with the preloaded version<br>Increased load rating within the same roller nut design                                                                     |
| On request, the SR assortment can be delivered with maximized load rating (maximum number of rollers) for sizes $d_0 \leq 80 \text{ mm}$                                           | Increased load rating within the same roller nut design                                                                                                                                                      |
| Flexible design and manufacturing equipment                                                                                                                                        | Custom designs to fit customer applications, e.g. left hand threads                                                                                                                                          |



## SRC/BRC planetary roller screws with cylindrical nut

d 8 – 30 mm



Standard SRC



Threaded rollers



Components assembly

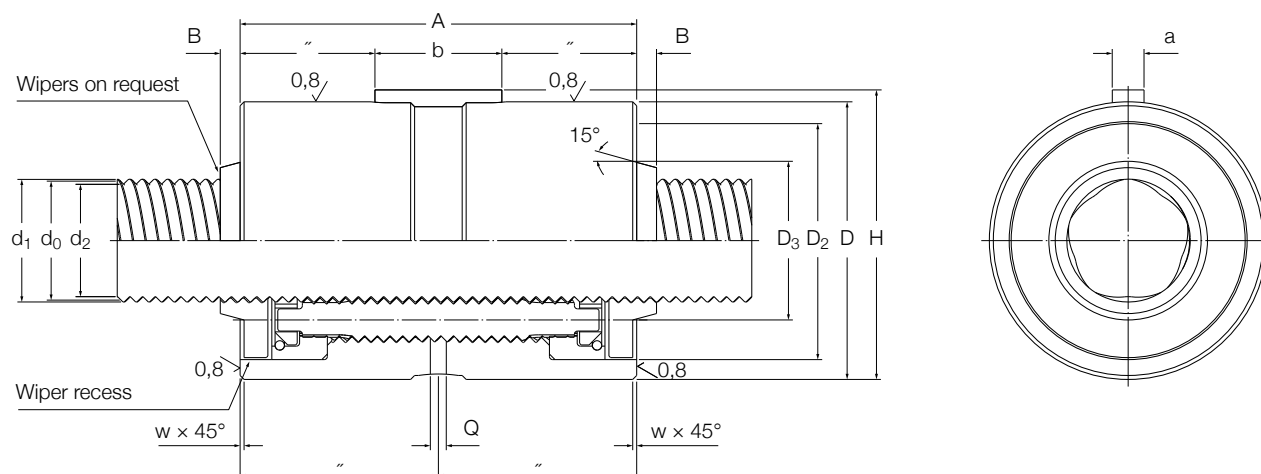
| Dimensions and technical characteristics |                |                               |                              |                               |                                  |                                   |      |      |                 |                 |                |                |                      |                   |                 |                 |                    |
|------------------------------------------|----------------|-------------------------------|------------------------------|-------------------------------|----------------------------------|-----------------------------------|------|------|-----------------|-----------------|----------------|----------------|----------------------|-------------------|-----------------|-----------------|--------------------|
| d <sub>0</sub>                           | P <sub>h</sub> | L <sub>tp</sub> <sup>3)</sup> | C <sub>a</sub> <sup>1)</sup> | C <sub>oa</sub> <sup>1)</sup> | C <sub>a</sub> <sup>2)</sup> max | C <sub>oa</sub> <sup>2)</sup> max | η    | η'   | S <sub>ap</sub> | T <sub>be</sub> | m <sub>n</sub> | m <sub>s</sub> | I <sub>s</sub>       | I <sub>nn</sub>   | I <sub>ns</sub> | Z <sub>n</sub>  | Z <sub>s</sub>     |
|                                          |                |                               | kN                           |                               |                                  |                                   | –    |      | mm              | Nm              | kg             | kg/m           | kgmm <sup>2</sup> /m | kgmm <sup>2</sup> |                 | cm <sup>3</sup> | cm <sup>3</sup> /m |
| 8                                        | 2              | 500                           | –                            | –                             | 8,61                             | 16                                | 0,88 | 0,87 | 0,02            | 0,1             | 0,1            | 0,4            | 3,20                 | 11,4              | 0,2             | 0,8             | 4                  |
|                                          | 4              | 500                           | –                            | –                             | 8,93                             | 13,4                              | 0,88 | 0,87 | 0,02            | 0,1             | 0,1            | 0,4            | 3,20                 | 11,4              | 0,2             | 0,9             | 4                  |
| 12                                       | 2              | 750                           | –                            | –                             | 13,2                             | 22,5                              | 0,86 | 0,83 | 0,02            | 0,1             | 0,1            | 0,9            | 16,0                 | 22,9              | 0,3             | 1,1             | 6                  |
|                                          | 5              | 750                           | 14,1                         | 18,3                          | 15,1                             | 20,4                              | 0,89 | 0,88 | 0,02            | 0,1             | 0,2            | 0,9            | 16,0                 | 22,9              | 0,4             | 1,4             | 6                  |
| 15                                       | 2              | 975                           | –                            | –                             | 23,9                             | 52,7                              | 0,84 | 0,80 | 0,02            | 0,2             | 0,2            | 1,4            | 39,0                 | 45,2              | 1,5             | 1,9             | 7                  |
|                                          | 5              | 975                           | 26                           | 43,6                          | 29,7                             | 53,3                              | 0,89 | 0,88 | 0,02            | 0,2             | 0,2            | 1,4            | 39,0                 | 45,2              | 1,2             | 2,3             | 7                  |
|                                          | 8              | 975                           | 27,4                         | 40,8                          | 29,4                             | 45,3                              | 0,88 | 0,86 | 0,02            | 0,2             | 0,2            | 1,4            | 39,0                 | 45,2              | 1,2             | 2,3             | 7                  |
| 18                                       | 2              | 1 200                         | –                            | –                             | 30,4                             | 71,0                              | 0,82 | 0,77 | 0,02            | 0,3             | 0,35           | 2,0            | 81,0                 | 81,0              | 3,0             | 4,0             | 8                  |
|                                          | 5              | 1 200                         | –                            | –                             | 37,7                             | 70,9                              | 0,89 | 0,87 | 0,02            | 0,3             | 0,35           | 2,0            | 81,0                 | 81,0              | 3,0             | 4,0             | 8                  |
|                                          | 8              | 1 200                         | –                            | –                             | 38,0                             | 61,5                              | 0,89 | 0,87 | 0,02            | 0,3             | 0,35           | 2,0            | 81,0                 | 81,0              | 3,0             | 4,0             | 8                  |
| 21                                       | 2              | 1 400                         | –                            | –                             | 47,4                             | 103                               | 0,80 | 0,74 | 0,02            | 0,3             | 0,4            | 2,7            | 150                  | 141               | 6,5             | 5,0             | 10                 |
|                                          | 5              | 1 400                         | 50,6                         | 82,0                          | 57,8                             | 100                               | 0,88 | 0,86 | 0,02            | 0,3             | 0,4            | 2,7            | 150                  | 141               | 6,5             | 5,0             | 10                 |
|                                          | 6              | 1 400                         | 52,8                         | 82,2                          | 60,3                             | 100                               | 0,89 | 0,87 | 0,02            | 0,3             | 0,4            | 2,7            | 150                  | 141               | 6,5             | 5,0             | 10                 |
|                                          | 8              | 1 400                         | 57                           | 84,1                          | 65,2                             | 103                               | 0,89 | 0,88 | 0,02            | 0,3             | 0,4            | 2,7            | 150                  | 141               | 6,5             | 5,0             | 10                 |
|                                          | 10             | 1 400                         | 59,2                         | 83                            | 63,6                             | 92,2                              | 0,89 | 0,87 | 0,04            | 0,3             | 0,4            | 2,7            | 150                  | 141               | 6,5             | 5,0             | 10                 |
| 24                                       | 6              | 1 600                         | 42,3                         | 65,2                          | 47,3                             | 77                                | 0,88 | 0,87 | 0,02            | 0,4             | 0,5            | 3,6            | 256                  | 173               | 6,3             | 4,0             | 11                 |
|                                          | 12             | 1 600                         | 47,7                         | 62,3                          | 53,3                             | 73,7                              | 0,88 | 0,87 | 0,04            | 0,4             | 0,5            | 3,6            | 256                  | 173               | 6,3             | 4,0             | 11                 |
| 25                                       | 5              | 1 650                         | 68,4                         | 122                           | 78,2                             | 149                               | 0,87 | 0,85 | 0,02            | 0,4             | 0,7            | 3,9            | 301                  | 322               | 14,3            | 10              | 11                 |
|                                          | 8              | 1 650                         | 76,1                         | 122                           | 87,0                             | 149                               | 0,89 | 0,88 | 0,02            | 0,4             | 0,7            | 3,9            | 301                  | 322               | 14,3            | 10              | 11                 |
|                                          | 10             | 1 650                         | 78,6                         | 118                           | 89,8                             | 145                               | 0,89 | 0,88 | 0,04            | 0,4             | 0,7            | 3,9            | 301                  | 322               | 14,3            | 10              | 11                 |
|                                          | 15             | 1 650                         | 85,6                         | 120                           | 91,9                             | 133                               | 0,87 | 0,85 | 0,07            | 0,4             | 0,7            | 3,9            | 301                  | 322               | 14,3            | 10              | 11                 |
| 30                                       | 5              | 2 000                         | 92                           | 178                           | 105                              | 218                               | 0,86 | 0,83 | 0,02            | 0,6             | 1,2            | 5,6            | 624                  | 762               | 36,2            | 14              | 14                 |
|                                          | 6              | 2 000                         | 95                           | 175                           | 109                              | 214                               | 0,87 | 0,85 | 0,02            | 0,6             | 1,2            | 5,6            | 624                  | 762               | 36,2            | 14              | 14                 |
|                                          | 8              | 2 000                         | 103                          | 178                           | 117                              | 218                               | 0,88 | 0,87 | 0,02            | 0,6             | 1,2            | 5,6            | 624                  | 762               | 36,2            | 14              | 14                 |
|                                          | 10             | 2 000                         | 106                          | 174                           | 122                              | 213                               | 0,89 | 0,88 | 0,04            | 0,6             | 1,2            | 5,6            | 624                  | 762               | 36,2            | 14              | 14                 |
|                                          | 15             | 2 000                         | 119                          | 182                           | 127                              | 201                               | 0,88 | 0,87 | 0,07            | 0,6             | 1,2            | 5,6            | 624                  | 762               | 36,2            | 14              | 14                 |
|                                          | 20             | 2 000                         | 123                          | 177                           | 132                              | 197                               | 0,86 | 0,83 | 0,07            | 0,8             | 1,2            | 5,6            | 624                  | 762               | 35,9            | 14              | 14                 |

■ Preferred range

<sup>1)</sup> Standard number of rollers. Configuration not available for certain sizes

<sup>2)</sup> Maximum number of rollers on request, or standard for certain sizes

<sup>3)</sup> For BRC (backlash eliminated), maximum length can be shorter



| Designation     | Dimensions     |                |            |          |     |         |    |      |   |   |                |                |
|-----------------|----------------|----------------|------------|----------|-----|---------|----|------|---|---|----------------|----------------|
|                 | d <sub>1</sub> | d <sub>2</sub> | D<br>g6/H7 | A<br>h12 | w   | a<br>h9 | b  | H    | Q | B | D <sub>2</sub> | D <sub>3</sub> |
| –               | mm             |                |            |          |     |         |    |      |   |   |                |                |
| SRC/BRC 8 x 2   | 8,2            | 7,6            | 25         | 44       | 0,5 | 4       | 12 | 26,5 | 5 | 3 | 21             | 13             |
| SRC/BRC 8 x 4   | 8,4            | 7,3            | 25         | 44       | 0,5 | 4       | 12 | 26,5 | 5 | 3 | 21             | 13             |
| SRC/BRC 12 x 2  | 12,2           | 11,6           | 30         | 44       | 0,5 | 4       | 12 | 31,5 | 5 | 3 | 25             | 17             |
| SRC/BRC 12 x 5  | 12,4           | 11,3           | 30         | 44       | 0,5 | 4       | 12 | 31,5 | 5 | 3 | 25             | 17             |
| SRC/BRC 15 x 2  | 15,2           | 14,6           | 35         | 50       | 0,5 | 4       | 16 | 36,5 | 5 | 3 | 30             | 20             |
| SRC/BRC 15 x 5  | 15,4           | 14,3           | 35         | 50       | 0,5 | 4       | 16 | 36,5 | 5 | 3 | 30             | 20             |
| SRC/BRC 15 x 8  | 15,6           | 14             | 35         | 50       | 0,5 | 4       | 16 | 36,5 | 5 | 3 | 30             | 20             |
| SRC/BRC 18 x 2  | 18,2           | 17,6           | 40         | 58       | 0,5 | 5       | 18 | 42   | 5 | 3 | 35             | 23             |
| SRC/BRC 18 x 5  | 18,4           | 17,3           | 40         | 58       | 0,5 | 5       | 18 | 42   | 5 | 3 | 35             | 23             |
| SRC/BRC 18 x 8  | 18,6           | 17             | 40         | 58       | 0,5 | 5       | 18 | 42   | 5 | 3 | 35             | 23             |
| SRC/BRC 21 x 2  | 21,2           | 20,6           | 45         | 64       | 0,5 | 5       | 20 | 47   | 5 | 4 | 40,5           | 26             |
| SRC/BRC 21 x 5  | 21,4           | 20,3           | 45         | 64       | 0,5 | 5       | 20 | 47   | 5 | 4 | 40,5           | 26             |
| SRC/BRC 21 x 6  | 21,5           | 20,2           | 45         | 64       | 0,5 | 5       | 20 | 47   | 5 | 4 | 40,5           | 26             |
| SRC/BRC 21 x 8  | 21,6           | 20             | 45         | 64       | 0,5 | 5       | 20 | 47   | 5 | 4 | 40,5           | 26             |
| SRC/BRC 21 x 10 | 21,8           | 19,8           | 45         | 64       | 0,5 | 5       | 20 | 47   | 5 | 4 | 40,5           | 26             |
| SRC/BRC 24 x 6  | 24,4           | 23,3           | 48         | 58       | 0,5 | 5       | 20 | 50   | 5 | 6 | 42             | 31             |
| SRC/BRC 24 x 12 | 24,8           | 22,8           | 48         | 58       | 0,5 | 5       | 20 | 50   | 5 | 6 | 42             | 31             |
| SRC/BRC 25 x 5  | 25,4           | 24,3           | 53         | 78       | 0,5 | 6       | 25 | 55,5 | 5 | 6 | 47             | 32             |
| SRC/BRC 25 x 8  | 25,6           | 24             | 53         | 78       | 0,5 | 6       | 25 | 55,5 | 5 | 6 | 47             | 32             |
| SRC/BRC 25 x 10 | 25,8           | 23,8           | 53         | 78       | 0,5 | 6       | 25 | 55,5 | 5 | 6 | 47             | 32             |
| SRC/BRC 25 x 15 | 26,2           | 23,2           | 53         | 78       | 0,5 | 6       | 25 | 55,5 | 5 | 6 | 47             | 32             |
| SRC/BRC 30 x 5  | 30,4           | 29,4           | 64         | 85       | 0,5 | 6       | 32 | 66,5 | 5 | 7 | 58             | 38             |
| SRC/BRC 30 x 6  | 30,5           | 29,3           | 64         | 85       | 0,5 | 6       | 32 | 66,5 | 5 | 7 | 58             | 38             |
| SRC/BRC 30 x 8  | 30,6           | 29             | 64         | 85       | 0,5 | 6       | 32 | 66,5 | 5 | 7 | 58             | 38             |
| SRC/BRC 30 x 10 | 30,8           | 28,8           | 64         | 85       | 0,5 | 6       | 32 | 66,5 | 5 | 7 | 58             | 38             |
| SRC/BRC 30 x 15 | 31,2           | 28,3           | 64         | 85       | 0,5 | 6       | 32 | 66,5 | 5 | 7 | 58             | 38             |
| SRC/BRC 30 x 20 | 31,5           | 27,6           | 64         | 85       | 0,5 | 6       | 32 | 66,5 | 5 | 7 | 58             | 38             |

## SRC/BRC planetary roller screws with cylindrical nut

d 36 – 56 mm



Standard SRC



Threaded rollers



Components assembly

### Dimensions and technical characteristics

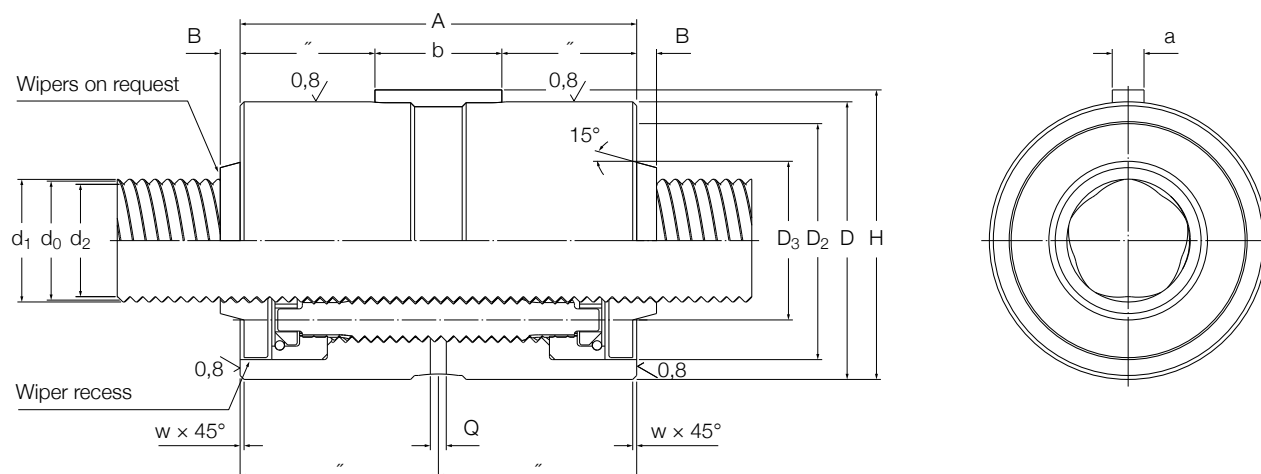
| d <sub>0</sub> | P <sub>h</sub> | L <sub>tp</sub> <sup>3)</sup> | C <sub>a</sub> <sup>1)</sup> | C <sub>oa</sub> <sup>1)</sup> | C <sub>a</sub> <sup>2)</sup><br>max | C <sub>oa</sub> <sup>2)</sup><br>max | η    | η'   | S <sub>ap</sub> | T <sub>be</sub> | m <sub>n</sub> | m <sub>s</sub> | I <sub>s</sub>       | I <sub>nn</sub>   | I <sub>ns</sub> | Z <sub>n</sub> | Z <sub>s</sub> |
|----------------|----------------|-------------------------------|------------------------------|-------------------------------|-------------------------------------|--------------------------------------|------|------|-----------------|-----------------|----------------|----------------|----------------------|-------------------|-----------------|----------------|----------------|
|                |                |                               | kN                           |                               |                                     |                                      |      | –    | mm              | Nm              | kg             | kg/m           | kgmm <sup>2</sup> /m | kgmm <sup>2</sup> |                 |                |                |
| 36             | 6              | 2 400                         | 90,5                         | 179                           | 106                                 | 228                                  | 0,86 | 0,83 | 0,02            | 0,8             | 1,2            | 8,0            | 1 290                | 923               | 46              | 13             | 16             |
|                | 9              | 2 400                         | 97,5                         | 174                           | 115                                 | 222                                  | 0,88 | 0,87 | 0,02            | 0,8             | 1,2            | 8,0            | 1 290                | 923               | 46              | 13             | 16             |
|                | 12             | 2 400                         | 107                          | 181                           | 125                                 | 230                                  | 0,89 | 0,88 | 0,04            | 0,8             | 1,2            | 8,0            | 1 290                | 873               | 46              | 13             | 16             |
|                | 18             | 2 400                         | 114                          | 177                           | 128                                 | 209                                  | 0,88 | 0,87 | 0,07            | 0,8             | 1,2            | 8,0            | 1 290                | 873               | 46              | 13             | 16             |
|                | 24             | 2 400                         | 124                          | 184                           | 138                                 | 218                                  | 0,86 | 0,83 | 0,07            | 0,8             | 1,2            | 8,0            | 1 290                | 873               | 46              | 13             | 16             |
| 39             | 5              | 2 650                         | 129                          | 269                           | 148                                 | 329                                  | 0,83 | 0,80 | 0,02            | 0,9             | 2,1            | 9,4            | 1 780                | 2 030             | 124             | 28             | 18             |
|                | 10             | 2 650                         | 153                          | 271                           | 174                                 | 331                                  | 0,88 | 0,87 | 0,04            | 0,9             | 2,1            | 9,4            | 1 780                | 2 030             | 124             | 28             | 18             |
|                | 15             | 2 650                         | 168                          | 273                           | 192                                 | 334                                  | 0,89 | 0,88 | 0,07            | 0,9             | 2,1            | 9,4            | 1 780                | 2 030             | 124             | 28             | 18             |
|                | 20             | 2 650                         | 173                          | 261                           | 198                                 | 319                                  | 0,88 | 0,87 | 0,07            | 0,9             | 2,1            | 9,4            | 1 780                | 2 030             | 124             | 28             | 18             |
|                | 25             | 2 650                         | 175                          | 249                           | 188                                 | 277                                  | 0,86 | 0,84 | 0,07            | 0,9             | 2,1            | 9,4            | 1 780                | 2 030             | 124             | 28             | 18             |
| 44             | 8              | 3 000                         | 130                          | 261                           | 153                                 | 333                                  | 0,86 | 0,84 | 0,02            | 1,1             | 1,7            | 11,9           | 2 890                | 1 730             | 119             | 23             | 20             |
|                | 12             | 3 000                         | 144                          | 263                           | 169                                 | 335                                  | 0,89 | 0,87 | 0,04            | 1,1             | 1,7            | 11,9           | 2 890                | 1 730             | 119             | 23             | 20             |
|                | 18             | 3 000                         | 158                          | 265                           | 185                                 | 337                                  | 0,89 | 0,88 | 0,07            | 1,1             | 1,7            | 11,9           | 2 890                | 1 730             | 118             | 23             | 20             |
|                | 24             | 3 000                         | 168                          | 267                           | 188                                 | 315                                  | 0,88 | 0,86 | 0,07            | 1,1             | 1,7            | 11,9           | 2 890                | 1 730             | 118             | 23             | 20             |
|                | 30             | 3 000                         | 166                          | 246                           | 185                                 | 291                                  | 0,85 | 0,83 | 0,07            | 1,1             | 1,7            | 11,9           | 2 890                | 1 730             | 118             | 23             | 20             |
| 48             | 5              | 3 300                         | 198                          | 482                           | 240                                 | 642                                  | 0,81 | 0,76 | 0,02            | 1,3             | 4,2            | 14,2           | 4 090                | 6 520             | 371             | 54             | 22             |
|                | 8              | 3 300                         | 218                          | 471                           | 250                                 | 575                                  | 0,86 | 0,83 | 0,02            | 1,3             | 4,2            | 14,2           | 4 090                | 6 520             | 371             | 54             | 22             |
|                | 10             | 3 300                         | 232                          | 475                           | 265                                 | 581                                  | 0,87 | 0,85 | 0,04            | 1,3             | 4,2            | 14,2           | 4 090                | 6 520             | 371             | 54             | 22             |
|                | 15             | 3 300                         | 258                          | 486                           | 295                                 | 594                                  | 0,89 | 0,88 | 0,07            | 1,3             | 4,2            | 14,2           | 4 090                | 6 520             | 371             | 54             | 22             |
|                | 20             | 3 300                         | 266                          | 462                           | 304                                 | 565                                  | 0,89 | 0,88 | 0,07            | 1,3             | 4,2            | 14,2           | 4 090                | 6 520             | 371             | 54             | 22             |
|                | 25             | 3 300                         | 286                          | 491                           | 327                                 | 600                                  | 0,88 | 0,87 | 0,07            | 1,3             | 4,2            | 14,2           | 4 090                | 6 520             | 370             | 54             | 22             |
| 56             | 30             | 3 300                         | 276                          | 467                           | 316                                 | 571                                  | 0,87 | 0,85 | 0,07            | 1,3             | 4,2            | 14,2           | 4 090                | 6 520             | 370             | 54             | 22             |
|                | 12             | 4 000                         | 212                          | 433                           | 249                                 | 551                                  | 0,87 | 0,86 | 0,04            | 1,7             | 3,2            | 19,3           | 7 580                | 5 000             | 385             | 46             | 25             |
|                | 24             | 4 000                         | 242                          | 419                           | 284                                 | 533                                  | 0,89 | 0,88 | 0,07            | 1,7             | 3,2            | 19,3           | 7 580                | 5 000             | 383             | 46             | 25             |
|                | 36             | 4 000                         | 258                          | 424                           | 289                                 | 501                                  | 0,86 | 0,84 | 0,07            | 1,7             | 3,2            | 19,3           | 7 580                | 5 000             | 383             | 46             | 25             |

#### Preferred range

<sup>1)</sup> Standard number of rollers

<sup>2)</sup> Maximum number of rollers on request

<sup>3)</sup> For BRC (backlash eliminated), maximum length can be shorter



| Designation     | Dimensions     |                |            |          |     |         |    |      |   |   |                |                |
|-----------------|----------------|----------------|------------|----------|-----|---------|----|------|---|---|----------------|----------------|
|                 | d <sub>1</sub> | d <sub>2</sub> | D<br>g6/H7 | A<br>h12 | w   | a<br>h9 | b  | H    | Q | B | D <sub>2</sub> | D <sub>3</sub> |
| –               | mm             |                |            |          |     |         |    |      |   |   |                |                |
| SRC/BRC 36 x 6  | 36,4           | 35,4           | 68         | 80       | 0,5 | 5       | 25 | 70   | 5 | 8 | 62             | 45             |
| SRC/BRC 36 x 9  | 36,6           | 35,1           | 68         | 80       | 0,5 | 5       | 25 | 70   | 5 | 8 | 62             | 45             |
| SRC/BRC 36 x 12 | 36,8           | 34,8           | 68         | 80       | 0,5 | 5       | 25 | 70   | 5 | 8 | 62             | 45             |
| SRC/BRC 36 x 18 | 37,2           | 34,2           | 68         | 80       | 0,5 | 5       | 25 | 70   | 5 | 8 | 62             | 45             |
| SRC/BRC 36 x 24 | 37,5           | 33,6           | 68         | 80       | 0,5 | 5       | 25 | 70   | 5 | 8 | 62             | 45             |
| SRC/BRC 39 x 5  | 39,4           | 38,4           | 80         | 100      | 1   | 8       | 40 | 83   | 7 | 8 | 73             | 50             |
| SRC/BRC 39 x 10 | 39,8           | 37,9           | 80         | 100      | 1   | 8       | 40 | 83   | 7 | 8 | 73             | 50             |
| SRC/BRC 39 x 15 | 40,2           | 37,3           | 80         | 100      | 1   | 8       | 40 | 83   | 7 | 8 | 73             | 50             |
| SRC/BRC 39 x 20 | 40,5           | 36,7           | 80         | 100      | 1   | 8       | 40 | 83   | 7 | 8 | 73             | 50             |
| SRC/BRC 39 x 25 | 40,9           | 36,1           | 80         | 100      | 1   | 8       | 40 | 83   | 7 | 8 | 73             | 50             |
| SRC/BRC 44 x 8  | 44,5           | 43,2           | 80         | 90       | 0,5 | 6       | 32 | 82,5 | 7 | 8 | 74             | 56             |
| SRC/BRC 44 x 12 | 44,8           | 42,8           | 80         | 90       | 0,5 | 6       | 32 | 82,5 | 7 | 8 | 74             | 56             |
| SRC/BRC 44 x 18 | 45,2           | 42,3           | 80         | 90       | 0,5 | 6       | 32 | 82,5 | 7 | 8 | 74             | 56             |
| SRC/BRC 44 x 24 | 45,5           | 41,7           | 80         | 90       | 0,5 | 6       | 32 | 82,5 | 7 | 8 | 74             | 56             |
| SRC/BRC 44 x 30 | 45,9           | 41,1           | 80         | 90       | 0,5 | 6       | 32 | 82,5 | 7 | 8 | 74             | 56             |
| SRC/BRC 48 x 5  | 48,4           | 47,4           | 100        | 127      | 1   | 8       | 45 | 103  | 7 | 9 | 90             | 60             |
| SRC/BRC 48 x 8  | 48,6           | 47,1           | 100        | 127      | 1   | 8       | 45 | 103  | 7 | 9 | 90             | 60             |
| SRC/BRC 48 x 10 | 48,8           | 46,9           | 100        | 127      | 1   | 8       | 45 | 103  | 7 | 9 | 90             | 60             |
| SRC/BRC 48 x 15 | 49,2           | 46,3           | 100        | 127      | 1   | 8       | 45 | 103  | 7 | 9 | 90             | 60             |
| SRC/BRC 48 x 20 | 49,5           | 45,8           | 100        | 127      | 1   | 8       | 45 | 103  | 7 | 9 | 90             | 60             |
| SRC/BRC 48 x 25 | 49,9           | 45,2           | 100        | 127      | 1   | 8       | 45 | 103  | 7 | 9 | 90             | 60             |
| SRC/BRC 48 x 30 | 50,3           | 44,6           | 100        | 127      | 1   | 8       | 45 | 103  | 7 | 9 | 90             | 60             |
| SRC/BRC 56 x 12 | 56,8           | 54,9           | 100        | 112      | 1   | 8       | 40 | 103  | 7 | 9 | 93             | 66             |
| SRC/BRC 56 x 24 | 57,5           | 53,8           | 100        | 112      | 1   | 8       | 40 | 103  | 7 | 9 | 93             | 66             |
| SRC/BRC 56 x 36 | 58,3           | 52,5           | 100        | 112      | 1   | 8       | 40 | 103  | 7 | 9 | 93             | 66             |

## SRC/BRC planetary roller screws with cylindrical nut

d 60 – 120 mm



Standard SRC



Threaded rollers



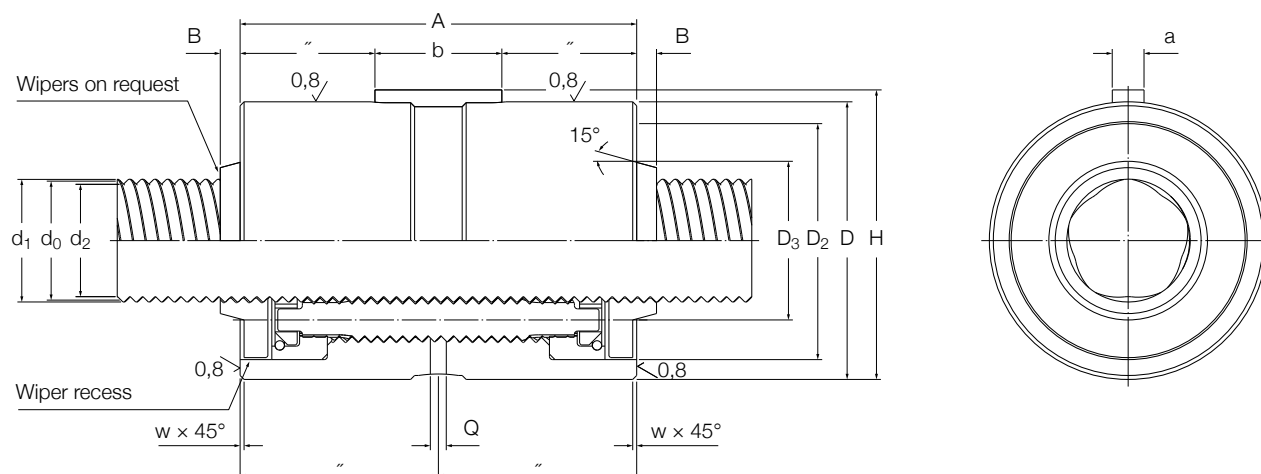
Components assembly

| Dimensions and technical characteristics |                |                               |                              |                               |                                     |                                      |      |      |                 |                 |                |                |                      |                   |                 |                 |                    |  |
|------------------------------------------|----------------|-------------------------------|------------------------------|-------------------------------|-------------------------------------|--------------------------------------|------|------|-----------------|-----------------|----------------|----------------|----------------------|-------------------|-----------------|-----------------|--------------------|--|
| d <sub>0</sub>                           | P <sub>h</sub> | L <sub>tp</sub> <sup>3)</sup> | C <sub>a</sub> <sup>1)</sup> | C <sub>oa</sub> <sup>1)</sup> | C <sub>a</sub> <sup>2)</sup><br>max | C <sub>oa</sub> <sup>2)</sup><br>max | η    | η'   | S <sub>ap</sub> | T <sub>be</sub> | m <sub>n</sub> | m <sub>s</sub> | I <sub>s</sub>       | I <sub>nn</sub>   | I <sub>ns</sub> | Z <sub>n</sub>  | Z <sub>s</sub>     |  |
|                                          |                |                               | kN                           |                               |                                     |                                      | –    |      | mm              | Nm              | kg             | kg/m           | kgmm <sup>2</sup> /m | kgmm <sup>2</sup> |                 | cm <sup>3</sup> | cm <sup>3</sup> /m |  |
| 60                                       | 10             | 4 250                         | 339                          | 780                           | 387                                 | 953                                  | 0,86 | 0,83 | 0,04            | 1,9             | 7,3            | 22,2           | 9 990                | 16 500            | 1 100           | 100             | 27                 |  |
|                                          | 15             | 4 250                         | 373                          | 783                           | 426                                 | 957                                  | 0,88 | 0,87 | 0,07            | 1,9             | 7,3            | 22,2           | 9 990                | 16 500            | 1 100           | 100             | 27                 |  |
|                                          | 20             | 4 250                         | 395                          | 786                           | 452                                 | 960                                  | 0,89 | 0,88 | 0,07            | 1,9             | 7,3            | 22,2           | 9 990                | 16 400            | 1 100           | 100             | 27                 |  |
| 64                                       | 12             | 4 600                         | –                            | –                             | 296                                 | 763                                  | 0,87 | 0,84 | 0,04            | 2,1             | 5,4            | 25,3           | 12 900               | 10 600            | 984             | 46              | 29                 |  |
|                                          | 18             | 4 600                         | 317                          | 726                           | 333                                 | 781                                  | 0,89 | 0,87 | 0,07            | 2,1             | 5,2            | 25,3           | 12 900               | 10 500            | 914             | 54              | 29                 |  |
|                                          | 24             | 4 600                         | 329                          | 690                           | 346                                 | 743                                  | 0,89 | 0,88 | 0,07            | 2,1             | 5,2            | 25,3           | 12 900               | 10 500            | 911             | 54              | 29                 |  |
|                                          | 30             | 4 600                         | 318                          | 620                           | 356                                 | 733                                  | 0,89 | 0,87 | 0,07            | 2,1             | 4,9            | 25,3           | 12 900               | 10 300            | 771             | 69              | 29                 |  |
|                                          | 36             | 4 600                         | 309                          | 589                           | 346                                 | 697                                  | 0,88 | 0,86 | 0,07            | 2,1             | 4,9            | 25,3           | 12 900               | 10 300            | 771             | 69              | 29                 |  |
| 75                                       | 10             | 5 500                         | –                            | –                             | 505                                 | 1 486                                | 0,84 | 0,80 | 0,04            | –               | 14,6           | 34,7           | 24 400               | 46 900            | 4 150           | 140             | 33                 |  |
|                                          | 15             | 5 500                         | –                            | –                             | 561                                 | 1 491                                | 0,87 | 0,85 | 0,07            | –               | 14,6           | 34,7           | 24 400               | 46 900            | 4 150           | 140             | 33                 |  |
|                                          | 20             | 5 500                         | –                            | –                             | 572                                 | 1 496                                | 0,88 | 0,87 | 0,07            | –               | 14,6           | 34,7           | 24 400               | 46 900            | 4 150           | 140             | 33                 |  |
| 80                                       | 10             | 6 000                         | 365                          | 1 040                         | 383                                 | 1 115                                | 0,83 | 0,79 | 0,02            | –               | 8,9            | 39,5           | 31 600               | 26 000            | 2 720           | 100             | 36                 |  |
|                                          | 18             | 6 000                         | 420                          | 1 020                         | 441                                 | 1 098                                | 0,88 | 0,86 | 0,07            | –               | 8,9            | 39,5           | 31 600               | 26 000            | 2 720           | 100             | 36                 |  |
|                                          | 24             | 6 000                         | 452                          | 1 040                         | 474                                 | 1 120                                | 0,89 | 0,87 | 0,07            | –               | 8,9            | 39,5           | 31 600               | 26 000            | 2 710           | 100             | 36                 |  |
|                                          | 42             | 6 000                         | 398                          | 837                           | 445                                 | 989                                  | 0,88 | 0,87 | 0,07            | –               | 8,9            | 39,5           | 31 600               | 25 200            | 2 290           | 130             | 36                 |  |
| 99                                       | 20             | 7 500                         | –                            | –                             | 925                                 | 3 090                                | 0,87 | 0,85 | 0,07            | –               | 36,2           | 60,4           | 74 000               | 207 000           | 17 500          | 340             | 44                 |  |
|                                          | 25             | 7 500                         | –                            | –                             | 937                                 | 3 096                                | 0,89 | 0,88 | 0,07            | –               | 36,2           | 60,4           | 74 000               | 207 000           | 17 500          | 340             | 44                 |  |
| 120                                      | 20             | 8 000                         | –                            | –                             | 1 131                               | 4 141                                | 0,84 | 0,81 | 0,07            | –               | 55,5           | 88,8           | 160 000              | 453 000           | 40 900          | 540             | 53                 |  |
|                                          | 25             | 8 000                         | –                            | –                             | 1 127                               | 4 038                                | 0,87 | 0,85 | 0,07            | –               | 55,5           | 88,8           | 160 000              | 453 000           | 40 900          | 540             | 53                 |  |

<sup>1)</sup> Standard number of rollers. Configuration not available for certain sizes

<sup>2)</sup> Maximum number of rollers on request, or standard for certain sizes

<sup>3)</sup> For BRC (backlash eliminated), maximum length can be shorter



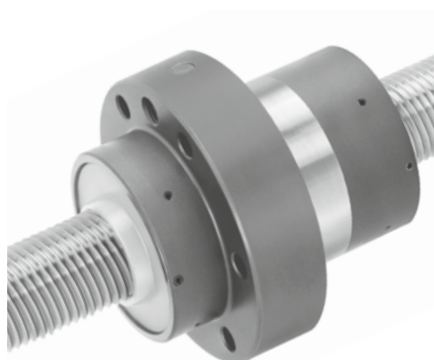
| Designation            | Dimensions     |                |            |            |          |           |           |            |             |          |                |                |
|------------------------|----------------|----------------|------------|------------|----------|-----------|-----------|------------|-------------|----------|----------------|----------------|
|                        | d <sub>1</sub> | d <sub>2</sub> | D<br>g6/H7 | A<br>h12   | w        | a<br>h9   | b         | H          | Q           | B        | D <sub>2</sub> | D <sub>3</sub> |
| –                      | mm             |                |            |            |          |           |           |            |             |          |                |                |
| <b>SRC/BRC 60 x 10</b> | 60,8           | 58,9           | 122        | 152        | 1        | 10        | 45        | 125        | 10,5        | 9        | 110            | 71             |
| <b>SRC/BRC 60 x 15</b> | 61,2           | 58,4           | 122        | 152        | 1        | 10        | 45        | 125        | 10,5        | 9        | 110            | 71             |
| <b>SRC/BRC 60 x 20</b> | <b>61,5</b>    | <b>57,8</b>    | <b>122</b> | <b>152</b> | <b>1</b> | <b>10</b> | <b>45</b> | <b>125</b> | <b>10,5</b> | <b>9</b> | <b>110</b>     | <b>71</b>      |
| <b>SRC/BRC 64 x 12</b> | 64,8           | 62,9           | 115        | 129        | 1        | 8         | 45        | 118        | 7           | 11       | 106            | 75             |
| <b>SRC/BRC 64 x 18</b> | 65,2           | 62,3           | 115        | 129        | 1        | 8         | 45        | 118        | 7           | 11       | 106            | 75             |
| <b>SRC/BRC 64 x 24</b> | 65,5           | 61,8           | 115        | 129        | 1        | 8         | 45        | 118        | 7           | 11       | 106            | 75             |
| <b>SRC/BRC 64 x 30</b> | 65,9           | 61,2           | 115        | 129        | 1        | 8         | 45        | 118        | 7           | 11       | 106            | 75             |
| <b>SRC/BRC 64 x 36</b> | 66,3           | 60,6           | 115        | 129        | 1        | 8         | 45        | 118        | 7           | 11       | 106            | 75             |
| <b>SRC 75 x 10</b>     | 75,8           | 73,9           | 150        | 191        | 1        | 10        | 63        | 153        | 10,5        | 10       | 136            | 87             |
| <b>SRC 75 x 15</b>     | 76,2           | 73,4           | 150        | 191        | 1        | 10        | 63        | 153        | 10,5        | 10       | 136            | 87             |
| <b>SRC 75 x 20</b>     | 76,5           | 72,9           | 150        | 191        | 1        | 10        | 63        | 153        | 10,5        | 10       | 136            | 87             |
| <b>SRC 80 x 10</b>     | 80,7           | 79             | 140        | 156        | 1        | 10        | 63        | 143        | 10,5        | 12       | 132            | 92             |
| <b>SRC 80 x 18</b>     | 81,2           | 78,4           | 140        | 156        | 1        | 10        | 63        | 143        | 10,5        | 12       | 132            | 92             |
| <b>SRC 80 x 24</b>     | 81,5           | 77,8           | 140        | 156        | 1        | 10        | 63        | 143        | 10,5        | 12       | 132            | 92             |
| <b>SRC 80 x 42</b>     | 82,7           | 76,1           | 140        | 156        | 1        | 10        | 63        | 143        | 10,5        | 12       | 132            | 92             |
| <b>SRC 99 x 20</b>     | 100,5          | 96,9           | 200        | 260        | 1,5      | 16        | 100       | 204        | 15          | 12       | 180            | 112            |
| <b>SRC 99 x 25</b>     | 100,9          | 96,3           | 200        | 260        | 1,5      | 16        | 100       | 204        | 15          | 12       | 180            | 112            |
| <b>SRC 120 x 20</b>    | 121,5          | 118            | 240        | 280        | 1,5      | 16        | 100       | 244        | 15          | 12       | 220            | 180            |
| <b>SRC 120 x 25</b>    | 121,9          | 117,4          | 240        | 280        | 1,5      | 16        | 100       | 244        | 15          | 12       | 220            | 180            |

## SRF/BRF/SRP/BRP planetary roller screws with flanged nut

d 8 – 30 mm



Standard SRF



Standard SRP



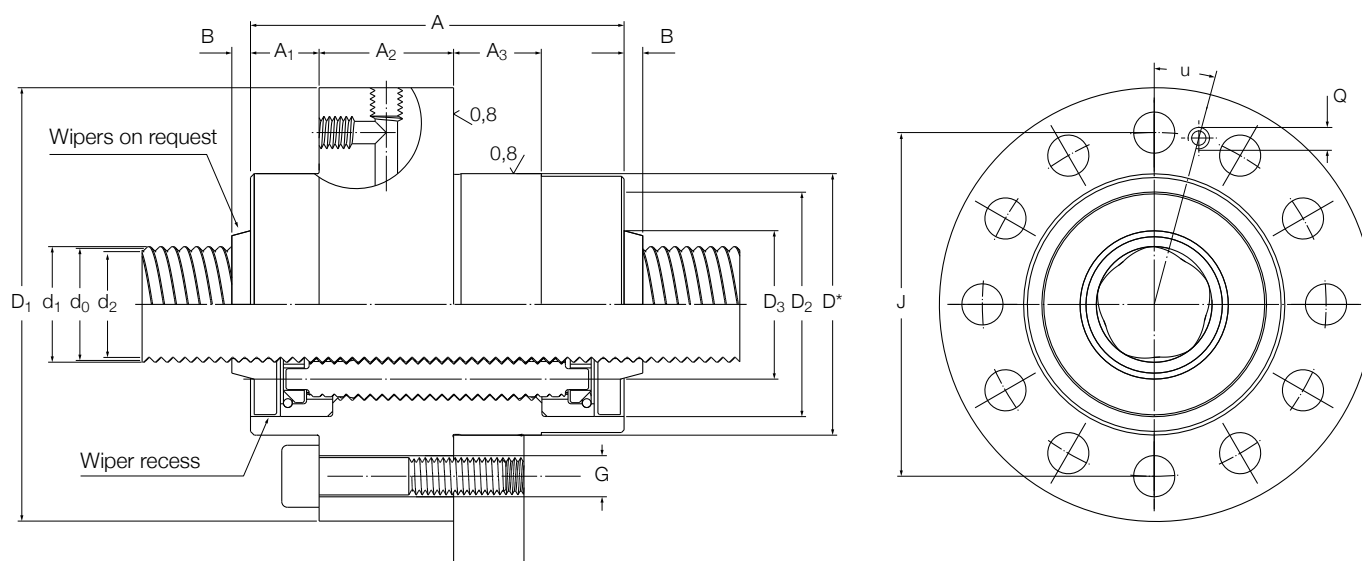
Threaded rollers

| Dimensions and technical characteristics |                |                               |                              |                               |                                     |                                      |      |      |                 |                 |                |                |                      |                   |                 |                |                |  |
|------------------------------------------|----------------|-------------------------------|------------------------------|-------------------------------|-------------------------------------|--------------------------------------|------|------|-----------------|-----------------|----------------|----------------|----------------------|-------------------|-----------------|----------------|----------------|--|
| d <sub>0</sub>                           | P <sub>h</sub> | L <sub>tp</sub> <sup>3)</sup> | C <sub>a</sub> <sup>1)</sup> | C <sub>oa</sub> <sup>1)</sup> | C <sub>a</sub> <sup>2)</sup><br>max | C <sub>oa</sub> <sup>2)</sup><br>max | η    | η'   | S <sub>ap</sub> | T <sub>be</sub> | m <sub>n</sub> | m <sub>s</sub> | I <sub>s</sub>       | I <sub>nn</sub>   | I <sub>ns</sub> | Z <sub>n</sub> | Z <sub>s</sub> |  |
|                                          |                |                               | kN                           |                               |                                     |                                      | –    |      | mm              | Nm              | kg             | kg/m           | kgmm <sup>2</sup> /m | kgmm <sup>2</sup> |                 |                |                |  |
| 8                                        | 4              | 500                           | –                            | –                             | 8,93                                | 13,4                                 | 0,88 | 0,87 | 0,02            | 0,1             | 0,3            | 0,4            | 3,2                  | 66,4              | 0,2             | 0,9            | 4              |  |
| 12                                       | 5              | 750                           | 14,1                         | 18,3                          | 15,1                                | 20,4                                 | 0,89 | 0,88 | 0,02            | 0,1             | 0,3            | 0,9            | 16                   | 106               | 0,4             | 1,4            | 6              |  |
| 15                                       | 5              | 975                           | 26                           | 43,6                          | 30                                  | 53                                   | 0,89 | 0,88 | 0,02            | 0,2             | 0,5            | 1,4            | 39                   | 202               | 1,2             | 2,3            | 7              |  |
|                                          | 8              | 975                           | 27,4                         | 40,8                          | 30                                  | 45                                   | 0,88 | 0,86 | 0,02            | 0,2             | 0,5            | 1,4            | 39                   | 202               | 1,2             | 2,3            | 7              |  |
| 18                                       | 5              | 1 200                         | –                            | –                             | 38                                  | 71                                   | 0,89 | 0,87 | 0,02            | 0,3             | 0,6            | 2              | 81                   | 244               | 3               | 4              | 8              |  |
|                                          | 8              | 1 200                         | –                            | –                             | 38                                  | 62                                   | 0,89 | 0,87 | 0,02            | 0,3             | 0,6            | 2              | 81                   | 244               | 3               | 4              | 8              |  |
| 21                                       | 5              | 1 400                         | 50,6                         | 82                            | 58                                  | 101                                  | 0,88 | 0,86 | 0,02            | 0,3             | 0,7            | 2,7            | 150                  | 437               | 6,5             | 5,0            | 10             |  |
|                                          | 6              | 1 400                         | 52,8                         | 82,2                          | 60                                  | 101                                  | 0,89 | 0,87 | 0,02            | 0,3             | 0,7            | 2,7            | 150                  | 437               | 6,5             | 5,0            | 10             |  |
|                                          | 8              | 1 400                         | 57                           | 84,1                          | 65                                  | 103                                  | 0,89 | 0,88 | 0,02            | 0,3             | 0,7            | 2,7            | 150                  | 437               | 6,5             | 5,0            | 10             |  |
|                                          | 10             | 1 400                         | 59,2                         | 83                            | 64                                  | 92                                   | 0,89 | 0,87 | 0,04            | 0,3             | 0,7            | 2,7            | 150                  | 437               | 6,5             | 5,0            | 10             |  |
| 24                                       | 6              | 1 600                         | 42,3                         | 65,2                          | 47                                  | 77                                   | 0,88 | 0,87 | 0,02            | 0,4             | 0,8            | 3,6            | 256                  | 525               | 6,3             | 4,0            | 11             |  |
|                                          | 12             | 1 600                         | 47,7                         | 62,3                          | 53                                  | 74                                   | 0,88 | 0,87 | 0,04            | 0,4             | 0,8            | 3,6            | 256                  | 525               | 6,3             | 4,0            | 11             |  |
| 25                                       | 5              | 1 650                         | 68,4                         | 122                           | 78                                  | 149                                  | 0,87 | 0,85 | 0,02            | 0,4             | 1,4            | 3,9            | 301                  | 1 200             | 14              | 10             | 11             |  |
|                                          | 8              | 1 650                         | 76,1                         | 122                           | 87                                  | 149                                  | 0,89 | 0,88 | 0,02            | 0,4             | 1,4            | 3,9            | 301                  | 1 200             | 14              | 10             | 11             |  |
|                                          | 10             | 1 650                         | 78,6                         | 118                           | 90                                  | 145                                  | 0,89 | 0,88 | 0,04            | 0,4             | 1,4            | 3,9            | 301                  | 1 200             | 14              | 10             | 11             |  |
|                                          | 15             | 1 650                         | 85,6                         | 120                           | 92                                  | 133                                  | 0,87 | 0,85 | 0,07            | 0,4             | 1,4            | 3,9            | 301                  | 1 200             | 14              | 10             | 11             |  |
| 30                                       | 5              | 2 000                         | 92                           | 178                           | 106                                 | 218                                  | 0,86 | 0,83 | 0,02            | 0,6             | 2,1            | 5,6            | 625                  | 2 680             | 36              | 14             | 14             |  |
|                                          | 6              | 2 000                         | 95                           | 175                           | 109                                 | 215                                  | 0,87 | 0,85 | 0,02            | 0,6             | 2,1            | 5,6            | 625                  | 2 680             | 36              | 14             | 14             |  |
|                                          | 8              | 2 000                         | 103                          | 178                           | 118                                 | 218                                  | 0,88 | 0,87 | 0,02            | 0,6             | 2,1            | 5,6            | 625                  | 2 680             | 36              | 14             | 14             |  |
|                                          | 10             | 2 000                         | 106                          | 174                           | 122                                 | 214                                  | 0,89 | 0,88 | 0,04            | 0,6             | 2,1            | 5,6            | 625                  | 2 680             | 36              | 14             | 14             |  |
|                                          | 15             | 2 000                         | 119                          | 182                           | 127                                 | 201                                  | 0,88 | 0,87 | 0,07            | 0,6             | 2,1            | 5,6            | 625                  | 2 680             | 36              | 14             | 14             |  |
|                                          | 20             | 2 000                         | 123                          | 177                           | 133                                 | 197                                  | 0,86 | 0,83 | 0,07            | 0,8             | 2,1            | 5,6            | 625                  | 2 680             | 36              | 14             | 14             |  |

<sup>1)</sup> Standard number of rollers. Configuration not available for certain sizes

<sup>2)</sup> Maximum number of rollers on request, or standard for certain sizes

<sup>3)</sup> For BRC (backlash eliminated), maximum length can be shorter



\* g6 fit only applies to the finished surface, on side opposite to the lubrication port, marked with a  $0,8\sqrt{\phantom{x}}$

| Designation             | Dimensions     |                |    |    |                |                              |                |                |                |    |        |    |   |                |                |    |
|-------------------------|----------------|----------------|----|----|----------------|------------------------------|----------------|----------------|----------------|----|--------|----|---|----------------|----------------|----|
|                         | d <sub>1</sub> | d <sub>2</sub> | D  | A  | A <sub>1</sub> | A <sub>1</sub> <sup>1)</sup> | A <sub>3</sub> | A <sub>2</sub> | D <sub>1</sub> | J  | G      | Q  | B | D <sub>2</sub> | D <sub>3</sub> | u  |
| —                       | mm             |                |    |    |                |                              |                |                |                |    |        |    |   |                |                |    |
| SRF/BRF 8 x 4           | 8,4            | 7,3            | 25 | 44 | 14             | —                            | 14             | 16             | 46             | 36 | 6 x M4 | M6 | 3 | 21             | 13             | 30 |
| SRF/BRF 12 x 5          | 12,4           | 11,3           | 30 | 44 | 14             | —                            | 14             | 16             | 51             | 41 | 6 x M4 | M6 | 3 | 25             | 17             | 30 |
| SRF/BRF 15 x 5          | 15,4           | 14,3           | 35 | 50 | 16             | —                            | 16             | 18             | 58             | 46 | 6 x M5 | M6 | 3 | 30             | 20             | 30 |
| SRF/BRF 15 x 8          | 15,6           | 14             | 35 | 50 | 16             | —                            | 16             | 18             | 58             | 46 | 6 x M5 | M6 | 3 | 30             | 20             | 30 |
| SRF/BRF 18 x 5          | 18,4           | 17,3           | 40 | 58 | 20             | —                            | 20             | 18             | 63             | 51 | 6 x M5 | M6 | 3 | 35             | 23             | 30 |
| SRF/BRF 18 x 8          | 18,6           | 17             | 40 | 58 | 20             | —                            | 20             | 18             | 63             | 51 | 6 x M5 | M6 | 3 | 35             | 23             | 30 |
| SRF/BRF/SRP/BRP 21 x 5  | 21,4           | 20,3           | 45 | 64 | 23             | 10                           | 10             | 18             | 68             | 56 | 6 x M5 | M6 | 4 | 40,5           | 26             | 30 |
| SRF/BRF/SRP/BRP 21 x 6  | 21,5           | 20,2           | 45 | 64 | 23             | 10                           | 10             | 18             | 68             | 56 | 6 x M5 | M6 | 4 | 40,5           | 26             | 30 |
| SRF/BRF/SRP/BRP 21 x 8  | 21,6           | 20             | 45 | 64 | 23             | 10                           | 10             | 18             | 68             | 56 | 6 x M5 | M6 | 4 | 40,5           | 26             | 30 |
| SRF/BRF/SRP/BRP 21 x 10 | 21,8           | 19,8           | 45 | 64 | 23             | 10                           | 10             | 18             | 68             | 56 | 6 x M5 | M6 | 4 | 40,5           | 26             | 30 |
| SRF/BRF/SRP/BRP 24 x 6  | 24,4           | 23,3           | 48 | 58 | 20             | 10                           | 10             | 18             | 71             | 59 | 6 x M5 | M6 | 6 | 42             | 31             | 30 |
| SRF/BRF/SRP/BRP 24 x 12 | 24,8           | 22,8           | 48 | 58 | 20             | 10                           | 10             | 18             | 71             | 59 | 6 x M5 | M6 | 6 | 42             | 31             | 30 |
| SRF/BRF/SRP/BRP 25 x 5  | 25,4           | 24,3           | 56 | 78 | 29             | 10                           | 10             | 20             | 84             | 70 | 6 x M6 | M6 | 6 | 47             | 32             | 30 |
| SRF/BRF/SRP/BRP 25 x 8  | 25,6           | 24             | 56 | 78 | 29             | 10                           | 10             | 20             | 84             | 70 | 6 x M6 | M6 | 6 | 47             | 32             | 30 |
| SRF/BRF/SRP/BRP 25 x 10 | 25,8           | 23,8           | 56 | 78 | 29             | 10                           | 10             | 20             | 84             | 70 | 6 x M6 | M6 | 6 | 47             | 32             | 30 |
| SRF/BRF/SRP/BRP 25 x 15 | 26,2           | 23,2           | 56 | 78 | 29             | 10                           | 10             | 20             | 84             | 70 | 6 x M6 | M6 | 6 | 47             | 32             | 30 |
| SRF/BRF/SRP/BRP 30 x 5  | 30,4           | 29,4           | 64 | 85 | 29             | 12                           | 15             | 27             | 97             | 81 | 6 x M8 | M6 | 7 | 58             | 38             | 30 |
| SRF/BRF/SRP/BRP 30 x 6  | 30,5           | 29,3           | 64 | 85 | 29             | 12                           | 15             | 27             | 97             | 81 | 6 x M8 | M6 | 7 | 58             | 38             | 30 |
| SRF/BRF/SRP/BRP 30 x 8  | 30,6           | 29             | 64 | 85 | 29             | 12                           | 15             | 27             | 97             | 81 | 6 x M8 | M6 | 7 | 58             | 38             | 30 |
| SRF/BRF/SRP/BRP 30 x 10 | 30,8           | 28,8           | 64 | 85 | 29             | 12                           | 15             | 27             | 97             | 81 | 6 x M8 | M6 | 7 | 58             | 38             | 30 |
| SRF/BRF/SRP/BRP 30 x 15 | 31,2           | 28,3           | 64 | 85 | 29             | 12                           | 15             | 27             | 97             | 81 | 6 x M8 | M6 | 7 | 58             | 38             | 30 |
| SRF/BRF/SRP/BRP 30 x 20 | 31,5           | 27,6           | 64 | 85 | 29             | 12                           | 15             | 27             | 97             | 81 | 6 x M8 | M6 | 7 | 58             | 38             | 30 |

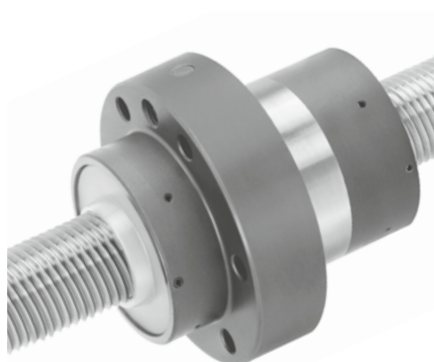
<sup>1)</sup> SRP/BRP configuration is not available for screws with nominal diameter d<sub>0</sub> from 8 to 18 mm

## SRF/BRF/SRP/BRP planetary roller screws with flanged nut

d 36 – 56 mm



Standard SRF



Standard SRP



Threaded rollers

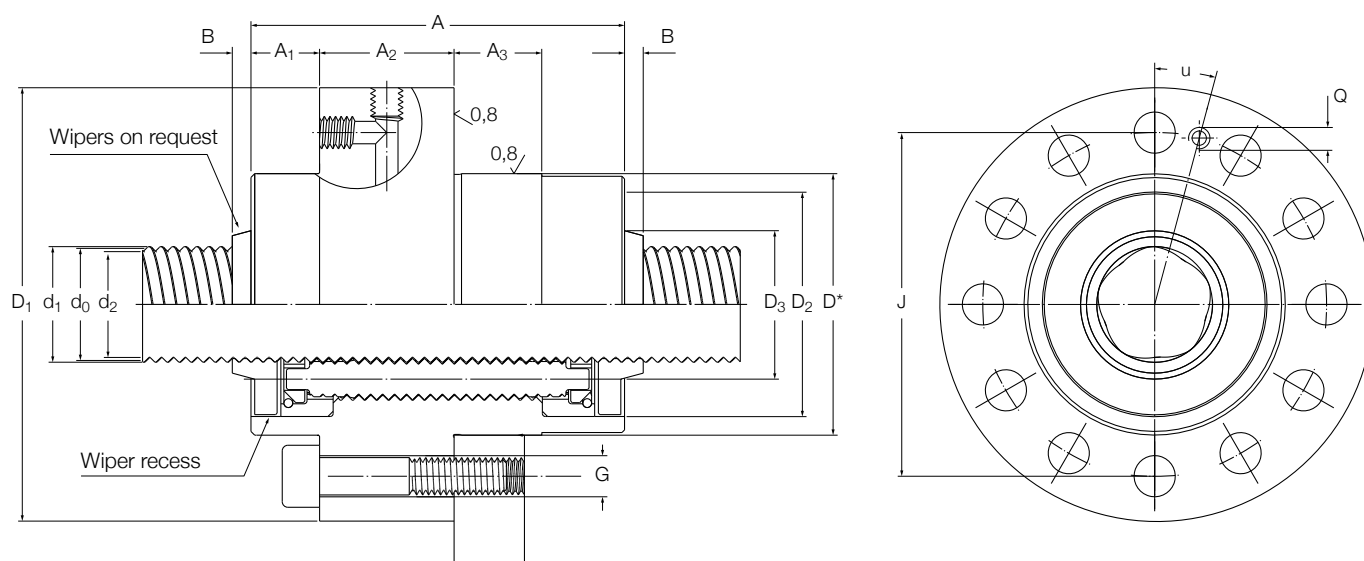
| Dimensions and technical characteristics |                |                               |                              |                               |                                  |                                   |      |      |                 |                 |                |                |                      |                   |                 |                 |                    |
|------------------------------------------|----------------|-------------------------------|------------------------------|-------------------------------|----------------------------------|-----------------------------------|------|------|-----------------|-----------------|----------------|----------------|----------------------|-------------------|-----------------|-----------------|--------------------|
| d <sub>0</sub>                           | P <sub>h</sub> | L <sub>tp</sub> <sup>3)</sup> | C <sub>a</sub> <sup>1)</sup> | C <sub>oa</sub> <sup>1)</sup> | C <sub>a</sub> <sup>2)</sup> max | C <sub>oa</sub> <sup>2)</sup> max | η    | η'   | S <sub>ap</sub> | T <sub>be</sub> | m <sub>n</sub> | m <sub>s</sub> | I <sub>s</sub>       | I <sub>nn</sub>   | I <sub>ns</sub> | Z <sub>n</sub>  | Z <sub>s</sub>     |
|                                          |                |                               | kN                           |                               |                                  |                                   | –    |      | mm              | Nm              | kg             | kg/m           | kgmm <sup>2</sup> /m | kgmm <sup>2</sup> |                 | cm <sup>3</sup> | cm <sup>3</sup> /m |
| 36                                       | 6              | 2 400                         | 90,5                         | 179                           | 107                              | 229                               | 0,86 | 0,83 | 0,02            | 0,8             | 2,2            | 8              | 1 290                | 3 170             | 46              | 13              | 16                 |
|                                          | 9              | 2 400                         | 97,5                         | 174                           | 115                              | 222                               | 0,88 | 0,87 | 0,02            | 0,8             | 2,2            | 8              | 1 290                | 3 170             | 46              | 13              | 16                 |
|                                          | 12             | 2 400                         | 107                          | 181                           | 126                              | 231                               | 0,89 | 0,88 | 0,04            | 0,8             | 2,1            | 8              | 1 290                | 3 120             | 46              | 13              | 16                 |
|                                          | 18             | 2 400                         | 114                          | 177                           | 128                              | 209                               | 0,88 | 0,87 | 0,07            | 0,8             | 2,1            | 8              | 1 290                | 3 120             | 46              | 13              | 16                 |
|                                          | 24             | 2 400                         | 124                          | 184                           | 139                              | 218                               | 0,86 | 0,83 | 0,07            | 0,8             | 2,1            | 8              | 1 290                | 3 120             | 46              | 13              | 16                 |
| 39                                       | 5              | 2 650                         | 129                          | 269                           | 148                              | 329                               | 0,83 | 0,80 | 0,02            | 0,9             | 4              | 9,4            | 1 780                | 8 360             | 124             | 28              | 18                 |
|                                          | 10             | 2 650                         | 153                          | 271                           | 175                              | 332                               | 0,88 | 0,87 | 0,04            | 0,9             | 4              | 9,4            | 1 780                | 8 360             | 124             | 28              | 18                 |
|                                          | 15             | 2 650                         | 168                          | 273                           | 192                              | 334                               | 0,89 | 0,88 | 0,07            | 0,9             | 4              | 9,4            | 1 780                | 8 360             | 124             | 28              | 18                 |
|                                          | 20             | 2 650                         | 173                          | 261                           | 198                              | 319                               | 0,88 | 0,87 | 0,07            | 0,9             | 4              | 9,4            | 1 780                | 8 360             | 124             | 28              | 18                 |
|                                          | 25             | 2 650                         | 175                          | 249                           | 188                              | 277                               | 0,86 | 0,84 | 0,07            | 0,9             | 4              | 9,4            | 1 780                | 8 360             | 124             | 28              | 18                 |
| 44                                       | 8              | 3 000                         | 130                          | 261                           | 154                              | 333                               | 0,86 | 0,84 | 0,02            | 1,1             | 3,6            | 11,9           | 2 890                | 8 030             | 119             | 23              | 20                 |
|                                          | 12             | 3 000                         | 144                          | 263                           | 169                              | 335                               | 0,89 | 0,87 | 0,04            | 1,1             | 3,6            | 11,9           | 2 890                | 8 030             | 119             | 23              | 20                 |
|                                          | 18             | 3 000                         | 158                          | 265                           | 186                              | 338                               | 0,89 | 0,88 | 0,07            | 1,1             | 3,6            | 11,9           | 2 890                | 8 030             | 118             | 23              | 20                 |
|                                          | 24             | 3 000                         | 168                          | 267                           | 188                              | 316                               | 0,88 | 0,86 | 0,07            | 1,1             | 3,6            | 11,9           | 2 890                | 8 030             | 118             | 23              | 20                 |
|                                          | 30             | 3 000                         | 166                          | 246                           | 186                              | 292                               | 0,85 | 0,83 | 0,07            | 1,1             | 3,6            | 11,9           | 2 890                | 8 030             | 118             | 23              | 20                 |
| 48                                       | 5              | 3 300                         | 198                          | 482                           | 240                              | 643                               | 0,81 | 0,76 | 0,02            | 1,3             | 7,8            | 14,2           | 4 090                | 18 500            | 371             | 54              | 22                 |
|                                          | 8              | 3 300                         | 218                          | 471                           | 250                              | 576                               | 0,86 | 0,83 | 0,02            | 1,3             | 7,8            | 14,2           | 4 090                | 18 500            | 371             | 54              | 22                 |
|                                          | 10             | 3 300                         | 232                          | 475                           | 265                              | 581                               | 0,87 | 0,85 | 0,04            | 1,3             | 7,8            | 14,2           | 4 090                | 18 500            | 371             | 54              | 22                 |
|                                          | 15             | 3 300                         | 258                          | 486                           | 295                              | 595                               | 0,89 | 0,88 | 0,07            | 1,3             | 7,8            | 14,2           | 4 090                | 18 500            | 371             | 54              | 22                 |
|                                          | 20             | 3 300                         | 266                          | 462                           | 304                              | 565                               | 0,89 | 0,88 | 0,07            | 1,3             | 7,8            | 14,2           | 4 090                | 18 500            | 371             | 54              | 22                 |
| 56                                       | 25             | 3 300                         | 286                          | 491                           | 327                              | 601                               | 0,88 | 0,87 | 0,07            | 1,3             | 7,8            | 14,2           | 4 090                | 18 500            | 370             | 54              | 22                 |
|                                          | 30             | 3 300                         | 276                          | 467                           | 316                              | 571                               | 0,87 | 0,85 | 0,07            | 1,3             | 7,8            | 14,2           | 4 090                | 18 500            | 370             | 54              | 22                 |
|                                          | 36             | 4 000                         | 258                          | 424                           | 289                              | 502                               | 0,86 | 0,84 | 0,07            | 1,7             | 6,5            | 19,3           | 7 580                | 21 300            | 383             | 46              | 25                 |
|                                          | 24             | 4 000                         | 242                          | 419                           | 285                              | 534                               | 0,89 | 0,88 | 0,07            | 1,7             | 6,5            | 19,3           | 7 580                | 21 300            | 383             | 46              | 25                 |
|                                          | 36             | 4 000                         | 258                          | 424                           | 289                              | 502                               | 0,86 | 0,84 | 0,07            | 1,7             | 6,5            | 19,3           | 7 580                | 21 300            | 383             | 46              | 25                 |

Preferred range

<sup>1)</sup> Standard number of rollers

<sup>2)</sup> Maximum number of rollers on request

<sup>3)</sup> For BRC (backlash eliminated), maximum length can be shorter



\* g6 fit only applies to the finished surface, on side opposite to the lubrication port, marked with a  $\sqrt{0,8}$

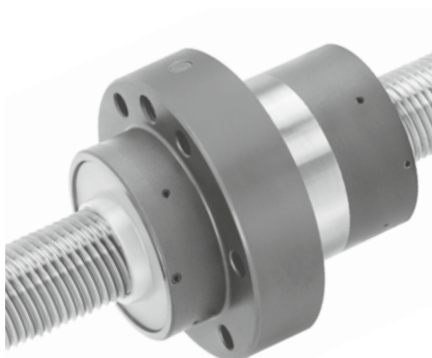
| Designation             | Dimensions     |                |     |     |                |                              |                |                |                |     |         |          |    |                |                |    |
|-------------------------|----------------|----------------|-----|-----|----------------|------------------------------|----------------|----------------|----------------|-----|---------|----------|----|----------------|----------------|----|
|                         | d <sub>1</sub> | d <sub>2</sub> | D   | A   | A <sub>1</sub> | A <sub>1</sub> <sup>1)</sup> | A <sub>3</sub> | A <sub>2</sub> | D <sub>1</sub> | J   | G       | Q        | B  | D <sub>2</sub> | D <sub>3</sub> | u  |
|                         | mm             |                | g6  | h12 | SRF/BRF        | SRP/BRP                      |                |                |                |     |         |          |    |                |                | °  |
| —                       | mm             |                |     |     |                |                              |                |                |                |     |         |          |    |                |                |    |
| SRF/BRF/SRP/BRP 36 x 6  | 36,4           | 35,4           | 68  | 80  | 26,5           | 12                           | 15             | 27             | 102            | 85  | 6 x M8  | M6       | 8  | 62             | 45             | 30 |
| SRF/BRF/SRP/BRP 36 x 9  | 36,6           | 35,1           | 68  | 80  | 26,5           | 12                           | 15             | 27             | 102            | 85  | 6 x M8  | M6       | 8  | 62             | 45             | 30 |
| SRF/BRF/SRP/BRP 36 x 12 | 36,8           | 34,8           | 68  | 80  | 26,5           | 12                           | 15             | 27             | 102            | 85  | 6 x M8  | M6       | 8  | 62             | 45             | 30 |
| SRF/BRF/SRP/BRP 36 x 18 | 37,2           | 34,2           | 68  | 80  | 26,5           | 12                           | 15             | 27             | 102            | 85  | 6 x M8  | M6       | 8  | 62             | 45             | 30 |
| SRF/BRF/SRP/BRP 36 x 24 | 37,5           | 33,6           | 68  | 80  | 26,5           | 12                           | 15             | 27             | 102            | 85  | 6 x M8  | M6       | 8  | 62             | 45             | 30 |
| SRF/BRF/SRP/BRP 39 x 5  | 39,4           | 38,4           | 82  | 100 | 33,5           | 13                           | 18             | 33             | 124            | 102 | 6 x M10 | M6       | 8  | 73             | 50             | 30 |
| SRF/BRF/SRP/BRP 39 x 10 | 39,8           | 37,9           | 82  | 100 | 33,5           | 13                           | 18             | 33             | 124            | 102 | 6 x M10 | M6       | 8  | 73             | 50             | 30 |
| SRF/BRF/SRP/BRP 39 x 15 | 40,2           | 37,3           | 82  | 100 | 33,5           | 13                           | 18             | 33             | 124            | 102 | 6 x M10 | M6       | 8  | 73             | 50             | 30 |
| SRF/BRF/SRP/BRP 39 x 20 | 40,5           | 36,7           | 82  | 100 | 33,5           | 13                           | 18             | 33             | 124            | 102 | 6 x M10 | M6       | 8  | 73             | 50             | 30 |
| SRF/BRF/SRP/BRP 39 x 25 | 40,9           | 36,1           | 82  | 100 | 33,5           | 13                           | 18             | 33             | 124            | 102 | 6 x M10 | M6       | 8  | 73             | 50             | 30 |
| SRF/BRF/SRP/BRP 44 x 8  | 44,5           | 43,2           | 82  | 90  | 28,5           | 12                           | 18             | 33             | 124            | 102 | 6 x M10 | M6       | 8  | 74             | 56             | 30 |
| SRF/BRF/SRP/BRP 44 x 12 | 44,8           | 42,8           | 82  | 90  | 28,5           | 12                           | 18             | 33             | 124            | 102 | 6 x M10 | M6       | 8  | 74             | 56             | 30 |
| SRF/BRF/SRP/BRP 44 x 18 | 45,2           | 42,3           | 82  | 90  | 28,5           | 12                           | 18             | 33             | 124            | 102 | 6 x M10 | M6       | 8  | 74             | 56             | 30 |
| SRF/BRF/SRP/BRP 44 x 24 | 45,5           | 41,7           | 82  | 90  | 28,5           | 12                           | 18             | 33             | 124            | 102 | 6 x M10 | M6       | 8  | 74             | 56             | 30 |
| SRF/BRF/SRP/BRP 44 x 30 | 45,9           | 41,1           | 82  | 90  | 28,5           | 12                           | 18             | 33             | 124            | 102 | 6 x M10 | M6       | 8  | 74             | 56             | 30 |
| SRF/BRF/SRP/BRP 48 x 5  | 48,4           | 47,4           | 105 | 127 | 45             | 15                           | 20             | 37             | 150            | 127 | 6 x M12 | M8 x 1 9 | 90 | 60             | 30             |    |
| SRF/BRF/SRP/BRP 48 x 8  | 48,6           | 47,1           | 105 | 127 | 45             | 15                           | 20             | 37             | 150            | 127 | 6 x M12 | M8 x 1 9 | 90 | 60             | 30             |    |
| SRF/BRF/SRP/BRP 48 x 10 | 48,8           | 46,9           | 105 | 127 | 45             | 15                           | 20             | 37             | 150            | 127 | 6 x M12 | M8 x 1 9 | 90 | 60             | 30             |    |
| SRF/BRF/SRP/BRP 48 x 15 | 49,2           | 46,3           | 105 | 127 | 45             | 15                           | 20             | 37             | 150            | 127 | 6 x M12 | M8 x 1 9 | 90 | 60             | 30             |    |
| SRF/BRF/SRP/BRP 48 x 20 | 49,5           | 45,8           | 105 | 127 | 45             | 15                           | 20             | 37             | 150            | 127 | 6 x M12 | M8 x 1 9 | 90 | 60             | 30             |    |
| SRF/BRF/SRP/BRP 48 x 25 | 49,9           | 45,2           | 105 | 127 | 45             | 15                           | 20             | 37             | 150            | 127 | 6 x M12 | M8 x 1 9 | 90 | 60             | 30             |    |
| SRF/BRF/SRP/BRP 48 x 30 | 50,3           | 44,6           | 105 | 127 | 45             | 15                           | 20             | 37             | 150            | 127 | 6 x M12 | M8 x 1 9 | 90 | 60             | 30             |    |
| SRF/BRF/SRP/BRP 56 x 12 | 56,8           | 54,9           | 105 | 112 | 37,5           | 15                           | 20             | 37             | 150            | 127 | 6 x M12 | M8 x 1 9 | 93 | 66             | 30             |    |
| SRF/BRF/SRP/BRP 56 x 24 | 57,5           | 53,8           | 105 | 112 | 37,5           | 15                           | 20             | 37             | 150            | 127 | 6 x M12 | M8 x 1 9 | 93 | 66             | 30             |    |
| SRF/BRF/SRP/BRP 56 x 36 | 58,3           | 52,5           | 105 | 112 | 37,5           | 15                           | 20             | 37             | 150            | 127 | 6 x M12 | M8 x 1 9 | 93 | 66             | 30             |    |

## SRF/BRF/SRP/BRP planetary roller screws with flanged nut

d 60 – 120 mm



Standard SRF



Standard SRP



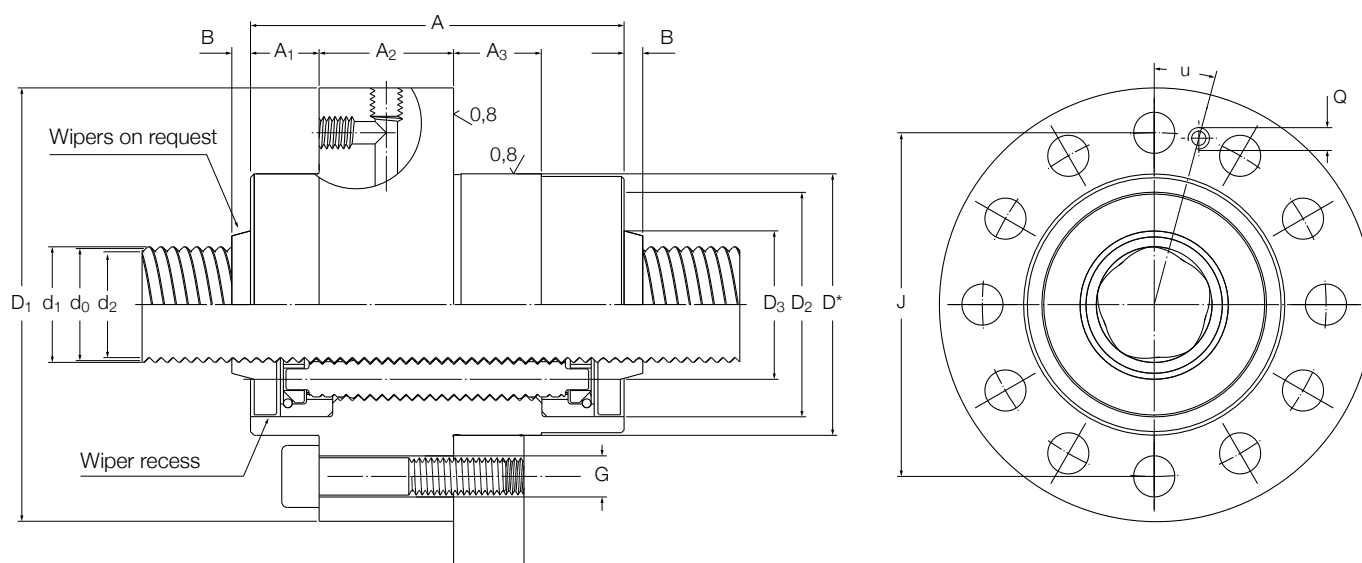
Threaded rollers

| Dimensions and technical characteristics |                |                               |                              |                               |                                     |                                      |      |      |                 |                 |                |                |                      |                   |                 |                 |                    |
|------------------------------------------|----------------|-------------------------------|------------------------------|-------------------------------|-------------------------------------|--------------------------------------|------|------|-----------------|-----------------|----------------|----------------|----------------------|-------------------|-----------------|-----------------|--------------------|
| d <sub>0</sub>                           | P <sub>h</sub> | L <sub>tp</sub> <sup>3)</sup> | C <sub>a</sub> <sup>1)</sup> | C <sub>oa</sub> <sup>1)</sup> | C <sub>a</sub> <sup>2)</sup><br>max | C <sub>oa</sub> <sup>2)</sup><br>max | η    | η'   | S <sub>ap</sub> | T <sub>be</sub> | m <sub>n</sub> | m <sub>s</sub> | I <sub>s</sub>       | I <sub>nn</sub>   | I <sub>ns</sub> | Z <sub>n</sub>  | Z <sub>s</sub>     |
|                                          |                |                               | kN                           |                               |                                     |                                      | –    |      | mm              | Nm              | kg             | kg/m           | kgmm <sup>2</sup> /m | kgmm <sup>2</sup> |                 | cm <sup>3</sup> | cm <sup>3</sup> /m |
| 60                                       | 10             | 4 250                         | 339                          | 780                           | 388                                 | 953                                  | 0,86 | 0,83 | 0,04            | 1,9             | 12,1           | 22,2           | 9 990                | 52 800            | 1 100           | 100             | 27                 |
|                                          | 15             | 4 250                         | 373                          | 783                           | 427                                 | 957                                  | 0,88 | 0,87 | 0,07            | 1,9             | 12,1           | 22,2           | 9 990                | 52 800            | 1 100           | 100             | 27                 |
|                                          | 20             | 4 250                         | 395                          | 786                           | 452                                 | 961                                  | 0,89 | 0,88 | 0,07            | 1,9             | 12,1           | 22,2           | 9 990                | 52 800            | 1 100           | 100             | 27                 |
| 64                                       | 12             | 4 600                         | –                            | –                             | 297                                 | 764                                  | 0,87 | 0,84 | 0,04            | 2,1             | 11,3           | 25,3           | 12 900               | 50 200            | 984             | 46              | 29                 |
|                                          | 18             | 4 600                         | 317                          | 726                           | 333                                 | 782                                  | 0,89 | 0,87 | 0,07            | 2,1             | 11,2           | 25,3           | 12 900               | 50 100            | 914             | 54              | 29                 |
|                                          | 24             | 4 600                         | 329                          | 690                           | 346                                 | 743                                  | 0,89 | 0,88 | 0,07            | 2,1             | 11,2           | 25,3           | 12 900               | 50 100            | 911             | 54              | 29                 |
|                                          | 30             | 4 600                         | 318                          | 620                           | 356                                 | 733                                  | 0,89 | 0,87 | 0,07            | 2,1             | 10,9           | 25,3           | 12 900               | 49 900            | 771             | 69              | 29                 |
|                                          | 36             | 4 600                         | 309                          | 589                           | 346                                 | 697                                  | 0,88 | 0,86 | 0,07            | 2,1             | 10,9           | 25,3           | 12 900               | 49 900            | 771             | 69              | 29                 |
| 75                                       | 10             | 5 500                         | –                            | –                             | 505                                 | 1 486                                | 0,84 | 0,8  | 0,04            | –               | 20,6           | 34,7           | 24 400               | 114 000           | 4 150           | 140             | 33                 |
|                                          | 15             | 5 500                         | –                            | –                             | 561                                 | 1 491                                | 0,87 | 0,85 | 0,07            | –               | 20,6           | 34,7           | 24 400               | 114 000           | 4 150           | 140             | 33                 |
|                                          | 20             | 5 500                         | –                            | –                             | 572                                 | 1 496                                | 0,88 | 0,87 | 0,07            | –               | 20,6           | 34,7           | 24 400               | 114 000           | 4 150           | 140             | 33                 |
| 80                                       | 10             | 6 000                         | 365                          | 1 040                         | 384                                 | 1 115                                | 0,83 | 0,79 | 0,02            | –               | 17,7           | 39,5           | 31 600               | 108 000           | 2 720           | 100             | 36                 |
|                                          | 18             | 6 000                         | 420                          | 1 020                         | 442                                 | 1 099                                | 0,88 | 0,86 | 0,07            | –               | 17,7           | 39,5           | 31 600               | 108 000           | 2 720           | 100             | 36                 |
|                                          | 24             | 6 000                         | 452                          | 1 040                         | 475                                 | 1 121                                | 0,89 | 0,87 | 0,07            | –               | 17,7           | 39,5           | 31 600               | 108 000           | 2 710           | 100             | 36                 |
|                                          | 42             | 6 000                         | 398                          | 837                           | 445                                 | 989                                  | 0,88 | 0,87 | 0,07            | –               | 17,7           | 39,5           | 31 600               | 108 000           | 2 290           | 130             | 36                 |
| 99                                       | 20             | 7 500                         | –                            | –                             | 925                                 | 3 091                                | 0,87 | 0,85 | 0,07            | –               | 48,3           | 60,4           | 74 000               | 449 000           | 17 500          | 340             | 44                 |
|                                          | 25             | 7 500                         | –                            | –                             | 937                                 | 3 096                                | 0,89 | 0,88 | 0,07            | –               | 48,3           | 60,4           | 74 000               | 449 000           | 17 500          | 340             | 44                 |
| 120                                      | 20             | 8 000                         | –                            | –                             | 1 131                               | 4 041                                | 0,84 | 0,81 | 0,07            | –               | 89             | 88,8           | 160 000              | 1,29 x 106        | 40 900          | 540             | 53                 |
|                                          | 25             | 8 000                         | –                            | –                             | 1 127                               | 4 038                                | 0,87 | 0,85 | 0,07            | –               | 89             | 88,8           | 160 000              | 1,29 x 106        | 40 900          | 540             | 53                 |

<sup>1)</sup> Standard number of rollers. Configuration not available for certain sizes

<sup>2)</sup> Maximum number of rollers on request, or standard for certain sizes

<sup>3)</sup> For BRC (backlash eliminated), maximum length can be shorter



\* g6 fit only applies to the finished surface, on side opposite to the lubrication port, marked with a  $0,8\sqrt{\text{ }}$

| Designation                    | Dimensions     |                |            |            |                           |                                         |                |                |                |            |                |               |          |                |                |           |
|--------------------------------|----------------|----------------|------------|------------|---------------------------|-----------------------------------------|----------------|----------------|----------------|------------|----------------|---------------|----------|----------------|----------------|-----------|
|                                | d <sub>1</sub> | d <sub>2</sub> | D<br>g6    | A<br>h12   | A <sub>1</sub><br>SRF/BRF | A <sub>1</sub> <sup>1)</sup><br>SRP/BRP | A <sub>3</sub> | A <sub>2</sub> | D <sub>1</sub> | J<br>js12  | G              | Q             | B        | D <sub>2</sub> | D <sub>3</sub> | u         |
| —                              | mm             |                |            |            |                           |                                         |                |                |                |            |                |               |          |                |                |           |
| <b>SRF/BRF/SRP/BRP 60 x 10</b> | 60,8           | 58,9           | 122        | 152        | 53,5                      | 17                                      | 25             | 45             | 180            | 150        | 6 x M16        | M8 x 1        | 9        | 110            | 71             | 30        |
| <b>SRF/BRF/SRP/BRP 60 x 15</b> | 61,2           | 58,4           | 122        | 152        | 53,5                      | 17                                      | 25             | 45             | 180            | 150        | 6 x M16        | M8 x 1        | 9        | 110            | 71             | 30        |
| <b>SRF/BRF/SRP/BRP 60 x 20</b> | <b>61,5</b>    | <b>57,8</b>    | <b>122</b> | <b>152</b> | <b>53,5</b>               | <b>17</b>                               | <b>25</b>      | <b>45</b>      | <b>180</b>     | <b>150</b> | <b>6 x M16</b> | <b>M8 x 1</b> | <b>9</b> | <b>110</b>     | <b>71</b>      | <b>30</b> |
| <b>SRF/BRF/SRP/BRP 64 x 12</b> | 64,8           | 62,9           | 120        | 129        | 42                        | 17                                      | 25             | 45             | 180            | 150        | 6 x M16        | M8 x 1        | 11       | 106            | 75             | 30        |
| <b>SRF/BRF/SRP/BRP 64 x 18</b> | 65,2           | 62,3           | 120        | 129        | 42                        | 17                                      | 25             | 45             | 180            | 150        | 6 x M16        | M8 x 1        | 11       | 106            | 75             | 30        |
| <b>SRF/BRF/SRP/BRP 64 x 24</b> | 65,5           | 61,8           | 120        | 129        | 42                        | 17                                      | 25             | 45             | 180            | 150        | 6 x M16        | M8 x 1        | 11       | 106            | 75             | 30        |
| <b>SRF/BRF/SRP/BRP 64 x 30</b> | 65,9           | 61,2           | 120        | 129        | 42                        | 17                                      | 25             | 45             | 180            | 150        | 6 x M16        | M8 x 1        | 11       | 106            | 75             | 30        |
| <b>SRF/BRF/SRP/BRP 64 x 36</b> | 66,3           | 60,6           | 120        | 129        | 42                        | 17                                      | 25             | 45             | 180            | 150        | 6 x M16        | M8 x 1        | 11       | 106            | 75             | 30        |
| <b>SRF/SRP 75 x 10</b>         | 75,8           | 73,9           | 150        | 191        | 73                        | 21                                      | 35             | 45             | 210            | 180        | 8 x M16        | M8 x 1        | 10       | 136            | 87             | 22,5      |
| <b>SRF/SRP 75 x 15</b>         | 76,2           | 73,4           | 150        | 191        | 73                        | 21                                      | 35             | 45             | 210            | 180        | 8 x M16        | M8 x 1        | 10       | 136            | 87             | 22,5      |
| <b>SRF/SRP 75 x 20</b>         | 76,5           | 72,9           | 150        | 191        | 73                        | 21                                      | 35             | 45             | 210            | 180        | 8 x M16        | M8 x 1        | 10       | 136            | 87             | 22,5      |
| <b>SRF/SRP 80 x 10</b>         | 80,7           | 79             | 150        | 156        | 55,5                      | 19                                      | 35             | 45             | 210            | 180        | 8 x M16        | M8 x 1        | 12       | 132            | 92             | 22,5      |
| <b>SRF/SRP 80 x 18</b>         | 81,2           | 78,4           | 150        | 156        | 55,5                      | 19                                      | 35             | 45             | 210            | 180        | 8 x M16        | M8 x 1        | 12       | 132            | 92             | 22,5      |
| <b>SRF/SRP 80 x 24</b>         | 81,5           | 77,8           | 150        | 156        | 55,5                      | 19                                      | 35             | 45             | 210            | 180        | 8 x M16        | M8 x 1        | 12       | 132            | 92             | 22,5      |
| <b>SRF/SRP 80 x 42</b>         | 82,7           | 76,1           | 150        | 156        | 55,5                      | 19                                      | 35             | 45             | 210            | 180        | 8 x M16        | M8 x 1        | 12       | 132            | 92             | 22,5      |
| <b>SRF/SRP 99 x 20</b>         | 100,5          | 96,9           | 200        | 260        | 102,5                     | 26                                      | 40             | 55             | 275            | 245        | 12 x M16       | M8 x 1        | 12       | 180            | 112            | 15        |
| <b>SRF/SRP 99 x 25</b>         | 100,9          | 96,3           | 200        | 260        | 102,5                     | 26                                      | 40             | 55             | 275            | 245        | 12 x M16       | M8 x 1        | 12       | 180            | 112            | 15        |
| <b>SRF/SRP 120 x 20</b>        | 121,5          | 118            | 260        | 280        | 112,5                     | 27                                      | 60             | 55             | 340            | 305        | 12 x M16       | M12 x 1,75    | 12       | 220            | 180            | 15        |
| <b>SRF/SRP 120 x 25</b>        | 121,9          | 117,4          | 260        | 280        | 112,5                     | 27                                      | 60             | 55             | 340            | 305        | 12 x M16       | M12 x 1,75    | 12       | 220            | 180            | 15        |

## PRU preloaded planetary roller screws with cylindrical nut

d 8 – 30 mm



Standard PRU



Threaded rollers



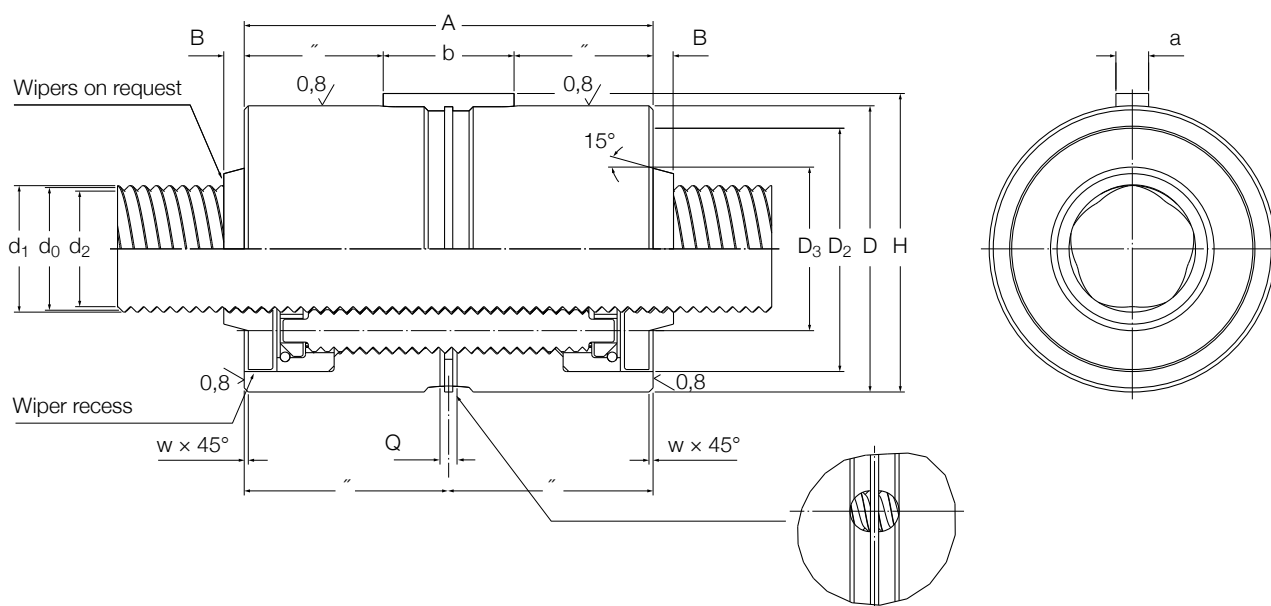
Components assembly

### Dimensions and technical characteristics

| d <sub>0</sub> | P <sub>h</sub> | L <sub>tp</sub> | C <sub>a</sub> <sup>1)</sup> | C <sub>oa</sub> <sup>1)</sup> | C <sub>s</sub> <sup>2)</sup><br>max | C <sub>oa</sub> <sup>2)</sup><br>max | η    | η'   | R <sub>ng</sub> | R <sub>nr</sub> | T <sub>pr</sub> | F <sub>pr</sub> | m <sub>n</sub> | m <sub>s</sub> | I <sub>s</sub>       | I <sub>nn</sub>   | I <sub>ns</sub> | Z <sub>n</sub>  | Z <sub>s</sub>     |
|----------------|----------------|-----------------|------------------------------|-------------------------------|-------------------------------------|--------------------------------------|------|------|-----------------|-----------------|-----------------|-----------------|----------------|----------------|----------------------|-------------------|-----------------|-----------------|--------------------|
|                |                |                 | kN                           |                               |                                     |                                      | –    |      | N/μm            |                 | Nm              | N               | kg             | kg/m           | kgmm <sup>2</sup> /m | kgmm <sup>2</sup> |                 | cm <sup>3</sup> | cm <sup>3</sup> /m |
| 8              | 2              | 400             | –                            | –                             | 4,74                                | 7,98                                 | 0,88 | 0,87 | 173             | 193             | 0,1             | 602             | 0,1            | 0,4            | 3,2                  | 11,4              | 0,1             | 0,8             | 4                  |
|                | 4              | 400             | –                            | –                             | 4,92                                | 6,72                                 | 0,88 | 0,87 | 110             | 150             | 0,1             | 236             | 0,1            | 0,4            | 3,2                  | 11,4              | 0,1             | 0,9             | 4                  |
| 12             | 2              | 600             | –                            | –                             | 7,25                                | 11,2                                 | 0,86 | 0,83 | 249             | 298             | 0,2             | 1 007           | 0,2            | 0,9            | 16                   | 22,9              | 0,4             | 1,1             | 6                  |
|                | 5              | 600             | 7,76                         | 9,17                          | 8,32                                | 10,2                                 | 0,89 | 0,88 | 180             | 240             | 0,2             | 570             | 0,2            | 0,9            | 16                   | 22,9              | 0,4             | 1,4             | 6                  |
| 15             | 2              | 750             | –                            | –                             | 13,1                                | 26,4                                 | 0,84 | 0,80 | 498             | 565             | 0,3             | 1 211           | 0,2            | 1,4            | 39                   | 45,2              | 1,2             | 1,9             | 7                  |
|                | 5              | 750             | 14,3                         | 21,8                          | 16,4                                | 26,6                                 | 0,89 | 0,88 | 290             | 380             | 0,3             | 932             | 0,2            | 1,4            | 39                   | 45,2              | 1,2             | 2,3             | 7                  |
|                | 8              | 750             | 15,1                         | 20,4                          | 16,2                                | 22,7                                 | 0,88 | 0,86 | 242             | 315             | 0,3             | 954             | 0,2            | 1,4            | 39                   | 45,2              | 1,2             | 2,3             | 7                  |
| 18             | 2              | 900             | –                            | –                             | 16,8                                | 35,5                                 | 0,82 | 0,77 | 529             | 644             | 0,4             | 1 500           | 0,36           | 2              | 81                   | 81                | 3               | 4,0             | 8                  |
|                | 5              | 900             | –                            | –                             | 20,8                                | 35,5                                 | 0,89 | 0,87 | 348             | 385             | 0,4             | 1 078           | 0,35           | 2              | 81                   | 81                | 3               | 4,0             | 8                  |
|                | 8              | 900             | –                            | –                             | 20,9                                | 30,8                                 | 0,89 | 0,87 | 202             | 224             | 0,4             | 630             | 0,35           | 2              | 81                   | 81                | 3               | 4,0             | 8                  |
| 21             | 2              | 1 100           | –                            | –                             | 26,1                                | 51,6                                 | 0,80 | 0,74 | 675             | 762             | 0,5             | 1 740           | 0,4            | 2,7            | 150                  | 141               | 6,5             | 5,0             | 10                 |
|                | 5              | 1 100           | 27,9                         | 41                            | 31,8                                | 50,1                                 | 0,88 | 0,86 | 400             | 520             | 0,5             | 1 341           | 0,4            | 2,7            | 150                  | 141               | 6,5             | 5,0             | 10                 |
|                | 6              | 1 100           | 29,1                         | 41,1                          | 33,2                                | 50,2                                 | 0,89 | 0,87 | 359             | 467             | 0,5             | 1 394           | 0,4            | 2,7            | 150                  | 141               | 6,5             | 5,0             | 10                 |
|                | 8              | 1 100           | 31,4                         | 42,1                          | 35,9                                | 51,4                                 | 0,89 | 0,88 | 311             | 404             | 0,5             | 1 354           | 0,4            | 2,7            | 150                  | 141               | 6,5             | 5,0             | 10                 |
|                | 10             | 1 100           | 32,6                         | 41,5                          | 35                                  | 46,1                                 | 0,89 | 0,87 | 200             | 260             | 0,5             | 557             | 0,4            | 2,7            | 150                  | 141               | 6,5             | 5,0             | 10                 |
| 24             | 6              | 1 250           | 23,3                         | 32,6                          | 26,1                                | 38,5                                 | 0,88 | 0,87 | 370             | 490             | 0,6             | 1 597           | 0,5            | 3,6            | 256                  | 173               | 6,3             | 4,0             | 11                 |
|                | 12             | 1 250           | 26,3                         | 31,2                          | 29,4                                | 36,8                                 | 0,88 | 0,87 | 150             | 200             | 0,6             | 541             | 0,5            | 3,6            | 256                  | 173               | 6,3             | 4,0             | 11                 |
| 25             | 5              | 1 300           | 37,7                         | 60,9                          | 43,1                                | 74,4                                 | 0,87 | 0,85 | 460             | 600             | 0,6             | 1 577           | 0,7            | 3,9            | 301                  | 322               | 14,3            | 10              | 11                 |
|                | 8              | 1 300           | 41,9                         | 60,8                          | 47,9                                | 74,3                                 | 0,89 | 0,88 | 347             | 385             | 0,6             | 1 335           | 0,7            | 3,9            | 301                  | 322               | 14,3            | 10              | 11                 |
|                | 10             | 1 300           | 43,3                         | 59,2                          | 49,5                                | 72,4                                 | 0,89 | 0,88 | 290             | 380             | 0,6             | 1 008           | 0,7            | 3,9            | 301                  | 322               | 14,3            | 10              | 11                 |
|                | 15             | 1 300           | 47,2                         | 59,8                          | 50,6                                | 66,5                                 | 0,87 | 0,85 | 180             | 230             | 0,6             | 426             | 0,7            | 3,9            | 301                  | 322               | 14,3            | 10              | 11                 |
| 30             | 5              | 1 600           | 50,7                         | 89,2                          | 57,9                                | 109                                  | 0,86 | 0,83 | 620             | 810             | 0,9             | 1 844           | 1,2            | 5,6            | 624                  | 762               | 36,2            | 14              | 14                 |
|                | 6              | 1 600           | 52,3                         | 87,7                          | 59,8                                | 107                                  | 0,87 | 0,85 | 561             | 729             | 0,9             | 1 780           | 1,2            | 5,6            | 624                  | 762               | 36,2            | 14              | 14                 |
|                | 8              | 1 600           | 56,5                         | 89,1                          | 64,6                                | 109                                  | 0,88 | 0,87 | 489             | 544             | 0,9             | 1 629           | 1,2            | 5,6            | 624                  | 762               | 36,2            | 14              | 14                 |
|                | 10             | 1 600           | 58,6                         | 87,2                          | 67                                  | 107                                  | 0,89 | 0,88 | 420             | 550             | 0,9             | 1 472           | 1,2            | 5,6            | 624                  | 762               | 36,2            | 14              | 14                 |
|                | 15             | 1 600           | 65,4                         | 90,7                          | 70,1                                | 101                                  | 0,88 | 0,87 | 280             | 311             | 0,9             | 601             | 1,2            | 5,6            | 624                  | 762               | 35,9            | 14              | 14                 |
|                | 20             | 1 600           | 67,9                         | 88,6                          | 72,9                                | 98,5                                 | 0,86 | 0,83 | 190             | 260             | 1,1             | 555             | 1,2            | 5,6            | 624                  | 762               | 35,9            | 14              | 14                 |

<sup>1)</sup> Standard number of rollers. Configuration not available for certain sizes

<sup>2)</sup> Maximum number of rollers on request, or standard for certain sizes



| Designation | Dimensions     |                |            |          |     |         |    |      |   |   |                |                |
|-------------|----------------|----------------|------------|----------|-----|---------|----|------|---|---|----------------|----------------|
|             | d <sub>1</sub> | d <sub>2</sub> | D<br>g6/H7 | A<br>h12 | w   | a<br>h9 | b  | H    | Q | B | D <sub>2</sub> | D <sub>3</sub> |
| –           | mm             |                |            |          |     |         |    |      |   |   |                |                |
| PRU 8 x 2   | 8,2            | 7,6            | 25         | 44       | 0,5 | 4       | 12 | 26,5 | 5 | 3 | 21             | 13             |
| PRU 8 x 4   | 8,4            | 7,3            | 25         | 44       | 0,5 | 4       | 12 | 26,5 | 5 | 3 | 21             | 13             |
| PRU 12 x 2  | 12,2           | 11,6           | 30         | 44       | 0,5 | 4       | 12 | 31,5 | 5 | 3 | 25             | 17             |
| PRU 12 x 5  | 12,4           | 11,3           | 30         | 44       | 0,5 | 4       | 12 | 31,5 | 5 | 3 | 25             | 17             |
| PRU 15 x 2  | 15,2           | 14,6           | 35         | 50       | 0,5 | 4       | 16 | 36,5 | 5 | 3 | 30             | 20             |
| PRU 15 x 5  | 15,4           | 14,3           | 35         | 50       | 0,5 | 4       | 16 | 36,5 | 5 | 3 | 30             | 20             |
| PRU 15 x 8  | 15,6           | 14             | 35         | 50       | 0,5 | 4       | 16 | 36,5 | 5 | 3 | 30             | 20             |
| PRU 18 x 2  | 18,2           | 17,6           | 40         | 58       | 0,5 | 5       | 18 | 42   | 5 | 3 | 35             | 23             |
| PRU 18 x 5  | 18,4           | 17,3           | 40         | 58       | 0,5 | 5       | 18 | 42   | 5 | 3 | 35             | 23             |
| PRU 18 x 8  | 18,6           | 17,0           | 40         | 58       | 0,5 | 5       | 18 | 42   | 5 | 3 | 35             | 23             |
| PRU 21 x 2  | 21,2           | 20,6           | 45         | 64       | 0,5 | 5       | 20 | 47   | 5 | 4 | 40,5           | 26             |
| PRU 21 x 5  | 21,4           | 20,3           | 45         | 64       | 0,5 | 5       | 20 | 47   | 5 | 4 | 40,5           | 26             |
| PRU 21 x 6  | 21,5           | 20,2           | 45         | 64       | 0,5 | 5       | 20 | 47   | 5 | 4 | 40,5           | 26             |
| PRU 21 x 8  | 21,6           | 20             | 45         | 64       | 0,5 | 5       | 20 | 47   | 5 | 4 | 40,5           | 26             |
| PRU 21 x 10 | 21,8           | 19,8           | 45         | 64       | 0,5 | 5       | 20 | 47   | 5 | 4 | 40,5           | 26             |
| PRU 24 x 6  | 24,4           | 23,3           | 48         | 58       | 0,5 | 5       | 20 | 50   | 5 | 6 | 42             | 31             |
| PRU 24 x 12 | 24,8           | 22,8           | 48         | 58       | 0,5 | 5       | 20 | 50   | 5 | 6 | 42             | 31             |
| PRU 25 x 5  | 25,4           | 24,3           | 53         | 78       | 0,5 | 6       | 25 | 55,5 | 5 | 6 | 47             | 32             |
| PRU 25 x 8  | 25,6           | 24,0           | 53         | 78       | 0,5 | 6       | 25 | 55,5 | 5 | 6 | 47             | 32             |
| PRU 25 x 10 | 25,8           | 23,8           | 53         | 78       | 0,5 | 6       | 25 | 55,5 | 5 | 6 | 47             | 32             |
| PRU 25 x 15 | 26,2           | 23,2           | 53         | 78       | 0,5 | 6       | 25 | 55,5 | 5 | 6 | 47             | 32             |
| PRU 30 x 5  | 30,4           | 29,4           | 64         | 85       | 0,5 | 6       | 32 | 66,5 | 5 | 7 | 58             | 38             |
| PRU 30 x 6  | 30,5           | 29,3           | 64         | 85       | 0,5 | 6       | 32 | 66,5 | 5 | 7 | 58             | 38             |
| PRU 30 x 8  | 30,6           | 29             | 64         | 85       | 0,5 | 6       | 32 | 66,5 | 5 | 7 | 58             | 38             |
| PRU 30 x 10 | 30,8           | 28,8           | 64         | 85       | 0,5 | 6       | 32 | 66,5 | 5 | 7 | 58             | 38             |
| PRU 30 x 15 | 31,2           | 28,3           | 64         | 85       | 0,5 | 6       | 32 | 66,5 | 5 | 7 | 58             | 38             |
| PRU 30 x 20 | 31,5           | 27,6           | 64         | 85       | 0,5 | 6       | 32 | 66,5 | 5 | 7 | 58             | 38             |

## PRU preloaded planetary roller screws with cylindrical nut

d 36 – 56 mm



Standard PRU



Threaded rollers



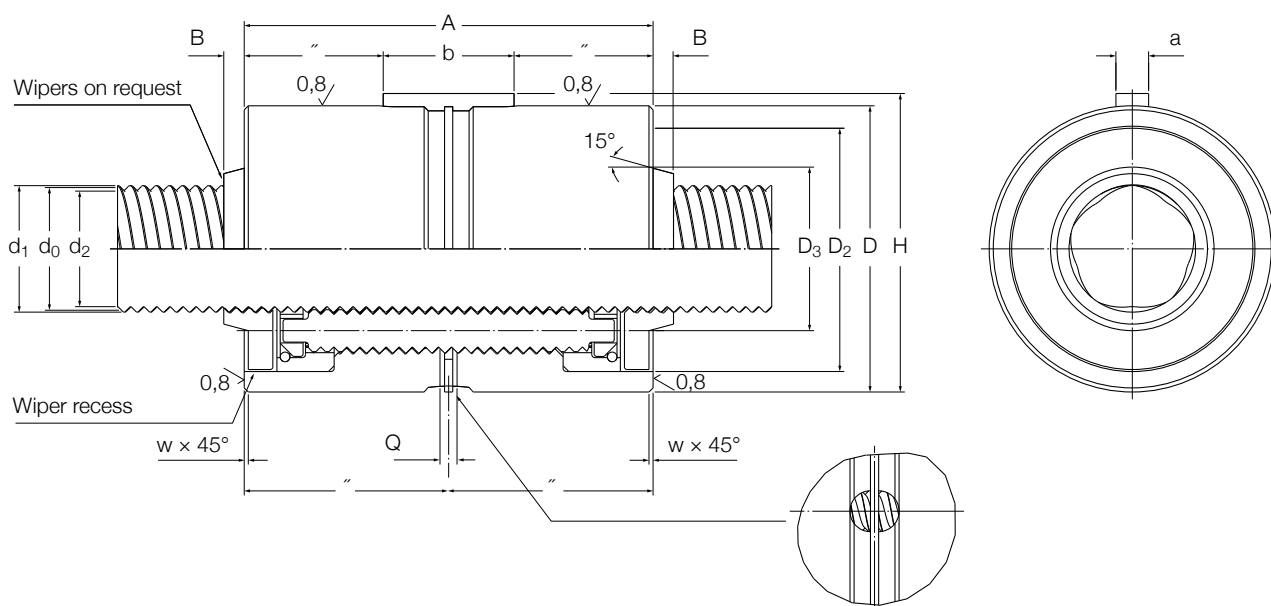
Components assembly

### Dimensions and technical characteristics

| $d_0$ | $P_h$ | $L_{tp}$ | $C_a^{1)}$ | $C_{oa}^{1)}$ | $C_a^{2)}$<br>max | $C_{oa}^{2)}$<br>max | $\eta$ | $\eta'$ | $R_{ng}$   | $R_{nr}$ | $T_{pr}$ | $F_{pr}$ | $m_n$ | $m_s$ | $I_s$                | $I_{nn}$          | $I_{ns}$ | $Z_n$           | $Z_s$              |
|-------|-------|----------|------------|---------------|-------------------|----------------------|--------|---------|------------|----------|----------|----------|-------|-------|----------------------|-------------------|----------|-----------------|--------------------|
| mm    |       |          | kN         |               |                   |                      | –      |         | N/ $\mu$ m |          | Nm       | N        | kg    | kg/m  | kgmm <sup>2</sup> /m | kgmm <sup>2</sup> |          | cm <sup>3</sup> | cm <sup>3</sup> /m |
| 36    | 6     | 1 900    | 49,8       | 89,7          | 58,5              | 114                  | 0,86   | 0,83    | 770        | 1 000    | 1,2      | 2 334    | 1,2   | 8     | 1 290                | 823               | 45,7     | 13              | 16                 |
|       | 9     | 1 900    | 53,7       | 87            | 63,1              | 111                  | 0,88   | 0,87    | 530        | 689      | 1,2      | 1 960    | 1,2   | 8     | 1 290                | 823               | 45,7     | 13              | 16                 |
|       | 12    | 1 900    | 58,7       | 90,6          | 69                | 115                  | 0,89   | 0,88    | 510        | 660      | 1,2      | 1 820    | 1,2   | 8     | 1 290                | 823               | 45,7     | 13              | 16                 |
|       | 18    | 1 900    | 62,9       | 88,3          | 70,3              | 104                  | 0,88   | 0,87    | 260        | 330      | 1,2      | 707      | 1,2   | 8     | 1 290                | 823               | 45,7     | 13              | 16                 |
|       | 24    | 1 900    | 68,1       | 92,2          | 76,1              | 109                  | 0,86   | 0,83    | 240        | 310      | 1,5      | 649      | 1,2   | 8     | 1 290                | 823               | 45,7     | 13              | 16                 |
| 39    | 5     | 2 100    | 71,2       | 134           | 81,4              | 164                  | 0,83   | 0,80    | 750        | 980      | 1,3      | 2 288    | 2,1   | 9,4   | 1 780                | 2 030             | 124      | 28              | 18                 |
|       | 10    | 2 100    | 84,1       | 135           | 96,1              | 166                  | 0,88   | 0,87    | 500        | 650      | 1,3      | 1 965    | 2,1   | 9,4   | 1 780                | 2 030             | 124      | 28              | 18                 |
|       | 15    | 2 100    | 92,4       | 136           | 106               | 167                  | 0,89   | 0,88    | 390        | 510      | 1,3      | 1 465    | 2,1   | 9,4   | 1 780                | 2 030             | 124      | 28              | 18                 |
|       | 20    | 2 100    | 95,2       | 130           | 109               | 159                  | 0,88   | 0,87    | 220        | 290      | 1,3      | 694      | 2,1   | 9,4   | 1 780                | 2 030             | 124      | 28              | 18                 |
|       | 25    | 2 100    | 96,3       | 125           | 103               | 138                  | 0,86   | 0,84    | 210        | 280      | 1,8      | 697      | 2,1   | 9,4   | 1 780                | 2 030             | 124      | 28              | 18                 |
| 44    | 8     | 2 400    | 71,9       | 131           | 84,4              | 166                  | 0,86   | 0,84    | 688        | 895      | 1,6      | 2 432    | 1,7   | 11,9  | 2 890                | 1 730             | 119      | 23              | 20                 |
|       | 12    | 2 400    | 79,2       | 131           | 93                | 167                  | 0,89   | 0,87    | 610        | 800      | 1,6      | 2 297    | 1,7   | 11,9  | 2 890                | 1 730             | 119      | 23              | 20                 |
|       | 18    | 2 400    | 86,9       | 132           | 102               | 169                  | 0,89   | 0,88    | 430        | 550      | 1,6      | 1 497    | 1,7   | 11,9  | 2 890                | 1 730             | 118      | 23              | 20                 |
|       | 24    | 2 400    | 92,5       | 133           | 103               | 158                  | 0,88   | 0,86    | 290        | 380      | 1,6      | 725      | 1,7   | 11,9  | 2 890                | 1 730             | 118      | 23              | 20                 |
|       | 30    | 2 400    | 91,4       | 123           | 102               | 146                  | 0,85   | 0,83    | 190        | 250      | 2,1      | 727      | 1,7   | 11,9  | 2 890                | 1 730             | 118      | 23              | 20                 |
| 48    | 5     | 2 600    | 109        | 241           | 132               | 321                  | 0,81   | 0,76    | 1 080      | 1 410    | 1,9      | 2 698    | 4,2   | 14,2  | 4 090                | 6 520             | 371      | 54              | 22                 |
|       | 8     | 2 600    | 120        | 235           | 138               | 288                  | 0,86   | 0,83    | 889        | 1 156    | 1,9      | 2 583    | 4,2   | 14,2  | 4 090                | 6 520             | 371      | 54              | 22                 |
|       | 10    | 2 600    | 128        | 238           | 146               | 290                  | 0,87   | 0,85    | 760        | 980      | 1,9      | 2 405    | 4,2   | 14,2  | 4 090                | 6 520             | 371      | 54              | 22                 |
|       | 15    | 2 600    | 142        | 243           | 162               | 297                  | 0,89   | 0,88    | 600        | 780      | 1,9      | 2 072    | 4,2   | 14,2  | 4 090                | 6 520             | 371      | 54              | 22                 |
|       | 20    | 2 600    | 146        | 231           | 167               | 283                  | 0,89   | 0,88    | 460        | 600      | 1,9      | 1 423    | 4,2   | 14,2  | 4 090                | 6 520             | 371      | 54              | 22                 |
|       | 25    | 2 600    | 157        | 246           | 180               | 300                  | 0,88   | 0,87    | 320        | 480      | 1,9      | 782      | 4,2   | 14,2  | 4 090                | 6 520             | 370      | 54              | 22                 |
|       | 30    | 2 600    | 152        | 233           | 174               | 285                  | 0,87   | 0,85    | 344        | 384      | 2,5      | 1 260    | 4,2   | 14,2  | 4 090                | 6 520             | 370      | 54              | 22                 |
| 56    | 12    | 3 100    | 117        | 217           | 137               | 276                  | 0,87   | 0,86    | 810        | 1 060    | 2,4      | 2 952    | 3,2   | 19,3  | 7 580                | 5 000             | 385      | 46              | 25                 |
|       | 24    | 3 100    | 133        | 210           | 157               | 267                  | 0,89   | 0,88    | 410        | 530      | 2,4      | 1 579    | 3,2   | 19,3  | 7 580                | 5 000             | 383      | 46              | 25                 |
|       | 36    | 3 100    | 142        | 212           | 159               | 251                  | 0,86   | 0,84    | 290        | 370      | 3,2      | 910      | 3,2   | 19,3  | 7 580                | 5 000             | 383      | 46              | 25                 |

<sup>1)</sup> Standard number of rollers

<sup>2)</sup> Maximum number of rollers on request



| Designation | Dimensions     |                |            |          |     |         |    |      |   |   |                |                |
|-------------|----------------|----------------|------------|----------|-----|---------|----|------|---|---|----------------|----------------|
|             | d <sub>1</sub> | d <sub>2</sub> | D<br>g6/H7 | A<br>h12 | w   | a<br>h9 | b  | H    | Q | B | D <sub>2</sub> | D <sub>3</sub> |
| –           | mm             |                |            |          |     |         |    |      |   |   |                |                |
| PRU 36 x 6  | 36,4           | 35,4           | 68         | 80       | 0,5 | 5       | 25 | 70   | 5 | 8 | 62             | 45             |
| PRU 36 x 9  | 36,6           | 35,1           | 68         | 80       | 0,5 | 5       | 25 | 70   | 5 | 8 | 62             | 45             |
| PRU 36 x 12 | 36,8           | 34,8           | 68         | 80       | 0,5 | 5       | 25 | 70   | 5 | 8 | 62             | 45             |
| PRU 36 x 18 | 37,2           | 34,2           | 68         | 80       | 0,5 | 5       | 25 | 70   | 5 | 8 | 62             | 45             |
| PRU 36 x 24 | 37,5           | 33,6           | 68         | 80       | 0,5 | 5       | 25 | 70   | 5 | 8 | 62             | 45             |
| PRU 39 x 5  | 39,4           | 38,4           | 80         | 100      | 1   | 8       | 40 | 83   | 7 | 8 | 73             | 50             |
| PRU 39 x 10 | 39,8           | 37,9           | 80         | 100      | 1   | 8       | 40 | 83   | 7 | 8 | 73             | 50             |
| PRU 39 x 15 | 40,2           | 37,3           | 80         | 100      | 1   | 8       | 40 | 83   | 7 | 8 | 73             | 50             |
| PRU 39 x 20 | 40,5           | 36,7           | 80         | 100      | 1   | 8       | 40 | 83   | 7 | 8 | 73             | 50             |
| PRU 39 x 25 | 40,9           | 36,1           | 80         | 100      | 1   | 8       | 40 | 83   | 7 | 8 | 73             | 50             |
| PRU 44 x 8  | 44,5           | 43,2           | 80         | 90       | 0,5 | 6       | 32 | 82,5 | 7 | 8 | 74             | 56             |
| PRU 44 x 12 | 44,8           | 42,8           | 80         | 90       | 0,5 | 6       | 32 | 82,5 | 7 | 8 | 74             | 56             |
| PRU 44 x 18 | 45,2           | 42,3           | 80         | 90       | 0,5 | 6       | 32 | 82,5 | 7 | 8 | 74             | 56             |
| PRU 44 x 24 | 45,5           | 41,7           | 80         | 90       | 0,5 | 6       | 32 | 82,5 | 7 | 8 | 74             | 56             |
| PRU 44 x 30 | 45,9           | 41,1           | 80         | 90       | 0,5 | 6       | 32 | 82,5 | 7 | 8 | 74             | 56             |
| PRU 48 x 5  | 48,4           | 47,4           | 100        | 127      | 1   | 8       | 45 | 103  | 7 | 9 | 90             | 60             |
| PRU 48 x 8  | 48,6           | 47,1           | 100        | 127      | 1   | 8       | 45 | 103  | 7 | 9 | 90             | 60             |
| PRU 48 x 10 | 48,8           | 46,9           | 100        | 127      | 1   | 8       | 45 | 103  | 7 | 9 | 90             | 60             |
| PRU 48 x 15 | 49,2           | 46,3           | 100        | 127      | 1   | 8       | 45 | 103  | 7 | 9 | 90             | 60             |
| PRU 48 x 20 | 49,5           | 45,8           | 100        | 127      | 1   | 8       | 45 | 103  | 7 | 9 | 90             | 60             |
| PRU 48 x 25 | 49,9           | 45,2           | 100        | 127      | 1   | 8       | 45 | 103  | 7 | 9 | 90             | 60             |
| PRU 48 x 30 | 50,3           | 44,6           | 100        | 127      | 1   | 8       | 45 | 103  | 7 | 9 | 90             | 60             |
| PRU 56 x 12 | 56,8           | 54,9           | 100        | 112      | 1   | 8       | 40 | 103  | 7 | 9 | 93             | 66             |
| PRU 56 x 24 | 57,5           | 53,8           | 100        | 112      | 1   | 8       | 40 | 103  | 7 | 9 | 93             | 66             |
| PRU 56 x 36 | 58,3           | 52,5           | 100        | 112      | 1   | 8       | 40 | 103  | 7 | 9 | 93             | 66             |

## PRU preloaded planetary roller screws with cylindrical nut

d 60 – 64 mm



Standard PRU



Threaded rollers



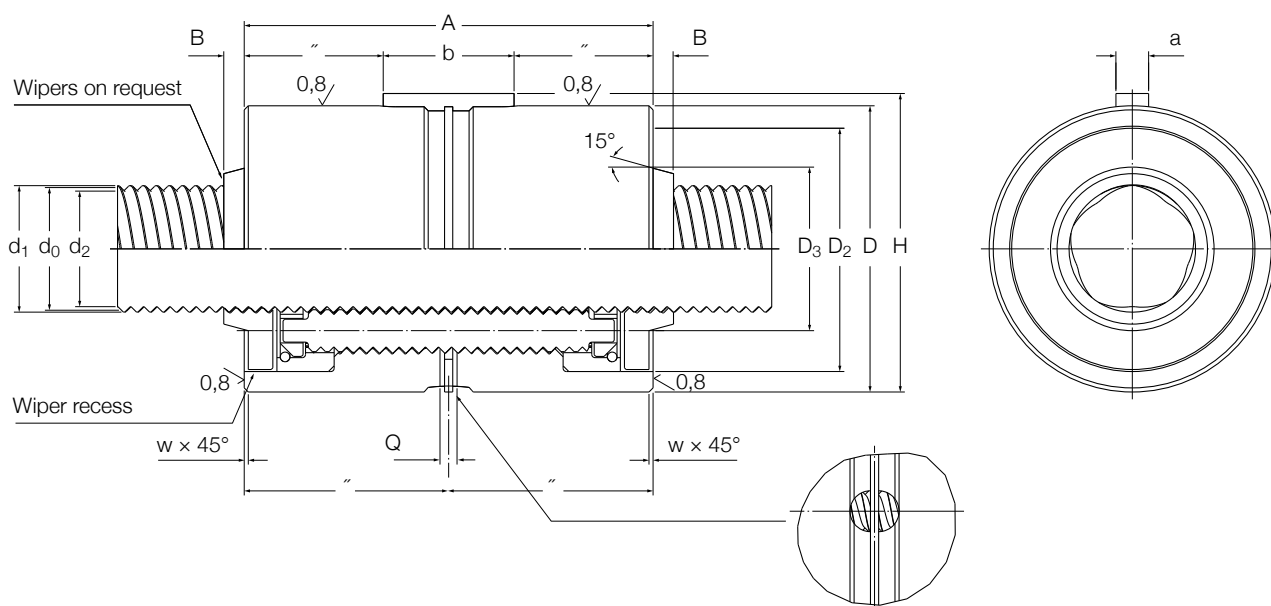
Components assembly

### Dimensions and technical characteristics

| $d_0$ | $P_h$ | $L_{tp}$ | $C_a^{1)}$ | $C_{oa}^{1)}$ | $C_s^{2)}$<br>max | $C_{oa}^{2)}$<br>max | $\eta$ | $\eta'$ | $R_{ng}$   | $R_{nr}$ | $T_{pr}$ | $F_{pr}$ | $m_n$ | $m_s$ | $I_s$                | $I_{nn}$          | $I_{ns}$ | $Z_n$           | $Z_s$              |
|-------|-------|----------|------------|---------------|-------------------|----------------------|--------|---------|------------|----------|----------|----------|-------|-------|----------------------|-------------------|----------|-----------------|--------------------|
| mm    |       |          | kN         |               |                   |                      | –      |         | N/ $\mu$ m |          | Nm       | N        | kg    | kg/m  | kgmm <sup>2</sup> /m | kgmm <sup>2</sup> |          | cm <sup>3</sup> | cm <sup>3</sup> /m |
| 60    | 10    | 3 400    | 187        | 390           | 213               | 476                  | 0,86   | 0,83    | 1 030      | 1 340    | 2,7      | 2 913    | 7,3   | 22,2  | 9 990                | 16 500            | 1 100    | 100             | 27                 |
|       | 15    | 3 400    | 206        | 391           | 235               | 478                  | 0,88   | 0,87    | 830        | 1 080    | 2,7      | 2 635    | 7,3   | 22,2  | 9 990                | 16 500            | 1 100    | 100             | 27                 |
|       | 20    | 3 400    | 218        | 393           | 249               | 480                  | 0,89   | 0,88    | 700        | 910      | 2,7      | 2 326    | 7,3   | 22,2  | 9 990                | 16 400            | 1 100    | 100             | 27                 |
| 64    | 12    | 3 650    | –          | –             | 166               | 382                  | 0,87   | 0,84    | 930        | 1 200    | 3        | 3 328    | 5,4   | 25,3  | 12 900               | 10 600            | 984      | 46              | 29                 |
|       | 18    | 3 650    | 177        | 363           | 186               | 391                  | 0,89   | 0,87    | 790        | 1 030    | 3        | 2 900    | 5,2   | 25,3  | 12 900               | 10 500            | 914      | 54              | 29                 |
|       | 24    | 3 650    | 184        | 345           | 193               | 371                  | 0,89   | 0,88    | 640        | 840      | 3        | 2 318    | 5,2   | 25,3  | 12 900               | 10 500            | 911      | 54              | 29                 |
|       | 30    | 3 650    | 178        | 310           | 199               | 366                  | 0,89   | 0,87    | 440        | 570      | 3        | 1 292    | 4,9   | 25,3  | 12 900               | 10 300            | 771      | 69              | 29                 |
|       | 36    | 3 650    | 173        | 295           | 193               | 348                  | 0,88   | 0,86    | 350        | 450      | 3        | 892      | 4,9   | 25,3  | 12 900               | 10 300            | 771      | 69              | 29                 |

<sup>1)</sup> Standard number of rollers

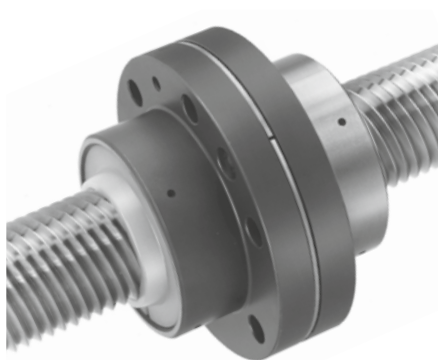
<sup>2)</sup> Maximum number of rollers on request



| Designation        | Dimensions     |                |            |          |   |         |    |     |      |    |                |                |
|--------------------|----------------|----------------|------------|----------|---|---------|----|-----|------|----|----------------|----------------|
|                    | d <sub>1</sub> | d <sub>2</sub> | D<br>g6/H7 | A<br>h12 | w | a<br>h9 | b  | H   | Q    | B  | D <sub>2</sub> | D <sub>3</sub> |
| –                  | mm             |                |            |          |   |         |    |     |      |    |                |                |
| <b>PRU 60 x 10</b> | 60,8           | 58,9           | 122        | 152      | 1 | 10      | 45 | 125 | 10,5 | 9  | 110            | 71             |
| <b>PRU 60 x 15</b> | 61,2           | 58,4           | 122        | 152      | 1 | 10      | 45 | 125 | 10,5 | 9  | 110            | 71             |
| <b>PRU 60 x 20</b> | 61,5           | 57,8           | 122        | 152      | 1 | 10      | 45 | 125 | 10,5 | 9  | 110            | 71             |
| <b>PRU 64 x 12</b> | 64,8           | 62,9           | 115        | 129      | 1 | 8       | 45 | 118 | 7    | 11 | 106            | 75             |
| <b>PRU 64 x 18</b> | 65,2           | 62,3           | 115        | 129      | 1 | 8       | 45 | 118 | 7    | 11 | 106            | 75             |
| <b>PRU 64 x 24</b> | 65,5           | 61,8           | 115        | 129      | 1 | 8       | 45 | 118 | 7    | 11 | 106            | 75             |
| <b>PRU 64 x 30</b> | 65,9           | 61,2           | 115        | 129      | 1 | 8       | 45 | 118 | 7    | 11 | 106            | 75             |
| <b>PRU 64 x 36</b> | 66,3           | 60,6           | 115        | 129      | 1 | 8       | 45 | 118 | 7    | 11 | 106            | 75             |

## PRK preloaded planetary roller screws with flanged nut

d 8 – 36 mm



Standard PRK



Threaded rollers

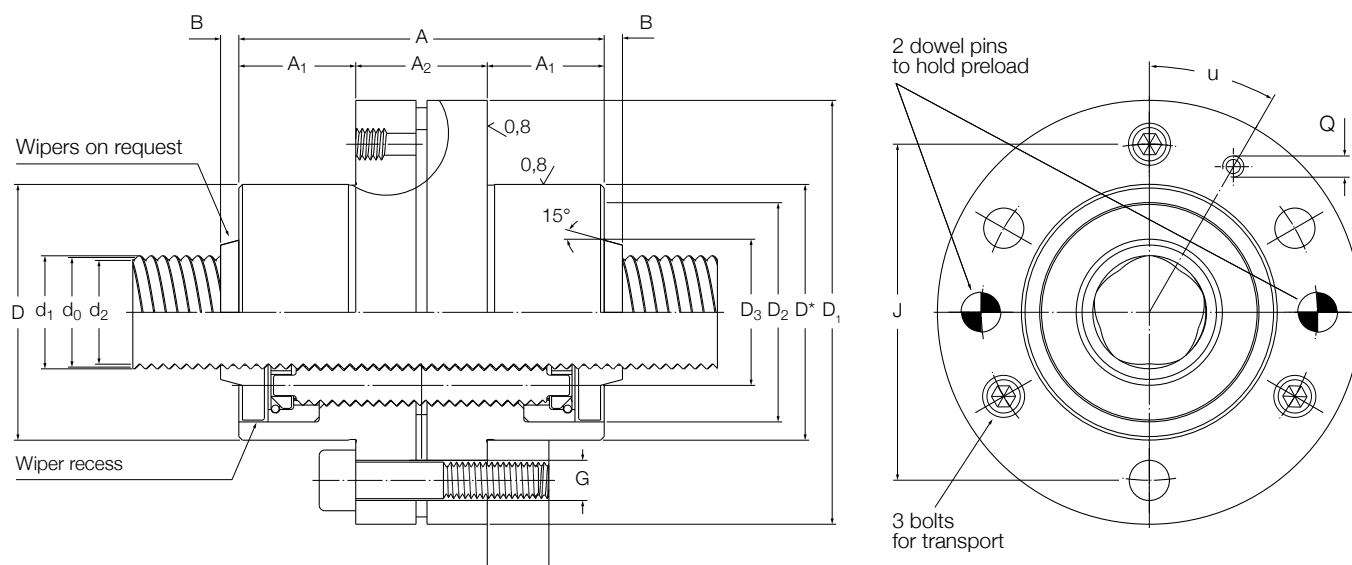


Components assembly

| Dimensions and technical characteristics |                |                 |                              |                               |                                     |                                      |      |      |                 |                 |                 |                 |                |                |                      |                   |                 |                 |                    |
|------------------------------------------|----------------|-----------------|------------------------------|-------------------------------|-------------------------------------|--------------------------------------|------|------|-----------------|-----------------|-----------------|-----------------|----------------|----------------|----------------------|-------------------|-----------------|-----------------|--------------------|
| d <sub>0</sub>                           | P <sub>h</sub> | L <sub>tp</sub> | C <sub>a</sub> <sup>1)</sup> | C <sub>oa</sub> <sup>1)</sup> | C <sub>a</sub> <sup>2)</sup><br>max | C <sub>oa</sub> <sup>2)</sup><br>max | η    | η'   | R <sub>ng</sub> | R <sub>nr</sub> | T <sub>pr</sub> | F <sub>pr</sub> | m <sub>n</sub> | m <sub>s</sub> | I <sub>s</sub>       | I <sub>nn</sub>   | I <sub>ns</sub> | Z <sub>n</sub>  | Z <sub>s</sub>     |
| mm                                       |                |                 | kN                           |                               |                                     |                                      | –    |      | N/μm            |                 | Nm              | N               | kg             | kg/m           | kgmm <sup>2</sup> /m | kgmm <sup>2</sup> |                 | cm <sup>3</sup> | cm <sup>3</sup> /m |
| 8                                        | 4              | 400             | –                            | –                             | 4,92                                | 6,72                                 | 0,88 | 0,87 | 110             | 150             | 0,1             | 236             | 0,3            | 0,4            | 3,2                  | 66,4              | 0,1             | 0,9             | 4                  |
| 12                                       | 5              | 600             | 7,76                         | 9,17                          | 8,32                                | 10,2                                 | 0,89 | 0,88 | 180             | 240             | 0,2             | 570             | 0,3            | 0,9            | 16                   | 106               | 0,4             | 1,4             | 6                  |
| 15                                       | 5              | 750             | 14,3                         | 21,8                          | 16,4                                | 26,6                                 | 0,89 | 0,88 | 290             | 380             | 0,3             | 932             | 0,5            | 1,4            | 39                   | 202               | 1,2             | 2,3             | 7                  |
|                                          | 8              | 750             | 15,1                         | 20,4                          | 16,2                                | 22,7                                 | 0,88 | 0,86 | 242             | 315             | 0,3             | 954             | 0,5            | 1,4            | 39                   | 202               | 1,2             | 2,3             | 7                  |
| 18                                       | 5              | 900             | –                            | –                             | 20,8                                | 35,5                                 | 0,89 | 0,87 | 348             | 385             | 0,4             | 1 078           | 0,6            | 2              | 81                   | 244               | 5,7             | 4               | 8                  |
|                                          | 8              | 900             | –                            | –                             | 20,9                                | 30,8                                 | 0,89 | 0,87 | 202             | 224             | 0,4             | 630             | 0,6            | 2              | 81                   | 244               | 5,7             | 4               | 8                  |
| 21                                       | 5              | 1 100           | 27,9                         | 41                            | 31,8                                | 50,1                                 | 0,88 | 0,86 | 400             | 520             | 0,5             | 1 341           | 0,7            | 2,7            | 150                  | 437               | 6,5             | 5               | 10                 |
|                                          | 6              | 1 100           | 29,1                         | 41,1                          | 33,2                                | 50,2                                 | 0,89 | 0,87 | 359             | 467             | 0,5             | 1 394           | 0,7            | 2,7            | 150                  | 437               | 6,5             | 5               | 10                 |
|                                          | 8              | 1 100           | 31,4                         | 42,1                          | 35,9                                | 51,4                                 | 0,89 | 0,88 | 311             | 404             | 0,5             | 1 354           | 0,7            | 2,7            | 150                  | 437               | 6,5             | 5               | 10                 |
|                                          | 10             | 1 100           | 32,6                         | 41,5                          | 35,0                                | 46,1                                 | 0,89 | 0,87 | 200             | 260             | 0,5             | 557             | 0,7            | 2,7            | 150                  | 437               | 6,5             | 5               | 10                 |
| 24                                       | 6              | 1 250           | 23,3                         | 32,6                          | 26,1                                | 38,5                                 | 0,88 | 0,87 | 370             | 490             | 0,6             | 1 597           | 0,8            | 3,6            | 256                  | 524               | 6,3             | 4               | 11                 |
|                                          | 12             | 1 250           | 26,3                         | 31,2                          | 29,4                                | 36,8                                 | 0,88 | 0,87 | 150             | 200             | 0,6             | 541             | 0,8            | 3,6            | 256                  | 524               | 6,3             | 4               | 11                 |
| 25                                       | 5              | 1 300           | 37,7                         | 60,9                          | 43,1                                | 74,4                                 | 0,87 | 0,85 | 460             | 600             | 0,6             | 1 577           | 1,4            | 3,9            | 301                  | 1 200             | 14,3            | 10              | 11                 |
|                                          | 8              | 1 300           | 41,9                         | 60,8                          | 47,9                                | 74,3                                 | 0,89 | 0,88 | 347             | 385             | 0,6             | 1 335           | 1,4            | 3,9            | 301                  | 1 200             | 14,3            | 10              | 11                 |
|                                          | 10             | 1 300           | 43,3                         | 59,2                          | 49,5                                | 72,4                                 | 0,89 | 0,88 | 290             | 380             | 0,6             | 1 008           | 1,4            | 3,9            | 301                  | 1 200             | 14,3            | 10              | 11                 |
|                                          | 15             | 1 300           | 47,2                         | 59,8                          | 50,6                                | 66,5                                 | 0,87 | 0,85 | 180             | 230             | 0,6             | 426             | 1,4            | 3,9            | 301                  | 1 200             | 14,3            | 10              | 11                 |
| 30                                       | 5              | 1 600           | 50,7                         | 89,2                          | 57,9                                | 109                                  | 0,86 | 0,83 | 620             | 810             | 0,9             | 1 844           | 2,1            | 5,6            | 624                  | 2 680             | 36,2            | 14              | 14                 |
|                                          | 6              | 1 600           | 52,3                         | 87,7                          | 59,8                                | 107                                  | 0,87 | 0,85 | 561             | 729             | 0,9             | 1 780           | 2,1            | 5,6            | 624                  | 2 680             | 36,2            | 14              | 14                 |
|                                          | 8              | 1 600           | 56,5                         | 89,1                          | 64,6                                | 109                                  | 0,88 | 0,87 | 489             | 544             | 0,9             | 1 629           | 2,1            | 5,6            | 624                  | 2 680             | 36,2            | 14              | 14                 |
|                                          | 10             | 1 600           | 58,6                         | 87,2                          | 67                                  | 107                                  | 0,89 | 0,88 | 420             | 550             | 0,9             | 1 472           | 2,1            | 5,6            | 624                  | 2 680             | 36,2            | 14              | 14                 |
|                                          | 15             | 1 600           | 65,4                         | 90,7                          | 70,1                                | 101                                  | 0,88 | 0,87 | 280             | 311             | 0,9             | 601             | 2,1            | 5,6            | 624                  | 2 680             | 36,2            | 14              | 14                 |
|                                          | 20             | 1 600           | 67,9                         | 88,6                          | 72,9                                | 98,5                                 | 0,86 | 0,83 | 190             | 260             | 1,1             | 555             | 2,1            | 5,6            | 624                  | 2 680             | 35,9            | 14              | 14                 |
| 36                                       | 6              | 1 900           | 49,8                         | 89,7                          | 58,5                                | 114                                  | 0,86 | 0,83 | 770             | 1 000           | 1,2             | 2 334           | 2,1            | 8              | 1 290                | 3 170             | 45,7            | 13              | 16                 |
|                                          | 9              | 1 900           | 53,7                         | 87                            | 63,1                                | 111                                  | 0,88 | 0,87 | 530             | 689             | 1,2             | 1 960           | 2,1            | 8              | 1 290                | 3 170             | 45,7            | 13              | 16                 |
|                                          | 12             | 1 900           | 58,7                         | 90,6                          | 69                                  | 115                                  | 0,89 | 0,88 | 510             | 660             | 1,2             | 1 820           | 2,1            | 8              | 1 290                | 3 120             | 45,7            | 13              | 16                 |
|                                          | 18             | 1 900           | 62,9                         | 88,3                          | 70,3                                | 104                                  | 0,88 | 0,87 | 260             | 330             | 1,2             | 707             | 2,1            | 8              | 1 290                | 3 120             | 45,7            | 13              | 16                 |
|                                          | 24             | 1 900           | 68,1                         | 92,2                          | 76,1                                | 109                                  | 0,86 | 0,83 | 240             | 310             | 1,5             | 649             | 2,1            | 8              | 1 290                | 3 120             | 45,7            | 13              | 16                 |

<sup>1)</sup> Standard number of rollers. Configuration not available for certain sizes

<sup>2)</sup> Maximum number of rollers on request, or standard for certain sizes

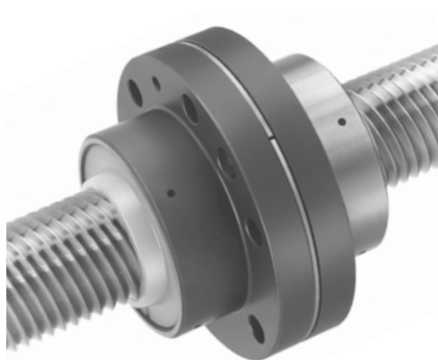


\* g6 fit only applies to the finished surface, on side opposite to the lubrication port, marked with a  $0,8\sqrt{\text{ }}$

| Designation | Dimensions     |                |            |          |                |                |                |           |        |    |   |                |                |    |
|-------------|----------------|----------------|------------|----------|----------------|----------------|----------------|-----------|--------|----|---|----------------|----------------|----|
|             | d <sub>1</sub> | d <sub>2</sub> | D<br>g6/H7 | A<br>h12 | A <sub>1</sub> | A <sub>2</sub> | D <sub>1</sub> | J<br>js12 | G      | Q  | B | D <sub>2</sub> | D <sub>3</sub> | u  |
| —           | mm             |                |            |          |                |                |                |           |        |    |   |                |                |    |
| PRK 8 x 4   | 8,4            | 7,3            | 25         | 44       | 14             | 16             | 46             | 36        | 6 x M4 | M6 | 3 | 21             | 13             | 30 |
| PRK 12 x 5  | 12,4           | 11,3           | 30         | 44       | 14             | 16             | 51             | 41        | 6 x M4 | M6 | 3 | 25             | 17             | 30 |
| PRK 15 x 5  | 15,4           | 14,3           | 35         | 50       | 16             | 18             | 58             | 46        | 6 x M5 | M6 | 3 | 30             | 20             | 30 |
| PRK 15 x 8  | 15,6           | 14             | 35         | 50       | 16             | 18             | 58             | 46        | 6 x M5 | M6 | 3 | 30             | 20             | 30 |
| PRK 18 x 5  | 18,4           | 17,3           | 40         | 58       | 20             | 18             | 63             | 51        | 6 x M5 | M6 | 3 | 35             | 23             | 30 |
| PRK 18 x 8  | 18,6           | 17             | 40         | 58       | 20             | 18             | 63             | 51        | 6 x M5 | M6 | 3 | 35             | 23             | 30 |
| PRK 21 x 5  | 21,4           | 20,3           | 45         | 64       | 23             | 18             | 68             | 56        | 6 x M5 | M6 | 4 | 40,5           | 26             | 30 |
| PRK 21 x 6  | 21,5           | 20,2           | 45         | 64       | 23             | 18             | 68             | 56        | 6 x M5 | M6 | 4 | 40,5           | 26             | 30 |
| PRK 21 x 8  | 21,6           | 20             | 45         | 64       | 23             | 18             | 68             | 56        | 6 x M5 | M6 | 4 | 40,5           | 26             | 30 |
| PRK 21 x 10 | 21,8           | 19,8           | 45         | 64       | 23             | 18             | 68             | 56        | 6 x M5 | M6 | 4 | 40,5           | 26             | 30 |
| PRK 24 x 6  | 24,4           | 23,3           | 48         | 58       | 20             | 18             | 71             | 59        | 6 x M5 | M6 | 6 | 42             | 31             | 30 |
| PRK 24 x 12 | 24,8           | 22,8           | 48         | 58       | 20             | 18             | 71             | 59        | 6 x M5 | M6 | 6 | 42             | 31             | 30 |
| PRK 25 x 5  | 25,4           | 24,3           | 56         | 78       | 29             | 20             | 84             | 70        | 6 x M6 | M6 | 6 | 47             | 32             | 30 |
| PRK 25 x 8  | 25,6           | 24             | 56         | 78       | 29             | 20             | 84             | 70        | 6 x M6 | M6 | 6 | 47             | 32             | 30 |
| PRK 25 x 10 | 25,8           | 23,8           | 56         | 78       | 29             | 20             | 84             | 70        | 6 x M6 | M6 | 6 | 47             | 32             | 30 |
| PRK 25 x 15 | 26,2           | 23,2           | 56         | 78       | 29             | 20             | 84             | 70        | 6 x M6 | M6 | 6 | 47             | 32             | 30 |
| PRK 30 x 5  | 30,4           | 29,4           | 64         | 85       | 29             | 27             | 98             | 81        | 6 x M8 | M6 | 7 | 58             | 38             | 30 |
| PRK 30 x 6  | 30,5           | 29,3           | 64         | 85       | 29             | 27             | 98             | 81        | 6 x M8 | M6 | 7 | 58             | 38             | 30 |
| PRK 30 x 8  | 30,6           | 29             | 64         | 85       | 29             | 27             | 98             | 81        | 6 x M8 | M8 | 7 | 58             | 38             | 30 |
| PRK 30 x 10 | 30,8           | 28,8           | 64         | 85       | 29             | 27             | 98             | 81        | 6 x M8 | M8 | 7 | 58             | 38             | 30 |
| PRK 30 x 15 | 31,2           | 28,3           | 64         | 85       | 29             | 27             | 98             | 81        | 6 x M8 | M8 | 7 | 58             | 38             | 30 |
| PRK 30 x 20 | 31,5           | 27,6           | 64         | 85       | 29             | 27             | 98             | 81        | 6 x M8 | M8 | 7 | 58             | 38             | 30 |
| PRK 36 x 6  | 36,4           | 35,4           | 68         | 80       | 26,5           | 27             | 102            | 85        | 6 x M8 | M6 | 8 | 62             | 45             | 30 |
| PRK 36 x 9  | 36,6           | 35,1           | 68         | 80       | 26,5           | 27             | 102            | 85        | 6 x M8 | M6 | 8 | 62             | 45             | 30 |
| PRK 36 x 12 | 36,8           | 34,8           | 68         | 80       | 26,5           | 27             | 102            | 85        | 6 x M8 | M6 | 8 | 62             | 45             | 30 |
| PRK 36 x 18 | 37,2           | 34,2           | 68         | 80       | 26,5           | 27             | 102            | 85        | 6 x M8 | M6 | 8 | 62             | 45             | 30 |
| PRK 36 x 24 | 37,5           | 33,6           | 68         | 80       | 26,5           | 27             | 102            | 85        | 6 x M8 | M6 | 8 | 62             | 45             | 30 |

## PRK preloaded planetary roller screws with flanged nut

d 39 – 64 mm



Standard PRK



Threaded rollers



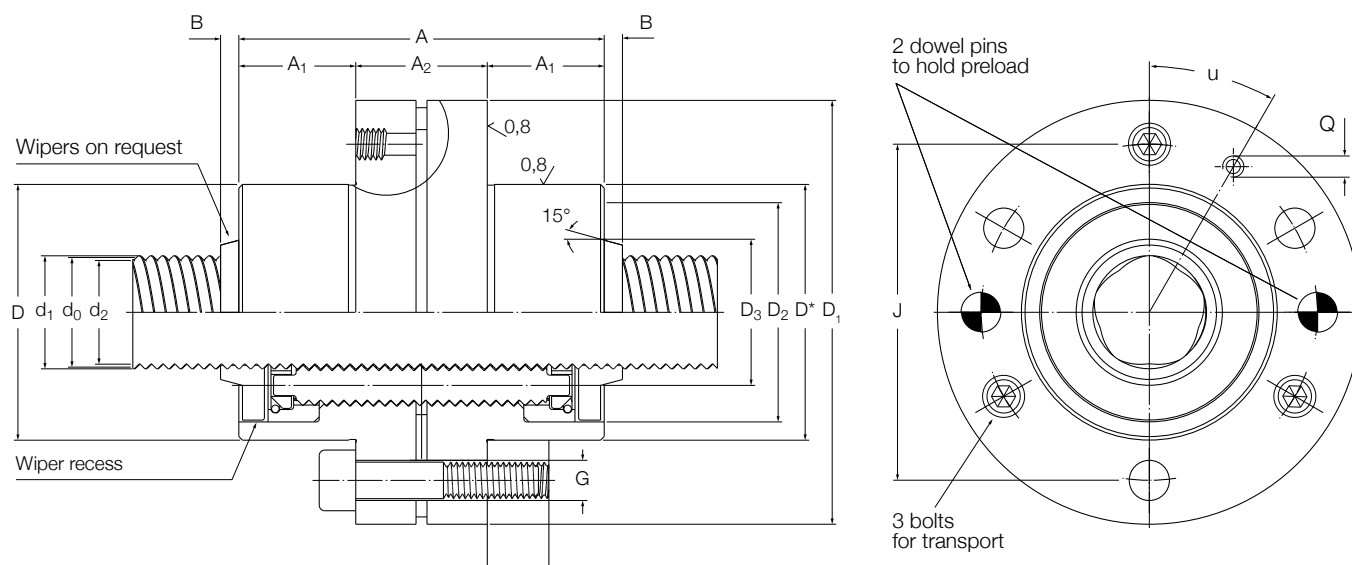
Components assembly

### Dimensions and technical characteristics

| d <sub>0</sub> | P <sub>h</sub> | L <sub>tp</sub> | C <sub>a</sub> <sup>1)</sup> | C <sub>oa</sub> <sup>1)</sup> | C <sub>s</sub> <sup>2)</sup><br>max | C <sub>oa</sub> <sup>2)</sup><br>max | η    | η'   | R <sub>ng</sub> | R <sub>nr</sub> | T <sub>pr</sub> | F <sub>pr</sub> | m <sub>n</sub> | m <sub>s</sub> | I <sub>s</sub>       | I <sub>nn</sub>   | I <sub>ns</sub> | Z <sub>n</sub>  | Z <sub>s</sub>     |
|----------------|----------------|-----------------|------------------------------|-------------------------------|-------------------------------------|--------------------------------------|------|------|-----------------|-----------------|-----------------|-----------------|----------------|----------------|----------------------|-------------------|-----------------|-----------------|--------------------|
| mm             |                |                 | kN                           |                               |                                     |                                      | –    |      | N/μm            |                 | Nm              | N               | kg             | kg/m           | kgmm <sup>2</sup> /m | kgmm <sup>2</sup> |                 | cm <sup>3</sup> | cm <sup>3</sup> /m |
| <b>39</b>      | 5              | 2 100           | 71,2                         | 134                           | 81,4                                | 164                                  | 0,83 | 0,80 | 750             | 980             | 1,3             | 2 288           | 4              | 9,4            | 1 780                | 8 360             | 124             | 28              | 18                 |
|                | 10             | 2 100           | 84,1                         | 135                           | 96,1                                | 166                                  | 0,88 | 0,87 | 500             | 650             | 1,3             | 1 965           | 4              | 9,4            | 1 780                | 8 360             | 124             | 28              | 18                 |
|                | 15             | 2 100           | 92,4                         | 136                           | 106                                 | 167                                  | 0,89 | 0,88 | 390             | 510             | 1,3             | 1 465           | 4              | 9,4            | 1 780                | 8 360             | 124             | 28              | 18                 |
|                | 20             | 2 100           | 95,2                         | 130                           | 109                                 | 159                                  | 0,88 | 0,87 | 220             | 290             | 1,3             | 694             | 4              | 9,4            | 1 780                | 8 360             | 124             | 28              | 18                 |
|                | 25             | 2 100           | 96,3                         | 125                           | 103                                 | 138                                  | 0,86 | 0,84 | 210             | 280             | 1,8             | 697             | 4              | 9,4            | 1 780                | 8 360             | 124             | 28              | 18                 |
| <b>44</b>      | 8              | 2 400           | 71,9                         | 131                           | 84,4                                | 166                                  | 0,86 | 0,84 | 761             | 989             | 1,6             | 3 445           | 3,6            | 11,9           | 2 890                | 8 020             | 119             | 23              | 20                 |
|                | 12             | 2 400           | 79,2                         | 131                           | 93                                  | 167                                  | 0,89 | 0,87 | 610             | 800             | 1,6             | 2 297           | 3,6            | 11,9           | 2 890                | 8 020             | 119             | 23              | 20                 |
|                | 18             | 2 400           | 86,9                         | 132                           | 102                                 | 169                                  | 0,89 | 0,88 | 430             | 550             | 1,6             | 1 497           | 3,6            | 11,9           | 2 890                | 8 020             | 118             | 23              | 20                 |
|                | 24             | 2 400           | 92,5                         | 133                           | 103                                 | 158                                  | 0,88 | 0,86 | 290             | 380             | 1,6             | 725             | 3,6            | 11,9           | 2 890                | 8 020             | 118             | 23              | 20                 |
|                | 30             | 2 400           | 91,4                         | 123                           | 102                                 | 146                                  | 0,85 | 0,83 | 190             | 250             | 2,1             | 724             | 3,6            | 11,9           | 2 890                | 8 020             | 118             | 23              | 20                 |
| <b>48</b>      | 5              | 2 600           | 109                          | 241                           | 132                                 | 321                                  | 0,81 | 0,76 | 1 080           | 1 410           | 1,9             | 2 698           | 7,7            | 14,2           | 4 090                | 23 000            | 371             | 54              | 22                 |
|                | 8              | 2 600           | 120                          | 235                           | 138                                 | 288                                  | 0,86 | 0,83 | 889             | 1 156           | 1,9             | 2 583           | 7,7            | 14,2           | 4 090                | 23 000            | 371             | 54              | 22                 |
|                | 10             | 2 600           | 128                          | 238                           | 146                                 | 291                                  | 0,87 | 0,85 | 760             | 980             | 1,9             | 2 405           | 7,7            | 14,2           | 4 090                | 23 000            | 371             | 54              | 22                 |
|                | 15             | 2 600           | 142                          | 243                           | 162                                 | 297                                  | 0,89 | 0,88 | 600             | 780             | 1,9             | 2 072           | 7,7            | 14,2           | 4 090                | 23 000            | 371             | 54              | 22                 |
|                | 20             | 2 600           | 146                          | 231                           | 167                                 | 283                                  | 0,89 | 0,88 | 460             | 600             | 1,9             | 1 423           | 7,7            | 14,2           | 4 090                | 23 000            | 371             | 54              | 22                 |
|                | 25             | 2 600           | 157                          | 246                           | 180                                 | 300                                  | 0,88 | 0,87 | 320             | 420             | 1,9             | 782             | 7,7            | 14,2           | 4 090                | 23 000            | 370             | 54              | 22                 |
|                | 30             | 2 600           | 152                          | 233                           | 174                                 | 285                                  | 0,87 | 0,85 | 344             | 384             | 2,5             | 1 260           | 7,7            | 14,2           | 4 090                | 23 000            | 370             | 54              | 22                 |
| <b>56</b>      | 12             | 3 100           | 117                          | 217                           | 137                                 | 276                                  | 0,87 | 0,86 | 810             | 1 060           | 2,4             | 2 952           | 6,5            | 19,3           | 7 580                | 21 300            | 385             | 46              | 25                 |
|                | 24             | 3 100           | 133                          | 210                           | 157                                 | 267                                  | 0,89 | 0,88 | 410             | 530             | 2,4             | 1 579           | 6,5            | 19,3           | 7 580                | 21 300            | 383             | 46              | 25                 |
|                | 36             | 3 100           | 142                          | 212                           | 159                                 | 251                                  | 0,86 | 0,84 | 290             | 370             | 3,2             | 910             | 6,5            | 19,3           | 7 580                | 21 300            | 383             | 46              | 25                 |
| <b>60</b>      | 10             | 3 400           | 187                          | 390                           | 213                                 | 477                                  | 0,86 | 0,83 | 1 030           | 1 340           | 2,7             | 2 913           | 12,1           | 22,2           | 9 990                | 52 800            | 1 100           | 100             | 27                 |
|                | 15             | 3 400           | 206                          | 391                           | 235                                 | 478                                  | 0,88 | 0,87 | 830             | 1 080           | 2,7             | 2 635           | 12,1           | 22,2           | 9 990                | 52 800            | 1 100           | 100             | 27                 |
|                | 20             | 3 400           | 218                          | 393                           | 249                                 | 480                                  | 0,89 | 0,88 | 700             | 910             | 2,7             | 2 326           | 12,1           | 22,2           | 9 990                | 52 800            | 1 100           | 100             | 27                 |
| <b>64</b>      | 12             | 3 650           | –                            | –                             | 166                                 | 382                                  | 0,87 | 0,84 | 930             | 1 200           | 3               | 3 328           | 11,3           | 25,3           | 12 900               | 50 200            | 984             | 46              | 29                 |
|                | 18             | 3 650           | 177                          | 363                           | 186                                 | 391                                  | 0,89 | 0,87 | 790             | 1 030           | 3               | 2 900           | 11,3           | 25,3           | 12 900               | 50 200            | 914             | 54              | 29                 |
|                | 24             | 3 650           | 184                          | 345                           | 193                                 | 371                                  | 0,89 | 0,88 | 640             | 840             | 3               | 2 318           | 11,3           | 25,3           | 12 900               | 50 200            | 911             | 54              | 29                 |
|                | 30             | 3 650           | 178                          | 310                           | 199                                 | 366                                  | 0,89 | 0,87 | 440             | 570             | 3               | 1 292           | 11,3           | 25,3           | 12 900               | 50 200            | 771             | 69              | 29                 |
|                | 36             | 3 650           | 173                          | 295                           | 193                                 | 348                                  | 0,88 | 0,86 | 350             | 450             | 3               | 892             | 11,3           | 25,3           | 12 900               | 50 200            | 771             | 69              | 29                 |

<sup>1)</sup> Standard number of rollers. Configuration not available for certain sizes

<sup>2)</sup> Maximum number of rollers on request, or standard for certain sizes



\* g6 fit only applies to the finished surface, on side opposite to the lubrication port, marked with a  $0,8\sqrt{\text{ }}$

| Designation | Dimensions     |                |            |          |                |                |                |           |         |        |    |                |                |        |
|-------------|----------------|----------------|------------|----------|----------------|----------------|----------------|-----------|---------|--------|----|----------------|----------------|--------|
|             | d <sub>1</sub> | d <sub>2</sub> | D<br>g6/H7 | A<br>h12 | A <sub>1</sub> | A <sub>2</sub> | D <sub>1</sub> | J<br>js12 | G       | Q      | B  | D <sub>2</sub> | D <sub>3</sub> | u<br>° |
| –           | mm             |                |            |          |                |                |                |           |         |        |    |                |                |        |
| PRK 39 x 5  | 39,4           | 38,4           | 82         | 100      | 33,5           | 33             | 124            | 102       | 6 x M10 | M6     | 8  | 73             | 50             | 30     |
| PRK 39 x 10 | 39,8           | 37,9           | 82         | 100      | 33,5           | 33             | 124            | 102       | 6 x M10 | M6     | 8  | 73             | 50             | 30     |
| PRK 39 x 15 | 40,2           | 37,3           | 82         | 100      | 33,5           | 33             | 124            | 102       | 6 x M10 | M6     | 8  | 73             | 50             | 30     |
| PRK 39 x 20 | 40,5           | 36,7           | 82         | 100      | 33,5           | 33             | 124            | 102       | 6 x M10 | M6     | 8  | 73             | 50             | 30     |
| PRK 39 x 25 | 40,9           | 36,1           | 82         | 100      | 33,5           | 33             | 124            | 102       | 6 x M10 | M6     | 8  | 73             | 50             | 30     |
| PRK 44 x 8  | 44,5           | 43,2           | 82         | 90       | 28,5           | 33             | 124            | 102       | 6 x M10 | M6     | 8  | 74             | 56             | 30     |
| PRK 44 x 12 | 44,8           | 42,8           | 82         | 90       | 28,5           | 33             | 124            | 102       | 6 x M10 | M6     | 8  | 74             | 56             | 30     |
| PRK 44 x 18 | 45,2           | 42,3           | 82         | 90       | 28,5           | 33             | 124            | 102       | 6 x M10 | M6     | 8  | 74             | 56             | 30     |
| PRK 44 x 24 | 45,5           | 41,7           | 82         | 90       | 28,5           | 33             | 124            | 102       | 6 x M10 | M6     | 8  | 74             | 56             | 30     |
| PRK 44 x 30 | 45,9           | 41,1           | 82         | 90       | 28,5           | 33             | 124            | 102       | 6 x M10 | M6     | 8  | 74             | 56             | 30     |
| PRK 48 x 5  | 48,4           | 47,4           | 105        | 127      | 45             | 37             | 150            | 127       | 6 x M12 | M8 x 1 | 9  | 90             | 60             | 30     |
| PRK 48 x 8  | 48,6           | 47,1           | 105        | 127      | 45             | 37             | 150            | 127       | 6 x M12 | M8 x 1 | 9  | 90             | 60             | 30     |
| PRK 48 x 10 | 48,8           | 46,9           | 105        | 127      | 45             | 37             | 150            | 127       | 6 x M12 | M8 x 1 | 9  | 90             | 60             | 30     |
| PRK 48 x 15 | 49,2           | 46,3           | 105        | 127      | 45             | 37             | 150            | 127       | 6 x M12 | M8 x 1 | 9  | 90             | 60             | 30     |
| PRK 48 x 20 | 49,5           | 45,8           | 105        | 127      | 45             | 37             | 150            | 127       | 6 x M12 | M8 x 1 | 9  | 90             | 60             | 30     |
| PRK 48 x 25 | 49,9           | 45,2           | 105        | 127      | 45             | 37             | 150            | 127       | 6 x M12 | M8 x 1 | 9  | 90             | 60             | 30     |
| PRK 48 x 30 | 50,3           | 44,6           | 105        | 127      | 45             | 37             | 150            | 127       | 6 x M12 | M8 x 1 | 9  | 90             | 60             | 30     |
| PRK 56 x 12 | 56,8           | 54,9           | 105        | 112      | 37,5           | 37             | 150            | 127       | 6 x M12 | M8 x 1 | 9  | 93             | 66             | 30     |
| PRK 56 x 24 | 57,5           | 53,8           | 105        | 112      | 37,5           | 37             | 150            | 127       | 6 x M12 | M8 x 1 | 9  | 93             | 66             | 30     |
| PRK 56 x 36 | 58,3           | 52,5           | 105        | 112      | 37,5           | 37             | 150            | 127       | 6 x M12 | M8 x 1 | 9  | 93             | 66             | 30     |
| PRK 60 x 10 | 60,8           | 58,9           | 122        | 152      | 53,5           | 45             | 180            | 150       | 6 x M16 | M8 x 1 | 9  | 110            | 71             | 30     |
| PRK 60 x 15 | 61,2           | 58,4           | 122        | 152      | 53,5           | 45             | 180            | 150       | 6 x M16 | M8 x 1 | 9  | 110            | 71             | 30     |
| PRK 60 x 20 | 61,5           | 57,8           | 122        | 152      | 53,5           | 45             | 180            | 150       | 6 x M16 | M8 x 1 | 9  | 110            | 71             | 30     |
| PRK 64 x 12 | 64,8           | 62,9           | 120        | 129      | 42             | 45             | 180            | 150       | 6 x M16 | M8 x 1 | 11 | 106            | 75             | 30     |
| PRK 64 x 18 | 65,2           | 62,3           | 120        | 129      | 42             | 45             | 180            | 150       | 6 x M16 | M8 x 1 | 11 | 106            | 75             | 30     |
| PRK 64 x 24 | 65,5           | 61,8           | 120        | 129      | 42             | 45             | 180            | 150       | 6 x M16 | M8 x 1 | 11 | 106            | 75             | 30     |
| PRK 64 x 30 | 65,9           | 61,2           | 120        | 129      | 42             | 45             | 180            | 150       | 6 x M16 | M8 x 1 | 11 | 106            | 75             | 30     |
| PRK 64 x 36 | 66,3           | 60,6           | 120        | 129      | 42             | 45             | 180            | 150       | 6 x M16 | M8 x 1 | 11 | 106            | 75             | 30     |

# Ultra Power roller screws HR

## Concept

The Ultra Power roller screws represent the strongest variant of the Ewellix planetary roller screw product line. They are designed for heavy loads and long service life.

The Ewellix Ultra Power assortment of planetary roller screws is optimized to provide a load carrying capacity increase up to 60% over the standard SR planetary roller screw with the same combination of diameter and lead, and, in addition, to reach the maximum possible service life within a compact space.

In order to operate within the principles of rolling fatigue and attain the  $L_{10}$  life performance, the maximum cycle operating load should not exceed 80% of the  $C_a$  value.

The maximum load should be applied on the nut flange, not on the mounting bolts.

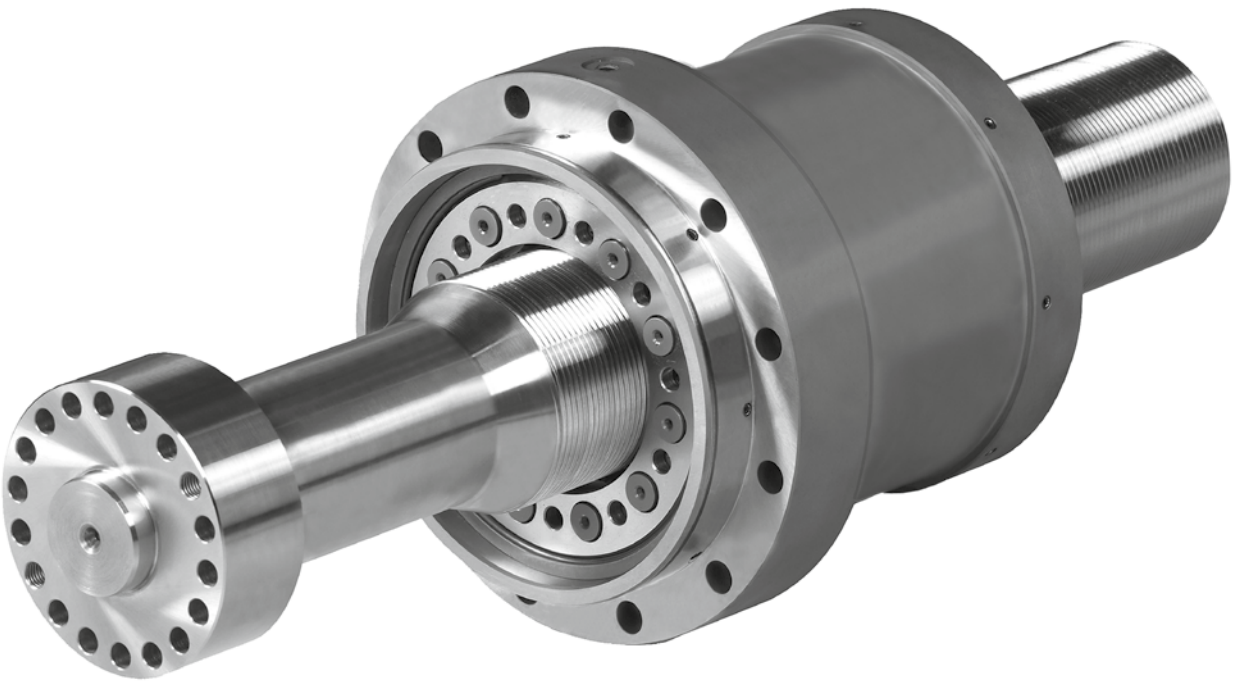
Roller screws without backlash or with preloaded split nut are not available in this assortment.

## Application examples

The Ultra Power roller screws offer the power of hydraulic actuators combined with the precision and flexibility of electric control:

- Injection moulding machines for plastic and rubber
- Electro-mechanical presses
- Broaching machines
- Large machine tools
- Off-highway vehicles
- Oil & gas equipment
- Steel industry including casting and rolling
- Friction welding
- Hydro-electric power plants
- Powerful electro-mechanical cylinders
- Heavy lifting equipment

| Design features                                                                                                                              | User benefits                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Planetary roller screw concept with maximized load rating                                                                                    | Highest possible load carrying capacity of any type of rolling screw<br>Reliability, resistance to shock loads, robustness in harsh environments |
| Nominal diameters from 60 mm to 240 mm                                                                                                       | Wide standard assortment to fit most heavy duty applications                                                                                     |
| Long leads up to 50 mm                                                                                                                       | High linear speed capability with long lead (1 m/s for size 135 x 50)                                                                            |
| Shaft lengths up to 8 000 mm for diameters 120 and 135 mm                                                                                    | For additional information about longer shaft lengths, please contact your local Ewellix representative                                          |
| Maximum $n \cdot d_0 = 160\,000$                                                                                                             | High speed for increased productivity                                                                                                            |
| High dynamic load carrying capacity up to 3 994 kN for HR assortment                                                                         | Long service life                                                                                                                                |
| High static load carrying capacity up to 23 350 kN for HR assortment                                                                         | Ability to accommodate heavy shock loads without raceway damage                                                                                  |
| Ultra Power roller screws is available with axial play lower than 0,07 mm (0,1 mm for screws with lead $\geq 40$ mm)                         | Unique combination of extreme load carrying capacity and driving accuracy                                                                        |
| Standard versions include wipers (WPR in the designation). Screws can be delivered without wipers on request (designation with NOWPR suffix) | Solution contributes to long service life                                                                                                        |
| Standard lead precision is G5, lead precision G3 or G1 on request                                                                            | Precise driving accuracy                                                                                                                         |
| Optional support bearings                                                                                                                    | Wide variety of spherical roller thrust bearing combinations                                                                                     |
| Three standard versions are available:<br>HRC: cylindrical nut<br>HRF: nut with centered flange<br>HRP: nut with off-centered flange         | Increased design flexibility                                                                                                                     |
| Adaptable tooling for non-standard, left hand threads or special designs                                                                     | Custom solutions on request. Please contact your Ewellix sales office for specific requirements and their feasibility                            |



3



## HRC Ultra Power planetary roller screws with cylindrical nut

d 60 – 120 mm



Standard HRC



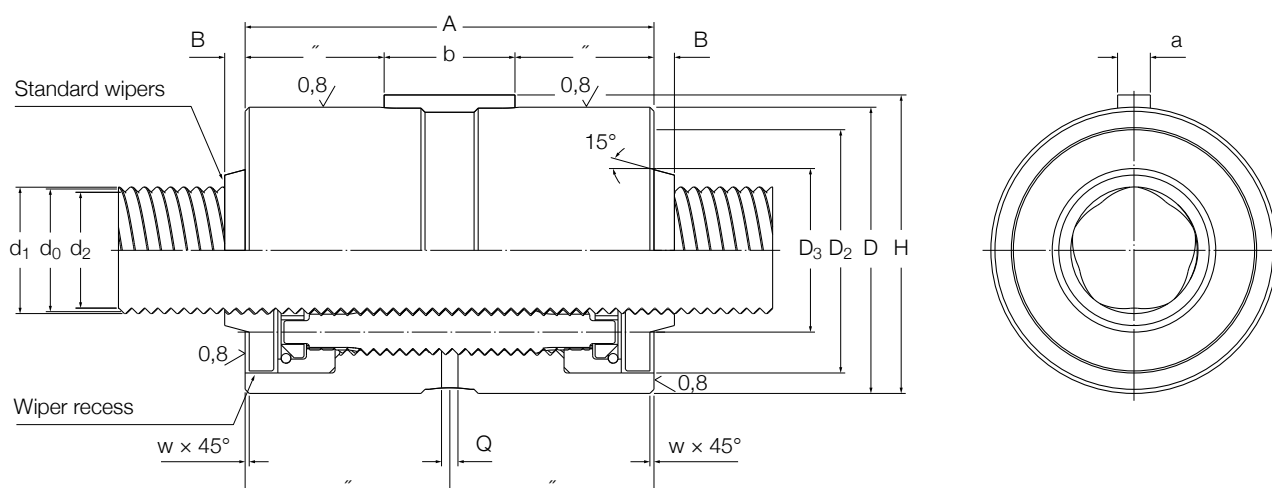
Threaded rollers



Components assembly

### Dimensions and technical characteristics

| d <sub>0</sub> | P <sub>h</sub> | L <sub>tp</sub> | C <sub>a</sub> | C <sub>0a</sub> | η    | η'   | S <sub>ap</sub> | m <sub>n</sub> | m <sub>s</sub> | I <sub>s</sub>       | I <sub>nn</sub>   | I <sub>ns</sub> | Z <sub>n</sub>  | Z <sub>s</sub>     |
|----------------|----------------|-----------------|----------------|-----------------|------|------|-----------------|----------------|----------------|----------------------|-------------------|-----------------|-----------------|--------------------|
|                |                |                 | kN             |                 | –    |      | mm              | kg             | kg/m           | kgmm <sup>2</sup> /m | kgmm <sup>2</sup> |                 | cm <sup>3</sup> | cm <sup>3</sup> /m |
| <b>60</b>      | 15             | 4 250           | 494            | 1 206           | 0,88 | 0,87 | 0,07            | 9              | 22,2           | 9 990                | 18 700            | 1 680           | 90              | 27                 |
|                | 20             | 4 250           | 515            | 1 181           | 0,89 | 0,88 | 0,07            | 9              | 22,2           | 9 990                | 18 700            | 1 680           | 90              | 27                 |
|                | 25             | 4 250           | 530            | 1 227           | 0,89 | 0,88 | 0,07            | 9              | 22,2           | 9 990                | 18 700            | 1 680           | 90              | 27                 |
|                | 30             | 4 250           | 528            | 1 216           | 0,88 | 0,87 | 0,07            | 9              | 22,2           | 9 990                | 18 700            | 1 680           | 90              | 27                 |
| <b>75</b>      | 15             | 5 500           | 836            | 2 473           | 0,87 | 0,85 | 0,07            | 16             | 34,7           | 24 400               | 51 700            | 5 130           | 170             | 33                 |
|                | 20             | 5 500           | 845            | 2 455           | 0,88 | 0,87 | 0,07            | 16             | 34,7           | 24 400               | 51 700            | 5 130           | 170             | 33                 |
|                | 25             | 5 500           | 855            | 2 461           | 0,89 | 0,88 | 0,07            | 16             | 34,7           | 24 400               | 51 700            | 5 130           | 170             | 33                 |
|                | 30             | 5 500           | 852            | 2 420           | 0,89 | 0,88 | 0,07            | 16             | 34,7           | 24 400               | 51 700            | 5 130           | 170             | 33                 |
| <b>87</b>      | 15             | 6 000           | 1 059          | 3 527           | 0,86 | 0,84 | 0,07            | 26             | 45,8           | 42 800               | 111 000           | 10 600          | 270             | 38                 |
|                | 20             | 6 000           | 1 061          | 3 452           | 0,88 | 0,86 | 0,07            | 26             | 45,8           | 42 800               | 111 000           | 10 600          | 270             | 38                 |
|                | 25             | 6 000           | 1 085          | 3 513           | 0,89 | 0,87 | 0,07            | 26             | 45,8           | 42 800               | 111 000           | 10 600          | 270             | 38                 |
|                | 30             | 6 000           | 1 085          | 3 465           | 0,89 | 0,88 | 0,07            | 26             | 45,8           | 42 800               | 111 000           | 10 600          | 270             | 38                 |
| <b>99</b>      | 15             | 7 500           | 1 277          | 4 671           | 0,85 | 0,82 | 0,07            | 40             | 60,4           | 74 000               | 220 000           | 20 400          | 400             | 44                 |
|                | 20             | 7 500           | 1 311          | 4 741           | 0,87 | 0,85 | 0,07            | 40             | 60,4           | 74 000               | 220 000           | 20 400          | 400             | 44                 |
|                | 25             | 7 500           | 1 328          | 4 749           | 0,88 | 0,87 | 0,07            | 40             | 60,4           | 74 000               | 220 000           | 20 400          | 400             | 44                 |
|                | 30             | 7 500           | 1 330          | 4 694           | 0,89 | 0,87 | 0,07            | 40             | 60,4           | 74 000               | 220 000           | 20 400          | 400             | 44                 |
|                | 35             | 7 500           | 1 329          | 4 639           | 0,89 | 0,88 | 0,07            | 40             | 60,4           | 74 000               | 220 000           | 20 400          | 400             | 44                 |
| <b>112,5</b>   | 15             | 7 500           | 1 396          | 5 288           | 0,84 | 0,80 | 0,07            | 58             | 76,8           | 120 000              | 423 000           | 37 100          | 550             | 50                 |
|                | 20             | 7 500           | 1 421          | 5 297           | 0,86 | 0,84 | 0,07            | 58             | 76,8           | 120 000              | 423 000           | 37 100          | 550             | 50                 |
|                | 25             | 7 500           | 1 446          | 5 341           | 0,88 | 0,86 | 0,07            | 58             | 76,8           | 120 000              | 423 000           | 37 100          | 550             | 50                 |
|                | 30             | 7 500           | 1 455          | 5 315           | 0,88 | 0,87 | 0,07            | 58             | 76,8           | 120 000              | 423 000           | 37 100          | 550             | 50                 |
|                | 35             | 7 500           | 1 461          | 5 289           | 0,89 | 0,88 | 0,07            | 58             | 76,8           | 120 000              | 423 000           | 37 100          | 550             | 50                 |
| <b>120</b>     | 15             | 8 000           | 1 547          | 6 179           | 0,83 | 0,79 | 0,07            | 64             | 88,8           | 160 000              | 516 000           | 47 200          | 700             | 53                 |
|                | 20             | 8 000           | 1 587          | 6 263           | 0,86 | 0,83 | 0,07            | 64             | 88,8           | 160 000              | 516 000           | 47 200          | 700             | 53                 |
|                | 25             | 8 000           | 1 585          | 6 123           | 0,87 | 0,85 | 0,07            | 64             | 88,8           | 160 000              | 516 000           | 47 200          | 700             | 53                 |
|                | 30             | 8 000           | 1 614          | 6 207           | 0,88 | 0,87 | 0,07            | 64             | 88,8           | 160 000              | 516 000           | 47 200          | 700             | 53                 |
|                | 35             | 8 000           | 1 640          | 6 291           | 0,89 | 0,87 | 0,07            | 64             | 88,8           | 160 000              | 516 000           | 47 200          | 700             | 53                 |
|                | 40             | 8 000           | 1 651          | 6 301           | 0,89 | 0,88 | 0,1             | 64             | 88,8           | 160 000              | 516 000           | 47 200          | 700             | 53                 |



| Designation    | Dimensions     |                |            |     |     |         |     |     |    |    |                |                |
|----------------|----------------|----------------|------------|-----|-----|---------|-----|-----|----|----|----------------|----------------|
|                | d <sub>1</sub> | d <sub>2</sub> | D<br>g6/H7 | A   | w   | a<br>h9 | b   | H   | Q  | B  | D <sub>2</sub> | D <sub>3</sub> |
| –              | mm             |                |            |     |     |         |     |     |    |    |                |                |
| HRC 60 x 15    | 61,1           | 58,5           | 122        | 171 | 1   | 10      | 56  | 125 | 11 | 9  | 110            | 71             |
| HRC 60 x 20    | 61,5           | 58,0           | 122        | 171 | 1   | 10      | 56  | 125 | 11 | 9  | 110            | 71             |
| HRC 60 x 25    | 61,9           | 57,5           | 122        | 171 | 1   | 10      | 56  | 125 | 11 | 9  | 110            | 71             |
| HRC 60 x 30    | 62,3           | 57,0           | 122        | 171 | 1   | 10      | 56  | 125 | 11 | 9  | 110            | 71             |
| HRC 75 x 15    | 76,1           | 73,5           | 150        | 213 | 1   | 10      | 63  | 153 | 11 | 10 | 136            | 87             |
| HRC 75 x 20    | 76,5           | 73,0           | 150        | 213 | 1   | 10      | 63  | 153 | 11 | 10 | 136            | 87             |
| HRC 75 x 25    | 76,9           | 72,5           | 150        | 213 | 1   | 10      | 63  | 153 | 11 | 10 | 136            | 87             |
| HRC 75 x 30    | 77,3           | 72,0           | 150        | 213 | 1   | 10      | 63  | 153 | 11 | 10 | 136            | 87             |
| HRC 87 x 15    | 88,1           | 85,5           | 175        | 245 | 1,5 | 12      | 100 | 178 | 12 | 12 | 158            | 103            |
| HRC 87 x 20    | 88,5           | 85,0           | 175        | 245 | 1,5 | 12      | 100 | 178 | 12 | 12 | 158            | 103            |
| HRC 87 x 25    | 88,9           | 84,5           | 175        | 245 | 1,5 | 12      | 100 | 178 | 12 | 12 | 158            | 103            |
| HRC 87 x 30    | 89,3           | 84,0           | 175        | 245 | 1,5 | 12      | 100 | 178 | 12 | 12 | 158            | 103            |
| HRC 99 x 15    | 100,1          | 97,5           | 200        | 280 | 1,5 | 16      | 100 | 204 | 15 | 12 | 180            | 112            |
| HRC 99 x 20    | 100,5          | 97,0           | 200        | 280 | 1,5 | 16      | 100 | 204 | 15 | 12 | 180            | 112            |
| HRC 99 x 25    | 100,9          | 96,5           | 200        | 280 | 1,5 | 16      | 100 | 204 | 15 | 12 | 180            | 112            |
| HRC 99 x 30    | 101,3          | 96,0           | 200        | 280 | 1,5 | 16      | 100 | 204 | 15 | 12 | 180            | 112            |
| HRC 99 x 35    | 101,6          | 95,5           | 200        | 280 | 1,5 | 16      | 100 | 204 | 15 | 12 | 180            | 112            |
| HRC 112.5 x 15 | 113,6          | 111,0          | 230        | 300 | 1,5 | 16      | 100 | 234 | 15 | 12 | 210            | 140            |
| HRC 112.5 x 20 | 114,0          | 110,5          | 230        | 300 | 1,5 | 16      | 100 | 234 | 15 | 12 | 210            | 140            |
| HRC 112.5 x 25 | 114,4          | 110,0          | 230        | 300 | 1,5 | 16      | 100 | 234 | 15 | 12 | 210            | 140            |
| HRC 112.5 x 30 | 114,8          | 109,5          | 230        | 300 | 1,5 | 16      | 100 | 234 | 15 | 12 | 210            | 140            |
| HRC 112.5 x 35 | 115,1          | 109,0          | 230        | 300 | 1,5 | 16      | 100 | 234 | 15 | 12 | 210            | 140            |
| HRC 120 x 15   | 121,1          | 118,5          | 240        | 330 | 1,5 | 16      | 100 | 244 | 15 | 12 | 220            | 180            |
| HRC 120 x 20   | 121,5          | 118,0          | 240        | 330 | 1,5 | 16      | 100 | 244 | 15 | 12 | 220            | 180            |
| HRC 120 x 25   | 121,9          | 117,5          | 240        | 330 | 1,5 | 16      | 100 | 244 | 15 | 12 | 220            | 180            |
| HRC 120 x 30   | 122,3          | 117,0          | 240        | 330 | 1,5 | 16      | 100 | 244 | 15 | 12 | 220            | 180            |
| HRC 120 x 35   | 122,6          | 116,5          | 240        | 330 | 1,5 | 16      | 100 | 244 | 15 | 12 | 220            | 180            |
| HRC 120 x 40   | 123,0          | 116,0          | 240        | 330 | 1,5 | 16      | 100 | 244 | 15 | 12 | 220            | 180            |

## HRC Ultra Power planetary roller screws with cylindrical nut

d 135 – 240 mm



Standard HRC



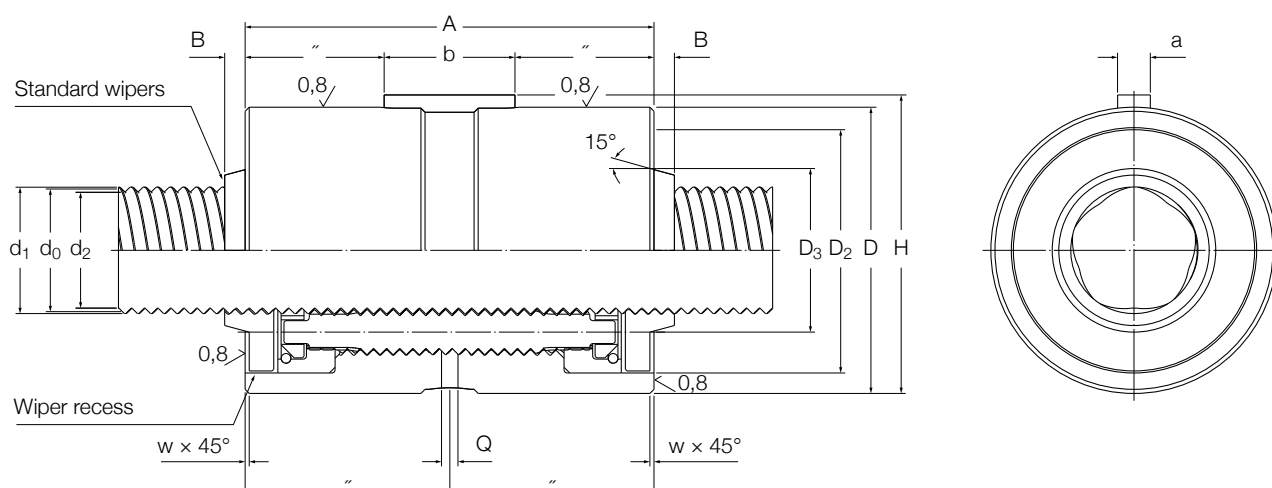
Threaded rollers



Components assembly

### Dimensions and technical characteristics

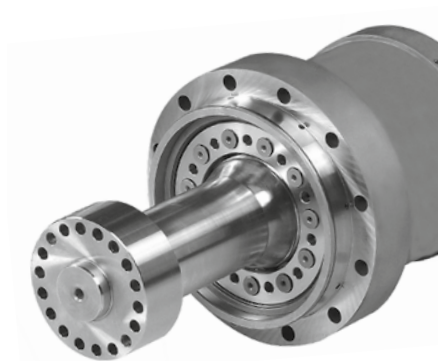
| $d_0$      | $P_h$ | $L_{tp}$ | $C_a$ | $C_{0a}$ | $\eta$ | $\eta'$ | $S_{ap}$ | $m_n$ | $m_s$ | $I_s$                | $I_{nn}$           | $I_{ns}$           | $Z_n$           | $Z_s$              |
|------------|-------|----------|-------|----------|--------|---------|----------|-------|-------|----------------------|--------------------|--------------------|-----------------|--------------------|
|            |       |          | kN    |          | –      |         | mm       | kg    | kg/m  | kgmm <sup>2</sup> /m | kgmm <sup>2</sup>  |                    | cm <sup>3</sup> | cm <sup>3</sup> /m |
| <b>135</b> | 15    | 8 000    | 1 843 | 8 037    | 0,82   | 0,77    | 0,07     | 108   | 113   | 261 000              | $1,18 \times 10^6$ | 94 200             | 980             | 60                 |
|            | 20    | 8 000    | 1 858 | 7 922    | 0,85   | 0,82    | 0,07     | 108   | 113   | 261 000              | $1,18 \times 10^6$ | 94 200             | 980             | 60                 |
|            | 25    | 8 000    | 1 903 | 8 059    | 0,86   | 0,84    | 0,07     | 108   | 113   | 261 000              | $1,18 \times 10^6$ | 94 200             | 980             | 60                 |
|            | 30    | 8 000    | 1 904 | 7 943    | 0,88   | 0,86    | 0,07     | 108   | 113   | 261 000              | $1,18 \times 10^6$ | 94 200             | 980             | 60                 |
|            | 35    | 8 000    | 1 921 | 7 953    | 0,88   | 0,87    | 0,07     | 108   | 113   | 261 000              | $1,18 \times 10^6$ | 94 200             | 980             | 60                 |
|            | 40    | 8 000    | 1 909 | 7 796    | 0,89   | 0,87    | 0,1      | 108   | 113   | 261 000              | $1,18 \times 10^6$ | 94 200             | 980             | 60                 |
|            | 50    | 8 000    | 1 944 | 7 901    | 0,89   | 0,88    | 0,1      | 108   | 113   | 261 000              | $1,18 \times 10^6$ | 94 200             | 980             | 60                 |
| <b>150</b> | 15    | 7 200    | 2 200 | 10 446   | 0,8    | 0,75    | 0,07     | 163   | 139   | 390 000              | $2,35 \times 10^6$ | 160 000            | 1 350           | 66                 |
|            | 20    | 7 200    | 2 240 | 10 459   | 0,84   | 0,80    | 0,07     | 163   | 139   | 390 000              | $2,35 \times 10^6$ | 160 000            | 1 350           | 66                 |
|            | 25    | 7 200    | 2 137 | 9 553    | 0,86   | 0,83    | 0,07     | 163   | 139   | 390 000              | $2,35 \times 10^6$ | 160 000            | 1 350           | 66                 |
|            | 30    | 7 200    | 2 167 | 9 611    | 0,87   | 0,85    | 0,07     | 163   | 139   | 390 000              | $2,35 \times 10^6$ | 160 000            | 1 350           | 66                 |
|            | 35    | 7 200    | 2 167 | 9 483    | 0,88   | 0,86    | 0,07     | 163   | 139   | 390 000              | $2,35 \times 10^6$ | 160 000            | 1 350           | 66                 |
|            | 40    | 7 200    | 2 176 | 9 449    | 0,88   | 0,87    | 0,1      | 163   | 139   | 390 000              | $2,35 \times 10^6$ | 160 000            | 1 350           | 66                 |
|            | 50    | 7 200    | 2 189 | 9 379    | 0,89   | 0,88    | 0,1      | 163   | 139   | 390 000              | $2,35 \times 10^6$ | 160 000            | 1 350           | 66                 |
| <b>180</b> | 15    | 5 000    | 3 073 | 17 366   | 0,78   | 0,71    | 0,07     | 310   | 200   | 809 000              | $6,54 \times 10^6$ | 437 000            | 2 500           | 79                 |
|            | 20    | 5 000    | 3 123 | 17 319   | 0,82   | 0,77    | 0,07     | 310   | 200   | 809 000              | $6,54 \times 10^6$ | 437 000            | 2 500           | 79                 |
|            | 25    | 5 000    | 3 002 | 16 004   | 0,84   | 0,81    | 0,07     | 310   | 200   | 809 000              | $6,54 \times 10^6$ | 437 000            | 2 500           | 79                 |
|            | 30    | 5 000    | 3 009 | 15 790   | 0,86   | 0,83    | 0,07     | 310   | 200   | 809 000              | $6,54 \times 10^6$ | 437 000            | 2 500           | 79                 |
|            | 35    | 5 000    | 3 023 | 15 690   | 0,87   | 0,85    | 0,07     | 310   | 200   | 809 000              | $6,54 \times 10^6$ | 437 000            | 2 500           | 79                 |
|            | 40    | 5 000    | 3 075 | 15 931   | 0,88   | 0,86    | 0,1      | 310   | 200   | 809 000              | $6,54 \times 10^6$ | 437 000            | 2 500           | 79                 |
|            | 50    | 5 000    | 3 128 | 16 073   | 0,89   | 0,87    | 0,1      | 310   | 200   | 809 000              | $6,54 \times 10^6$ | 437 000            | 2 500           | 79                 |
| <b>210</b> | 20    | 3 700    | 3 371 | 19 164   | 0,80   | 0,74    | 0,07     | 416   | 270   | $1,49 \times 10^6$   | $11,2 \times 10^6$ | 854 000            | 3 150           | 92                 |
|            | 25    | 3 700    | 3 435 | 19 324   | 0,82   | 0,79    | 0,07     | 416   | 270   | $1,49 \times 10^6$   | $11,2 \times 10^6$ | 854 000            | 3 150           | 92                 |
|            | 30    | 3 700    | 3 249 | 17 472   | 0,84   | 0,81    | 0,07     | 416   | 270   | $1,49 \times 10^6$   | $11,2 \times 10^6$ | 854 000            | 3 150           | 92                 |
|            | 35    | 3 700    | 3 265 | 17 359   | 0,86   | 0,83    | 0,07     | 416   | 270   | $1,49 \times 10^6$   | $11,2 \times 10^6$ | 854 000            | 3 150           | 92                 |
|            | 40    | 3 700    | 3 322 | 17 635   | 0,87   | 0,85    | 0,1      | 416   | 270   | $1,49 \times 10^6$   | $11,2 \times 10^6$ | 854 000            | 3 150           | 92                 |
|            | 50    | 3 700    | 3 381 | 17 798   | 0,88   | 0,86    | 0,1      | 416   | 270   | $1,49 \times 10^6$   | $11,2 \times 10^6$ | 854 000            | 3 150           | 92                 |
| <b>240</b> | 25    | 2 800    | 3 919 | 23 387   | 0,81   | 0,76    | 0,07     | 533   | 353   | $2,54 \times 10^6$   | $17 \times 10^6$   | $1,19 \times 10^6$ | 5 000           | 106                |
|            | 30    | 2 800    | 3 931 | 23 089   | 0,83   | 0,79    | 0,07     | 533   | 353   | $2,54 \times 10^6$   | $17 \times 10^6$   | $1,19 \times 10^6$ | 5 000           | 106                |
|            | 35    | 2 800    | 3 994 | 23 350   | 0,84   | 0,82    | 0,07     | 533   | 353   | $2,54 \times 10^6$   | $17 \times 10^6$   | $1,19 \times 10^6$ | 5 000           | 106                |
|            | 40    | 2 800    | 3 808 | 21 497   | 0,86   | 0,83    | 0,1      | 533   | 353   | $2,54 \times 10^6$   | $17 \times 10^6$   | $1,19 \times 10^6$ | 5 000           | 106                |
|            | 50    | 2 800    | 3 860 | 21 536   | 0,87   | 0,85    | 0,1      | 533   | 353   | $2,54 \times 10^6$   | $17 \times 10^6$   | $1,19 \times 10^6$ | 5 000           | 106                |



| Designation  | Dimensions     |                |            |     |   |         |     |     |    |      |                |                |
|--------------|----------------|----------------|------------|-----|---|---------|-----|-----|----|------|----------------|----------------|
|              | d <sub>1</sub> | d <sub>2</sub> | D<br>g6/H7 | A   | w | a<br>h9 | b   | H   | Q  | B    | D <sub>2</sub> | D <sub>3</sub> |
| –            | mm             |                |            |     |   |         |     |     |    |      |                |                |
| HRC 135 x 15 | 136,1          | 133,5          | 280        | 370 | 2 | 28      | 120 | 286 | 15 | 11,5 | 250            | 180            |
| HRC 135 x 20 | 136,5          | 133,0          | 280        | 370 | 2 | 28      | 120 | 286 | 15 | 11,5 | 250            | 180            |
| HRC 135 x 25 | 136,9          | 132,5          | 280        | 370 | 2 | 28      | 120 | 286 | 15 | 11,5 | 250            | 180            |
| HRC 135 x 30 | 137,3          | 132,0          | 280        | 370 | 2 | 28      | 120 | 286 | 15 | 11,5 | 250            | 180            |
| HRC 135 x 35 | 137,6          | 131,5          | 280        | 370 | 2 | 28      | 120 | 286 | 15 | 11,5 | 250            | 180            |
| HRC 135 x 40 | 138,0          | 131,0          | 280        | 370 | 2 | 28      | 120 | 286 | 15 | 11,5 | 250            | 180            |
| HRC 135 x 50 | 138,8          | 130,0          | 280        | 370 | 2 | 28      | 120 | 286 | 15 | 11,5 | 250            | 180            |
|              |                |                |            |     |   |         |     |     |    |      |                |                |
| HRC 150 x 15 | 151,1          | 148,5          | 320        | 412 | 3 | 32      | 160 | 327 | 15 | 12,5 | 280            | 230            |
| HRC 150 x 20 | 151,5          | 148,0          | 320        | 412 | 3 | 32      | 160 | 327 | 15 | 12,5 | 280            | 230            |
| HRC 150 x 25 | 151,9          | 147,5          | 320        | 412 | 3 | 32      | 160 | 327 | 15 | 12,5 | 280            | 230            |
| HRC 150 x 30 | 152,3          | 147,0          | 320        | 412 | 3 | 32      | 160 | 327 | 15 | 12,5 | 280            | 230            |
| HRC 150 x 35 | 152,6          | 146,5          | 320        | 412 | 3 | 32      | 160 | 327 | 15 | 12,5 | 280            | 230            |
| HRC 150 x 40 | 153,0          | 146,0          | 320        | 412 | 3 | 32      | 160 | 327 | 15 | 12,5 | 280            | 230            |
| HRC 150 x 50 | 153,8          | 145,0          | 320        | 412 | 3 | 32      | 160 | 327 | 15 | 12,5 | 280            | 230            |
|              |                |                |            |     |   |         |     |     |    |      |                |                |
| HRC 180 x 15 | 181,1          | 178,5          | 390        | 528 | 3 | 32      | 160 | 397 | 20 | 15   | 340            | 250            |
| HRC 180 x 20 | 181,5          | 178,0          | 390        | 528 | 3 | 32      | 160 | 397 | 20 | 15   | 340            | 250            |
| HRC 180 x 25 | 181,9          | 177,5          | 390        | 528 | 3 | 32      | 160 | 397 | 20 | 15   | 340            | 250            |
| HRC 180 x 30 | 182,3          | 177,0          | 390        | 528 | 3 | 32      | 160 | 397 | 20 | 15   | 340            | 250            |
| HRC 180 x 35 | 182,6          | 176,5          | 390        | 528 | 3 | 32      | 160 | 397 | 20 | 15   | 340            | 250            |
| HRC 180 x 40 | 183,0          | 176,0          | 390        | 528 | 3 | 32      | 160 | 397 | 20 | 15   | 340            | 250            |
| HRC 180 x 50 | 183,8          | 175,0          | 390        | 528 | 3 | 32      | 160 | 397 | 20 | 15   | 340            | 250            |
|              |                |                |            |     |   |         |     |     |    |      |                |                |
| HRC 210 x 20 | 211,5          | 208,0          | 440        | 570 | 3 | 40      | 200 | 450 | 20 | 15   | 398            | 250            |
| HRC 210 x 25 | 211,9          | 207,5          | 440        | 570 | 3 | 40      | 200 | 450 | 20 | 15   | 398            | 250            |
| HRC 210 x 30 | 212,3          | 207,0          | 440        | 570 | 3 | 40      | 200 | 450 | 20 | 15   | 398            | 250            |
| HRC 210 x 35 | 212,6          | 206,5          | 440        | 570 | 3 | 40      | 200 | 450 | 20 | 15   | 398            | 250            |
| HRC 210 x 40 | 213,0          | 206,0          | 440        | 570 | 3 | 40      | 200 | 450 | 20 | 15   | 398            | 250            |
| HRC 210 x 50 | 213,8          | 205,0          | 440        | 570 | 3 | 40      | 200 | 450 | 20 | 15   | 398            | 250            |
|              |                |                |            |     |   |         |     |     |    |      |                |                |
| HRC 240 x 25 | 241,9          | 237,5          | 490        | 600 | 3 | 50      | 200 | 501 | 20 | 15   | 448            | 290            |
| HRC 240 x 30 | 242,3          | 237,0          | 490        | 600 | 3 | 50      | 200 | 501 | 20 | 15   | 448            | 290            |
| HRC 240 x 35 | 242,6          | 236,5          | 490        | 600 | 3 | 50      | 200 | 501 | 20 | 15   | 448            | 290            |
| HRC 240 x 40 | 243,0          | 236,0          | 490        | 600 | 3 | 50      | 200 | 501 | 20 | 15   | 448            | 290            |
| HRC 240 x 50 | 243,8          | 235,0          | 490        | 600 | 3 | 50      | 200 | 501 | 20 | 15   | 448            | 290            |

## HRF/HRP Ultra Power planetary roller screws with flanged nut

d 60 – 120 mm



HRP



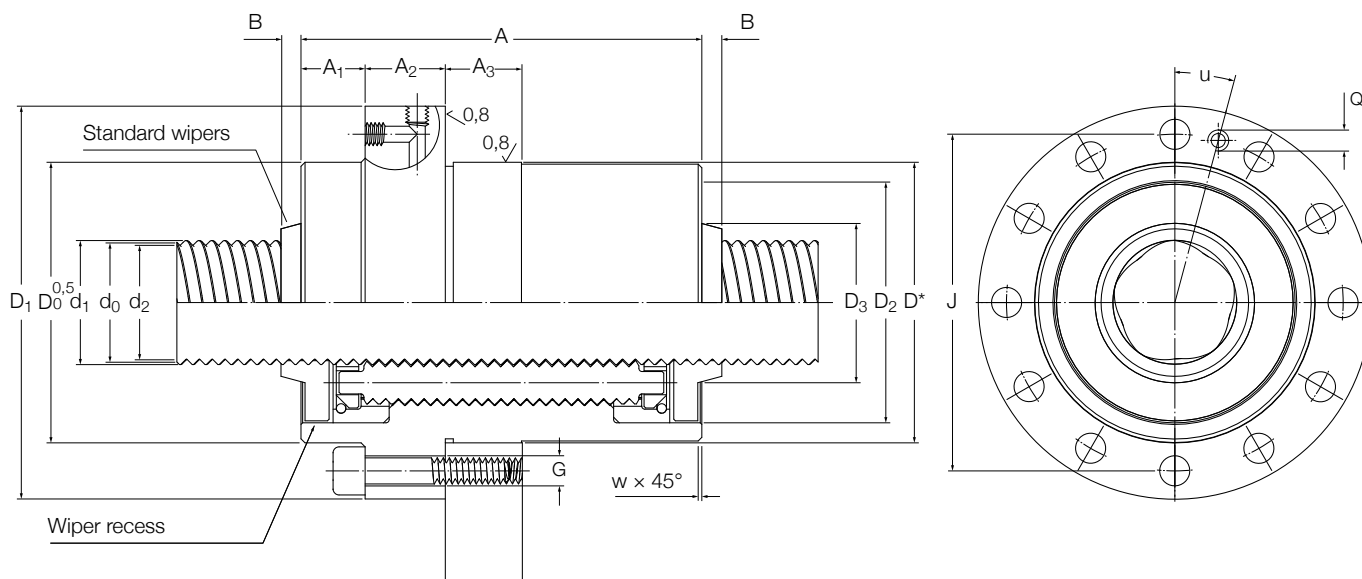
Threaded rollers



Components assembly

### Dimensions and technical characteristics

| d <sub>0</sub> | P <sub>h</sub> | L <sub>tp</sub> | C <sub>a</sub> | C <sub>0a</sub> | η    | η'   | S <sub>ap</sub> | m <sub>n</sub> | m <sub>s</sub> | I <sub>s</sub>       | I <sub>nn</sub>   | I <sub>ns</sub> | Z <sub>n</sub>  | Z <sub>s</sub>     |
|----------------|----------------|-----------------|----------------|-----------------|------|------|-----------------|----------------|----------------|----------------------|-------------------|-----------------|-----------------|--------------------|
|                |                |                 | kN             |                 | –    |      | mm              | kg             | kg/m           | kgmm <sup>2</sup> /m | kgmm <sup>2</sup> |                 | cm <sup>3</sup> | cm <sup>3</sup> /m |
| <b>60</b>      | 15             | 4 250           | 495            | 1 206           | 0,88 | 0,87 | 0,07            | 13             | 22,2           | 9 990                | 29 700            | 1 680           | 90              | 27                 |
|                | 20             | 4 250           | 515            | 1 181           | 0,89 | 0,88 | 0,07            | 13             | 22,2           | 9 990                | 29 700            | 1 680           | 90              | 27                 |
|                | 25             | 4 250           | 530            | 1 227           | 0,89 | 0,88 | 0,07            | 13             | 22,2           | 9 990                | 29 700            | 1 680           | 90              | 27                 |
|                | 30             | 4 250           | 528            | 1 216           | 0,88 | 0,87 | 0,07            | 13             | 22,2           | 9 990                | 29 700            | 1 680           | 90              | 27                 |
| <b>75</b>      | 15             | 5 500           | 836            | 2 473           | 0,87 | 0,85 | 0,07            | 20             | 34,7           | 24 400               | 73 400            | 5 130           | 170             | 33                 |
|                | 20             | 5 500           | 845            | 2 455           | 0,88 | 0,87 | 0,07            | 20             | 34,7           | 24 400               | 73 400            | 5 130           | 170             | 33                 |
|                | 25             | 5 500           | 855            | 2 461           | 0,89 | 0,88 | 0,07            | 20             | 34,7           | 24 400               | 73 400            | 5 130           | 170             | 33                 |
|                | 30             | 5 500           | 852            | 2 420           | 0,89 | 0,88 | 0,07            | 20             | 34,7           | 24 400               | 73 400            | 5 130           | 170             | 33                 |
| <b>87</b>      | 15             | 6 000           | 1 059          | 3 527           | 0,86 | 0,84 | 0,07            | 31             | 45,8           | 42 800               | 149 000           | 10 600          | 270             | 38                 |
|                | 20             | 6 000           | 1 061          | 3 452           | 0,88 | 0,86 | 0,07            | 31             | 45,8           | 42 800               | 149 000           | 10 600          | 270             | 38                 |
|                | 25             | 6 000           | 1 085          | 3 513           | 0,89 | 0,87 | 0,07            | 31             | 45,8           | 42 800               | 149 000           | 10 600          | 270             | 38                 |
|                | 30             | 6 000           | 1 085          | 3 465           | 0,89 | 0,88 | 0,07            | 31             | 45,8           | 42 800               | 149 000           | 10 600          | 270             | 38                 |
| <b>99</b>      | 15             | 7 500           | 1 277          | 4 671           | 0,85 | 0,82 | 0,07            | 46             | 60,4           | 74 000               | 288 000           | 20 400          | 400             | 44                 |
|                | 20             | 7 500           | 1 311          | 4 741           | 0,87 | 0,85 | 0,07            | 46             | 60,4           | 74 000               | 288 000           | 20 400          | 400             | 44                 |
|                | 25             | 7 500           | 1 328          | 4 749           | 0,88 | 0,87 | 0,07            | 46             | 60,4           | 74 000               | 288 000           | 20 400          | 400             | 44                 |
|                | 30             | 7 500           | 1 330          | 4 694           | 0,89 | 0,87 | 0,07            | 46             | 60,4           | 74 000               | 288 000           | 20 400          | 400             | 44                 |
|                | 35             | 7 500           | 1 329          | 4 639           | 0,89 | 0,88 | 0,07            | 46             | 60,4           | 74 000               | 288 000           | 20 400          | 400             | 44                 |
| <b>112,5</b>   | 15             | 7 500           | 1 396          | 5 288           | 0,84 | 0,80 | 0,07            | 66             | 76,8           | 120 000              | 552 000           | 37 100          | 550             | 50                 |
|                | 20             | 7 500           | 1 421          | 5 297           | 0,86 | 0,84 | 0,07            | 66             | 76,8           | 120 000              | 552 000           | 37 100          | 550             | 50                 |
|                | 25             | 7 500           | 1 446          | 5 341           | 0,88 | 0,86 | 0,07            | 66             | 76,8           | 120 000              | 552 000           | 37 100          | 550             | 50                 |
|                | 30             | 7 500           | 1 455          | 5 315           | 0,88 | 0,87 | 0,07            | 66             | 76,8           | 120 000              | 552 000           | 37 100          | 550             | 50                 |
|                | 35             | 7 500           | 1 461          | 5 289           | 0,89 | 0,88 | 0,07            | 66             | 76,8           | 120 000              | 552 000           | 37 100          | 550             | 50                 |
| <b>120</b>     | 15             | 8 000           | 1 547          | 6 179           | 0,83 | 0,79 | 0,07            | 73             | 88,8           | 160 000              | 676 000           | 47 200          | 700             | 53                 |
|                | 20             | 8 000           | 1 587          | 6 263           | 0,86 | 0,83 | 0,07            | 73             | 88,8           | 160 000              | 676 000           | 47 200          | 700             | 53                 |
|                | 25             | 8 000           | 1 585          | 6 123           | 0,87 | 0,85 | 0,07            | 73             | 88,8           | 160 000              | 676 000           | 47 200          | 700             | 53                 |
|                | 30             | 8 000           | 1 614          | 6 207           | 0,88 | 0,87 | 0,07            | 73             | 88,8           | 160 000              | 676 000           | 47 200          | 700             | 53                 |
|                | 35             | 8 000           | 1 640          | 6 291           | 0,89 | 0,87 | 0,07            | 73             | 88,8           | 160 000              | 676 000           | 47 200          | 700             | 53                 |
|                | 40             | 8 000           | 1 651          | 6 301           | 0,89 | 0,88 | 0,1             | 73             | 88,8           | 160 000              | 676 000           | 47 200          | 700             | 53                 |

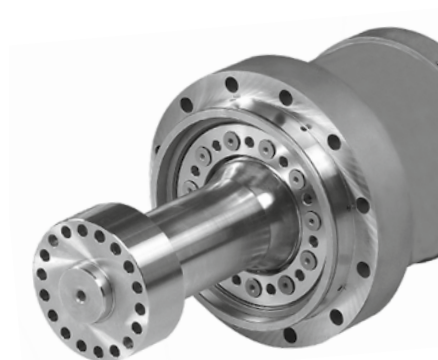


\* g6 fit only applies to the finished surface, on side opposite to the lubrication port, marked with a  $0,8\sqrt{\text{ }}$

| Designation        | Dimensions     |                |     |     |                |                |                |                |                |     |          |     |            |    |                |                |      |
|--------------------|----------------|----------------|-----|-----|----------------|----------------|----------------|----------------|----------------|-----|----------|-----|------------|----|----------------|----------------|------|
|                    | d <sub>1</sub> | d <sub>2</sub> | D   | A   | A <sub>1</sub> | A <sub>1</sub> | A <sub>3</sub> | A <sub>2</sub> | D <sub>1</sub> | J   | G        | W   | Q          | B  | D <sub>2</sub> | D <sub>3</sub> | u    |
| –                  | mm             |                |     |     |                |                |                |                |                |     |          |     |            |    |                |                |      |
| HRF/HRP 60 x 15    | 61,1           | 58,5           | 122 | 171 | 70,5           | 25             | 40             | 30             | 166            | 146 | 8 x M12  | 1   | M8 x 1     | 9  | 110            | 71             | 22,5 |
| HRF/HRP 60 x 20    | 61,5           | 58,0           | 122 | 171 | 70,5           | 25             | 40             | 30             | 166            | 146 | 8 x M12  | 1   | M8 x 1     | 9  | 110            | 71             | 22,5 |
| HRF/HRP 60 x 25    | 61,9           | 57,5           | 122 | 171 | 70,5           | 25             | 40             | 30             | 166            | 146 | 8 x M12  | 1   | M8 x 1     | 9  | 110            | 71             | 22,5 |
| HRF/HRP 60 x 30    | 62,3           | 57,0           | 122 | 171 | 70,5           | 25             | 40             | 30             | 166            | 146 | 8 x M12  | 1   | M8 x 1     | 9  | 110            | 71             | 22,5 |
| HRF/HRP 75 x 15    | 76,1           | 73,5           | 150 | 213 | 89             | 30             | 40             | 35             | 195            | 174 | 12 x M12 | 1   | M8 x 1     | 10 | 136            | 87             | 15   |
| HRF/HRP 75 x 20    | 76,5           | 73,0           | 150 | 213 | 89             | 30             | 40             | 35             | 195            | 174 | 12 x M12 | 1   | M8 x 1     | 10 | 136            | 87             | 15   |
| HRF/HRP 75 x 25    | 76,9           | 72,5           | 150 | 213 | 89             | 30             | 40             | 35             | 195            | 174 | 12 x M12 | 1   | M8 x 1     | 10 | 136            | 87             | 15   |
| HRF/HRP 75 x 30    | 77,3           | 72,0           | 150 | 213 | 89             | 30             | 40             | 35             | 195            | 174 | 12 x M12 | 1   | M8 x 1     | 10 | 136            | 87             | 15   |
| HRF/HRP 87 x 15    | 88,1           | 85,5           | 175 | 245 | 102,5          | 35             | 40             | 40             | 220            | 200 | 12 x M12 | 1,5 | M8 x 1     | 12 | 158            | 103            | 15   |
| HRF/HRP 87 x 20    | 88,5           | 85,0           | 175 | 245 | 102,5          | 35             | 40             | 40             | 220            | 200 | 12 x M12 | 1,5 | M8 x 1     | 12 | 158            | 103            | 15   |
| HRF/HRP 87 x 25    | 88,9           | 84,5           | 175 | 245 | 102,5          | 35             | 40             | 40             | 220            | 200 | 12 x M12 | 1,5 | M8 x 1     | 12 | 158            | 103            | 15   |
| HRF/HRP 87 x 30    | 89,3           | 84,0           | 175 | 245 | 102,5          | 35             | 40             | 40             | 220            | 200 | 12 x M12 | 1,5 | M8 x 1     | 12 | 158            | 103            | 15   |
| HRF/HRP 99 x 15    | 100,1          | 97,5           | 200 | 280 | 115            | 40             | 40             | 50             | 245            | 224 | 12 x M12 | 1,5 | M8 x 1     | 12 | 180            | 112            | 15   |
| HRF/HRP 99 x 20    | 100,5          | 97,0           | 200 | 280 | 115            | 40             | 40             | 50             | 245            | 224 | 12 x M12 | 1,5 | M8 x 1     | 12 | 180            | 112            | 15   |
| HRF/HRP 99 x 25    | 100,9          | 96,5           | 200 | 280 | 115            | 40             | 40             | 50             | 245            | 224 | 12 x M12 | 1,5 | M8 x 1     | 12 | 180            | 112            | 15   |
| HRF/HRP 99 x 30    | 101,3          | 96,0           | 200 | 280 | 115            | 40             | 40             | 50             | 245            | 224 | 12 x M12 | 1,5 | M8 x 1     | 12 | 180            | 112            | 15   |
| HRF/HRP 99 x 35    | 101,6          | 95,5           | 200 | 280 | 115            | 40             | 40             | 50             | 245            | 224 | 12 x M12 | 1,5 | M8 x 1     | 12 | 180            | 112            | 15   |
| HRF/HRP 112,5 x 15 | 113,6          | 111,0          | 230 | 300 | 125            | 50             | 40             | 50             | 286            | 260 | 12 x M16 | 1,5 | M12 x 1,75 | 12 | 210            | 140            | 15   |
| HRF/HRP 112,5 x 20 | 114,0          | 110,5          | 230 | 300 | 125            | 50             | 40             | 50             | 286            | 260 | 12 x M16 | 1,5 | M12 x 1,75 | 12 | 210            | 140            | 15   |
| HRF/HRP 112,5 x 25 | 114,4          | 110,0          | 230 | 300 | 125            | 50             | 40             | 50             | 286            | 260 | 12 x M16 | 1,5 | M12 x 1,75 | 12 | 210            | 140            | 15   |
| HRF/HRP 112,5 x 30 | 114,8          | 109,5          | 230 | 300 | 125            | 50             | 40             | 50             | 286            | 260 | 12 x M16 | 1,5 | M12 x 1,75 | 12 | 210            | 140            | 15   |
| HRF/HRP 112,5 x 35 | 115,1          | 109,0          | 230 | 300 | 125            | 50             | 40             | 50             | 286            | 260 | 12 x M16 | 1,5 | M12 x 1,75 | 12 | 210            | 140            | 15   |
| HRF/HRP 120 x 15   | 121,1          | 118,5          | 240 | 330 | 137,5          | 50             | 60             | 55             | 296            | 270 | 12 x M16 | 1,5 | M12 x 1,75 | 12 | 220            | 180            | 15   |
| HRF/HRP 120 x 20   | 121,5          | 118,0          | 240 | 330 | 137,5          | 50             | 60             | 55             | 296            | 270 | 12 x M16 | 1,5 | M12 x 1,75 | 12 | 220            | 180            | 15   |
| HRF/HRP 120 x 25   | 121,9          | 117,5          | 240 | 330 | 137,5          | 50             | 60             | 55             | 296            | 270 | 12 x M16 | 1,5 | M12 x 1,75 | 12 | 220            | 180            | 15   |
| HRF/HRP 120 x 30   | 122,3          | 117,0          | 240 | 330 | 137,5          | 50             | 60             | 55             | 296            | 270 | 12 x M16 | 1,5 | M12 x 1,75 | 12 | 220            | 180            | 15   |
| HRF/HRP 120 x 35   | 122,6          | 116,5          | 240 | 330 | 137,5          | 50             | 60             | 55             | 296            | 270 | 12 x M16 | 1,5 | M12 x 1,75 | 12 | 220            | 180            | 15   |
| HRF/HRP 120 x 40   | 123,0          | 116,0          | 240 | 330 | 137,5          | 50             | 60             | 55             | 296            | 270 | 12 x M16 | 1,5 | M12 x 1,75 | 12 | 220            | 180            | 15   |

## HRF/HRP Ultra Power planetary roller screws with flanged nut

d 135 – 240 mm



HRP

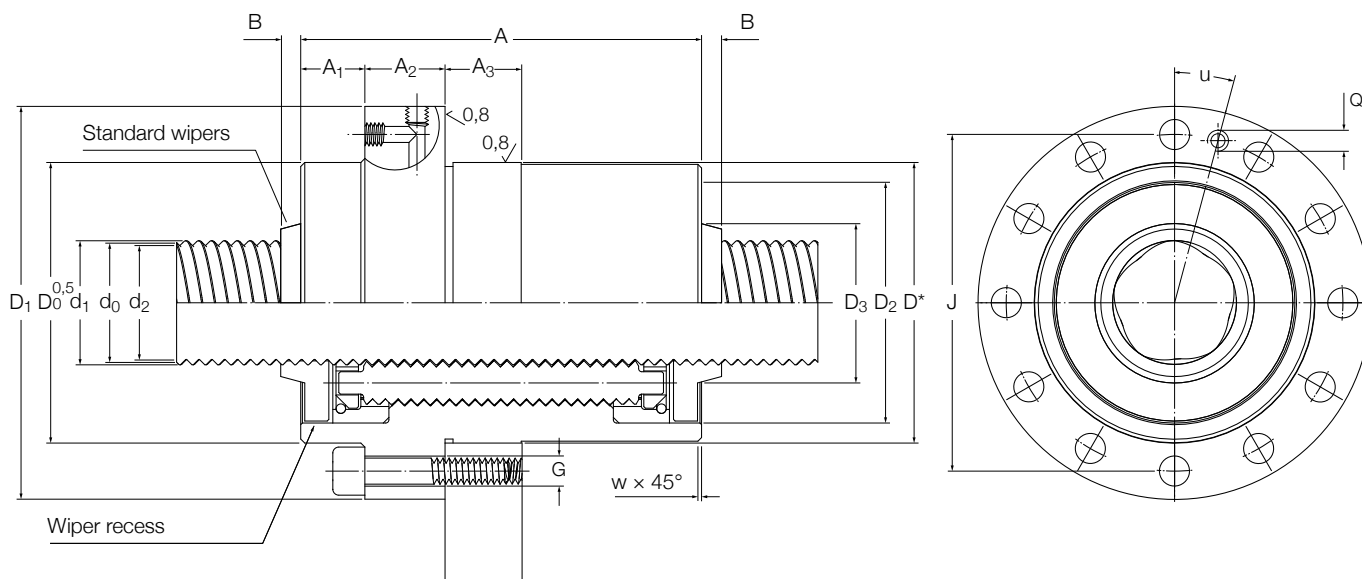


Threaded rollers



Components assembly

| Dimensions and technical characteristics |                |                 |                |                 |      |      |                 |                |                |                        |                        |                        |                 |                    |
|------------------------------------------|----------------|-----------------|----------------|-----------------|------|------|-----------------|----------------|----------------|------------------------|------------------------|------------------------|-----------------|--------------------|
| d <sub>0</sub>                           | P <sub>h</sub> | L <sub>tp</sub> | C <sub>a</sub> | C <sub>0a</sub> | η    | η'   | S <sub>ap</sub> | m <sub>n</sub> | m <sub>s</sub> | I <sub>s</sub>         | I <sub>nn</sub>        | I <sub>ns</sub>        | Z <sub>n</sub>  | Z <sub>s</sub>     |
|                                          |                |                 | kN             |                 | —    |      | mm              | kg             | kg/m           | kgmm <sup>2</sup> /m   | kgmm <sup>2</sup>      |                        | cm <sup>3</sup> | cm <sup>3</sup> /m |
| 135                                      | 15             | 8 000           | 1 843          | 8 037           | 0,82 | 0,77 | 0,07            | 122            | 113            | 261 000                | 1,5 × 10 <sup>6</sup>  | 94 200                 | 980             | 60                 |
|                                          | 20             | 8 000           | 1 858          | 7 922           | 0,85 | 0,82 | 0,07            | 122            | 113            | 261 000                | 1,5 × 10 <sup>6</sup>  | 94 200                 | 980             | 60                 |
|                                          | 25             | 8 000           | 1 903          | 8 059           | 0,86 | 0,84 | 0,07            | 122            | 113            | 261 000                | 1,5 × 10 <sup>6</sup>  | 94 200                 | 980             | 60                 |
|                                          | 30             | 8 000           | 1 904          | 7 943           | 0,88 | 0,86 | 0,07            | 122            | 113            | 261 000                | 1,5 × 10 <sup>6</sup>  | 94 200                 | 980             | 60                 |
|                                          | 35             | 8 000           | 1 921          | 7 953           | 0,88 | 0,87 | 0,07            | 122            | 113            | 261 000                | 1,5 × 10 <sup>6</sup>  | 94 200                 | 980             | 60                 |
|                                          | 40             | 8 000           | 1 909          | 7 796           | 0,89 | 0,87 | 0,1             | 122            | 113            | 261 000                | 1,5 × 10 <sup>6</sup>  | 94 200                 | 980             | 60                 |
|                                          | 50             | 8 000           | 1 944          | 7 901           | 0,89 | 0,88 | 0,1             | 122            | 113            | 261 000                | 1,5 × 10 <sup>6</sup>  | 94 200                 | 980             | 60                 |
| 150                                      | 15             | 7 200           | 2 200          | 10 446          | 0,80 | 0,75 | 0,07            | 180            | 139            | 390 000                | 2,9 × 10 <sup>6</sup>  | 160 000                | 1 350           | 66                 |
|                                          | 20             | 7 200           | 2 240          | 10 459          | 0,84 | 0,80 | 0,07            | 180            | 139            | 390 000                | 2,9 × 10 <sup>6</sup>  | 160 000                | 1 350           | 66                 |
|                                          | 25             | 7 200           | 2 137          | 9 553           | 0,86 | 0,83 | 0,07            | 180            | 139            | 390 000                | 2,9 × 10 <sup>6</sup>  | 160 000                | 1 350           | 66                 |
|                                          | 30             | 7 200           | 2 167          | 9 611           | 0,87 | 0,85 | 0,07            | 180            | 139            | 390 000                | 2,9 × 10 <sup>6</sup>  | 160 000                | 1 350           | 66                 |
|                                          | 35             | 7 200           | 2 167          | 9 483           | 0,88 | 0,86 | 0,07            | 180            | 139            | 390 000                | 2,9 × 10 <sup>6</sup>  | 160 000                | 1 350           | 66                 |
|                                          | 40             | 7 200           | 2 176          | 9 449           | 0,88 | 0,87 | 0,1             | 180            | 139            | 390 000                | 2,9 × 10 <sup>6</sup>  | 160 000                | 1 350           | 66                 |
|                                          | 50             | 7 200           | 2 189          | 9 379           | 0,89 | 0,88 | 0,1             | 180            | 139            | 390 000                | 2,9 × 10 <sup>6</sup>  | 160 000                | 1 350           | 66                 |
| 180                                      | 15             | 5 000           | 3 073          | 17 366          | 0,78 | 0,71 | 0,07            | 344            | 200            | 809 000                | 8,2 × 10 <sup>6</sup>  | 437 000                | 2 500           | 79                 |
|                                          | 20             | 5 000           | 3 123          | 17 319          | 0,82 | 0,77 | 0,07            | 344            | 200            | 809 000                | 8,2 × 10 <sup>6</sup>  | 437 000                | 2 500           | 79                 |
|                                          | 25             | 5 000           | 3 002          | 16 004          | 0,84 | 0,81 | 0,07            | 344            | 200            | 809 000                | 8,2 × 10 <sup>6</sup>  | 437 000                | 2 500           | 79                 |
|                                          | 30             | 5 000           | 3 009          | 15 790          | 0,86 | 0,83 | 0,07            | 344            | 200            | 809 000                | 8,2 × 10 <sup>6</sup>  | 437 000                | 2 500           | 79                 |
|                                          | 35             | 5 000           | 3 023          | 15 690          | 0,87 | 0,85 | 0,07            | 344            | 200            | 809 000                | 8,2 × 10 <sup>6</sup>  | 437 000                | 2 500           | 79                 |
|                                          | 40             | 5 000           | 3 075          | 15 931          | 0,88 | 0,86 | 0,1             | 344            | 200            | 809 000                | 8,2 × 10 <sup>6</sup>  | 437 000                | 2 500           | 79                 |
|                                          | 50             | 5 000           | 3 128          | 16 073          | 0,89 | 0,87 | 0,1             | 344            | 200            | 809 000                | 8,2 × 10 <sup>6</sup>  | 437 000                | 2 500           | 79                 |
| 210                                      | 20             | 3 700           | 3 371          | 19 164          | 0,80 | 0,74 | 0,07            | 465            | 270            | 1,49 × 10 <sup>6</sup> | 14,1 × 10 <sup>6</sup> | 854 000                | 3 150           | 92                 |
|                                          | 25             | 3 700           | 3 435          | 19 324          | 0,82 | 0,79 | 0,07            | 465            | 270            | 1,49 × 10 <sup>6</sup> | 14,1 × 10 <sup>6</sup> | 854 000                | 3 150           | 92                 |
|                                          | 30             | 3 700           | 3 249          | 17 472          | 0,84 | 0,81 | 0,07            | 465            | 270            | 1,49 × 10 <sup>6</sup> | 14,1 × 10 <sup>6</sup> | 854 000                | 3 150           | 92                 |
|                                          | 35             | 3 700           | 3 265          | 17 359          | 0,86 | 0,83 | 0,07            | 465            | 270            | 1,49 × 10 <sup>6</sup> | 14,1 × 10 <sup>6</sup> | 854 000                | 3 150           | 92                 |
|                                          | 40             | 3 700           | 3 322          | 17 635          | 0,87 | 0,85 | 0,1             | 465            | 270            | 1,49 × 10 <sup>6</sup> | 14,1 × 10 <sup>6</sup> | 854 000                | 3 150           | 92                 |
|                                          | 50             | 3 700           | 3 381          | 17 798          | 0,88 | 0,86 | 0,1             | 465            | 270            | 1,49 × 10 <sup>6</sup> | 14,1 × 10 <sup>6</sup> | 854 000                | 3 150           | 92                 |
| 240                                      | 25             | 2 800           | 3 919          | 23 387          | 0,81 | 0,76 | 0,07            | 594            | 353            | 2,54 × 10 <sup>6</sup> | 21,4 × 10 <sup>6</sup> | 1,19 × 10 <sup>6</sup> | 5 000           | 106                |
|                                          | 30             | 2 800           | 3 931          | 23 089          | 0,83 | 0,79 | 0,07            | 594            | 353            | 2,54 × 10 <sup>6</sup> | 21,4 × 10 <sup>6</sup> | 1,19 × 10 <sup>6</sup> | 5 000           | 106                |
|                                          | 35             | 2 800           | 3 994          | 23 350          | 0,84 | 0,82 | 0,07            | 594            | 353            | 2,54 × 10 <sup>6</sup> | 21,4 × 10 <sup>6</sup> | 1,19 × 10 <sup>6</sup> | 5 000           | 106                |
|                                          | 40             | 2 800           | 3 808          | 21 497          | 0,86 | 0,83 | 0,1             | 594            | 353            | 2,54 × 10 <sup>6</sup> | 21,4 × 10 <sup>6</sup> | 1,19 × 10 <sup>6</sup> | 5 000           | 106                |
|                                          | 50             | 2 800           | 3 860          | 21 536          | 0,87 | 0,85 | 0,1             | 594            | 353            | 2,54 × 10 <sup>6</sup> | 21,4 × 10 <sup>6</sup> | 1,19 × 10 <sup>6</sup> | 5 000           | 106                |



\* g6 fit only applies to the finished surface, on side opposite to the lubrication port, marked with a  $0,8\sqrt{\phantom{x}}$

| Designation      | Dimensions     |                |     |     |                |                |                |                |                |     |          |   |            |      |                |                |       |
|------------------|----------------|----------------|-----|-----|----------------|----------------|----------------|----------------|----------------|-----|----------|---|------------|------|----------------|----------------|-------|
|                  | d <sub>1</sub> | d <sub>2</sub> | D   | A   | A <sub>1</sub> | A <sub>1</sub> | A <sub>3</sub> | A <sub>2</sub> | D <sub>1</sub> | J   | G        | W | Q          | B    | D <sub>2</sub> | D <sub>3</sub> | u     |
| —                | mm             |                |     |     |                |                |                |                |                |     |          |   |            |      |                |                |       |
| HRF/HRP 135 x 15 | 136,1          | 133,5          | 280 | 370 | 155            | 60             | 80             | 60             | 345            | 315 | 12 x M18 | 2 | M12 x 1,75 | 11,5 | 250            | 180            | 15    |
| HRF/HRP 135 x 20 | 136,5          | 133,0          | 280 | 370 | 155            | 60             | 80             | 60             | 345            | 315 | 12 x M18 | 2 | M12 x 1,75 | 11,5 | 250            | 180            | 15    |
| HRF/HRP 135 x 25 | 136,9          | 132,5          | 280 | 370 | 155            | 60             | 80             | 60             | 345            | 315 | 12 x M18 | 2 | M12 x 1,75 | 11,5 | 250            | 180            | 15    |
| HRF/HRP 135 x 30 | 137,3          | 132,0          | 280 | 370 | 155            | 60             | 80             | 60             | 345            | 315 | 12 x M18 | 2 | M12 x 1,75 | 11,5 | 250            | 180            | 15    |
| HRF/HRP 135 x 35 | 137,6          | 131,5          | 280 | 370 | 155            | 60             | 80             | 60             | 345            | 315 | 12 x M18 | 2 | M12 x 1,75 | 11,5 | 250            | 180            | 15    |
| HRF/HRP 135 x 40 | 138,0          | 131,0          | 280 | 370 | 155            | 60             | 80             | 60             | 345            | 315 | 12 x M18 | 2 | M12 x 1,75 | 11,5 | 250            | 180            | 15    |
| HRF/HRP 135 x 50 | 138,8          | 130,0          | 280 | 370 | 155            | 60             | 80             | 60             | 345            | 315 | 12 x M18 | 2 | M12 x 1,75 | 11,5 | 250            | 180            | 15    |
| HRF/HRP 150 x 15 | 151,1          | 148,5          | 320 | 412 | 171            | 65             | 80             | 70             | 385            | 355 | 12 x M18 | 3 | M12 x 1,75 | 12,5 | 280            | 230            | 15    |
| HRF/HRP 150 x 20 | 151,5          | 148,0          | 320 | 412 | 171            | 65             | 80             | 70             | 385            | 355 | 12 x M18 | 3 | M12 x 1,75 | 12,5 | 280            | 230            | 15    |
| HRF/HRP 150 x 25 | 151,9          | 147,5          | 320 | 412 | 171            | 65             | 80             | 70             | 385            | 355 | 12 x M18 | 3 | M12 x 1,75 | 12,5 | 280            | 230            | 15    |
| HRF/HRP 150 x 30 | 152,3          | 147,0          | 320 | 412 | 171            | 65             | 80             | 70             | 385            | 355 | 12 x M18 | 3 | M12 x 1,75 | 12,5 | 280            | 230            | 15    |
| HRF/HRP 150 x 35 | 152,6          | 146,5          | 320 | 412 | 171            | 65             | 80             | 70             | 385            | 355 | 12 x M18 | 3 | M12 x 1,75 | 12,5 | 280            | 230            | 15    |
| HRF/HRP 150 x 40 | 153,0          | 146,0          | 320 | 412 | 171            | 65             | 80             | 70             | 385            | 355 | 12 x M18 | 3 | M12 x 1,75 | 12,5 | 280            | 230            | 15    |
| HRF/HRP 150 x 50 | 153,8          | 145,0          | 320 | 412 | 171            | 65             | 80             | 70             | 385            | 355 | 12 x M18 | 3 | M12 x 1,75 | 12,5 | 280            | 230            | 15    |
| HRF/HRP 180 x 15 | 181,1          | 178,5          | 390 | 528 | 219            | 96             | 100            | 90             | 470            | 433 | 12 x M22 | 3 | M12 x 1,75 | 15   | 340            | 250            | 15    |
| HRF/HRP 180 x 20 | 181,5          | 178,0          | 390 | 528 | 219            | 96             | 100            | 90             | 470            | 433 | 12 x M22 | 3 | M12 x 1,75 | 15   | 340            | 250            | 15    |
| HRF/HRP 180 x 25 | 181,9          | 177,5          | 390 | 528 | 219            | 96             | 100            | 90             | 470            | 433 | 12 x M22 | 3 | M12 x 1,75 | 15   | 340            | 250            | 15    |
| HRF/HRP 180 x 30 | 182,3          | 177,0          | 390 | 528 | 219            | 96             | 100            | 90             | 470            | 433 | 12 x M22 | 3 | M12 x 1,75 | 15   | 340            | 250            | 15    |
| HRF/HRP 180 x 35 | 182,6          | 176,5          | 390 | 528 | 219            | 96             | 100            | 90             | 470            | 433 | 12 x M22 | 3 | M12 x 1,75 | 15   | 340            | 250            | 15    |
| HRF/HRP 180 x 40 | 183,0          | 176,0          | 390 | 528 | 219            | 96             | 100            | 90             | 470            | 433 | 12 x M22 | 3 | M12 x 1,75 | 15   | 340            | 250            | 15    |
| HRF/HRP 180 x 50 | 183,8          | 175,0          | 390 | 528 | 219            | 96             | 100            | 90             | 470            | 433 | 12 x M22 | 3 | M12 x 1,75 | 15   | 340            | 250            | 15    |
| HRF/HRP 210 x 20 | 211,5          | 208,0          | 440 | 570 | 235            | 100            | 100            | 100            | 530            | 490 | 12 x M24 | 3 | M12 x 1,75 | 15   | 398            | 250            | 15    |
| HRF/HRP 210 x 25 | 211,9          | 207,5          | 440 | 570 | 235            | 100            | 100            | 100            | 530            | 490 | 12 x M24 | 3 | M12 x 1,75 | 15   | 398            | 250            | 15    |
| HRF/HRP 210 x 30 | 212,3          | 207,0          | 440 | 570 | 235            | 100            | 100            | 100            | 530            | 490 | 12 x M24 | 3 | M12 x 1,75 | 15   | 398            | 250            | 15    |
| HRF/HRP 210 x 35 | 212,6          | 206,5          | 440 | 570 | 235            | 100            | 100            | 100            | 530            | 490 | 12 x M24 | 3 | M12 x 1,75 | 15   | 398            | 250            | 15    |
| HRF/HRP 210 x 40 | 213,0          | 206,0          | 440 | 570 | 235            | 100            | 100            | 100            | 530            | 490 | 12 x M24 | 3 | M12 x 1,75 | 15   | 398            | 250            | 15    |
| HRF/HRP 210 x 50 | 213,8          | 205,0          | 440 | 570 | 235            | 100            | 100            | 100            | 530            | 490 | 12 x M24 | 3 | M12 x 1,75 | 15   | 398            | 250            | 15    |
| HRF/HRP 240 x 25 | 241,9          | 237,5          | 490 | 600 | 250            | 100            | 100            | 100            | 580            | 540 | 16 x M24 | 3 | M12 x 1,75 | 15   | 448            | 290            | 11,25 |
| HRF/HRP 240 x 30 | 242,3          | 237,0          | 490 | 600 | 250            | 100            | 100            | 100            | 580            | 540 | 16 x M24 | 3 | M12 x 1,75 | 15   | 448            | 290            | 11,25 |
| HRF/HRP 240 x 35 | 242,6          | 236,5          | 490 | 600 | 250            | 100            | 100            | 100            | 580            | 540 | 16 x M24 | 3 | M12 x 1,75 | 15   | 448            | 290            | 11,25 |
| HRF/HRP 240 x 40 | 243,0          | 236,0          | 490 | 600 | 250            | 100            | 100            | 100            | 580            | 540 | 16 x M24 | 3 | M12 x 1,75 | 15   | 448            | 290            | 11,25 |
| HRF/HRP 240 x 50 | 243,8          | 235,0          | 490 | 600 | 250            | 100            | 100            | 100            | 580            | 540 | 16 x M24 | 3 | M12 x 1,75 | 15   | 448            | 290            | 11,25 |

# Inverted roller screws ISR

## Concept

The inverted planetary roller screw provides powerful electro-mechanical actuation when compactness, low torque and high load capabilities are prerequisites.

The rollers, synchronized with the threaded shaft through toothed rings, translate along the nut. The application loads acting on the translating push tube transit through the planetary rollers to the rotating shaft or nut. Toothed rings and guides provide the rolling motion and the even circumferential position of the rollers, for near-perfect load distribution. The rings and guides also avoid any parasitic friction between the rollers.

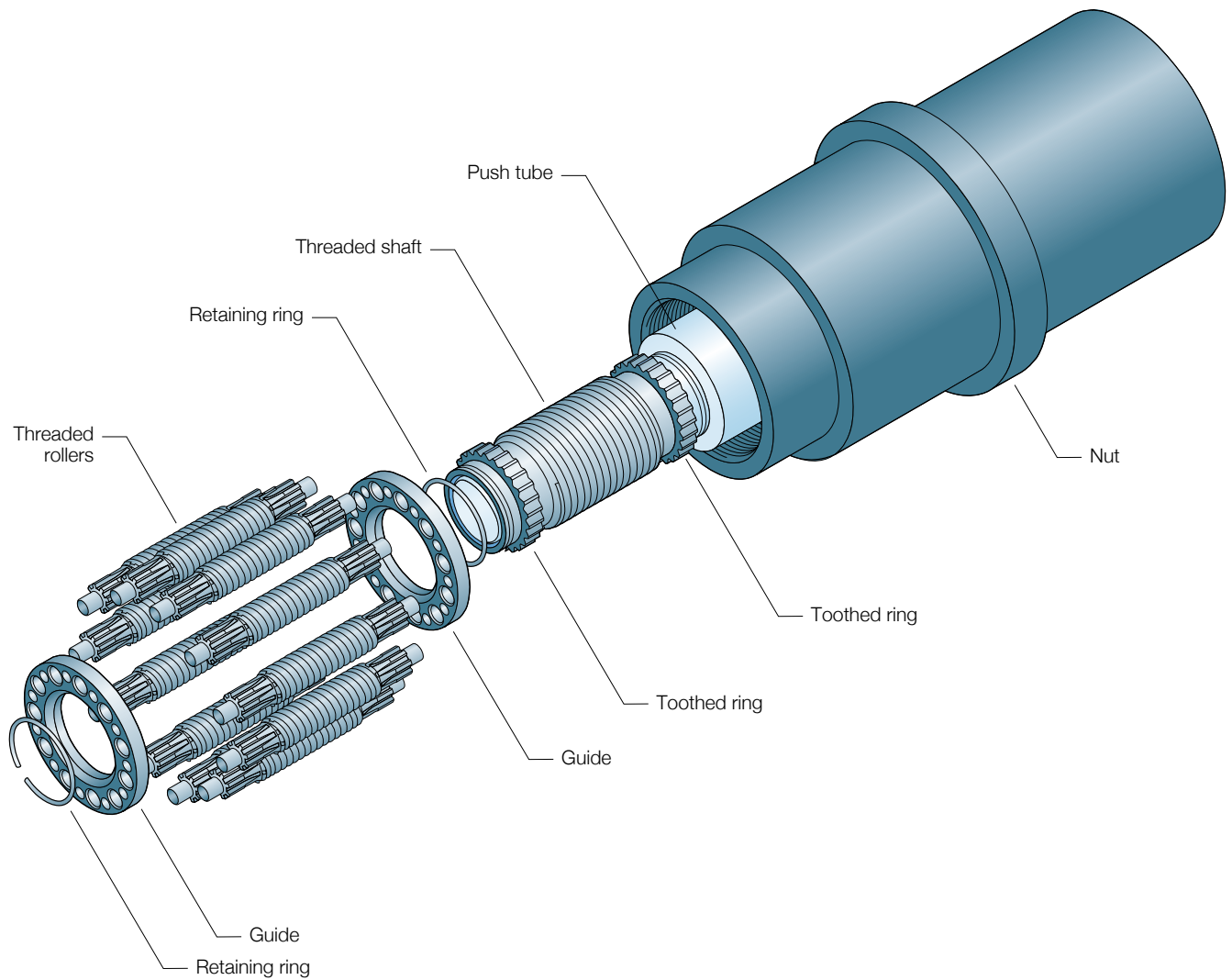
## Application examples

The compact inverted roller screw, incorporated within an electro-mechanical actuator, can replace hydraulic or pneumatic actuation systems typically found in the following applications:

- Factory automation (for example, automotive assembly lines)
- Welding guns
- Portable high power tools
- Oil and gas subsea equipment
- Aerospace actuators



| Design features                                                                                                                                          | User benefits                                                                                                                                                                                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Planetary roller screw concept without recirculation<br>Leads as small as 2,4 mm, combined with the benefits of the robust planetary roller screw design | Long service life and increased reliability improve productivity<br>Small leads achieved with robust threads, while providing high load carrying capacity and high axial stiffness<br>Reduced requirements for electric motor torque to reach high load actuation |
| Either nut or shaft can be driven, the non-rotating and translating component acting directly as the push tube                                           | Design flexibility<br>Anti-rotation function can be easily integrated into the component acting as the push tube                                                                                                                                                  |
| Custom screw-to-motor attachments for easy integration                                                                                                   | Compact, light weight solution with fewer parts for easy installation                                                                                                                                                                                             |
| Standard delivery without wipers                                                                                                                         | Guiding and sealing functions easily integrated on nut or shaft, resulting in high performance sealing                                                                                                                                                            |
| High speed and acceleration capability, similar to planetary roller screws                                                                               | Preferred solutions for applications with high duty cycle and high cycle rates                                                                                                                                                                                    |
| Two versions are available:<br>ISR with axial play<br>IBR without backlash                                                                               | Equipment stiffness and accuracy further increased when backlash is eliminated                                                                                                                                                                                    |
| Flexible production equipment                                                                                                                            | Custom designs to fit customer applications. Multiple dimensions can be created, starting from the standard assortment of planetary roller screws                                                                                                                 |
| Small lead associated to a relatively large nominal nut diameter                                                                                         | Low backdriving ability and even self locking solutions are possible                                                                                                                                                                                              |



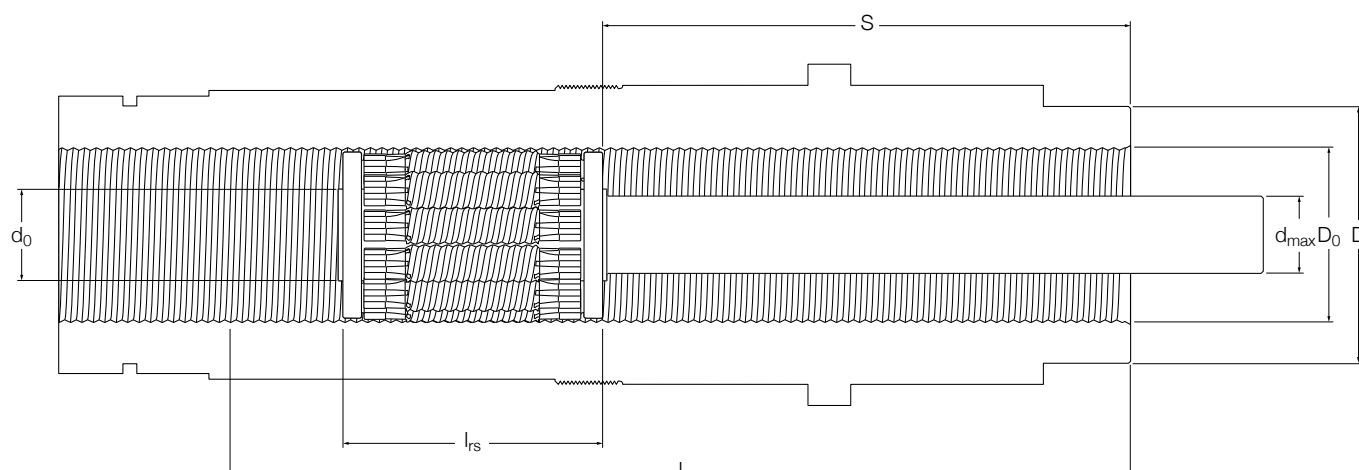
## ISR inverted roller screws

d 18 – 48 mm



*Roller set of an inverted roller screw*

| Dimensions and technical characteristics |       |       |             |          |               |           |  |
|------------------------------------------|-------|-------|-------------|----------|---------------|-----------|--|
| $d_0$<br>mm                              | $D_0$ | $P_h$ | $C_a$<br>kN | $C_{0a}$ | $\eta_p$<br>– | $\eta'_p$ |  |
| <b>18</b>                                | 30    | 2,4   | 35,6        | 69,9     | 0,69          | 0,55      |  |
|                                          | 30    | 3     | 37,8        | 70,9     | 0,73          | 0,63      |  |
|                                          | 30    | 4     | 36,6        | 61,2     | 0,77          | 0,70      |  |
|                                          | 30    | 5     | 37,8        | 59,2     | 0,80          | 0,75      |  |
|                                          | 30    | 6     | 40,4        | 61,9     | 0,82          | 0,78      |  |
| <b>21</b>                                | 35    | 2,4   | 55,5        | 102      | 0,66          | 0,48      |  |
|                                          | 35    | 3     | 59,6        | 105      | 0,7           | 0,57      |  |
|                                          | 35    | 4     | 63,3        | 104      | 0,75          | 0,67      |  |
|                                          | 35    | 5     | 61,5        | 91,8     | 0,78          | 0,72      |  |
|                                          | 35    | 6     | 64,2        | 92,2     | 0,8           | 0,75      |  |
| <b>24</b>                                | 40    | 2,4   | 63,7        | 118      | 0,63          | 0,41      |  |
|                                          | 40    | 3     | 67,2        | 119      | 0,68          | 0,53      |  |
|                                          | 40    | 4     | 72          | 119      | 0,73          | 0,63      |  |
|                                          | 40    | 5     | 75,3        | 118      | 0,76          | 0,68      |  |
|                                          | 40    | 6     | 74,5        | 109      | 0,79          | 0,73      |  |
| <b>30</b>                                | 50    | 2,4   | 93,2        | 195      | 0,58          | 0,28      |  |
|                                          | 50    | 3     | 99,2        | 198      | 0,63          | 0,41      |  |
|                                          | 50    | 4     | 105         | 194      | 0,69          | 0,55      |  |
|                                          | 50    | 5     | 111         | 197      | 0,73          | 0,63      |  |
|                                          | 50    | 6     | 117         | 200      | 0,76          | 0,68      |  |
| <b>39</b>                                | 65    | 2,4   | 135         | 311      | 0,52          | 0,08      |  |
|                                          | 65    | 3     | 143         | 311      | 0,57          | 0,25      |  |
|                                          | 65    | 4     | 153         | 312      | 0,64          | 0,44      |  |
|                                          | 65    | 5     | 161         | 310      | 0,68          | 0,53      |  |
|                                          | 65    | 6     | 169         | 314      | 0,72          | 0,61      |  |
| <b>48</b>                                | 80    | 2,4   | 209         | 564      | 0,47          | 0         |  |
|                                          | 80    | 3     | 221         | 567      | 0,52          | 0,08      |  |
|                                          | 80    | 4     | 234         | 557      | 0,59          | 0,31      |  |
|                                          | 80    | 5     | 247         | 554      | 0,64          | 0,44      |  |
|                                          | 80    | 6     | 259         | 559      | 0,68          | 0,53      |  |



| Designation        | Maximum axial play<br>$S_{ap}$<br>mm | Recommended minimum nut outer diameter<br>D | Maximum push tube outer diameter <sup>1)</sup><br>$d_{max}$ | Maximum stroke<br>S | Length of roller set<br>$l_{rs}$ |
|--------------------|--------------------------------------|---------------------------------------------|-------------------------------------------------------------|---------------------|----------------------------------|
| –                  |                                      |                                             |                                                             |                     |                                  |
| ISR/IBR 18 x 2,4R3 | 0,02                                 | 38                                          | 16                                                          | 65 <sup>2)</sup>    | 50                               |
| ISR/IBR 18 x 3R3   | 0,02                                 | 38                                          | 16                                                          | 60 <sup>2)</sup>    | 50                               |
| ISR/IBR 18 x 4R3   | 0,02                                 | 38                                          | 16                                                          | 55 <sup>2)</sup>    | 50                               |
| ISR/IBR 18 x 5R3   | 0,04                                 | 38                                          | 16                                                          | 50 <sup>2)</sup>    | 50                               |
| ISR/IBR 18 x 6R3   | 0,04                                 | 38                                          | 16                                                          | 45 <sup>2)</sup>    | 50                               |
| ISR/IBR 21 x 2,4R3 | 0,02                                 | 45                                          | 18                                                          | 84 <sup>2)</sup>    | 56                               |
| ISR/IBR 21 x 3R3   | 0,02                                 | 45                                          | 18                                                          | 79 <sup>2)</sup>    | 56                               |
| ISR/IBR 21 x 4R3   | 0,02                                 | 45                                          | 18                                                          | 74 <sup>2)</sup>    | 56                               |
| ISR/IBR 21 x 5R3   | 0,04                                 | 45                                          | 18                                                          | 69 <sup>2)</sup>    | 56                               |
| ISR/IBR 21 x 6R3   | 0,04                                 | 45                                          | 18                                                          | 64 <sup>2)</sup>    | 56                               |
| ISR/IBR 24 x 2,4R3 | 0,02                                 | 50                                          | 21                                                          | 210                 | 65                               |
| ISR/IBR 24 x 3R3   | 0,02                                 | 50                                          | 21                                                          | 170                 | 65                               |
| ISR/IBR 24 x 4R3   | 0,02                                 | 50                                          | 21                                                          | 110                 | 65                               |
| ISR/IBR 24 x 5R3   | 0,04                                 | 50                                          | 21                                                          | 80                  | 65                               |
| ISR/IBR 24 x 6R3   | 0,04                                 | 50                                          | 21                                                          | 75                  | 65                               |
| ISR/IBR 30 x 2,4R3 | 0,02                                 | 60                                          | 27                                                          | 210                 | 75                               |
| ISR/IBR 30 x 3R3   | 0,02                                 | 60                                          | 27                                                          | 210                 | 75                               |
| ISR/IBR 30 x 4R3   | 0,02                                 | 60                                          | 27                                                          | 210                 | 75                               |
| ISR/IBR 30 x 5R3   | 0,04                                 | 60                                          | 27                                                          | 200                 | 75                               |
| ISR/IBR 30 x 6R3   | 0,04                                 | 60                                          | 27                                                          | 200                 | 75                               |
| ISR/IBR 39 x 2,4R3 | 0,02                                 | 75                                          | 36                                                          | 195                 | 90                               |
| ISR/IBR 39 x 3R3   | 0,02                                 | 75                                          | 36                                                          | 195                 | 90                               |
| ISR/IBR 39 x 4R3   | 0,02                                 | 75                                          | 36                                                          | 195                 | 90                               |
| ISR/IBR 39 x 5R3   | 0,04                                 | 75                                          | 36                                                          | 195                 | 90                               |
| ISR/IBR 39 x 6R3   | 0,04                                 | 75                                          | 36                                                          | 195                 | 90                               |
| ISR/IBR 48 x 2,4R3 | 0,02                                 | 90                                          | 44                                                          | 171                 | 114                              |
| ISR/IBR 48 x 3R3   | 0,02                                 | 90                                          | 44                                                          | 171                 | 114                              |
| ISR/IBR 48 x 4R3   | 0,02                                 | 90                                          | 44                                                          | 171                 | 114                              |
| ISR/IBR 48 x 5R3   | 0,04                                 | 90                                          | 44                                                          | 171                 | 114                              |
| ISR/IBR 48 x 6R3   | 0,04                                 | 90                                          | 44                                                          | 171                 | 114                              |

<sup>1)</sup> Recommended maximum push tube diameter for standard inverted roller screws. For additional information about large push tube diameters, please contact your local Ewellix representative

<sup>2)</sup> For additional information about longer strokes, please contact your local Ewellix representative

# Rotating nut with planetary roller screws SRR

## Concept

A rotating nut planetary roller screw assembly is designed to function like an electro-mechanical cylinder, and is recommended for applications where space is limited.

The basic assembly consists of a housing, two angular contact ball bearings and a roller screw nut. In the case of direct drive, a customer supplied hollow motor drives the screw nut. In the case of indirect drive, a customer supplied pulley or gear, attached to the back of the roller screw assembly is needed to drive the nut. The rotation of the nut translates the screw shaft which operates as a push tube of an electro-mechanical cylinder. The screw shaft must be fitted with an anti-rotation device and must be precisely guided.

## Important:

Ewellix recommends that the roller screw nut be relubricated by regular injection of lubricant through an axial hole and a radial hole drilled in the roller screw shaft<sup>1)</sup>.

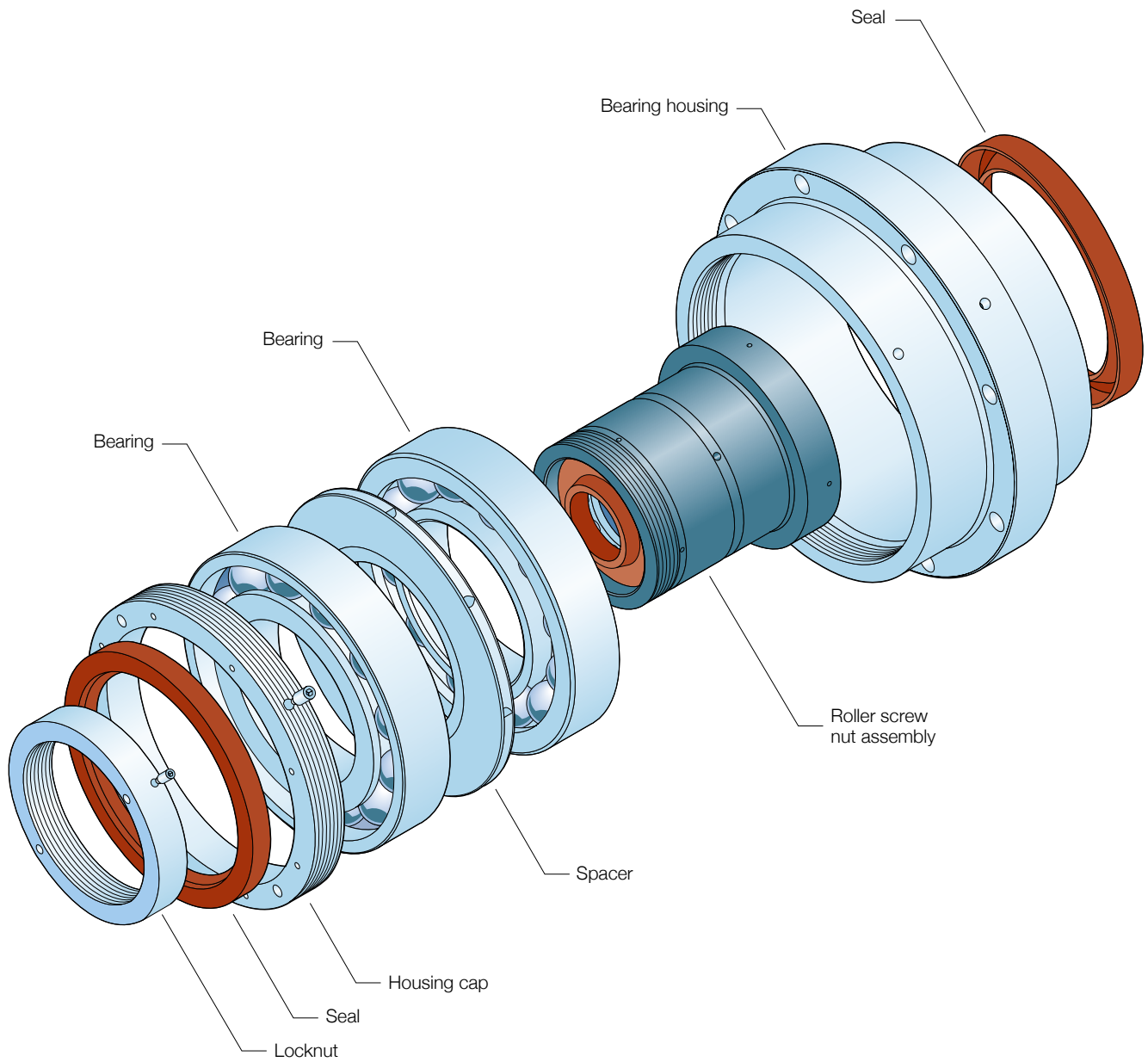
Customers are responsible for sourcing and assembling the motor and/or drive train and frame holding the bearings housing.

## Application examples

- Production processes in automotive industry (servo-presses, tube bending, forming, locking devices, etc.)
- Process in the injection moulding industry (part ejection)
- Short stroke and oscillating applications

| Design features                                                                                                                                                                    | User benefits                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| Planetary roller screws with a nut already fitted into a bearing housing                                                                                                           | Convenience of a roller screw and integrated support function for easy design and assembly                                 |
| Maximum $n \cdot d_0 = 160\,000$ and acceleration up to $12\,000 \text{ rad/s}^2$                                                                                                  | Ideal combination of high load carrying capacity, speed and acceleration for heavy duty applications and intensive cycling |
| 72 series angular contact ball bearings mounted in the housing are fitted with the nut and then adjusted for preload                                                               | Length saving solution ready to incorporate into application. Simplified engineering for machine builders                  |
| Bearings in back-to-back preloaded arrangement                                                                                                                                     | Robust and stiff bearing arrangement to accommodate moment loads from the power transmission                               |
| 2 garter seals (2 shields for size $d_0 = 60 \text{ mm}$ ) protect the bearings against contaminants, making these assemblies relubrication-free under normal operating conditions | Durable assembly for operation in difficult environments                                                                   |
| Wiper seals at each end of the nut of a standard assembly help to protect the nut from contaminants                                                                                |                                                                                                                            |
| A grease fitting for the bearings is located on the outside surface of the housing. Standard grease is SKF LGEP2. Specific grease is on request                                    | Easy maintenance                                                                                                           |
| Roller screw nut relubricated through conduits drilled in the screw shaft                                                                                                          | Independent relubrication for the bearings and for the roller screw                                                        |
| Two versions are available:<br>SRR with axial play<br>BRR without backlash                                                                                                         | Stiffness and running accuracy are further improved when a roller screw without backlash is selected                       |

<sup>1)</sup> For technical assistance regarding the roller screw nut relubrication, please contact your local Ewellix representative



## SRR/BRR planetary roller screws with rotating nut

d 25 – 60 mm

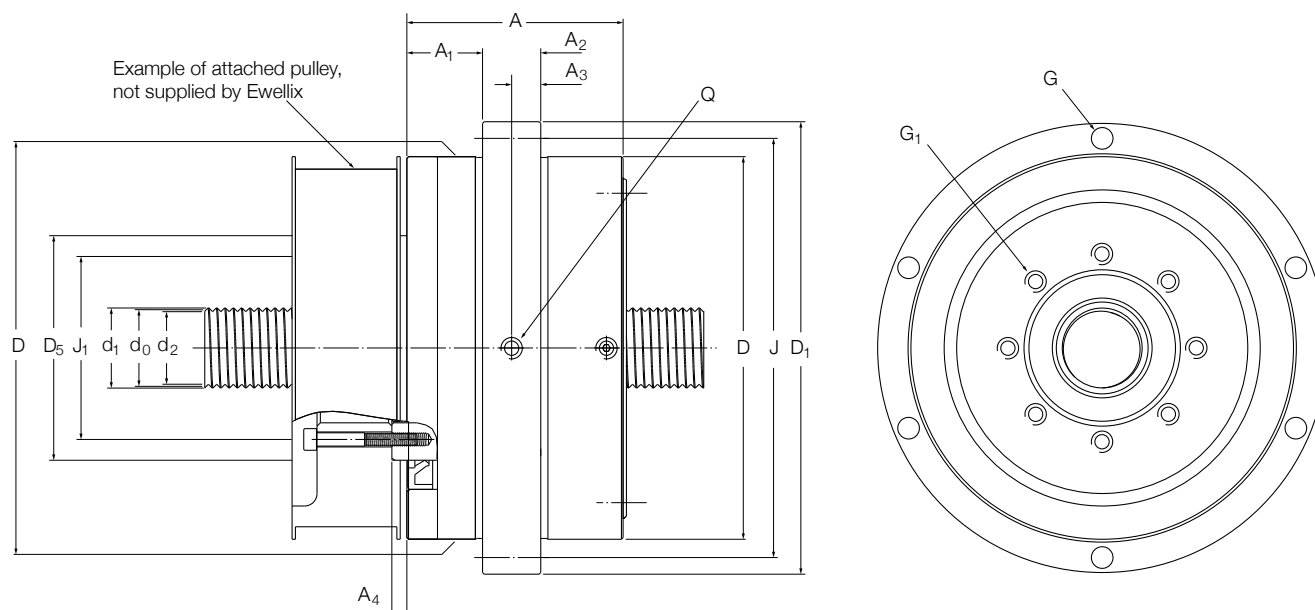


Standard SRR



Components assembly

| Dimensions and technical characteristics |       |          |       |          |        |         |          |       |       |                   |                 |                    |
|------------------------------------------|-------|----------|-------|----------|--------|---------|----------|-------|-------|-------------------|-----------------|--------------------|
| $d_0$                                    | $P_h$ | $L_{tp}$ | $C_a$ | $C_{0a}$ | $\eta$ | $\eta'$ | $S_{ap}$ | $m_n$ | $m_s$ | $I_{nn}$          | $Z_n$           | $Z_s$              |
|                                          |       |          | kN    |          | –      |         | mm       | kg    | kg/m  | kgmm <sup>2</sup> | cm <sup>3</sup> | cm <sup>3</sup> /m |
| <b>25</b>                                | 5     | 1 650    | 68,4  | 122      | 0,87   | 0,85    | 0,02     | 7     | 3,9   | 1 100             | 10,2            | 11                 |
|                                          | 10    | 1 650    | 78,5  | 118      | 0,89   | 0,88    | 0,04     | 7     | 3,9   | 1 100             | 10,2            | 11                 |
|                                          | 15    | 1 650    | 85,6  | 120      | 0,87   | 0,85    | 0,07     | 7     | 3,9   | 1 100             | 10,2            | 11                 |
| <b>30</b>                                | 5     | 2 000    | 91,9  | 178      | 0,86   | 0,83    | 0,02     | 12    | 5,6   | 2 900             | 13,7            | 13,2               |
|                                          | 10    | 2 000    | 106   | 174      | 0,89   | 0,88    | 0,04     | 12    | 5,6   | 2 900             | 13,7            | 13,2               |
|                                          | 15    | 2 000    | 119   | 181      | 0,88   | 0,87    | 0,07     | 12    | 5,6   | 2 900             | 13,7            | 13,2               |
|                                          | 20    | 2 000    | 123   | 177      | 0,86   | 0,83    | 0,07     | 12    | 5,6   | 2 900             | 13,7            | 13,2               |
| <b>39</b>                                | 5     | 2 650    | 129   | 269      | 0,83   | 0,80    | 0,02     | 20    | 9,4   | 10 500            | 27,9            | 17,1               |
|                                          | 10    | 2 650    | 153   | 270      | 0,88   | 0,87    | 0,04     | 20    | 9,4   | 10 500            | 27,9            | 17,1               |
|                                          | 15    | 2 650    | 168   | 273      | 0,89   | 0,88    | 0,07     | 20    | 9,4   | 10 500            | 27,9            | 17,1               |
|                                          | 20    | 2 650    | 173   | 261      | 0,88   | 0,87    | 0,07     | 20    | 9,4   | 10 500            | 27,9            | 17,1               |
|                                          | 25    | 2 650    | 175   | 249      | 0,86   | 0,84    | 0,07     | 20    | 9,4   | 10 500            | 27,9            | 17,1               |
| <b>48</b>                                | 5     | 3 300    | 198   | 482      | 0,81   | 0,76    | 0,02     | 37    | 14,2  | 28 000            | 54              | 21,1               |
|                                          | 10    | 3 300    | 232   | 475      | 0,87   | 0,85    | 0,04     | 37    | 14,2  | 28 000            | 54              | 21,1               |
|                                          | 15    | 3 300    | 258   | 486      | 0,89   | 0,88    | 0,07     | 37    | 14,2  | 28 000            | 54              | 21,1               |
|                                          | 20    | 3 300    | 266   | 462      | 0,89   | 0,88    | 0,07     | 37    | 14,2  | 28 000            | 54              | 21,1               |
|                                          | 25    | 3 300    | 286   | 491      | 0,88   | 0,87    | 0,07     | 37    | 14,2  | 28 000            | 54              | 21,1               |
| <b>60</b>                                | 10    | 4 250    | 339   | 780      | 0,86   | 0,83    | 0,04     | 100   | 22,2  | 85 000            | 103             | 26,4               |
|                                          | 15    | 4 250    | 373   | 783      | 0,88   | 0,87    | 0,07     | 100   | 22,2  | 85 000            | 103             | 26,4               |
|                                          | 20    | 4 250    | 395   | 786      | 0,89   | 0,88    | 0,07     | 100   | 22,2  | 85 000            | 103             | 26,4               |



| Designation            | Dimensions     |                |            |          |                |                |                |                              |                |     |                      |                |           |                |        |
|------------------------|----------------|----------------|------------|----------|----------------|----------------|----------------|------------------------------|----------------|-----|----------------------|----------------|-----------|----------------|--------|
|                        | d <sub>1</sub> | d <sub>2</sub> | D<br>g6/H7 | A<br>h12 | A <sub>1</sub> | A <sub>2</sub> | A <sub>3</sub> | A <sub>4</sub> <sup>1)</sup> | D <sub>1</sub> | J   | D <sub>5</sub><br>g7 | J <sub>1</sub> | G         | G <sub>1</sub> | Q      |
| –                      | mm             |                |            |          |                |                |                |                              |                |     |                      |                |           |                |        |
| <b>SRR/BRR 25 x 5</b>  | 25,4           | 24,3           | 120        | 81,5     | 28             | 25             | 12,5           | 6,5                          | 153            | 137 | 70                   | 58             | 6 x Ø9    | 8 x M6         | M6     |
| <b>SRR/BRR 25 x 10</b> | 25,8           | 23,8           | 120        | 81,5     | 28             | 25             | 12,5           | 6,5                          | 153            | 137 | 70                   | 58             | 6 x Ø9    | 8 x M6         | M6     |
| <b>SRR/BRR 25 x 15</b> | 26,2           | 23,2           | 120        | 81,5     | 28             | 25             | 12,5           | 6,5                          | 153            | 137 | 70                   | 58             | 6 x Ø9    | 8 x M6         | M6     |
| <b>SRR/BRR 30 x 5</b>  | 30,4           | 29,4           | 150        | 91,5     | 30             | 25             | 12,5           | 7,5                          | 190            | 170 | 85                   | 70             | 6 x Ø11   | 8 x M6         | M8 x 1 |
| <b>SRR/BRR 30 x 10</b> | 30,8           | 28,8           | 150        | 91,5     | 30             | 25             | 12,5           | 7,5                          | 190            | 170 | 85                   | 70             | 6 x Ø11   | 8 x M6         | M8 x 1 |
| <b>SRR/BRR 30 x 15</b> | 31,2           | 28,3           | 150        | 91,5     | 30             | 25             | 12,5           | 7,5                          | 190            | 170 | 85                   | 70             | 6 x Ø11   | 8 x M6         | M8 x 1 |
| <b>SRR/BRR 30 x 20</b> | 31,5           | 27,6           | 150        | 91,5     | 30             | 25             | 12,5           | 7,5                          | 190            | 170 | 85                   | 70             | 6 x Ø11   | 8 x M6         | M8 x 1 |
| <b>SRR/BRR 39 x 5</b>  | 39,4           | 38,4           | 180        | 109,5    | 34             | 35             | 17,5           | 12,5                         | 222            | 202 | 110                  | 90             | 6 x Ø13   | 8 x M8         | M8 x 1 |
| <b>SRR/BRR 39 x 10</b> | 39,8           | 37,9           | 180        | 109,5    | 34             | 35             | 17,5           | 12,5                         | 222            | 202 | 110                  | 90             | 6 x Ø13   | 8 x M8         | M8 x 1 |
| <b>SRR/BRR 39 x 15</b> | 40,2           | 37,3           | 180        | 109,5    | 34             | 35             | 17,5           | 12,5                         | 222            | 202 | 110                  | 90             | 6 x Ø13   | 8 x M8         | M8 x 1 |
| <b>SRR/BRR 39 x 20</b> | 40,5           | 36,7           | 180        | 109,5    | 34             | 35             | 17,5           | 12,5                         | 222            | 202 | 110                  | 90             | 6 x Ø13   | 8 x M8         | M8 x 1 |
| <b>SRR/BRR 39 x 25</b> | 40,9           | 36,1           | 180        | 109,5    | 34             | 35             | 17,5           | 12,5                         | 222            | 202 | 110                  | 90             | 6 x Ø13   | 8 x M8         | M8 x 1 |
| <b>SRR/BRR 48 x 5</b>  | 48,4           | 47,4           | 230        | 130      | 45,5           | 35             | 17,5           | 9                            | 272            | 252 | 135                  | 110            | 8 x Ø13   | 8 x M8         | M8 x 1 |
| <b>SRR/BRR 48 x 10</b> | 48,8           | 46,9           | 230        | 130      | 45,5           | 35             | 17,5           | 9                            | 272            | 252 | 135                  | 110            | 8 x Ø13   | 8 x M8         | M8 x 1 |
| <b>SRR/BRR 48 x 15</b> | 49,2           | 46,3           | 230        | 130      | 45,5           | 35             | 17,5           | 9                            | 272            | 252 | 135                  | 110            | 8 x Ø13   | 8 x M8         | M8 x 1 |
| <b>SRR/BRR 48 x 20</b> | 49,5           | 45,8           | 230        | 130      | 45,5           | 35             | 17,5           | 9                            | 272            | 252 | 135                  | 110            | 8 x Ø13   | 8 x M8         | M8 x 1 |
| <b>SRR/BRR 48 x 25</b> | 49,9           | 45,2           | 230        | 130      | 45,5           | 35             | 17,5           | 9                            | 272            | 252 | 135                  | 110            | 8 x Ø13   | 8 x M8         | M8 x 1 |
| <b>SRR/BRR 60 x 10</b> | 60,8           | 58,9           | 320        | 189      | 70,5           | 45             | 22,5           | 10                           | 380            | 350 | 160                  | 135            | 8 x Ø17,5 | 8 x M8         | M8 x 1 |
| <b>SRR/BRR 60 x 15</b> | 61,2           | 58,4           | 320        | 189      | 70,5           | 45             | 22,5           | 10                           | 380            | 350 | 160                  | 135            | 8 x Ø17,5 | 8 x M8         | M8 x 1 |
| <b>SRR/BRR 60 x 20</b> | 61,5           | 57,8           | 320        | 189      | 70,5           | 45             | 22,5           | 10                           | 380            | 350 | 160                  | 135            | 8 x Ø17,5 | 8 x M8         | M8 x 1 |

<sup>1)</sup> Axial offset between the faces of the rotating nut and the fixed bearing housing

# Recirculating roller screws SV

## Concept

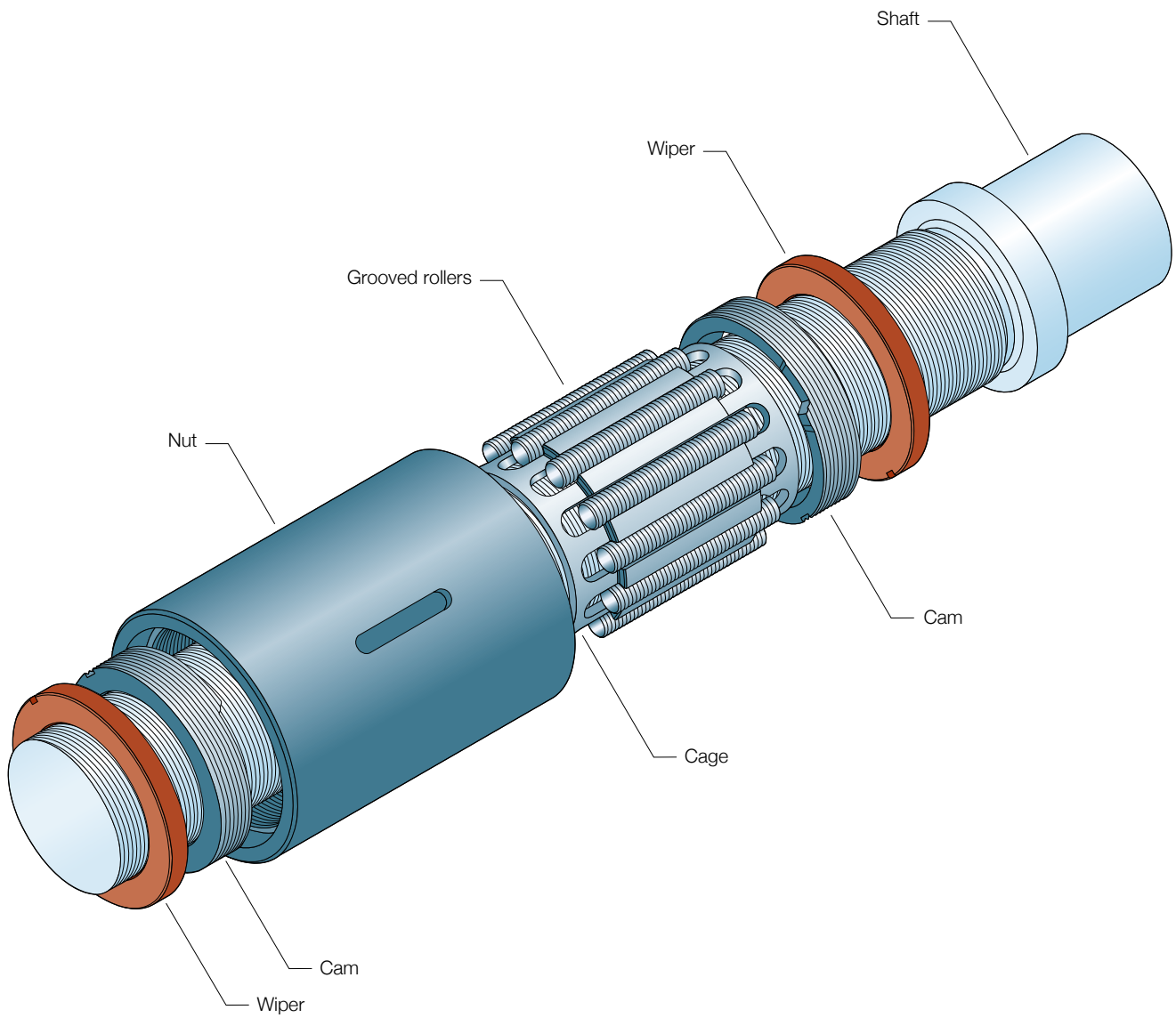
Recirculating roller screws provide the ideal combination of load carrying capacity, fine resolution, positioning accuracy and axial stiffness for ultra precision driving solutions.

The small leads and small helix angle can provide a low back-driving capability, or even self-locking ability for certain sizes of recirculating roller screws, in combination with low rolling friction.

## Application examples

- Medical
- Laboratory equipment
- Semi-conductor industry
- Telescopes
- Satellites
- Precision grinders

| Design features                                                                                                                                                                               | User benefits                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Absence of small parts compared to small lead ball screw                                                                                                                                      | Highly robust and durable                                                                                                                                                                                             |
| Nominal diameters from 8 to 125 mm                                                                                                                                                            | Wide standard assortment to fit most applications                                                                                                                                                                     |
| Standard leads from 1 mm to 5 mm                                                                                                                                                              | Ideal combination of precise positioning accuracy, high load carrying capacity, maximum axial stiffness, and low torque requirements<br>Precise resolution of movement<br>Good repeatability with small displacements |
| Shaft lengths up to 8 000 mm                                                                                                                                                                  | Longer shaft lengths available on request                                                                                                                                                                             |
| Maximum $n \cdot d_1 = 30\,000$ for nominal diameters $d_1 \leq 25$ mm<br>Maximum $n \cdot d_1 = 20\,000$ for nominal diameters $d_1 > 25$ mm<br>Accelerations up to $4\,000 \text{ rad/s}^2$ | Long service life                                                                                                                                                                                                     |
| High dynamic load carrying capacity up to 756 kN                                                                                                                                              |                                                                                                                                                                                                                       |
| High static load carrying capacity up to 2 770 kN                                                                                                                                             | Ability to accommodate heavy shock loads without raceway damage                                                                                                                                                       |
| Roller retention for nut and shaft disassembly (except for diameters $d_1 < 16$ mm)                                                                                                           | Easy roller screw assembly                                                                                                                                                                                            |
| Optional support bearings                                                                                                                                                                     | Support bearings simplify design, assembly, and ordering process                                                                                                                                                      |
| Three standard versions are available:<br>SV with axial play<br>BV without backlash<br>PV with preloaded split nut                                                                            | Running accuracy and stiffness further improved without backlash or with preload                                                                                                                                      |
| Flexible equipment                                                                                                                                                                            | Custom designs e.g. left hand threads available on request                                                                                                                                                            |



## SVC/BVC recirculating roller screws with cylindrical nut

d 8 – 125 mm



Standard SVC



Grooved rollers

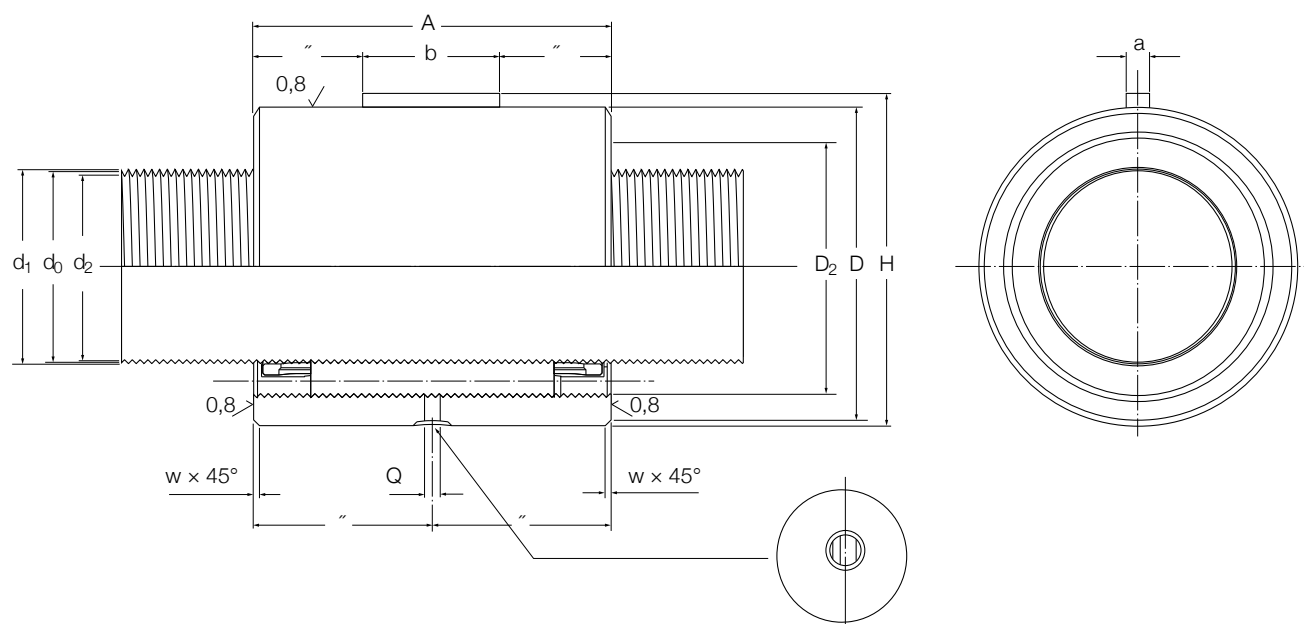


Components assembly

| Dimensions and technical characteristics |                |                               |                |                 |      |      |                 |                 |                |                |                      |                   |                 |                 |                    |
|------------------------------------------|----------------|-------------------------------|----------------|-----------------|------|------|-----------------|-----------------|----------------|----------------|----------------------|-------------------|-----------------|-----------------|--------------------|
| d <sub>1</sub>                           | P <sub>h</sub> | L <sub>tp</sub> <sup>1)</sup> | C <sub>a</sub> | C <sub>oa</sub> | η    | η'   | S <sub>ap</sub> | T <sub>be</sub> | m <sub>n</sub> | m <sub>s</sub> | I <sub>s</sub>       | I <sub>nn</sub>   | I <sub>ns</sub> | Z <sub>n</sub>  | Z <sub>s</sub>     |
|                                          |                |                               | kN             |                 | —    |      | mm              | Nm              | kg             | kg/m           | kgmm <sup>2</sup> /m | kgmm <sup>2</sup> |                 | cm <sup>3</sup> | cm <sup>3</sup> /m |
| 8                                        | 1              | 500                           | 8,5            | 11              | 0,83 | 0,79 | 0,02            | 0,1             | 0,1            | 0,36           | 2,6                  | 3,6               | 0,1             | 0,72            | 4                  |
| 10                                       | 1              | 650                           | 8,95           | 11,4            | 0,80 | 0,75 | 0,02            | 0,1             | 0,1            | 0,57           | 6,7                  | 5                 | 0,1             | 0,95            | 5                  |
|                                          | 2              | 650                           | 8,95           | 11,4            | 0,87 | 0,85 | 0,02            | 0,1             | 0,1            | 0,57           | 6,7                  | 5                 | 0,1             | 0,95            | 5                  |
| 12                                       | 1              | 750                           | 10,3           | 14              | 0,78 | 0,71 | 0,02            | 0,1             | 0,1            | 0,84           | 14,2                 | 6,7               | 0,1             | 1,08            | 6                  |
|                                          | 2              | 750                           | 10,3           | 14              | 0,86 | 0,83 | 0,02            | 0,1             | 0,1            | 0,84           | 14,2                 | 6,7               | 0,1             | 1,08            | 6                  |
| 16                                       | 1              | 1 050                         | 11,5           | 16,8            | 0,73 | 0,63 | 0,02            | 0,1             | 0,1            | 1,51           | 46,2                 | 14                | 0,3             | 1,43            | 8                  |
|                                          | 2              | 1 050                         | 11,5           | 16,8            | 0,83 | 0,79 | 0,02            | 0,1             | 0,1            | 1,51           | 46,2                 | 14                | 0,3             | 1,43            | 8                  |
| 20                                       | 1              | 1 300                         | 18,5           | 36,6            | 0,69 | 0,54 | 0,02            | 0,18            | 0,2            | 2,38           | 115                  | 29,8              | 0,8             | 1,9             | 9                  |
|                                          | 2              | 1 300                         | 18,5           | 36,6            | 0,80 | 0,75 | 0,02            | 0,2             | 0,2            | 2,38           | 115                  | 29,8              | 0,8             | 1,9             | 9                  |
| 25                                       | 1              | 1 650                         | 32,9           | 68,4            | 0,64 | 0,43 | 0,02            | 0,35            | 0,3            | 3,75           | 285                  | 79,3              | 2,5             | 3,57            | 11                 |
|                                          | 2              | 1 650                         | 32,9           | 68,4            | 0,77 | 0,70 | 0,02            | 0,4             | 0,3            | 3,75           | 285                  | 79,3              | 2,5             | 3,57            | 11                 |
| 32                                       | 1              | 2 150                         | 64,3           | 159             | 0,58 | 0,28 | 0,02            | 0,5             | 0,6            | 6,18           | 773                  | 280               | 9,1             | 6,92            | 15                 |
|                                          | 2              | 2 150                         | 64,3           | 159             | 0,73 | 0,63 | 0,02            | 0,5             | 0,6            | 6,18           | 773                  | 280               | 9,1             | 6,92            | 15                 |
| 40                                       | 1              | 2 700                         | 79,1           | 232             | 0,53 | 0,11 | 0,02            | 0,7             | 1,2            | 9,69           | 1 900                | 879               | 18,8            | 9,57            | 18                 |
|                                          | 2              | 2 700                         | 49,9           | 117             | 0,69 | 0,54 | 0,04            | 0,7             | 1,2            | 9,52           | 1 840                | 951               | 20              | 13,6            | 18                 |
| 50                                       | 1              | 3 500                         | 190            | 544             | 0,47 | 0    | 0,02            | 1,2             | 2              | 15,0           | 4 550                | 2 190             | 76              | 24,9            | 22                 |
|                                          | 2              | 3 500                         | 98,1           | 249             | 0,64 | 0,43 | 0,04            | 1,2             | 2              | 15,0           | 4 550                | 2 190             | 68,6            | 24,4            | 22                 |
|                                          | 3              | 3 500                         | 153            | 443             | 0,72 | 0,61 | 0,04            | 1,2             | 2              | 15,0           | 4 550                | 2 190             | 88,1            | 24              | 22                 |
|                                          | 4              | 3 500                         | 98,1           | 249             | 0,77 | 0,70 | 0,04            | 1,2             | 2              | 15,0           | 4 550                | 2 190             | 68,6            | 24,4            | 22                 |
| 63                                       | 2              | 4 500                         | 186            | 534             | 0,59 | 0,29 | 0,04            | 1,8             | 3,8            | 23,9           | 11 600               | 6 460             | 230             | 44,3            | 28                 |
|                                          | 4              | 4 500                         | 186            | 534             | 0,73 | 0,63 | 0,04            | 2,0             | 3,8            | 23,9           | 11 600               | 6 460             | 230             | 44,3            | 28                 |
| 80                                       | 4              | 6 000                         | 325            | 888             | 0,69 | 0,54 | 0,07            | 3,0             | 12,5           | 38,1           | 29 400               | 38 900            | 1 290           | 166             | 36                 |
| 100                                      | 5              | 8 000                         | 469            | 1 376           | 0,69 | 0,54 | 0,07            | 4,5             | 22,8           | 59,51          | 71 800               | 108 000           | 4 000           | 308             | 44                 |
| 125                                      | 5              | 8 000                         | 756            | 2 770           | 0,64 | 0,43 | 0,07            | 7,0             | 46,1           | 93,66          | 178 000              | 342 000           | 11 800          | 520             | 55                 |

■ Preferred range

<sup>1)</sup> For BV (backlash elimination), maximal length can be shorter

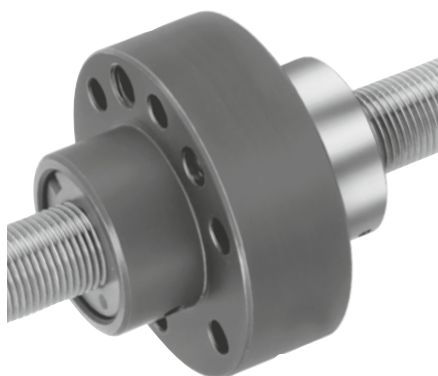


| Designation    | Dimensions     |                |     |                                 |                                                  |     |    |     |       |    |                |
|----------------|----------------|----------------|-----|---------------------------------|--------------------------------------------------|-----|----|-----|-------|----|----------------|
|                | d <sub>0</sub> | d <sub>2</sub> | D   | A with wiper<br>recesses<br>h12 | A without wiper<br>recesses<br>h12 <sup>1)</sup> | w   | a  | b   | H     | Q  | D <sub>2</sub> |
| –              | mm             |                |     |                                 |                                                  |     |    |     |       |    |                |
| SVC/BVC 8 x 1  | 7,7            | 7,1            | 20  | 40                              | 31                                               | 0,2 | 2  | 12  | 20,8  | 5  | 16,5           |
| SVC/BVC 10 x 1 | 9,7            | 9,1            | 22  | 40                              | 31                                               | 0,2 | 2  | 12  | 22,8  | 5  | 18,5           |
| SVC/BVC 10 x 2 | 9,7            | 9,1            | 22  | 40                              | 31                                               | 0,2 | 2  | 12  | 22,8  | 5  | 18,5           |
| SVC/BVC 12 x 1 | 11,7           | 11,1           | 24  | 40                              | 31                                               | 0,2 | 2  | 12  | 24,8  | 5  | 20,5           |
| SVC/BVC 12 x 2 | 11,7           | 11,1           | 24  | 40                              | 31                                               | 0,2 | 2  | 12  | 24,8  | 5  | 20,5           |
| SVC/BVC 16 x 1 | 15,7           | 15,1           | 29  | 40                              | 31                                               | 0,5 | 3  | 12  | 30,2  | 5  | 25             |
| SVC/BVC 16 x 2 | 15,7           | 15,1           | 29  | 40                              | 31                                               | 0,5 | 3  | 12  | 30,2  | 5  | 25             |
| SVC/BVC 20 x 1 | 19,7           | 19,1           | 34  | –                               | 37                                               | 0,5 | 3  | 16  | 35,2  | 5  | 28,5           |
| SVC/BVC 20 x 2 | 19,7           | 19,1           | 34  | 45                              | 37                                               | 0,5 | 3  | 16  | 35,2  | 5  | 28,5           |
| SVC/BVC 25 x 1 | 24,7           | 24,1           | 42  | –                               | 44                                               | 0,5 | 4  | 20  | 43,5  | 5  | 36             |
| SVC/BVC 25 x 2 | 24,7           | 24,1           | 42  | 54                              | 44                                               | 0,5 | 4  | 20  | 43,5  | 5  | 36             |
| SVC/BVC 32 x 1 | 31,7           | 31,1           | 54  | –                               | 57                                               | 1   | 4  | 25  | 55,5  | 5  | 45             |
| SVC/BVC 32 x 2 | 31,7           | 31,1           | 54  | –                               | 57                                               | 1   | 4  | 25  | 55,5  | 5  | 45             |
| SVC/BVC 40 x 1 | 39,7           | 39,1           | 68  | 75                              | 63                                               | 1   | 5  | 32  | 70    | 5  | 55             |
| SVC/BVC 40 x 2 | 39,3           | 38,2           | 68  | 84                              | 72                                               | 1   | 5  | 32  | 70    | 5  | 57             |
| SVC/BVC 50 x 1 | 49,7           | 49,1           | 82  | 101                             | 85                                               | 1   | 6  | 32  | 84,5  | 8  | 70             |
| SVC/BVC 50 x 2 | 49,3           | 48,7           | 82  | 101                             | 85                                               | 1   | 6  | 32  | 84,5  | 8  | 70             |
| SVC 50 x 3     | 49,5           | 48,6           | 82  | 108                             | 92                                               | 1,5 | 6  | 35  | 84,5  | 8  | 70             |
| SVC 50 x 4     | 49,3           | 48,2           | 82  | 101                             | 85                                               | 1   | 6  | 32  | 84,5  | 8  | 70             |
| SVC 63 x 2     | 62,3           | 61,2           | 103 | 120                             | 104                                              | 1   | 6  | 40  | 105,5 | 8  | 94             |
| SVC 63 x 4     | 62,3           | 61,2           | 103 | 120                             | 104                                              | 1   | 6  | 40  | 105,5 | 8  | 94             |
| SVC 80 x 4     | 78,6           | 76,4           | 141 | 197                             | 175                                              | 1,5 | 8  | 63  | 144   | 10 | 120            |
| SVC 100 x 5    | 98,3           | 95,5           | 175 | 237                             | 205                                              | 2   | 10 | 80  | 178   | 10 | 150            |
| SVC 125 x 5    | 123,3          | 120,5          | 220 | 282                             | 250                                              | 3   | 12 | 100 | 223   | 12 | 185            |

<sup>1)</sup> For this shorter version, please use the NORCS option (→ Ordering key page 113)

## SVF/BVF recirculating roller screws with flanged nut

d 8 – 125 mm



Standard SVF



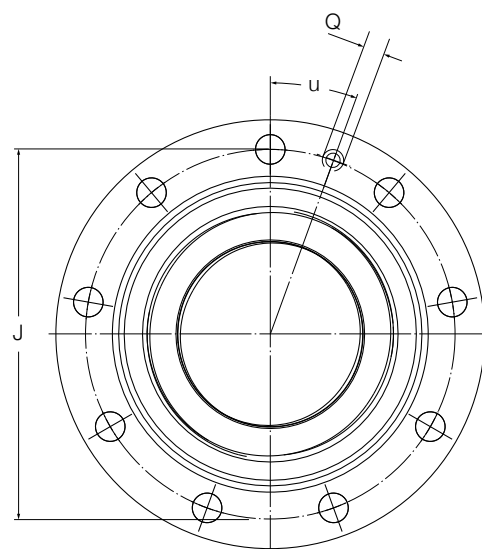
Grooved rollers



Components assembly

| Dimensions and technical characteristics |                |                               |                |                 |      |      |                 |                 |                |                |                      |                   |                 |                 |                    |
|------------------------------------------|----------------|-------------------------------|----------------|-----------------|------|------|-----------------|-----------------|----------------|----------------|----------------------|-------------------|-----------------|-----------------|--------------------|
| d <sub>1</sub>                           | P <sub>h</sub> | L <sub>tp</sub> <sup>1)</sup> | C <sub>a</sub> | C <sub>oa</sub> | η    | η'   | S <sub>ap</sub> | T <sub>be</sub> | m <sub>n</sub> | m <sub>s</sub> | I <sub>s</sub>       | I <sub>nn</sub>   | I <sub>ns</sub> | Z <sub>n</sub>  | Z <sub>s</sub>     |
|                                          |                |                               | kN             |                 | –    |      | mm              | Nm              | kg             | kg/m           | kgmm <sup>2</sup> /m | kgmm <sup>2</sup> |                 | cm <sup>3</sup> | cm <sup>3</sup> /m |
| 8                                        | 1              | 500                           | 8,5            | 11              | 0,83 | 0,79 | 0,02            | 0,02            | 0,2            | 0,36           | 2,6                  | 47,9              | 0,1             | 0,72            | 4                  |
| 10                                       | 1              | 650                           | 8,95           | 11,4            | 0,80 | 0,75 | 0,02            | 0,03            | 0,2            | 0,57           | 6,7                  | 47                | 0,1             | 0,95            | 5                  |
|                                          | 2              | 650                           | 8,95           | 11,4            | 0,87 | 0,85 | 0,02            | 0,03            | 0,2            | 0,57           | 6,7                  | 47                | 0,1             | 0,95            | 5                  |
| 12                                       | 1              | 750                           | 10,3           | 14              | 0,78 | 0,71 | 0,02            | 0,05            | 0,2            | 0,84           | 14,2                 | 63,5              | 0,1             | 1,08            | 6                  |
|                                          | 2              | 750                           | 10,3           | 14              | 0,86 | 0,83 | 0,02            | 0,05            | 0,2            | 0,84           | 14,2                 | 63,5              | 0,1             | 1,08            | 6                  |
| 16                                       | 1              | 1 050                         | 11,5           | 16,8            | 0,73 | 0,63 | 0,02            | 0,1             | 0,3            | 1,51           | 46,2                 | 100               | 0,3             | 1,43            | 8                  |
|                                          | 2              | 1 050                         | 11,5           | 16,8            | 0,83 | 0,79 | 0,02            | 0,1             | 0,3            | 1,51           | 46,2                 | 100               | 0,3             | 1,43            | 8                  |
| 20                                       | 1              | 1 300                         | 18,5           | 36,6            | 0,69 | 0,54 | 0,02            | 0,18            | 0,4            | 2,38           | 115                  | 192               | 0,8             | 1,9             | 9                  |
|                                          | 2              | 1 300                         | 18,5           | 36,6            | 0,80 | 0,75 | 0,02            | 0,2             | 0,4            | 2,38           | 115                  | 192               | 0,8             | 1,9             | 9                  |
| 25                                       | 1              | 1 650                         | 32,9           | 68,4            | 0,64 | 0,43 | 0,02            | 0,35            | 0,6            | 3,75           | 285                  | 416               | 2,5             | 3,57            | 11                 |
|                                          | 2              | 1 650                         | 32,9           | 68,4            | 0,77 | 0,70 | 0,02            | 0,4             | 0,6            | 3,75           | 285                  | 416               | 2,5             | 3,57            | 11                 |
| 32                                       | 1              | 2 150                         | 64,3           | 159             | 0,58 | 0,28 | 0,02            | 0,5             | 1,2            | 6,18           | 773                  | 1 110             | 9,1             | 6,92            | 15                 |
|                                          | 2              | 2 150                         | 64,3           | 159             | 0,73 | 0,63 | 0,02            | 0,5             | 1,2            | 6,18           | 773                  | 1 110             | 9,1             | 6,92            | 15                 |
| 40                                       | 1              | 2 700                         | 79,1           | 232             | 0,53 | 0,11 | 0,02            | 0,7             | 2,1            | 9,69           | 1 900                | 3 120             | 18,8            | 9,57            | 18                 |
|                                          | 2              | 2 700                         | 49,9           | 117             | 0,69 | 0,54 | 0,04            | 0,7             | 2,2            | 9,52           | 1 840                | 3 200             | 20              | 13,6            | 18                 |
| 50                                       | 1              | 3 500                         | 190            | 544             | 0,47 | 0    | 0,02            | 1,2             | 3,7            | 15             | 4 550                | 8 190             | 76              | 24,9            | 22                 |
|                                          | 2              | 3 500                         | 98,1           | 249             | 0,64 | 0,43 | 0,04            | 1,2             | 3,7            | 15             | 4 550                | 8 190             | 68,6            | 24,4            | 22                 |
|                                          | 3              | 3 500                         | 153            | 443             | 0,72 | 0,61 | 0,04            | 1,2             | 3,7            | 15             | 4 550                | 8 050             | 88,1            | 24              | 22                 |
|                                          | 4              | 3 500                         | 98,1           | 249             | 0,77 | 0,70 | 0,04            | 1,2             | 3,7            | 15             | 4 550                | 8 190             | 68,6            | 24,4            | 22                 |
| 63                                       | 2              | 4 500                         | 186            | 534             | 0,59 | 0,29 | 0,04            | 1,8             | 6,4            | 23,9           | 11 600               | 20 100            | 230             | 44,3            | 28                 |
|                                          | 4              | 4 500                         | 186            | 534             | 0,73 | 0,63 | 0,04            | 2,0             | 6,4            | 23,9           | 11 600               | 20 100            | 230             | 44,3            | 28                 |
| 80                                       | 4              | 6 000                         | 325            | 888             | 0,69 | 0,54 | 0,07            | 3,0             | 17,8           | 38,1           | 29 400               | 92 600            | 1 290           | 166             | 36                 |
| 100                                      | 5              | 8 000                         | 469            | 1 376           | 0,69 | 0,54 | 0,07            | 4,5             | 33,1           | 59,5           | 71 800               | 256 000           | 4 000           | 308             | 44                 |
| 125                                      | 5              | 8 000                         | 756            | 2 770           | 0,64 | 0,43 | 0,07            | 7,0             | 62,3           | 93,7           | 178 000              | 733 000           | 11 800          | 520             | 55                 |

<sup>1)</sup> For BV (backlash elimination), maximal length can be shorter



3

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## PVU preloaded recirculating roller screws with cylindrical nut

d 8 – 125 mm



Standard PVU



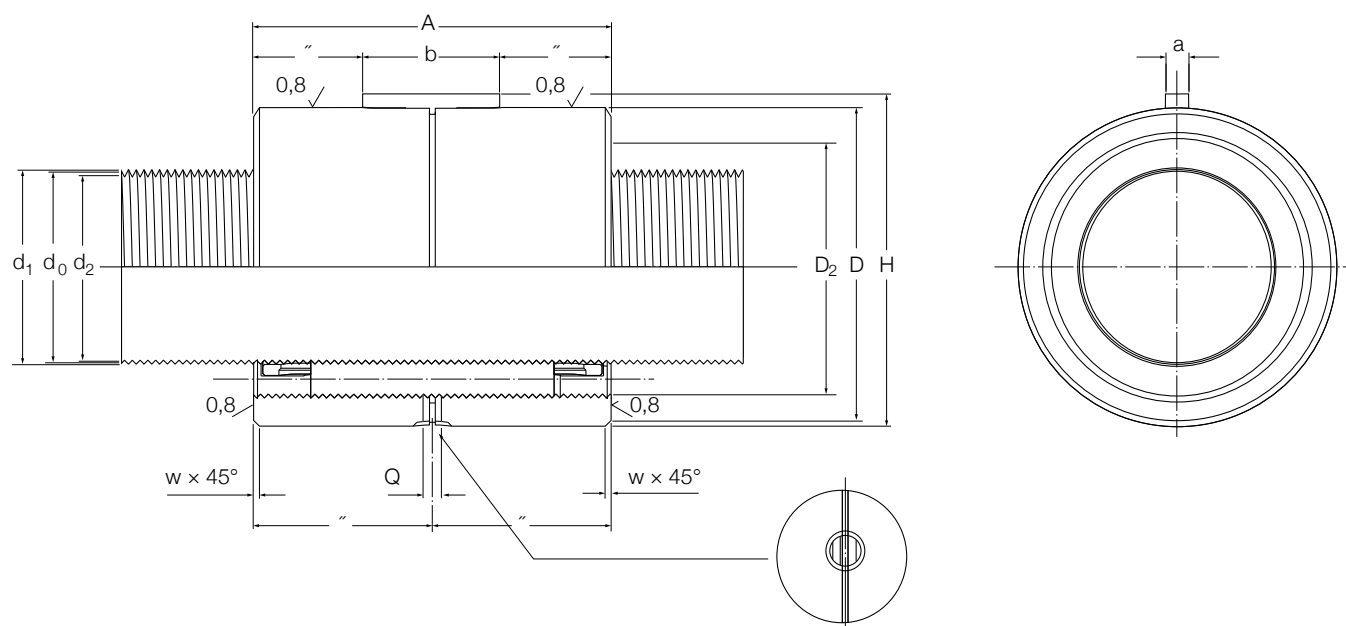
Grooved rollers



Components assembly

### Dimensions and technical characteristics

| d <sub>1</sub> | P <sub>h</sub> | L <sub>tp</sub> | C <sub>a</sub> | C <sub>0a</sub> | η    | η'   | R <sub>ng</sub> | R <sub>nr</sub> | T <sub>pr</sub> | F <sub>pr</sub> | m <sub>n</sub> | m <sub>s</sub> | I <sub>s</sub>       | I <sub>nn</sub>   | I <sub>ns</sub> | Z <sub>n</sub>  | Z <sub>s</sub>     |
|----------------|----------------|-----------------|----------------|-----------------|------|------|-----------------|-----------------|-----------------|-----------------|----------------|----------------|----------------------|-------------------|-----------------|-----------------|--------------------|
|                |                |                 | kN             |                 | –    |      | N/μm            | –               | Nm              | N               | kg             | kg/m           | kgmm <sup>2</sup> /m | kgmm <sup>2</sup> |                 | cm <sup>3</sup> | cm <sup>3</sup> /m |
| 8              | 1              | 400             | 4,88           | 5,51            | 0,83 | 0,79 | 140             | 190             | 0,05            | 770             | 0,1            | 0,36           | 2,6                  | 3,6               | 0,1             | 0,72            | 4                  |
| 10             | 1              | 500             | 5,14           | 5,7             | 0,80 | 0,75 | 138             | 185             | 0,07            | 820             | 0,1            | 0,57           | 6,7                  | 5                 | 0,1             | 0,95            | 5                  |
|                | 2              | 500             | 5,14           | 5,7             | 0,87 | 0,85 | 138             | 185             | 0,07            | 820             | 0,1            | 0,57           | 6,7                  | 5                 | 0,1             | 0,95            | 5                  |
| 12             | 1              | 600             | 5,96           | 7               | 0,78 | 0,71 | 159             | 215             | 0,1             | 940             | 0,1            | 0,84           | 14,2                 | 6,7               | 0,1             | 1,08            | 6                  |
|                | 2              | 600             | 5,96           | 7               | 0,86 | 0,83 | 159             | 215             | 0,1             | 940             | 0,1            | 0,84           | 14,2                 | 6,7               | 0,1             | 1,08            | 6                  |
| 16             | 1              | 825             | 6,71           | 8,42            | 0,73 | 0,63 | 182             | 245             | 0,15            | 1 060           | 0,1            | 1,51           | 46,2                 | 14                | 0,3             | 1,43            | 8                  |
|                | 2              | 825             | 6,71           | 8,42            | 0,83 | 0,79 | 182             | 245             | 0,15            | 1 060           | 0,1            | 1,51           | 46,2                 | 14                | 0,3             | 1,43            | 8                  |
| 20             | 1              | 1 050           | 10,6           | 18,3            | 0,69 | 0,54 | 362             | 490             | 0,2             | 1 430           | 0,2            | 2,38           | 115                  | 29,8              | 0,8             | 1,9             | 9                  |
|                | 2              | 1 050           | 10,6           | 18,3            | 0,80 | 0,75 | 362             | 490             | 0,3             | 1 430           | 0,2            | 2,38           | 115                  | 29,8              | 0,8             | 1,9             | 9                  |
| 25             | 1              | 1 300           | 18,9           | 34,2            | 0,64 | 0,43 | 469             | 635             | 0,5             | 2 270           | 0,3            | 3,75           | 285                  | 79,3              | 2,5             | 3,57            | 11                 |
|                | 2              | 1 300           | 18,9           | 34,2            | 0,77 | 0,70 | 469             | 635             | 0,55            | 2 270           | 0,3            | 3,75           | 285                  | 79,3              | 2,5             | 3,57            | 11                 |
| 32             | 1              | 1 700           | 36,9           | 79,6            | 0,58 | 0,28 | 736             | 995             | 0,7             | 2 510           | 0,6            | 6,18           | 773                  | 280               | 9,1             | 6,92            | 15                 |
|                | 2              | 1 700           | 36,9           | 79,6            | 0,73 | 0,63 | 721             | 975             | 0,7             | 2 320           | 0,6            | 6,18           | 773                  | 280               | 9,1             | 6,92            | 15                 |
| 40             | 1              | 2 150           | 45,4           | 116             | 0,53 | 0,11 | 1 034           | 1 395           | 1               | 2 840           | 1,2            | 9,69           | 1 900                | 879               | 18,8            | 9,57            | 18                 |
|                | 2              | 2 150           | 28,7           | 58,6            | 0,69 | 0,54 | 618             | 835             | 1               | 2 710           | 1,2            | 9,52           | 1 840                | 951               | 20              | 13,6            | 18                 |
| 50             | 1              | 2 800           | 109            | 272             | 0,47 | 0,00 | 1 100           | 1 430           | 1,85            | 3 900           | 2              | 15             | 4 550                | 2 190             | 76              | 24,4            | 22                 |
|                | 2              | 2 800           | 56,3           | 125             | 0,64 | 0,43 | 803             | 1 045           | 1,85            | 3 660           | 2              | 15             | 4 550                | 2 190             | 68,6            | 24,4            | 22                 |
|                | 3              | 2 800           | 88             | 222             | 0,72 | 0,61 | 1 000           | 1 300           | 1,85            | 3 600           | 2              | 15             | 4 550                | 2 190             | 81,1            | 24,4            | 22                 |
|                | 4              | 2 800           | 56,3           | 125             | 0,77 | 0,70 | 803             | 1 045           | 1,85            | 3 660           | 2              | 15             | 4 550                | 2 190             | 68,6            | 24,4            | 22                 |
| 63             | 2              | 3 600           | 107            | 267             | 0,59 | 0,29 | 1 177           | 1 530           | 2,5             | 4 540           | 3,8            | 23,9           | 11 600               | 6 460             | 230             | 44,3            | 28                 |
|                | 4              | 3 600           | 107            | 267             | 0,73 | 0,63 | 1 177           | 1 530           | 2,75            | 4 540           | 3,8            | 23,9           | 11 600               | 6 460             | 230             | 44,3            | 28                 |
| 80             | 4              | 4 000           | 187            | 444             | 0,69 | 0,54 | 1 280           | 1 665           | 4               | 5 410           | 12,5           | 38,1           | 29 400               | 38 900            | 1 290           | 166             | 36                 |
| 100            | 5              | 4 000           | 269            | 688             | 0,69 | 0,54 | 1 323           | 1 720           | 6               | 5 920           | 22,8           | 59,5           | 71 800               | 108 000           | 4 000           | 308             | 44                 |
| 125            | 5              | 4 000           | 434            | 1385            | 0,64 | 0,43 | 2 027           | 2 635           | 8,5             | 6 510           | 46,1           | 93,7           | 179 000              | 342 000           | 11 800          | 520             | 55                 |



| Designation | Dimensions     |                |     |                           |                                            |     |    |     |       |    |                |
|-------------|----------------|----------------|-----|---------------------------|--------------------------------------------|-----|----|-----|-------|----|----------------|
|             | d <sub>0</sub> | d <sub>2</sub> | D   | A with wiper recesses h12 | A without wiper recesses h12 <sup>1)</sup> | w   | a  | b   | H     | Q  | D <sub>2</sub> |
| –           | mm             |                |     |                           |                                            |     |    |     |       |    |                |
| PVU 8 x 1   | 7,7            | 7,1            | 20  | 40                        | 31                                         | 0,2 | 2  | 12  | 20,8  | 5  | 16,5           |
| PVU 10 x 1  | 9,7            | 9,1            | 22  | 40                        | 31                                         | 0,2 | 2  | 12  | 22,8  | 5  | 18,5           |
| PVU 10 x 2  | 9,7            | 9,1            | 22  | 40                        | 31                                         | 0,2 | 2  | 12  | 22,8  | 5  | 18,5           |
| PVU 12 x 1  | 11,7           | 11,1           | 24  | 40                        | 31                                         | 0,2 | 2  | 12  | 24,8  | 5  | 20,5           |
| PVU 12 x 2  | 11,7           | 11,1           | 24  | 40                        | 31                                         | 0,2 | 2  | 12  | 24,8  | 5  | 20,5           |
| PVU 16 x 1  | 15,7           | 15,1           | 29  | 40                        | 31                                         | 0,5 | 3  | 12  | 30,2  | 5  | 25             |
| PVU 16 x 2  | 15,7           | 15,1           | 29  | 40                        | 31                                         | 0,5 | 3  | 12  | 30,2  | 5  | 25             |
| PVU 20 x 1  | 19,7           | 19,1           | 34  | 45                        | 37                                         | 0,5 | 3  | 16  | 35,2  | 5  | 28,5           |
| PVU 20 x 2  | 19,7           | 19,1           | 34  | 45                        | 37                                         | 0,5 | 3  | 16  | 35,2  | 5  | 28,5           |
| PVU 25 x 1  | 24,7           | 24,1           | 42  | 54                        | 44                                         | 0,5 | 4  | 20  | 43,5  | 5  | 36             |
| PVU 25 x 2  | 24,7           | 24,1           | 42  | 54                        | 44                                         | 0,5 | 4  | 20  | 43,5  | 5  | 36             |
| PVU 32 x 1  | 31,7           | 31,1           | 54  | 67                        | 57                                         | 1   | 4  | 25  | 55,5  | 5  | 45             |
| PVU 32 x 2  | 31,7           | 31,1           | 54  | 67                        | 57                                         | 1   | 4  | 25  | 55,5  | 5  | 45             |
| PVU 40 x 1  | 39,7           | 39,1           | 68  | 75                        | 63                                         | 1   | 5  | 32  | 70    | 5  | 55             |
| PVU 40 x 2  | 39,3           | 38,2           | 68  | 84                        | 72                                         | 1   | 5  | 32  | 70    | 5  | 57             |
| PVU 50 x 1  | 49,7           | 49,1           | 82  | 101                       | 85                                         | 1   | 6  | 32  | 84,5  | 8  | 70             |
| PVU 50 x 2  | 49,3           | 48,7           | 82  | 101                       | 85                                         | 1   | 6  | 32  | 84,5  | 8  | 70             |
| PVU 50 x 3  | 49,5           | 48,6           | 82  | 108                       | 92                                         | 1,5 | 6  | 35  | 84,5  | 8  | 70             |
| PVU 50 x 4  | 49,3           | 48,2           | 82  | 101                       | 85                                         | 1   | 6  | 32  | 84,5  | 8  | 70             |
| PVU 63 x 2  | 62,3           | 61,2           | 103 | 120                       | 104                                        | 1   | 6  | 40  | 105,5 | 8  | 94             |
| PVU 63 x 4  | 62,3           | 61,2           | 103 | 120                       | 104                                        | 1   | 6  | 40  | 105,5 | 8  | 94             |
| PVU 80 x 4  | 78,6           | 76,4           | 141 | 197                       | 175                                        | 1,5 | 8  | 63  | 144   | 10 | 120            |
| PVU 100 x 5 | 98,3           | 95,5           | 175 | 237                       | 205                                        | 2   | 10 | 80  | 178   | 10 | 150            |
| PVU 125 x 5 | 123,3          | 120,5          | 220 | 282                       | 250                                        | 3   | 12 | 100 | 223   | 12 | 185            |

<sup>1)</sup> For this shorter version, please use the NORCS option (→ Ordering key page 113)

## PVK preloaded recirculating roller screws with flanged nut

d 8 – 125 mm



Standard PVK



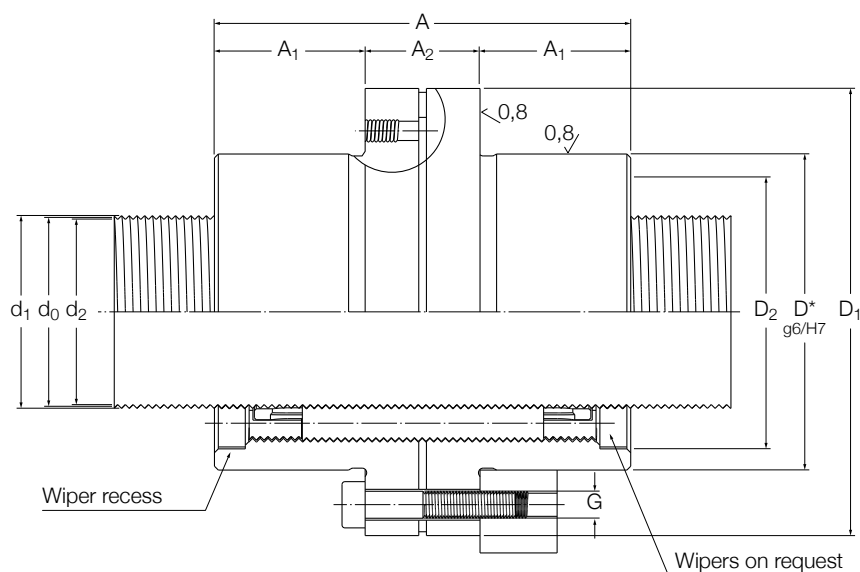
Grooved rollers



Components assembly

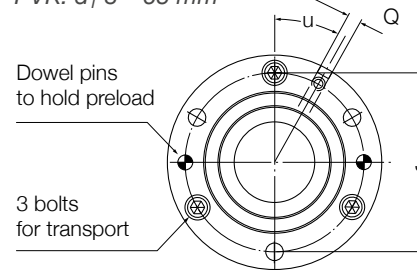
### Dimensions and technical characteristics

| d <sub>1</sub> | P <sub>h</sub> | L <sub>tp</sub> | C <sub>a</sub> | C <sub>0a</sub> | η    | η'   | R <sub>ng</sub> | R <sub>nr</sub> | T <sub>pr</sub> | F <sub>pr</sub> | m <sub>n</sub> | m <sub>s</sub> | I <sub>s</sub>       | I <sub>nn</sub>   | I <sub>ns</sub> | Z <sub>n</sub>  | Z <sub>s</sub>     |
|----------------|----------------|-----------------|----------------|-----------------|------|------|-----------------|-----------------|-----------------|-----------------|----------------|----------------|----------------------|-------------------|-----------------|-----------------|--------------------|
|                |                |                 | kN             |                 | –    |      | N/μm            | –               | Nm              | N               | kg             | kg/m           | kgmm <sup>2</sup> /m | kgmm <sup>2</sup> |                 | cm <sup>3</sup> | cm <sup>3</sup> /m |
| 8              | 1              | 400             | 4,88           | 5,51            | 0,83 | 0,79 | 190             | 255             | 0,05            | 770             | 0,2            | 0,36           | 2,6                  | 47,9              | 0,1             | 0,72            | 4                  |
| 10             | 1              | 500             | 5,14           | 5,7             | 0,80 | 0,75 | 185             | 250             | 0,07            | 820             | 0,2            | 0,57           | 6,7                  | 47                | 0,1             | 0,95            | 5                  |
|                | 2              | 500             | 5,14           | 5,7             | 0,87 | 0,85 | 185             | 250             | 0,07            | 820             | 0,2            | 0,57           | 6,7                  | 47                | 0,1             | 0,95            | 5                  |
| 12             | 1              | 600             | 5,96           | 7               | 0,78 | 0,71 | 215             | 290             | 0,1             | 940             | 0,2            | 0,84           | 14,2                 | 63,5              | 0,1             | 1,08            | 6                  |
|                | 2              | 600             | 5,96           | 7               | 0,86 | 0,83 | 215             | 290             | 0,1             | 940             | 0,2            | 0,84           | 14,2                 | 63,5              | 0,1             | 1,08            | 6                  |
| 16             | 1              | 825             | 6,71           | 8,42            | 0,73 | 0,63 | 245             | 330             | 0,15            | 1 060           | 0,3            | 1,51           | 46,2                 | 100               | 0,3             | 1,43            | 8                  |
|                | 2              | 825             | 6,71           | 8,42            | 0,83 | 0,79 | 245             | 330             | 0,15            | 1 060           | 0,3            | 1,51           | 46,2                 | 100               | 0,3             | 1,43            | 8                  |
| 20             | 1              | 1 050           | 10,6           | 18,3            | 0,69 | 0,54 | 490             | 660             | 0,2             | 1 430           | 0,4            | 2,38           | 115                  | 192               | 0,8             | 1,9             | 9                  |
|                | 2              | 1 050           | 10,6           | 18,3            | 0,80 | 0,75 | 490             | 660             | 0,3             | 1 430           | 0,4            | 2,38           | 115                  | 192               | 0,8             | 1,9             | 9                  |
| 25             | 1              | 1 300           | 18,9           | 34,2            | 0,64 | 0,43 | 635             | 855             | 0,5             | 2 270           | 0,6            | 3,75           | 285                  | 416               | 2,5             | 3,57            | 11                 |
|                | 2              | 1 300           | 18,9           | 34,2            | 0,77 | 0,70 | 635             | 855             | 0,55            | 2 270           | 0,6            | 3,75           | 285                  | 416               | 2,5             | 3,57            | 11                 |
| 32             | 1              | 1 700           | 36,9           | 79,6            | 0,58 | 0,28 | 995             | 1 345           | 0,7             | 2 510           | 1,2            | 6,18           | 773                  | 1 110             | 9,1             | 6,92            | 15                 |
|                | 2              | 1 700           | 36,9           | 79,6            | 0,73 | 0,63 | 975             | 1 315           | 0,7             | 2 320           | 1,2            | 6,18           | 773                  | 1 110             | 9,1             | 6,92            | 15                 |
| 40             | 1              | 2 150           | 45,4           | 116             | 0,53 | 0,11 | 1 395           | 1 885           | 1               | 2 840           | 2,1            | 9,69           | 1 900                | 3 120             | 18,8            | 9,57            | 18                 |
|                | 2              | 2 150           | 28,7           | 58,6            | 0,69 | 0,54 | 835             | 1 125           | 1               | 2 710           | 2,2            | 9,52           | 1 840                | 3 200             | 20              | 13,6            | 18                 |
| 50             | 1              | 2 800           | 109            | 272             | 0,47 | 0,00 | 1 430           | 1 930           | 1,85            | 3 900           | 3,7            | 15             | 4 550                | 8 190             | 76              | 24,4            | 22                 |
|                | 2              | 2 800           | 56,3           | 125             | 0,64 | 0,43 | 1 045           | 1 410           | 1,85            | 3 660           | 3,7            | 15             | 4 550                | 8 190             | 68,6            | 24,4            | 22                 |
|                | 3              | 2 800           | 88             | 222             | 0,72 | 0,61 | 1 300           | 1 755           | 1,85            | 3 600           | 3,7            | 15             | 4 550                | 8 050             | 81,1            | 24,4            | 22                 |
|                | 4              | 2 800           | 56,3           | 125             | 0,77 | 0,70 | 1 045           | 1 410           | 1,85            | 3 660           | 3,7            | 15             | 4 550                | 8 190             | 68,6            | 24,4            | 22                 |
| 63             | 2              | 3 600           | 107            | 267             | 0,59 | 0,29 | 1 530           | 2 065           | 2,5             | 4 540           | 6,4            | 23,9           | 11 600               | 20 100            | 230             | 44,3            | 28                 |
|                | 4              | 3 600           | 107            | 267             | 0,73 | 0,63 | 1 530           | 2 065           | 2,25            | 4 540           | 6,4            | 23,9           | 11 600               | 20 100            | 230             | 44,3            | 28                 |
| 80             | 4              | 4 000           | 187            | 444             | 0,69 | 0,54 | 1 665           | 2 250           | 4               | 5 410           | 17,8           | 38,1           | 29 400               | 92 600            | 1 290           | 166             | 36                 |
| 100            | 5              | 4 000           | 269            | 688             | 0,69 | 0,54 | 1 720           | 2 320           | 6               | 5 920           | 33,1           | 59,5           | 71 800               | 256 000           | 4 000           | 308             | 44                 |
| 125            | 5              | 4 000           | 434            | 1 385           | 0,64 | 0,43 | 2 635           | 3 555           | 8,5             | 6 510           | 62,3           | 93,7           | 179 000              | 733 000           | 11 800          | 520             | 55                 |

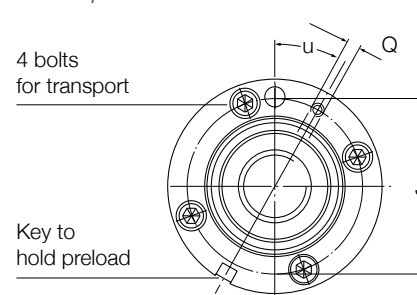


\* g6 fit only applies to the finished surface, on side opposite to the lubrication port, marked with a 0,8

PVK:  $d_1$  8 – 63 mm



PVK:  $d_1$  80 – 125 mm



| Designation | Dimensions     |                |            |                              |                       |                |                        |     |          |        |                |      |
|-------------|----------------|----------------|------------|------------------------------|-----------------------|----------------|------------------------|-----|----------|--------|----------------|------|
|             | d <sub>0</sub> | d <sub>2</sub> | D<br>g6/H7 | A with wiper recesses<br>h12 | A <sub>1</sub><br>h12 | A <sub>2</sub> | D <sub>1</sub><br>js12 | J   | G        | Q      | D <sub>2</sub> | u    |
| —           | mm             |                |            |                              |                       |                |                        |     |          |        |                | °    |
| PVK 8 x 1   | 7,7            | 7,1            | 22         | 40                           | 12                    | 16             | 43                     | 33  | 6 x M4   | M6     | 16,5           | 30   |
| PVK 10 x 1  | 9,7            | 9,1            | 22         | 40                           | 12                    | 16             | 43                     | 33  | 6 x M4   | M6     | 18,5           | 30   |
| PVK 10 x 2  | 9,7            | 9,1            | 22         | 40                           | 12                    | 16             | 43                     | 33  | 6 x M4   | M6     | 18,5           | 30   |
| PVK 12 x 1  | 11,7           | 11,1           | 25         | 40                           | 12                    | 16             | 46                     | 36  | 6 x M4   | M6     | 20,5           | 30   |
| PVK 12 x 2  | 11,7           | 11,1           | 25         | 40                           | 12                    | 16             | 46                     | 36  | 6 x M4   | M6     | 20,5           | 30   |
| PVK 16 x 1  | 15,7           | 15,1           | 30         | 40                           | 12                    | 16             | 51                     | 41  | 6 x M4   | M6     | 25             | 30   |
| PVK 16 x 2  | 15,7           | 15,1           | 30         | 40                           | 12                    | 16             | 51                     | 41  | 6 x M4   | M6     | 25             | 30   |
| PVK 20 x 1  | 19,7           | 19,1           | 35         | 45                           | 13,5                  | 18             | 58                     | 46  | 6 x M5   | M6     | 28,5           | 30   |
| PVK 20 x 2  | 19,7           | 19,1           | 35         | 45                           | 13,5                  | 18             | 58                     | 46  | 6 x M5   | M6     | 28,5           | 30   |
| PVK 25 x 1  | 24,7           | 24,1           | 45         | 54                           | 18                    | 18             | 68                     | 56  | 6 x M5   | M6     | 36             | 30   |
| PVK 25 x 2  | 24,7           | 24,1           | 45         | 54                           | 18                    | 18             | 68                     | 56  | 6 x M5   | M6     | 36             | 30   |
| PVK 32 x 1  | 31,7           | 31,1           | 56         | 67                           | 23,5                  | 20             | 84                     | 70  | 6 x M6   | M6     | 45             | 30   |
| PVK 32 x 2  | 31,7           | 31,1           | 56         | 67                           | 23,5                  | 20             | 84                     | 70  | 6 x M6   | M6     | 45             | 30   |
| PVK 40 x 1  | 39,7           | 39,1           | 68         | 75                           | 24                    | 27             | 102                    | 85  | 6 x M8   | M6     | 55             | 30   |
| PVK 40 x 2  | 39,3           | 38,2           | 68         | 84                           | 28,5                  | 27             | 102                    | 85  | 6 x M8   | M6     | 57             | 30   |
| PVK 50 x 1  | 49,7           | 49,1           | 82         | 101                          | 34                    | 33             | 124                    | 102 | 6 x M10  | M6     | 70             | 30   |
| PVK 50 x 2  | 49,3           | 48,7           | 82         | 101                          | 34                    | 33             | 124                    | 102 | 6 x M10  | M6     | 70             | 30   |
| PVK 50 x 3  | 49,5           | 48,6           | 82         | 108                          | 37,5                  | 33             | 124                    | 102 | 6 x M10  | M6     | 70             | 30   |
| PVK 50 x 4  | 49,3           | 48,2           | 82         | 101                          | 34                    | 33             | 124                    | 102 | 6 x M10  | M6     | 70             | 30   |
| PVK 63 x 2  | 62,3           | 61,2           | 105        | 120                          | 43,5                  | 33             | 150                    | 127 | 6 x M12  | M8 x 1 | 94             | 30   |
| PVK 63 x 4  | 62,3           | 61,2           | 105        | 120                          | 43,5                  | 33             | 150                    | 127 | 6 x M12  | M8 x 1 | 94             | 30   |
| PVK 80 x 4  | 78,6           | 76,4           | 140        | 197                          | 76                    | 45             | 200                    | 170 | 8 x M16  | M8 x 1 | 120            | 22,5 |
| PVK 100 x 5 | 98,3           | 95,5           | 180        | 237                          | 93,5                  | 50             | 240                    | 210 | 12 x M16 | M8 x 1 | 150            | 15   |
| PVK 125 x 5 | 123,3          | 120,5          | 220        | 282                          | 113,5                 | 55             | 310                    | 270 | 12 x M18 | M8 x 1 | 185            | 15   |

# Support bearings FLRBU

## Concept

To assist in the design and assembly process, Ewellix has developed a standard assortment of support bearings which consists of a housing, a bearing arrangement and seals. The bearings are adjusted at the factory to improve stiffness and running accuracy. Support bearings are filled with grease at the Ewellix factory and are easy to install. Standard support bearings are specifically designed for roller screws with nominal diameters from 8 mm to 80 mm (planetary roller screws) and from 8 mm to 125 mm (recirculating roller screws). These support bearings can easily be mounted on the screw shaft ends, following Ewellix recommendations for standard machined ends.

For larger roller screws, a preselection of spherical roller thrust bearings is also available.

## FLRBU sizes 1 to 9 with angular contact ball bearings

The standard assortment of support bearings consist of a steel housing and two to six angular contact ball bearings. Support bearing size FLRBU9 is available with a total of four or six bearings (→ pages 104 to 110).

To attain the nominal life of the support bearings, the maximum static or dynamic operating load should not exceed 80% of the  $C_a$  value of the support bearing. This recommendation considers the load carrying capacity of the bearings, the strength of the support bearing housing and the KMT locknut.

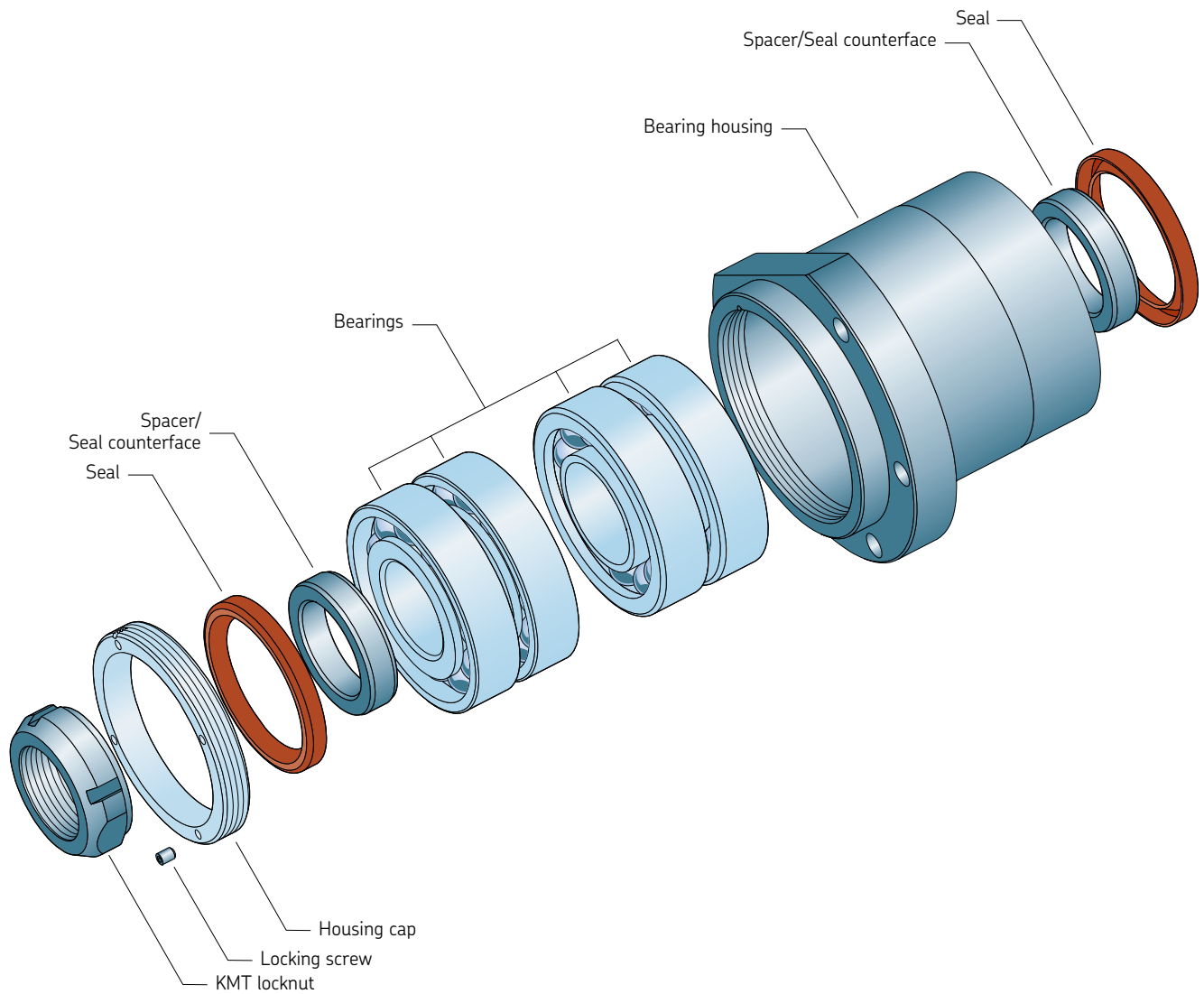
## Larger support bearing sizes with spherical roller thrust bearings

For extremely high load applications, Ewellix has preselected sizes of spherical roller thrust bearings for assembly with back-to-back arrangement into larger support bearings. These support bearings are typically used in applications where there are extremely heavy axial loads in one direction and lighter loads in the other direction, e.g. presses. As a result, these assemblies typically have two different size bearings, supporting the application axial loads in each direction, and requiring the support bearing to be oriented correctly (→ fig. 24, page 111).

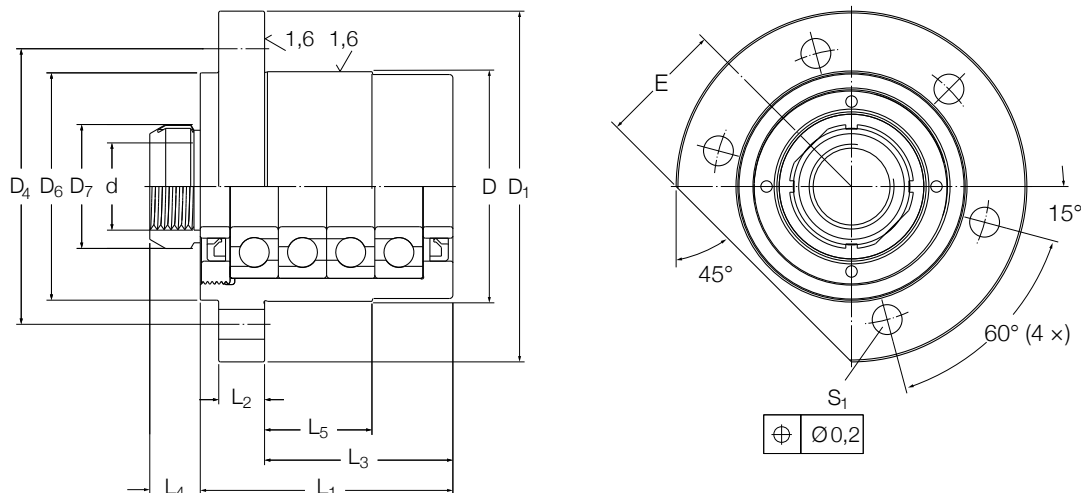
For additional information about optimizing the selection of each spherical roller thrust bearing, please contact your local Ewellix representative.

## Support bearings description

| Design features                                                                                                                                                                             | User benefits                                                                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Precision machined steel housing                                                                                                                                                            | Complete support bearing solution ready to use, simplified application design, easy ordering process                                                                                                                                                           |
| Preloaded SKF Explorer angular contact ball bearings, 72 or 73 series, arranged back-to-back (1 + 1 for FLRBU1 and FLRBU2, 2 + 2 for FLRBU3 to FLRBU9 and 3 + 3 for FLRBU9)                 | Eliminates most technical risks associated with bearing and seal assemblies<br>Bearing solutions offering high speed capability and low friction torque<br>Bearings are arranged back-to-back and preloaded to increase stiffness and improve running accuracy |
| Two garter seals                                                                                                                                                                            | Greased for life                                                                                                                                                                                                                                               |
| Precision KMT locknut as standard                                                                                                                                                           | KMT locknuts are part of the standard Ewellix product assortment, and can be ordered separately                                                                                                                                                                |
| Standard screw shaft end machining defined for extremely heavy axial loads                                                                                                                  | Quick connection to shaft ends                                                                                                                                                                                                                                 |
| Different bearing arrangements are available on request, should the applications present unique load conditions with the axial loads predominantly acting in one direction (1 + 3 or 3 + 1) | Bearing load carrying capacity matched to the roller screw load carrying capacity and application conditions                                                                                                                                                   |
| SKF spherical roller thrust bearings for extremely heavy axial loads                                                                                                                        | Support bearing dimensioning and load carrying capacity matched to the roller screw characteristics                                                                                                                                                            |



## FLRBU support bearings with angular contact ball bearings



| Support bearing designation | Support bearings bore diameter | Support bearing carrying capacity |                 | Standard bearing arrangement | Bearing designation | Maximum preload torque | Axial stiffness of the bearing stack <sup>1) 2)</sup> | Weight | High precision KMT locknut |              |                   |                 |                              |
|-----------------------------|--------------------------------|-----------------------------------|-----------------|------------------------------|---------------------|------------------------|-------------------------------------------------------|--------|----------------------------|--------------|-------------------|-----------------|------------------------------|
|                             |                                | Dynamic                           | Static          |                              |                     |                        |                                                       |        | Designation                | Hook spanner | Tightening torque | Grub screw size | Grub screw tightening torque |
| –                           | d mm                           | C <sub>a</sub> kN                 | C <sub>0a</sub> | –                            | –                   | Nm                     | N/μm                                                  | kg     | –                          | –            | Nm                | –               | Nm                           |
| FLRBU1                      | 12                             | 13,3                              | 14,7            | 1 + 1                        | 7 201               | 0,1                    | 150                                                   | 0,69   | KMT 1                      | HN 3         | 15                | M5              | 4,5                          |
| FLRBU2                      | 17                             | 27,9                              | 31,9            | 1 + 1                        | 7 303               | 0,25                   | 190                                                   | 1,93   | KMT 3                      | HN 4         | 22                | M6              | 8                            |
| FLRBU3                      | 20                             | 40,1                              | 63,8            | 2 + 2                        | 7 204               | 0,25                   | 475                                                   | 1,61   | KMT 4                      | HN 5         | 27                | M6              | 8                            |
| FLRBU4                      | 25                             | 74,2                              | 119             | 2 + 2                        | 7 305               | 1,1                    | 600                                                   | 3,30   | KMT 5                      | HN 5         | 38                | M6              | 8                            |
| FLRBU5                      | 35                             | 109                               | 188             | 2 + 2                        | 7 307               | 1,1                    | 785                                                   | 5,85   | KMT 7                      | HN 7         | 65                | M6              | 8                            |
| FLRBU6                      | 50                             | 208                               | 392             | 2 + 2                        | 7 310               | 1,5                    | 1 100                                                 | 11,1   | KMT 10                     | HN 10        | 110               | M8              | 18                           |
| FLRBU7                      | 65                             | 305                               | 615             | 2 + 2                        | 7 313               | 2                      | 1 400                                                 | 25,1   | KMT 13                     | HN 14        | 200               | M8              | 18                           |
| FLRBU8                      | 90                             | 473                               | 1 123           | 2 + 2                        | 7 318               | 2,3                    | 1 800                                                 | 53,1   | KMT 18                     | HN 18        | 300               | M10             | 35                           |
| FLRBU9 (2 + 2)              | 100                            | 615                               | 1 600           | 2 + 2                        | 7 320               | 3                      | 2 100                                                 | 73,1   | KMT 20                     | HN 20        | 400               | M10             | 35                           |
| FLRBU9 (3 + 3)              | 100                            | 817                               | 2 400           | 3 + 3                        | 7 320               | 3,5                    | 2 600                                                 | 96,1   | KMT 20                     | HN 20        | 400               | M10             | 35                           |

| Support bearing designation | Support bearings bore diameter | Dimensions |                |                |                 |                |                |     |                |                |                |                |                | Fixing screws |
|-----------------------------|--------------------------------|------------|----------------|----------------|-----------------|----------------|----------------|-----|----------------|----------------|----------------|----------------|----------------|---------------|
|                             |                                | d          | D <sub>1</sub> | D <sub>6</sub> | D <sub>h7</sub> | D <sub>4</sub> | D <sub>7</sub> | E   | L <sub>1</sub> | L <sub>2</sub> | L <sub>3</sub> | L <sub>4</sub> | L <sub>5</sub> |               |
|                             | mm                             |            |                |                |                 |                |                |     |                |                |                |                |                |               |
| FLRBU1                      | 12                             | 76         | 50             | 47             | 63              | 30             | 27             | 42  | 10             | 25             | 14             | 12             | (5x) 6,6       | M6 x 25       |
| FLRBU2                      | 17                             | 90         | 62             | 60             | 76              | 37             | 32             | 46  | 10             | 32             | 18             | 18             | (5x) 6,6       | M6 x 25       |
| FLRBU3                      | 20                             | 90         | 59             | 60             | 74              | 40             | 32             | 77  | 13             | 60             | 18             | 30             | (5x) 9         | M8 x 25       |
| FLRBU4                      | 25                             | 120        | 80             | 80             | 100             | 44             | 44             | 89  | 16             | 68             | 20             | 36             | (5x) 11        | M10 x 30      |
| FLRBU5                      | 35                             | 140        | 99             | 100            | 120             | 54             | 54             | 110 | 20             | 82             | 22             | 47             | (5x) 13        | M12 x 40      |
| FLRBU6                      | 50                             | 171        | 130            | 130            | 152             | 75             | 67             | 140 | 25             | 98,5           | 25             | 58,5           | (5x) 13        | M12 x 40      |
| FLRBU7                      | 65                             | 225        | 170            | 170            | 198             | 95             | 87             | 180 | 30             | 133,5          | 28             | 53,5           | (5x) 17,5      | M16 x 55      |
| FLRBU8                      | 90                             | 285        | 219            | 220            | 252             | 125            | 115            | 235 | 35             | 179            | 32             | 99             | (5x) 22        | M20 x 65      |
| FLRBU9 (2 + 2)              | 100                            | 322        | 249            | 250            | 285             | 135            | 130            | 253 | 36             | 195            | 32             | 115            | (9x) 243)      | M22 x 70      |
| FLRBU9 (3 + 3)              | 100                            | 322        | 249            | 250            | 285             | 135            | 130            | 347 | 36             | 289            | 32             | 115            | (9x) 243)      | M22 x 70      |

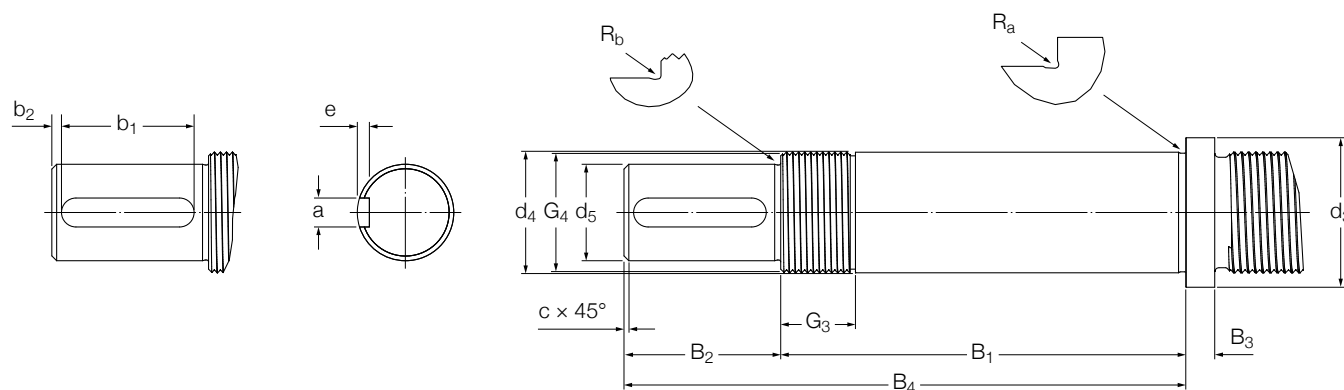
■ Preferred range: support bearing available in stock, for 2+2, 1+3 and 3+1 variants

<sup>1)</sup> Axial stiffness of the housing and bearings assembly, KMT locknut and shaft stiffness not included

<sup>2)</sup> Axial stiffness is calculated under F = 10% of C<sub>a</sub>

<sup>3)</sup> For the layout of mounting holes and detailed information, please contact Ewellix.

## Standard machined ends

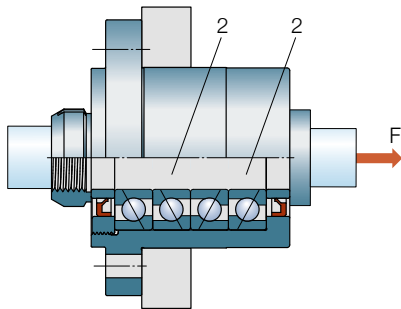
Support bearing  
designations

|                | $d_4^{1)}$<br>mm | $d_5$<br>h7 | $d_3$ | $B_1$<br>js12 | $B_2$ | $B_3$ | $B_4$<br>js12 | $G_4$<br>6g | $G_3$ | $c$ | $R_a$ | $R_b$ | $a$<br>N9 | $e$<br>+ 0,1 | $b_1$<br>+ 0,5 | $b_2$ |
|----------------|------------------|-------------|-------|---------------|-------|-------|---------------|-------------|-------|-----|-------|-------|-----------|--------------|----------------|-------|
| –              |                  |             |       |               |       |       |               |             |       |     |       |       |           |              |                |       |
| FLRBU1         | 12               | 10          | 17    | 58            | 20    | 5     | 78            | M12 x 1     | 17    | 0,5 | 0,4   | 0,4   | 3         | 1,8          | 16             | 1,5   |
| FLRBU2         | 17               | 15          | 23    | 66            | 30    | 5     | 96            | M17 x 1     | 22    | 0,5 | 0,6   | 0,6   | 5         | 3            | 25             | 2     |
| FLRBU3         | 20               | 17          | 27    | 97            | 40    | 7     | 137           | M20 x 1     | 22    | 0,5 | 0,6   | 0,6   | 5         | 3            | 35             | 2     |
| FLRBU4         | 25               | 20          | 34    | 112           | 45    | 7     | 157           | M25 x 1,5   | 25    | 0,5 | 0,6   | 0,6   | 6         | 3,5          | 40             | 2,5   |
| FLRBU5         | 35               | 30          | 45    | 134           | 55    | 10    | 189           | M35 x 1,5   | 26    | 1   | 0,6   | 0,6   | 8         | 4            | 45             | 2,5   |
| FLRBU6         | 50               | 40          | 62    | 168           | 65    | 12    | 233           | M50 x 1,5   | 31    | 1   | 0,8   | 0,8   | 12        | 5            | 55             | 4     |
| FLRBU7         | 65               | 60          | 78    | 210           | 100   | 18    | 310           | M65 x 2     | 32    | 1   | 1,2   | 1     | 18        | 7            | 90             | 2,5   |
| FLRBU8         | 90               | 85          | 108   | 270           | 120   | 25    | 390           | M90 x 2     | 39    | 1   | 1,6   | 1,2   | 25        | 9            | 100            | 5     |
| FLRBU9 (2 + 2) | 100              | 95          | 120   | 288           | 140   | 25    | 428           | M100 x 2    | 39    | 1   | 1,6   | 1,2   | 25        | 9            | 125            | 7     |
| FLRBU9 (3 + 3) | 100              | 95          | 120   | 382           | 140   | 25    | 522           | M100 x 2    | 39    | 1   | 1,6   | 1,2   | 25        | 9            | 125            | 7     |

Standard tolerance for direct drive:  $d_4$ h6. Recommended tolerance for parallel drive:  $d_4$ k6

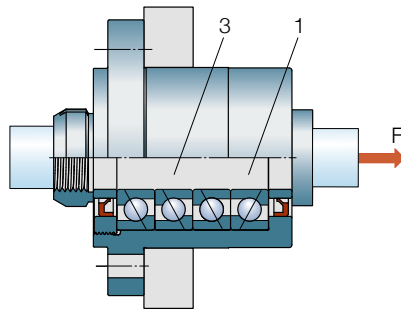
## Recommendations for support bearings assembly and orientation

### Standard support bearing orientation: Flange oriented towards machined end of shaft



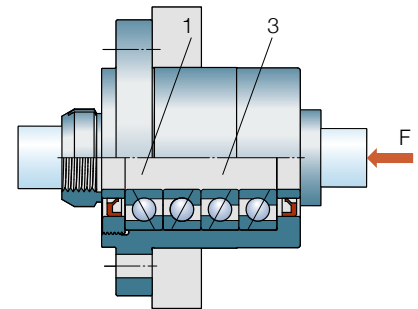
*FLRBU (1 + 1) (2 + 2) (3 + 3)*

- Assembly recommended for similar tension and compression loads on roller screw
- Customer to check flange fixing bolts with compression loads



*FLRBU (3 + 1)*

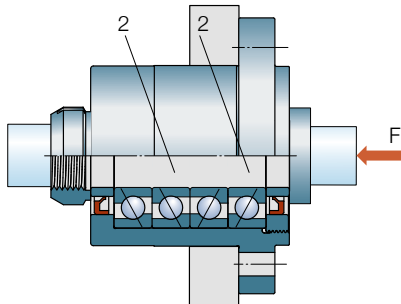
- Assembly recommended for predominantly tension loads on roller screw
- Customer to check flange fixing bolts with compression loads



*FLRBU (1 + 3)*

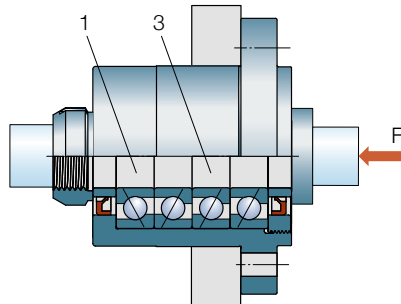
- Not the ideal assembly in case of predominantly compression loads on roller screw
- Customer to check flange fixing bolts with tension loads

### Non-standard support bearing orientation: Flange oriented towards thread of roller screw shaft



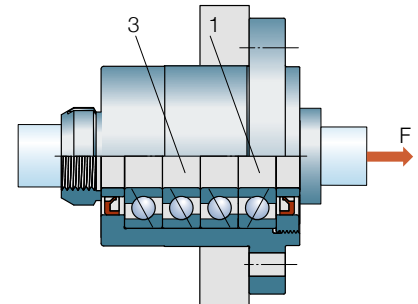
*FLRBU (1 + 1) (2 + 2) (3 + 3)*

- Assembly recommended for similar tension and compression loads on roller screw
- Customer to check flange fixing bolts with compression loads



*FLRBU (3 + 1)*

- Assembly recommended for predominantly compression loads on roller screw
- Customer to check flange fixing bolts with compression loads



*FLRBU (1 + 3)*

- Not the ideal assembly in case of predominantly tension loads on roller screw
- Customer to check flange fixing bolts with tension loads

| Support bearing bore diameter | Load ratings for the 3 bearings carrying the main application loads |                          | Load ratings for the opposite single bearing            |                          | Support bearing designation         |
|-------------------------------|---------------------------------------------------------------------|--------------------------|---------------------------------------------------------|--------------------------|-------------------------------------|
| d<br>mm                       | Support bearing carrying capacity<br>Dynamic<br>C<br>kN             | Static<br>C <sub>0</sub> | Support bearing carrying capacity<br>Dynamic<br>C<br>kN | Static<br>C <sub>0</sub> | —                                   |
| 20                            | 53,3                                                                | 95,7                     | 24,7                                                    | 31,9                     | FLRBU3                              |
| 25                            | 98,6                                                                | 179                      | 45,7                                                    | 59,6                     | FLRBU4                              |
| 35                            | 145                                                                 | 283                      | 67,3                                                    | 94,2                     | FLRBU5                              |
| 50                            | 277                                                                 | 589                      | 128                                                     | 196                      | FLRBU6                              |
| 65                            | 405                                                                 | 923                      | 188                                                     | 308                      | FLRBU7                              |
| 90                            | 628                                                                 | 1 685                    | 291                                                     | 561                      | FLRBU8                              |
| 100                           | 817                                                                 | 2 400                    | 378                                                     | 800                      | FLRBU9<br>(version with 4 bearings) |

■ Preferred range

## Support bearings recommended for standard planetary roller screws

(standard number of rollers)

| Planetary roller screws SR/BR, PR, HR: Recommended size of FLRBU support bearings <sup>1)</sup> |          |            |   |   |   |   |   |    |         |         |         |         |         |         |    |         |    |    |
|-------------------------------------------------------------------------------------------------|----------|------------|---|---|---|---|---|----|---------|---------|---------|---------|---------|---------|----|---------|----|----|
| Nominal diameter                                                                                | Nut type | Lead [mm]  |   |   |   |   |   |    |         |         |         |         |         |         |    |         |    |    |
|                                                                                                 |          | 2          | 4 | 5 | 6 | 8 | 9 | 10 | 12      | 15      | 18      | 20      | 24      | 25      | 30 | 35      | 36 | 42 |
| d <sub>0</sub><br>mm                                                                            | –        | FLRBU size |   |   |   |   |   |    |         |         |         |         |         |         |    |         |    |    |
| 8                                                                                               | SR/BR    | 1          | 1 |   |   |   |   |    |         |         |         |         |         |         |    |         |    |    |
| 8                                                                                               | PR       | 1          | 1 |   |   |   |   |    |         |         |         |         |         |         |    |         |    |    |
| 12                                                                                              | SR/BR    | 2          |   | 2 |   |   |   |    |         |         |         |         |         |         |    |         |    |    |
| 12                                                                                              | PR       | 1          |   | 1 |   |   |   |    |         |         |         |         |         |         |    |         |    |    |
| 15                                                                                              | SR/BR    | 2          |   | 2 |   | 2 |   |    |         |         |         |         |         |         |    |         |    |    |
| 15                                                                                              | PR       | 1          |   | 1 |   | 1 |   |    |         |         |         |         |         |         |    |         |    |    |
| 18                                                                                              | SR/BR    | 3          |   | 3 |   | 3 |   |    |         |         |         |         |         |         |    |         |    |    |
| 18                                                                                              | PR       | 2          |   | 2 |   | 2 |   |    |         |         |         |         |         |         |    |         |    |    |
| 21                                                                                              | SR/BR    | 4          |   | 4 | 4 | 4 |   | 4  |         |         |         |         |         |         |    |         |    |    |
| 21                                                                                              | PR       | 2          |   | 2 | 2 | 2 |   | 3  |         |         |         |         |         |         |    |         |    |    |
| 24                                                                                              | SR/BR    |            |   |   | 3 |   |   | 4  |         |         |         |         |         |         |    |         |    |    |
| 24                                                                                              | PR       |            |   |   | 2 |   |   | 2  |         |         |         |         |         |         |    |         |    |    |
| 25                                                                                              | SR/BR    |            |   | 4 |   | 4 |   | 4  |         | 4       |         |         |         |         |    |         |    |    |
| 25                                                                                              | PR       |            |   | 3 |   | 3 |   | 3  |         | 3       |         |         |         |         |    |         |    |    |
| 30                                                                                              | SR/BR    |            |   | 5 | 5 | 5 |   | 5  |         | 5       |         | 5       |         |         |    |         |    |    |
| 30                                                                                              | PR       |            |   | 4 | 4 | 4 |   | 4  |         | 4       |         | 4       |         |         |    |         |    |    |
| 36                                                                                              | SR/BR    |            |   |   | 5 |   | 5 |    | 5       |         | 5       |         | 5       |         |    |         |    |    |
| 36                                                                                              | PR       |            |   |   | 4 |   | 4 |    | 4       |         | 4       |         | 4       |         |    |         |    |    |
| 39                                                                                              | SR/BR    |            |   | 6 |   |   |   | 6  |         | 6       |         | 6       |         | 6       |    |         |    |    |
| 39                                                                                              | PR       |            |   | 5 |   |   |   | 5  |         | 5       |         | 5       |         | 5       |    |         |    |    |
| 44                                                                                              | SR/BR    |            |   |   |   | 6 |   |    | 6       |         | 6       |         | 6       |         |    | 6       |    |    |
| 44                                                                                              | PR       |            |   |   |   | 4 |   |    | 4       |         | 5       |         | 5       |         |    | 5       |    |    |
| 48                                                                                              | SR/BR    |            |   | 6 |   | 6 |   | 6  |         | 7       |         | 7       |         | 7       |    | 7       |    |    |
| 48                                                                                              | PR       |            |   | 5 |   | 5 |   | 6  |         | 6       |         | 6       |         | 6       |    | 6       |    |    |
| 56                                                                                              | SR/BR    |            |   |   |   |   |   | 6  |         |         |         | 7       |         |         |    |         | 7  |    |
| 56                                                                                              | PR       |            |   |   |   |   |   | 5  |         |         |         | 6       |         |         |    |         | 6  |    |
| 60                                                                                              | SR/BR    |            |   |   |   |   |   |    | 8       |         | 8       |         | 8       |         |    |         |    |    |
| 60                                                                                              | PR       |            |   |   |   |   |   |    | 6       |         | 6       |         | 6       |         |    |         |    |    |
| 60                                                                                              | HR       |            |   |   |   |   |   |    |         | 8       |         | 8       |         | 8       |    | 8       |    |    |
| 64                                                                                              | SR/BR    |            |   |   |   |   |   |    | 7       |         | 7       |         | 7       |         | 7  |         | 7  |    |
| 64                                                                                              | PR       |            |   |   |   |   |   |    | 6       |         | 6       |         | 6       |         | 6  |         | 6  |    |
| 75                                                                                              | SR       |            |   |   |   |   |   |    | 9       |         | 9       |         | 9       |         |    |         |    |    |
|                                                                                                 |          |            |   |   |   |   |   |    | (2 + 2) |         | (2 + 2) |         | (2 + 2) |         |    |         |    |    |
| 75                                                                                              | HR       |            |   |   |   |   |   |    |         | 9       |         | 9       |         | 9       |    | 9       |    |    |
|                                                                                                 |          |            |   |   |   |   |   |    |         | (3 + 3) |         | (3 + 3) |         | (3 + 3) |    | (3 + 3) |    |    |
| 80                                                                                              | SR       |            |   |   |   |   |   |    | 8       |         | 8       |         | 8       |         |    |         |    | 8  |

SR (C, F or P): Planetary roller screw with axial play; BR (C, F or P): Planetary roller screw without backlash

PR (U or K): Planetary roller screw with preloaded split nut; HR (C, F or P): Ultra Power planetary roller screw

<sup>1)</sup> Some SR/BR and PR planetary roller screw sizes (normal diameter x lead) are available with the maximum number of rollers only.

In such case, the recommended FLRBU support bearing size is suitable for these configurations

## Support bearings recommended for recirculating roller screws

Recirculating roller screws SV/BV, PV: Recommended size of FLRBU support bearings

| Nominal diameter     | Nut type | Lead [mm]  |   |   |   |           |
|----------------------|----------|------------|---|---|---|-----------|
|                      |          | 1          | 2 | 3 | 4 | 5         |
| d <sub>1</sub><br>mm | –        | FLRBU size |   |   |   |           |
| 8                    | SV/BV    | 1          |   |   |   |           |
| 8                    | PV       | 1          |   |   |   |           |
| 10                   | SV/BV    | 1          | 1 |   |   |           |
| 10                   | PV       | 1          | 1 |   |   |           |
| 12                   | SV/BV    | 1          | 1 |   |   |           |
| 12                   | PV       | 1          | 1 |   |   |           |
| 16                   | SV/BV    | 1          | 1 |   |   |           |
| 16                   | PV       | 1          | 1 |   |   |           |
| 20                   | SV/BV    | 2          | 2 |   |   |           |
| 20                   | PV       | 1          | 1 |   |   |           |
| 25                   | SV/BV    | 3          | 3 |   |   |           |
| 25                   | PV       | 2          | 2 |   |   |           |
| 32                   | SV/BV    | 4          | 4 |   |   |           |
| 32                   | PV       | 3          | 3 |   |   |           |
| 40                   | SV/BV    | 5          | 4 |   |   |           |
| 40                   | PV       | 4          | 3 |   |   |           |
| 50                   | SV/BV    | 6          | 5 | 6 | 5 |           |
| 50                   | PV       | 5          | 4 | 5 | 4 |           |
| 63                   | SV/BV    |            | 6 |   | 6 |           |
| 63                   | PV       |            | 6 |   | 6 |           |
| 80                   | SV/BV    |            |   |   | 7 |           |
| 80                   | PV       |            |   |   | 6 |           |
| 100                  | SV/BV    |            |   |   |   | 8         |
| 100                  | PV       |            |   |   |   | 7         |
| 125                  | SV/BV    |            |   |   |   | 9 (3 + 3) |
| 125                  | PV       |            |   |   |   | 8         |

SV (C or F): Recirculating roller screw with axial play  
 BV (C or F): Recirculating roller screw without backlash  
 PV (U or K): Recirculating roller screw with preloaded split nut

## Preselection of spherical roller thrust bearings

Fig. 23

Symmetrical bearing arrangement

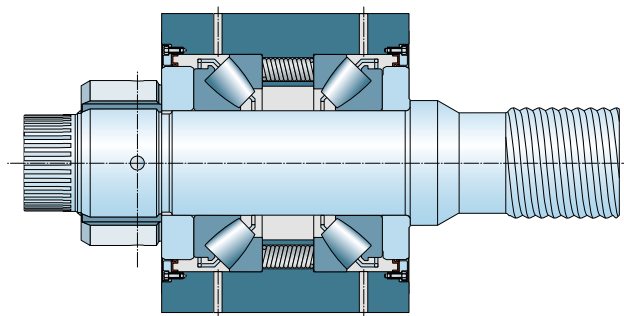
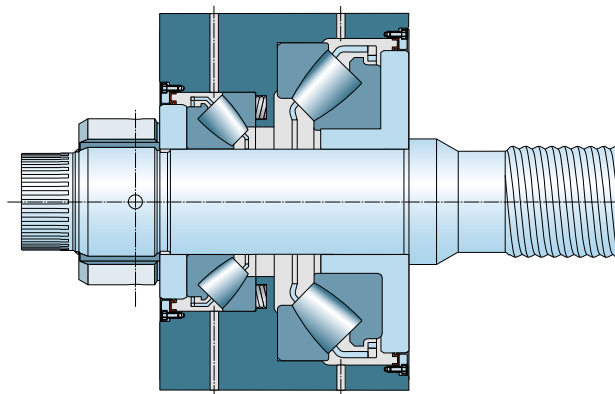


Fig. 24

Non-symmetrical bearing arrangement



For applications where FLRBU9 support bearings cannot accommodate existing loads, Ewellix can supply FLRBUs containing spherical roller thrust bearings. These larger support bearings complement the assortment of large roller screws and Ultra Power roller screws.

Spherical roller thrust bearing arrangements can be either symmetrical or non-symmetrical. Non-symmetrical arrangements are typically used when loads are heavier on one direction than the other.

Because these support bearings are used on large machinery, Ewellix designs the housing and bearing arrangement on a case by case basis.

For additional information about these support bearings, please contact your local Ewellix representative.

Preselection of spherical roller thrust bearings (see recommendation in SKF catalogue Rolling bearings)

| Ultra Power roller screws |          | Recommended size of spherical roller thrust bearings |                       |                                |               |                   |                 |                                   |
|---------------------------|----------|------------------------------------------------------|-----------------------|--------------------------------|---------------|-------------------|-----------------|-----------------------------------|
| $d_0$                     | $P_h$    | Bore diameter<br>$d$                                 | Outer diameter<br>$D$ | Bearing mean diameter<br>$d_m$ | Height<br>$H$ | Basic load rating |                 | Bearing designation <sup>1)</sup> |
| mm                        |          | mm                                                   |                       |                                |               | Dynamic<br>$C$    | Static<br>$C_0$ | –                                 |
|                           |          |                                                      |                       |                                |               | kN                |                 |                                   |
| 87                        | 15 to 30 | 110                                                  | 230                   | 170                            | 73            | 1 180             | 3 000           | 29422 E                           |
| 99                        | 15 to 35 | 130                                                  | 270                   | 200                            | 85            | 1 560             | 4 050           | 29426 E                           |
| 112,5                     | 15 to 35 | 140                                                  | 280                   | 210                            | 85            | 1 630             | 4 300           | 29428 E                           |
| 120                       | 15 to 40 | 150                                                  | 300                   | 225                            | 90            | 1 860             | 5 100           | 29430 E                           |
| 135                       | 15 to 50 | 160                                                  | 320                   | 240                            | 95            | 2 080             | 5 600           | 29432 E                           |
| 150                       | 15 to 50 | 170                                                  | 340                   | 255                            | 103           | 2 360             | 6 550           | 29434 E                           |
| 180                       | 15 to 50 | 200                                                  | 400                   | 300                            | 122           | 3 200             | 9 000           | 29440 E                           |
| 210                       | 20 to 50 | 240                                                  | 440                   | 340                            | 122           | 3 400             | 10 200          | 29448 E                           |
| 240                       | 20 to 50 | 260                                                  | 480                   | 370                            | 132           | 4 050             | 12 900          | 29452 E                           |

<sup>1)</sup> SKF Explorer bearing

For selection and dimensioning of spherical roller thrust bearings, for recommendations regarding minimum load, calculation of equivalent dynamic/static bearing loads, lubrication, design of bearing arrangements and mounting, please refer to SKF catalogue Rolling bearings.

In particular, the following calculation assumptions must be used:

- The maximum axial load must not exceed a quarter of the bearing static load rating

$$s_0 = C_0/F$$

$$s_0 \geq 4$$

With

$C_0$  = bearing static load carrying capacity [kN]

$F$  = maximum static or dynamic axial bearing carrying this load [kN]

- The permissible rotational speed of the bearing depends on the ratio of dynamic load rating to bearing equivalent mean load  $F_m$

If  $C/F_m \leq 4$

↳ Maximum  $n_{d_m} = 60\,000$

With  $C/F_m = 8$

↳ Maximum  $n_{d_m} = 120\,000$

If  $C/F_m \geq 15$

↳ Maximum  $n_{d_m} = 200\,000$

With

$C$  = bearing dynamic load carrying capacity [kN] according to the SKF catalogue Rolling bearings

$F_m$  = equivalent dynamic load applied to the roller screw and to the spherical roller thrust bearing carrying this axial load [kN]

$n$  = screw shaft rotational speed [r/min]

$d_m$  = bearing mean diameter [mm]

# Ordering key

## Complete roller screw assembly

SRF

30 x 5R 425/590 G5 L Z WPR

### Nut type

|     |                                                                     |
|-----|---------------------------------------------------------------------|
| SRC | Planetary roller screw, axial play, cylindrical nut                 |
| BRC | Planetary roller screw, without backlash, cylindrical nut           |
| SRF | Planetary roller screw, axial play, centered flange                 |
| BRF | Planetary roller screw, without backlash, centered flange           |
| SRP | Planetary roller screw, axial play, off-centered flange             |
| BRP | Planetary roller screw, without backlash, off-centered flange       |
| PRU | Planetary roller screw, preload with split nut, cylindrical nut     |
| PRK | Planetary roller screw, preload with split nut, centered flange     |
| HRC | Ultra Power planetary roller screw, cylindrical nut                 |
| HRF | Ultra Power planetary roller screw, centered flange                 |
| HRP | Ultra Power planetary roller screw, off-centered flange             |
| ISR | Inverted planetary roller screw, axial play                         |
| IBR | Inverted planetary roller screw, without backlash                   |
| SRR | Planetary roller screw, rotating nut, axial play                    |
| BRR | Planetary roller screw, rotating nut, without backlash              |
| SVC | Recirculating roller screw, axial play, cylindrical nut             |
| BVC | Recirculating roller screw, without backlash, cylindrical nut       |
| SVF | Recirculating roller screw, axial play, centered flange             |
| BVF | Recirculating roller screw, without backlash, centered flange       |
| PVU | Recirculating roller screw, preload with split nut, cylindrical nut |
| PVK | Recirculating roller screw, preload with split nut, centered flange |

### Nominal diameter x lead [mm]

### Hand

|   |                   |
|---|-------------------|
| R | Right             |
| L | Left (on request) |

### Threaded length/Total length [mm]

### Lead precision

|    |                           |
|----|---------------------------|
| G5 | Standard lead precision   |
| G3 | Lead precision on request |
| G1 | Lead precision on request |

### Flanged nut orientation

|   |                                                                                 |
|---|---------------------------------------------------------------------------------|
| S | Nut ground outer diameter D (g6) oriented towards shorter machined end of shaft |
| L | Nut ground outer diameter D (g6) oriented towards longer machined end of shaft  |
| - | In case of identical machined ends, and for cylindrical nuts                    |

### Shaft machined end

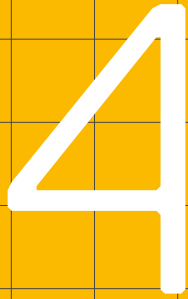
|   |                               |
|---|-------------------------------|
| Z | According to customer drawing |
|---|-------------------------------|

### Wipers

|       |                                                                                            |
|-------|--------------------------------------------------------------------------------------------|
| WPR   | With wipers                                                                                |
| NOWPR | Without wipers                                                                             |
| NORCS | Shorter nut without wiper and without wiper recess (applicable to SVC and PVU ranges only) |

### Example

SRC 25 x 5R 425/590 G5 L Z WPR



4

## Mounting instruction

Recommendations for assembly

# Recommendations for assembly

## Handling

Roller screw assemblies are precision components and should be handled with care to avoid damaging shocks, contamination or corrosion. After cleaning, avoid touching the screws with bare hands. Unprotected screws made of standard bearing steel are very sensitive to corrosion.

## Storage

Roller screw assemblies should be stored so that they are not exposed to contaminants, vibrations, shocks, humidity or other detrimental conditions.

During shipping, roller screw assemblies are wrapped in heavy gauge plastic bags, which protect them from solid or liquid contaminants. They should remain in the shipping crate and wrapped until they are used.

If they are stored out of the shipping crate, roller screw assemblies must lie on wooden, plastic or aluminum V-shaped blocks and should not be subjected to vibrations. The V-shaped supports should be positioned on the threaded section of the screw shaft, or on the machined ends. The assembly must not be supported on the shelf by the nut body (→ **fig. 38**).

The standard rust inhibitor protects roller screws in their original sleeve for a period of 12 to 18 months. Storage temperature should range between – 10 and +50 °C. For longer storage periods, special packing such as VCI sleeve can be used. For additional information about roller screw storage, please contact your local Ewellix representative.

## Nut disassembly

If possible, do not remove the nut from the shaft, especially for preloaded assemblies. If the nut must be removed from the shaft, i.e. for shaft end machining, check the nut orientation before disassembly.

Identify the type of nut by removing one wiper.

**Fig. 41:** Planetary roller screw

**Fig. 42:** Recirculating roller screw

For a recirculating roller screw with a nominal diameter < 16 mm, the nut should never be removed from the screw without using a sleeve (risk of losing the rollers).

For the other recirculating roller screws and for all planetary roller screws, the nut can be removed without any risk. But if the nut is fitted with wipers (components usually are black or white), Ewellix recommends marking the wipers and their angular position in relation to the nut (→ **fig. 40**) to facilitate the reassembly process.

In order to achieve the proper axial play or preload required by the application, each nut is matched to its shaft.

Therefore, special attention must be paid not to mix nuts and shafts during disassembly.

Just changing the orientation of a preloaded nut onto its matched screw shaft will affect the preload torque. Again, special care is required for proper disassembly and reassembly!

With preloaded assemblies (screws types with prefix PRU, PRK, PVU and PVK), do not remove the retaining device used for transportation inside the packaging. The retaining device can be:

- Transportation bolts (usually 3 screws) for the flanged types PRK and PVK
- Retaining strap for the cylindrical types PRU and PVU (→ **fig. 39**). When removing the retaining strap, there is a high risk of dropping the preloading spacers and the key. Therefore, this operation should be performed at the last minute when pressing the nut into its housing

Fig. 38

Roller screw on V-shaped supports

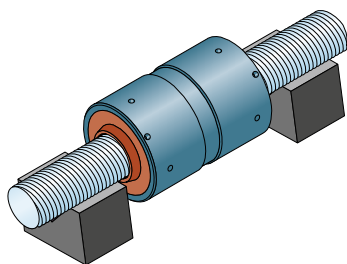


Fig. 39

Retaining strap

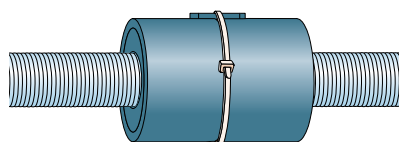
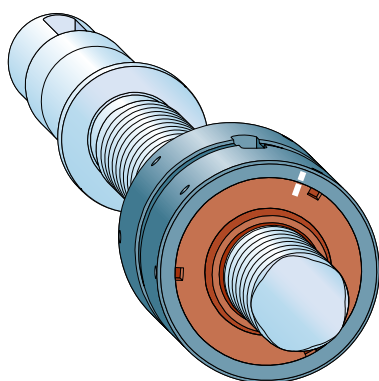


Fig. 40

Roller screw with wiper



Planetary roller screw

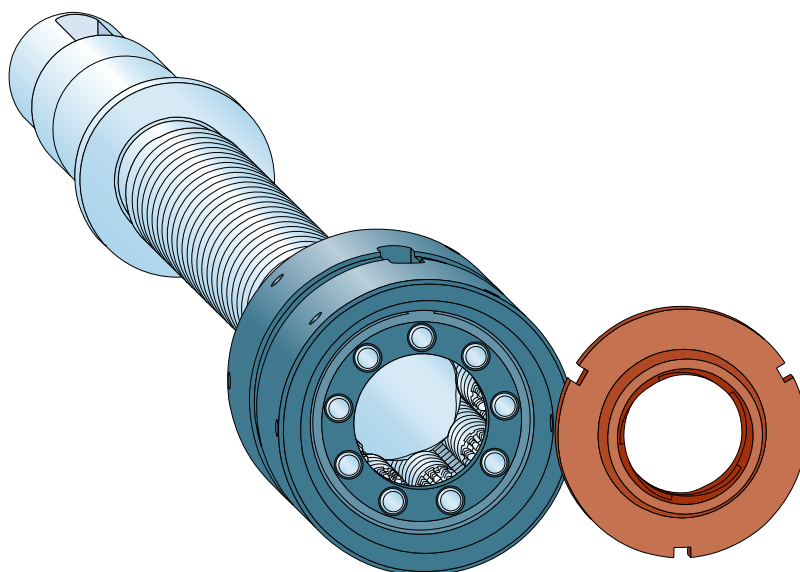
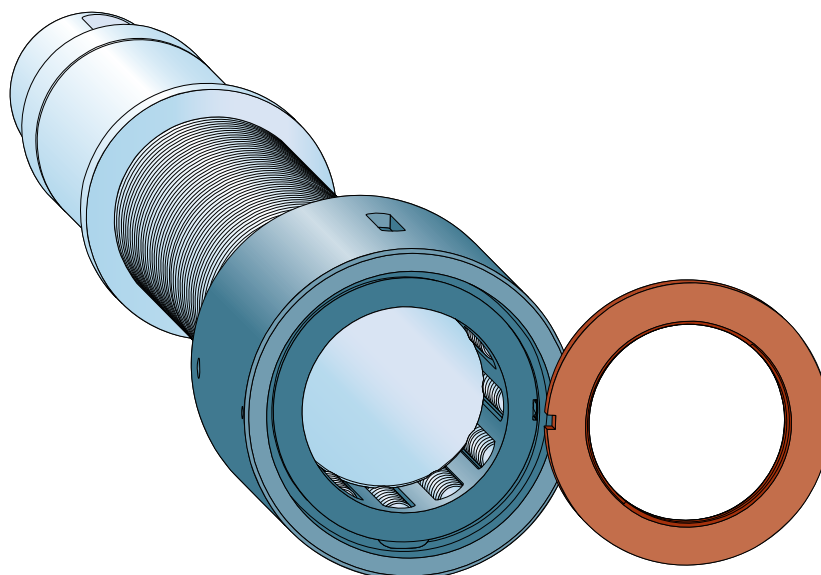


Fig. 41

Fig. 42

Recirculating roller screw



## Lubrication

The rust inhibitor is not a lubricant. For grease or oil lubrication, please refer to the lubrication chapter in this catalogue.

## Starting up the screw

After the assembly has been cleaned, fitted and lubricated, allow the nut to make several full strokes at low speed (< 50 r/min) and under light load (not to exceed 5% of the roller screw dynamic load carrying capacity) in order to check the proper positioning of the limit switches or reversing mechanism. Then, normal load and speed can be applied.

## Running in period

Non-preloaded roller screws will experience a running in process during the first hours of operation.

Ewellix recommends injecting half the volume of grease in the nut after running in, to renew the lubricant potentially contaminated by running in particles.

For preloaded roller screws, a running in of 20 000 revolutions is performed before delivery.

## Monitoring screw life

At the end of the screw's service life, the following conditions become observable: Fatigue flaking, increase in axial play, deterioration of running behavior, increase in driving torque and increase in operating temperature. Also, lubricant becomes noticeably contaminated. These indicators are important methods of monitoring the condition of a roller screw. Immediate replacement is recommended at the end of the service life in order to avoid any damage to the installation.

### Important:

Poor quality or lack of lubricant, abnormal stresses, misalignment and tilting, and operation outside defined specifications will increase operating temperature of the roller screw. Monitoring the operating temperature will help detect any irregularities.

## Traceability

Each roller screw shaft and nut are identified by engraving with unique manufacturing order and serial number. Each screw's individual dimensional data, lead precision, axial play, preload torque, etc. are recorded and archived by Ewellix for a period of 10 years. This period can be enlarged for special applications.

## Support bearings assembly

1. Check the direction of fitting (position of the flange) before fitting a FLRBU support bearing
2. If necessary, heat the FLRBU up to 80 °C with a suitable heater
3. Fit the FLRBU on the screw (check that it fits against the surface of the screw flange)
4. Prepare the KMT locknut and loosen the KMT locking screws one-quarter of a turn
5. Fit the KMT locknut:
  - Tighten to 1,5 times the tightening torque listed in the product table
  - Loosen the nut
  - Retighten the KMT locknut to the torque values listed in the product table and tighten the locking screws
6. Check the radial run-out of the machined end and mark the upper point
7. If the run-out is out of tolerance, loosen and retighten the radial locking screw which is closest to the previously marked upper point
8. Check the radial run-out again
9. Check the operation of the support bearing.

## Recommendations for bolts used with flanged nuts

Ewellix recommends using bolts with steel quality that complies with ISO class 12.9.

## Alignment

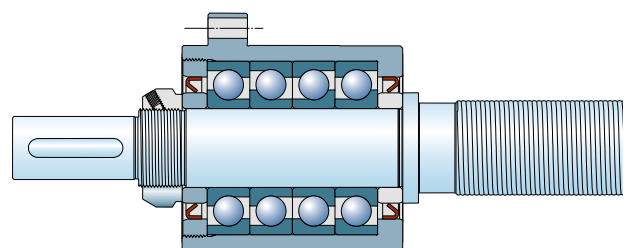
Ewellix linear guidance systems should be checked for proper alignment to avoid non-axial loading on the roller screw. If external linear guidance does not meet these requirements, we suggest mounting the roller screw nut on trunnions, or mounting the screw shaft on self-aligning bearings.

For assembly, Ewellix recommends the following procedure which applies to an assembly with a rotating shaft screw and stationary nut.

The linear guides must be correctly mounted according to recommendations for the selected guidance system.

Fig. 43

Support bearing assembly



### 1. Align the screw shaft with the linear guides

Align the support bearing housings with the guides to obtain parallelism of the screw shaft with respect to the linear guides. The inclination of the support bearing axis versus the linear guide, in two perpendicular planes, must be less than  $1/2\ 000$  rad ( $0,03^\circ$ ), the ideal target being  $1/5\ 000$  rad ( $0,011^\circ$ ) (→ fig. 44).

### 2. Align the nut housing with the linear guides

Align the roller screw nut housing with the axis of the linear guides to obtain parallelism of the nut axis with the linear guides.

The inclination must be less than  $1/2\ 000$  rad ( $0,03^\circ$ ), the ideal target being  $1/5\ 000$  rad ( $0,011^\circ$ ). These tolerances must be maintained under load (→ fig. 45).

### 3. Check the concentricity of the nut housing with the support bearings

Ewellix recommends checking that the nut housing is not off-centered versus the support bearings of the shaft. Otherwise, the excessive off-centered position of the nut housing would result in unacceptable radial loading on the roller screw. The radial eccentricity in two perpendicular planes must not exceed 0,02 mm between the nut housing bore diameter and the support bearings axis (→ fig. 46).

### 4. Check the axial run-out of the nut housing face versus the screw shaft axis (flanged nuts)

Ewellix recommends checking that the nut housing presents the appropriate perpendicularity to the roller screw axis to avoid the tilting of the screw nut and to avoid uneven loading along the rollers.

The axial run-out of the housing face must be (→ fig. 47):

- Lower than 0,015 mm for screws with  $d_0 \leq 15$  mm
- Lower than 0,02 mm for screws with  $15 < d_0 \leq 39$  mm
- Lower than 0,04 mm for screws with  $d_0 > 39$  mm.

Fig. 44

Align the screw shaft with the linear guides

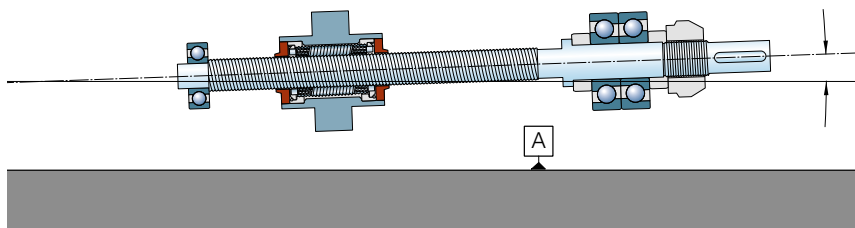


Fig. 45

Align the nut housing with the linear guides

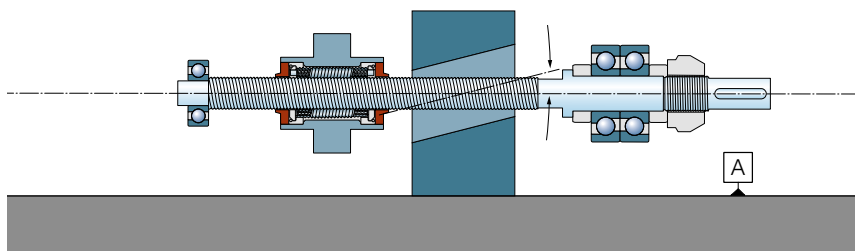


Fig. 46

Check the concentricity of the nut housing with the support bearings

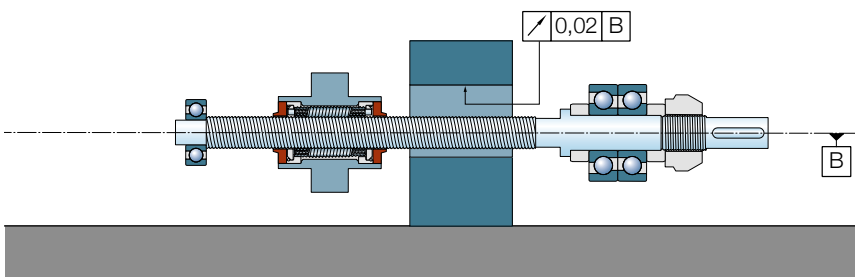
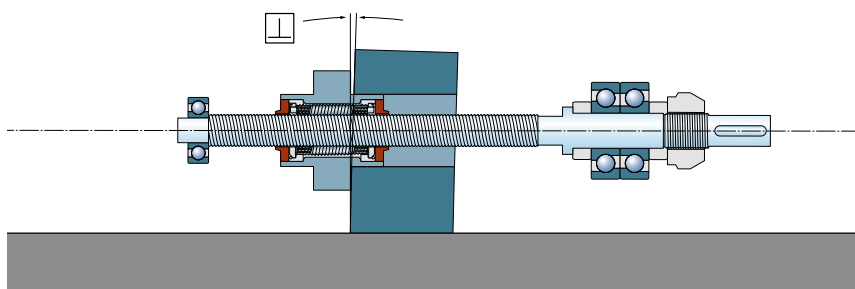


Fig. 47

Check the axial run-out of the nut housing face versus the screw shaft axis



# Lubrication

## Lubrication for roller screws

The primary objectives of lubrication are:

- To prevent metal-to-metal contact between the rolling surfaces, and to minimize metal fatigue
- To protect against corrosion
- To minimize wear
- To maximize the roller screw service life
- To achieve performance requirements for given operational conditions (temperature, humidity, vacuum environment, corrosive environment, etc.)

In standard delivery conditions, roller screws are not lubricated. However, they can be lubricated on request. Please contact your local Ewellix representative. For roller screws with standard delivery conditions, customers must provide proper lubrication prior to operation.

**Important:**

Before shipping, roller screws are coated with a rust inhibitor. The inhibitor is not a lubricant. Depending on the lubricant selected for the application, it may be necessary to remove the rust inhibitor before applying the lubricant in order to eliminate any risk of incompatibility. To remove the film, Ewellix recommends the following procedure:

- Wash the roller screw assembly with a solvent
- Allow the solvent to penetrate the nut assembly
- Let the solvent drain completely from the roller screw assembly

The rust inhibitor Ewellix applies to its roller screws is not compatible with the following lubricants:

- Polyglycol base oil
- Ester base oil
- Silicone base oil
- Aluminum complex soap

If any of the above lubricants are used, please follow the procedure above to remove the rust inhibitor prior to lubrication.

There are three main types of lubricants, grease, oil and dry lubricant. In the majority of applications, grease or oil lubrication will be selected. Due to similar tribological conditions, most greases or oils recommended for gears and bearings are also suitable for roller screw lubrication (→ table 5).

Table 5  
*Different lubricant pros and cons*

| Type of lubricant | User benefits                                                                                                                                         | Constraints                                                                                                                                                                       |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Grease            | Most practical and most usual lubrication solution for roller screws                                                                                  | Requires relubrication schedule                                                                                                                                                   |
| Oil               | Higher lubrication performance for roller screws<br>Circulating oil helps to clean the roller screw mechanism and stabilize the operating temperature | Requires more complex equipment installation<br>Special care required for equipment cleanliness and tightness                                                                     |
| Dry coating       | Lubrication solution for specific applications or environments where liquid lubricants cannot be used                                                 | Requires advanced processing method<br>Might require special steel variants for roller screws<br>Higher cost<br>Well defined operating conditions to achieve expected performance |



## Grease lubrication

Grease is the most common lubricant for screws. The grease type is primarily selected based on the requirements for operating temperature, load level, speed and environment.

Grease consists of base oil (average 80% of total grease volume) which is the lubricating agent, contained in a thickener matrix or soap, plus additives which provide special properties.

### Grease selection

Grease with a synthetic base oil is recommended over grease with a mineral base oil as it presents the advantages of greater stability over time and lower viscosity variation with changes of temperature.

The following synthetic oils provide good results for roller screw applications:

- Polyalphaolefins (PAO)
- Polyglycol (PAG)

Among many possible alternatives, the following thickeners achieve a good result with roller screw applications:

- Lithium or complex lithium
- Barium or complex barium

The dynamic viscosity characterizes the oil's ability to create a sufficiently thick hydrodynamic film between the contact surfaces of a screw. Lubricant data sheets usually provide the viscosity of the base oil at 40 °C and 100 °C.

In general, Ewellix recommends lubricants with a viscosity around 100 Cst when the application has reached its normal operating temperature.

Normal operating temperature is determined by the heat generated by the roller screw, any externally applied heat and the amount of heat that can be transferred away from the screw.

Grease consistency or NLGI grade between 0 (semi-fluid) and 2 (soft) is suitable for most applications. For automatic lubrication systems, Ewellix recommends checking the consistency required for the system to work properly.

For high speed applications and vertical applications which could cause the lubricant to fly off or pour down the shaft because of centrifugal forces, lubricants that will strongly adhere to the shaft are recommended. In this respect, barium soap and complex metallic soaps provide good adhesive properties. In these conditions, NLGI grade 2 is also recommended to provide good consistency.

However, when rotating speed is low (below 10 r/min), high viscosity lubricants are recommended to enable the creation of a sufficiently thick hydrodynamic film between the rolling surfaces, and to limit friction under load. Ewellix usually recommends a viscosity above 300 Cst at the operating temperature.

Shearing of the hydrodynamic lubricant film is proportional to the load level. In general, for external load levels greater than 25% of the dynamic load carrying capacity of roller screws, Ewellix recommends greases with extreme pressure (EP) additives.

Greases that pass the "four balls welding load test" under a weight of 250 kg, will perform well in heavily loaded applications.

The following working conditions require specific greases:

- Food industry
- Vacuum applications
- Presence of water
- Vibrations
- Small movements, oscillations...

Lubrication systems can generally be adapted to our roller screws for automatic injection of grease.

## Lubrication schedule and procedure

Ewellix recommends the following lubrication schedule and procedure:

### 1. Commissioning and initial lubrication

New roller screws must be lubricated prior to use.

#### 1.1. Lubrication procedure for the shaft:

On the threaded length of the shaft, spread a volume of grease with a brush. The product tables (**pages 54 to 103**) provide the quantity of grease  $Z_s$  to be applied per meter of threaded length for each screw size.

This volume of grease is estimated using the following formula:

$$Z_s = 4,4 \times 10^{-4} d_0 l_1$$

where

$Z_s$  = grease volume [cm<sup>3</sup>]

$d_0$  = nominal diameter of the screw [mm]

$l_1$  = threaded length of the screw [mm]

#### 1.2. Lubrication procedure for the nut:

Roller screws with a flanged nut have a threaded hole for a grease fitting. Roller screws with a cylindrical nut include a central groove and a lubrication hole that can be connected to a grease channel through the housing. During the initial lubrication, Ewellix recommends filling  $\frac{1}{3}$  rd of the free space in the nut with grease. The volume of grease to be injected is listed in the product tables in column  $Z_n$ .

Inject the grease in several steps, rotate the nut on the shaft or the shaft in the nut (several revolutions) between two grease injections in order to spread the grease between the rollers and to spread it over the nut length.

### 2. First relubrication

For non-preloaded screws, Ewellix recommends an additional injection volume of  $Z_n/2$  after 100 000 revolutions.

### 3. Lubrication maintenance schedule (after the first relubrication)

The following method describes the lubrication maintenance schedule and procedure for complete grease renewal, to be followed for the life of the roller screw, after the initial greasing operation and the first relubrication. This recommendation will optimize performance and extend the service life of the roller screw. This method is valid for screws working in an industrial environment, in a workshop, without external contaminants, and at ambient temperature not exceeding 40 °C.

A lubricant that does not completely meet the application requirements will require shorter relubrication intervals.

To avoid problems associated with grease compatibility (miscibility), always use the same type of grease. If, for whatever reason, it is necessary to switch to a different type of grease, check miscibility carefully.

When in doubt, thoroughly clean the nut and screw shaft.

### Note:

Grease applied to the length of the screw thread is usually not protected, which can accelerate aging and oxidation.

The parameters determining the relubrication intervals are:

- Speed: maximum rotational speed of the application
- Load: mean axial load carried by the screw in the application. The mean load can be calculated using the formulae detailed in **pages 44 to 50**.
- Temperature: internal temperature of the nut mechanism, usually the temperature measured on the outside surface of the nut, plus 15 °C.

If idle time is very long compared to operational time, the natural ageing and oxidation of the grease tends to change the grease condition, and decrease relubrication intervals. This case is not in the scope of following method.

The initial quantity of grease is the volume spread on the shaft plus the volume injected in the nut.

$$Z_o = Z_s + Z_n$$

The calculation of the lubrication intervals takes into account the actual operational time when the screw is in motion (idle time is not factored into that calculation).

The time before renewal of the initial quantity of grease is:

$$t_g = t_s K_T K_F$$

where

- $t_g$  = Operational time before complete renewal of the initial quantity of grease
- $t_s$  = Basic relubrication interval related to maximum speed.  $K_s$  can be estimated using **diagram 4**
- $K_T$  = Correction factor related to roller screw maximum internal operating temperature.  $K_T$  can be estimated using **diagram 5**. This diagram applies to standard greases such as lithium based greases
- $K_F$  = Correction factor related to screw mean operating load.  $K_F$  can be estimated using **diagram 6**, with consideration to the ratio of equivalent dynamic load to dynamic load carrying capacity  $F_m/C_a$ .

### Important:

The renewal of grease should be done incrementally. Once the relubrication quantity and total interval are determined, they must be fractioned over time in practical volume and intervals. Ewellix recommends applying small amounts of grease frequently rather than applying the full quantity in one operation.

If all the grease is renewed at once (which is not recommended), operate the roller screw at low speed to spread the grease over the full length of the screw.

If the consistency or viscosity of the grease changes rapidly, or if the temperature does not stabilize to an acceptable level, either the relubrication intervals must be shortened, or the grease is not suitable for the application conditions and another type of grease must be used.

Always rotate the shaft during periodic lubrication to distribute the grease evenly in the nut and the shaft. Rotating the shaft also prevents a roller from blocking the grease inlet hole.

Diagram 4

Basic relubrication interval  $t_s$  as a function of

- rotating speed [r/min]
- operational time [hours]
- nominal diameter  $d_0$  [mm]

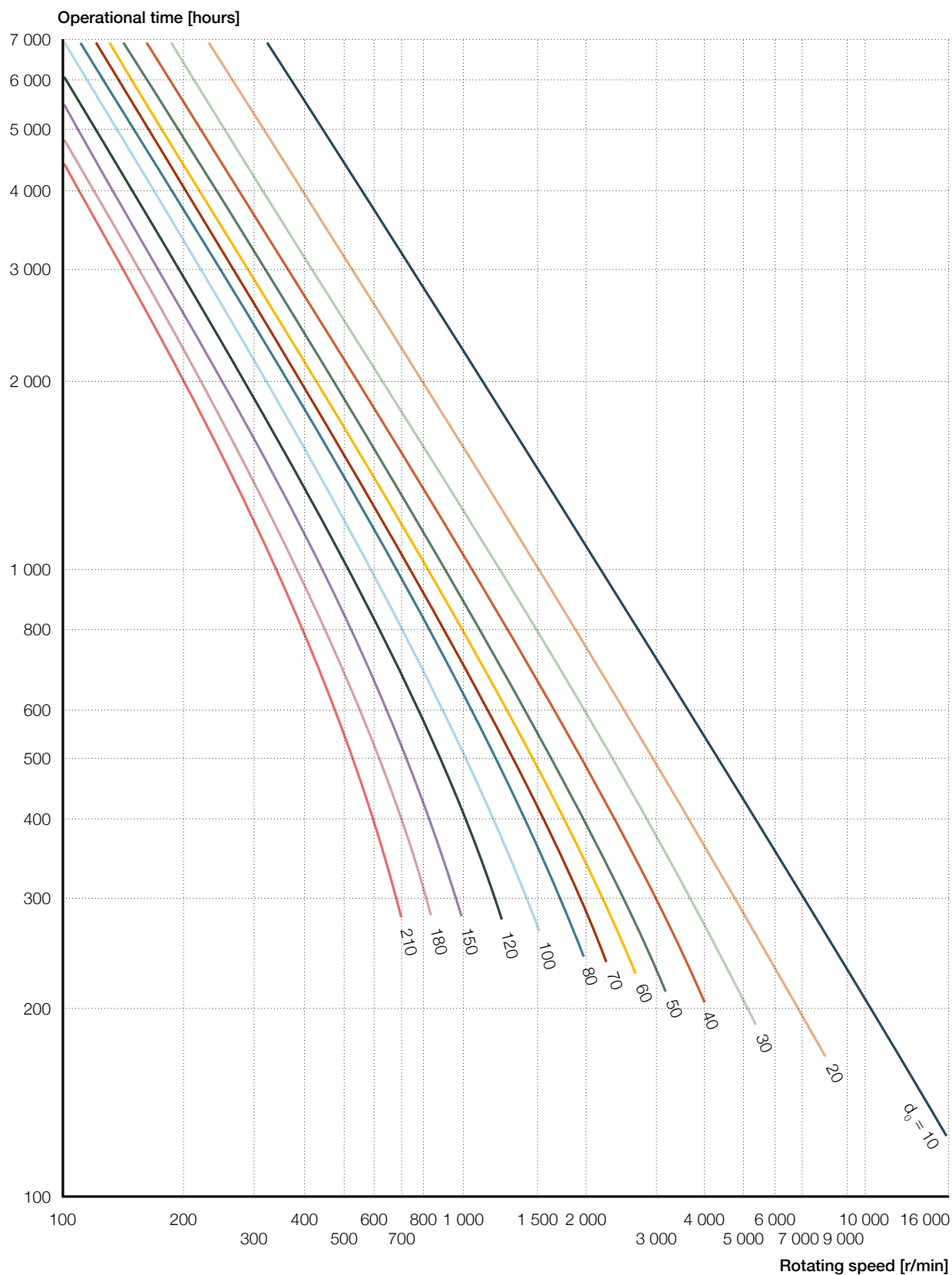


Diagram 5

Correction factor  $K_T$  for operating temperature

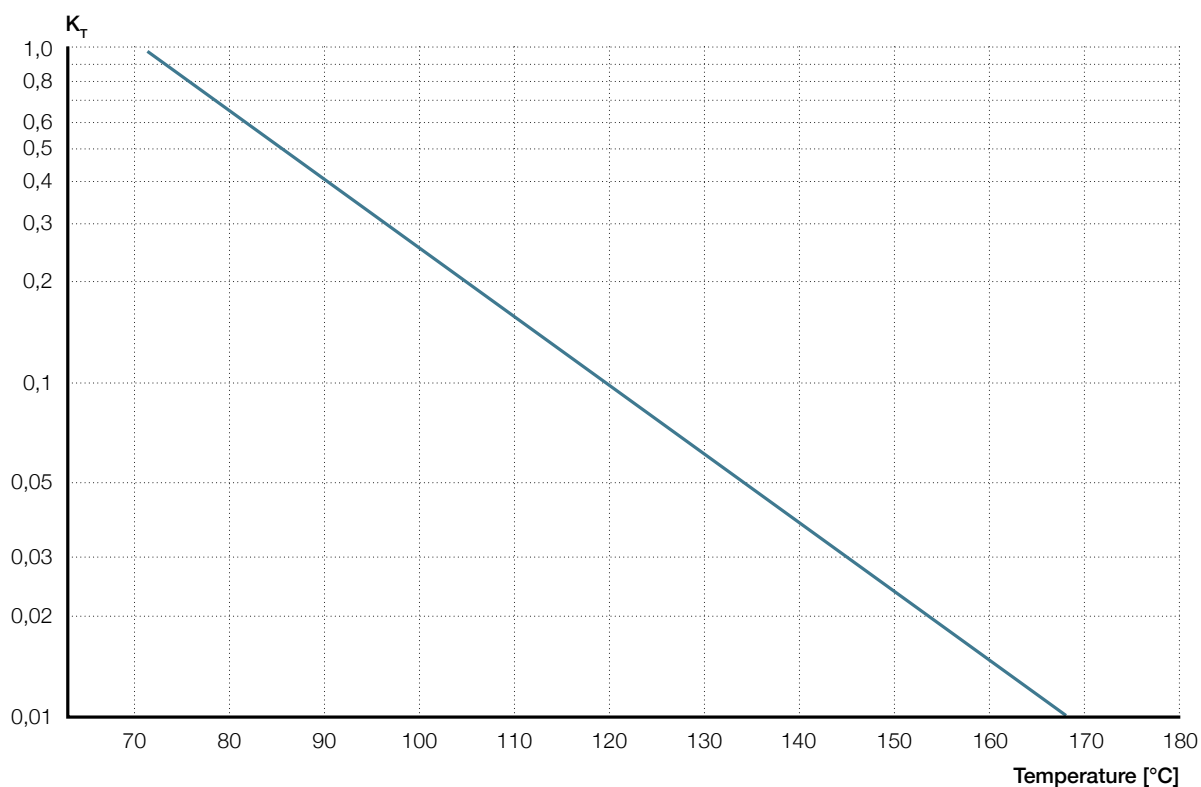
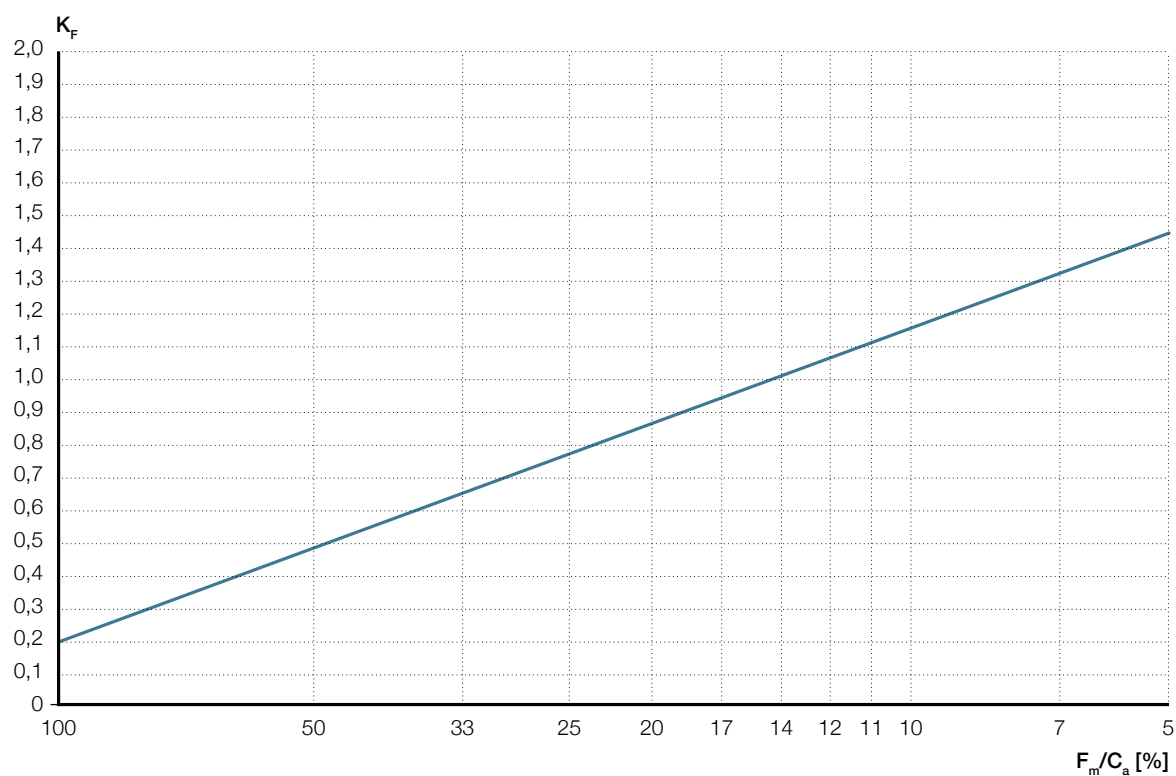


Diagram 6

Correction factor  $K_F$  for mean operating load



### Example:

Roller screw SRF 39 x 20R 760/1030 G5 Z WPR is used in a simulator, in the vertical position, and operates according to following conditions:

- Mean axial load over one working cycle = 17 kN
- Each working cycle accomplishes 32 back -and-forth strokes of 1 000 mm (total travel of 32 000 mm per working cycle), operation is 12 working cycles per hour, 8 hours per day
- The screw is in motion during 70% of the time of a working cycle, i.e. 5,6 hours of motion per day
- Maximum speed = 1 500 r/min

For such application data, a grease with metallic complex soap or barium is recommended because it will improve adhesion under high speed and vertical position. A viscosity of 100 to 150 Cst at 40 °C is advised.

### Initial quantity of grease when commissioning the screw

- Initial quantity of grease on the shaft  
 $Z_s = 4,4 \times 10^{-4} d_0 l_1$   
 $= 4,4 \times 10^{-4} \times 39 \times 760$   
 $= 13 \text{ cm}^3$  (see product table)
- Initial quantity of grease in the nut  
 $Z_n = 28 \text{ cm}^3$  (see product table)
- Total quantity of grease  
 $= 13 + 28 = 41 \text{ cm}^3$  must be applied

### Calculation of first relubrication

- With the given duty cycle, 100 000 revolutions are reached within one day
- $(32\ 000 / 20) = 1\ 600$  revolutions per working cycle
- 12 cycles per hour  $\rightarrow$  19 200 revolutions per hour
- 8 hours operation per day  $\rightarrow$  153 600 revolutions per day
- Approximately 1 day into operation, the first relubrication should be scheduled with 14 cm<sup>3</sup> of new grease in the nut (half the initial volume of grease in the nut).

### Calculation of lubrication maintenance schedule

- $t_s$ :  
 Maximum speed = 1 500 r/min  
 From **diagram 7**, with 1 500 r/min and  $d_0 = 39 \text{ mm} \rightarrow K_S = 680 \text{ hours}$
- $K_T$ :  
 The temperature measured on the nut external surface = 65 °C  
 $\rightarrow$  Internal screw nut temperature ° 80 °C  
 From **diagram 8**  $\rightarrow K_T = 0,65$
- $K_F$ :  
 Dynamic load carrying capacity  $C_a$  of SRF 39 x 20R = 172 kN  
 $F_m / C_a = 17 / 172 \approx 10\%$   
 From **diagram 9**  $\rightarrow K_F = 1,15$

• Therefore, the maintenance lubrication schedule is:

$$\begin{aligned} t_g &= t_s K_T K_F \\ &= 680 \times 1,15 \times 0,65 \\ &= 508 \text{ hours} \\ &= 90 \text{ working days } (508 / 5,6 = 90) \end{aligned}$$

Within a period of 90 days, 41 cm<sup>3</sup> of new grease must be applied, to be divided in fractions applied on a regular basis.

Diagram 7

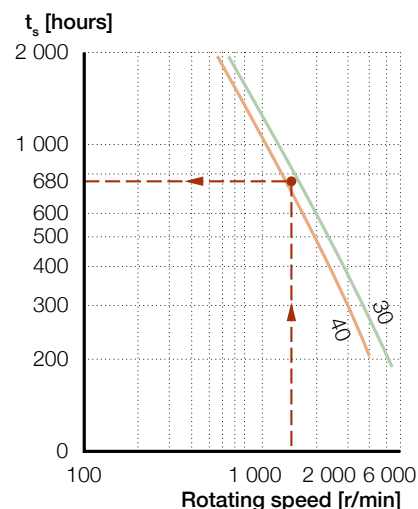


Diagram 8

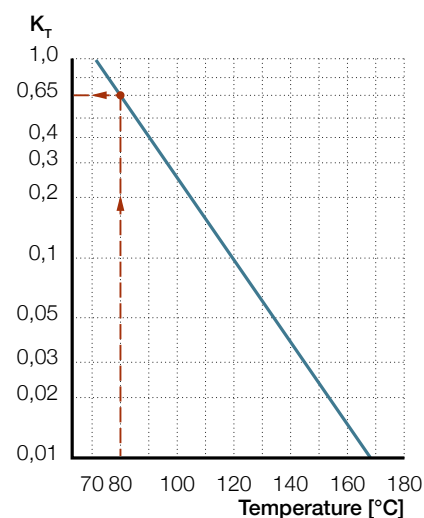
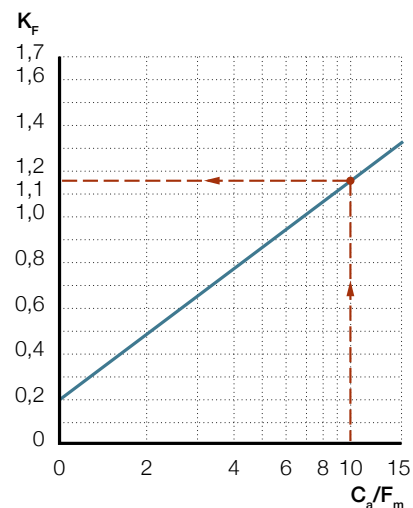


Diagram 9



## Oil lubrication

Oil lubrication provides the following advantages over grease lubrication.

Oil dissipates heat more efficiently than grease, particularly when there are heavy duty cycles and/or high speeds.

It helps to remove contaminants, and helps to clean the roller screw nut.

Lubricating a roller screw with oil is normally accomplished using a centralized recirculating oil system. This type of system is ideal because it continuously replaces the oil in the nut with cooled filtered oil coming from the reservoir. This system is recommended to control the flow of lubricant, remove any contaminants and avoid overheating.

### Oil selection

Oils used to lubricate other rotating parts such as bearings and especially gears can also be used to lubricate roller screws. Using hydraulic oils will jeopardize the product performance, condition and life.

The oil performance is affected by the rotational speed, the operating temperature and the load level.

The oil should have a viscosity of 100 Cst at the operating temperature. At low speed (below 10 r/min), the viscosity should be = 300 Cst at the operating temperature.

EP additives are recommended to improve the oil film strength.

Corrosion resistant and stabilizing additives are also recommended. Synthetic oils (PAO, polyglycol or ester based) are recommended for long service life and stable operation at high temperatures.

### Oil quantity

The quantity to be injected will depend on the size of the roller screw, the speed, the duty cycle and the sealing efficiency of the wipers. It can vary from 0,5 to 100 cm<sup>3</sup>/hour, with small injections of 0,1 to 1 cm<sup>3</sup>. It is best to adjust, by experience, the oil flow to obtain the correct stabilization temperature.

## Wipers

Wipers are composite components fitted at the ends of the nut with the purpose of preventing contamination and keeping the lubricant in place. Wipers are important components for roller screw performance and service life. It should be noted that standard wipers perform like labyrinth seals, not like garter seals. Depending on the product assortment, wipers are standard or optional (→ fig. 5).

Standard wipers are manufactured from acetyl resin with continuous operating temperature up to 110 °C and peak temperature up to 140 °C (→ tables 6 and 7).

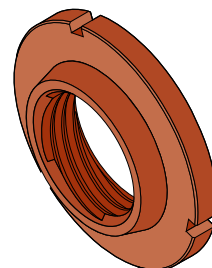
### Important:

Normally, threaded wipers are not axially secured in the nut. If the maximum stroke position is not respected and the edge of wiper extends beyond the non-threaded portion of the screw, the wiper can disengage from the nut or potentially jam. For this reason, the user shall respect the maximum stroke position.

On request, wipers can be axially secured to a nut to prevent disengagement of the wipers during operation.

Fig. 5

Wiper



## Dry lubricants

When wet lubrication is not allowed or not effective (application examples: satellites, laboratories), dry lubricants present the following advantages:

- Low out-gassing (for example, satellite applications)
- Coefficient of friction independent of speed and temperature
- Positional stability
- Low rate of ageing (for example, during long storage periods)

Dry lubricants can be applied by projection, electrolytic deposit or physical vapour deposit.

Ewellix recommends thin deposits that will support a low coefficient of friction: these dry lubricants are usually based on PTFE, MoS<sub>2</sub>, WS<sub>2</sub>, graphite. These coatings are not corrosion resistant, and special care must be taken when selecting raw materials

Ewellix also recommends thin deposits that enhance the resistance to wear. Such dry lubricants are typically based on tungsten carbide, Diamond Like Carbon or chrome plating. They do not provide the low coefficient of friction of PTFE for example.

Dry lubricants (on a stand-alone basis) are not suitable for industrial grade or for heavy duty applications, and they cannot reach the rolling fatigue life achieved with grease or oil lubrication.

### Note:

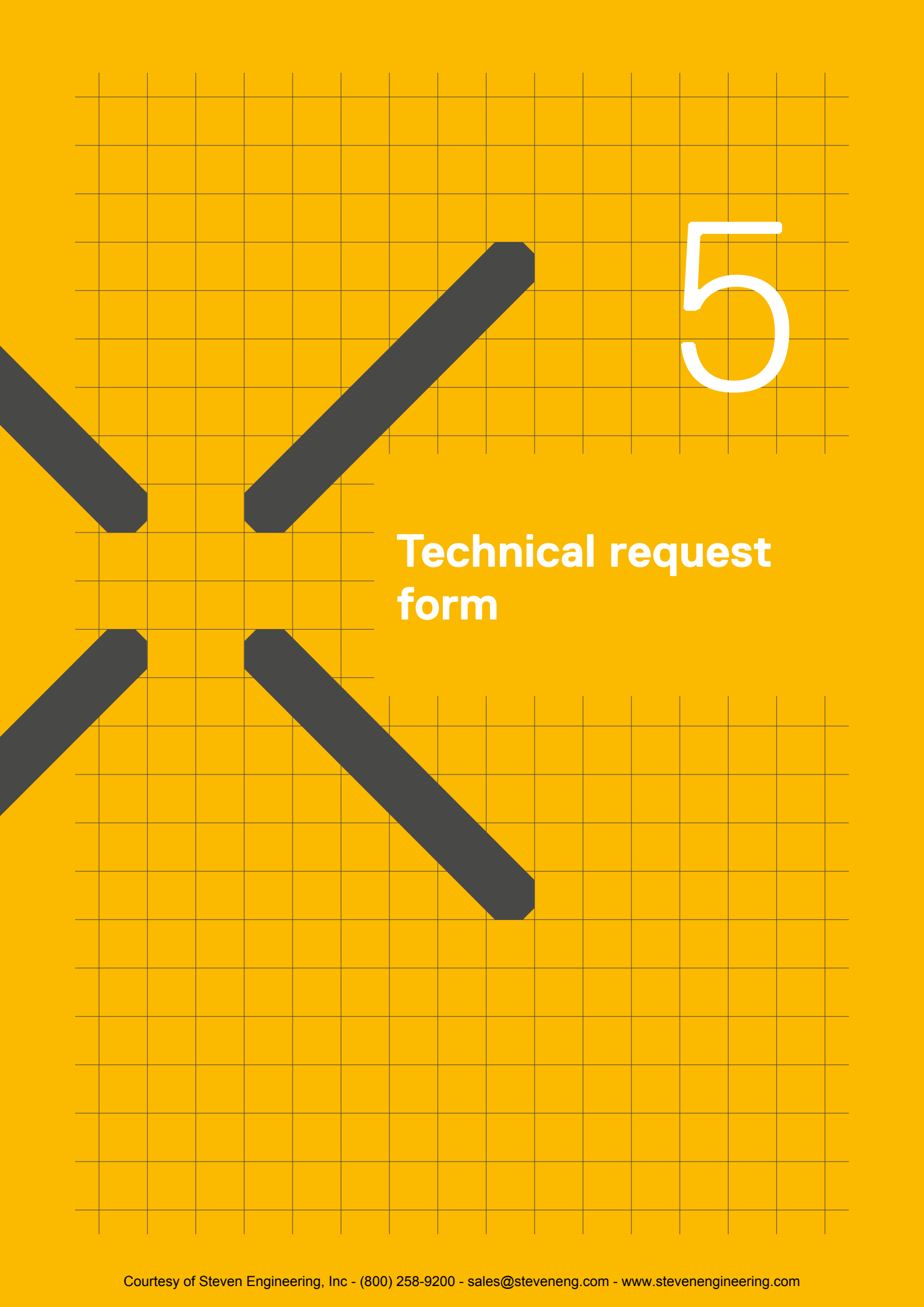
Lubrication that is performed at the customer facility after product delivery is outside the control of Ewellix. However, Ewellix provides the above guidelines to aid the customer in selecting a lubricant, and proper maintenance to provide maximum performance and product life. For additional information about lubricants and lubrication systems, please contact your local Ewellix representative.

Table 6

| Standard wipers                     |                                                                                                                                      |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Roller screw types                  | Wipers in standard delivery (Acetyl resin material)                                                                                  |
| <b>Planetary SR/BR/PR</b>           | To be specified in the designation                                                                                                   |
| <b>Planetary Ultra Power HR</b>     | Included                                                                                                                             |
| <b>Planetary IR (inverted)</b>      | Not included and not an option (wipers cannot be fitted into this roller screw design, sealing can be integrated into the push tube) |
| <b>Planetary SRR (rotating nut)</b> | Included (wipers fitted in the roller screw nut, garter seals fitted in the bearings housing)                                        |
| <b>Recirculating SV/BV/PV</b>       | To be specified in the designation                                                                                                   |

Table 7

| Special wipers                |                                                                                                 |
|-------------------------------|-------------------------------------------------------------------------------------------------|
| Optional wiper design         | Application                                                                                     |
| <b>PTFE material</b>          | High operating temperatures: continuous temperature up to 200 °C, peak temperature up to 260 °C |
| <b>Tighter wiper</b>          | Higher resistance to contaminants and better lubricant retention inside the nut                 |
| <b>Split (two half moons)</b> | Easier wiper disassembly on long, large diameter screws                                         |



5

## Technical request form

# Technical request form

## Customer and project information

Company name .....  
 Address .....  
 Contact name ..... Phone number .....  
 Email ..... Website .....  
 Project name.....  
 Application type<sup>1)</sup> .....

Customer is not a subsidiary or part of National Defense industry<sup>1)</sup> I agree  
 Application is not civil nuclear<sup>1)</sup> I agree  
 Application is civil<sup>1)</sup> I agree

Short description of application<sup>1)</sup>  
 (please attach a sketch if possible) .....  
 .....  
 .....

Current technology used for similar application.....

Annual roller screw requirements .....

Prototype requirements.....

Expected first delivery date.....

Expected prototype delivery date.....

## Preselection design parameters

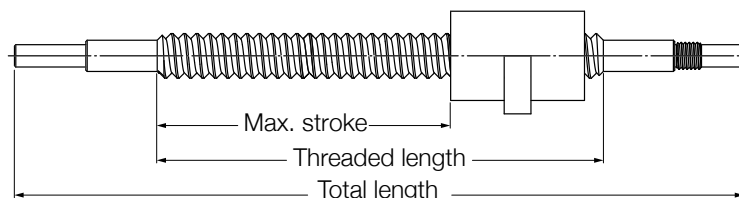
Maximum stroke [mm] ..... Preselection of screw shaft nominal diameter [mm] .....

Threaded length [mm]..... Preselection of lead Ph [mm].....

Total screw shaft length [mm] ..... Lead precision grade according to ISO 3408.....

Screw type (planetary, inverted, rotating nut, recirculating) ..... Axial play (standard or specific), without backlash or with preload.....

Nut shape (cylindrical, centered flange, off-centered flange, split nut, double nut) .....



<sup>1)</sup> This information must be provided.

## Operating conditions

### Environmental constraints

- Corrosive  
Polluted  
Vacuum  
Other

### Operating temperature

Minimum.....°C Maximum.....°C  
Average.....°C Ambient.....°C

### Lubrication

- Oil Grease  
Dry lubricant Specific lubrication needed

If lubricant is already selected

Brand name.....  
Type .....  
Viscosity at average operating temperature.....Cst

### Maximum loads, speed and acceleration

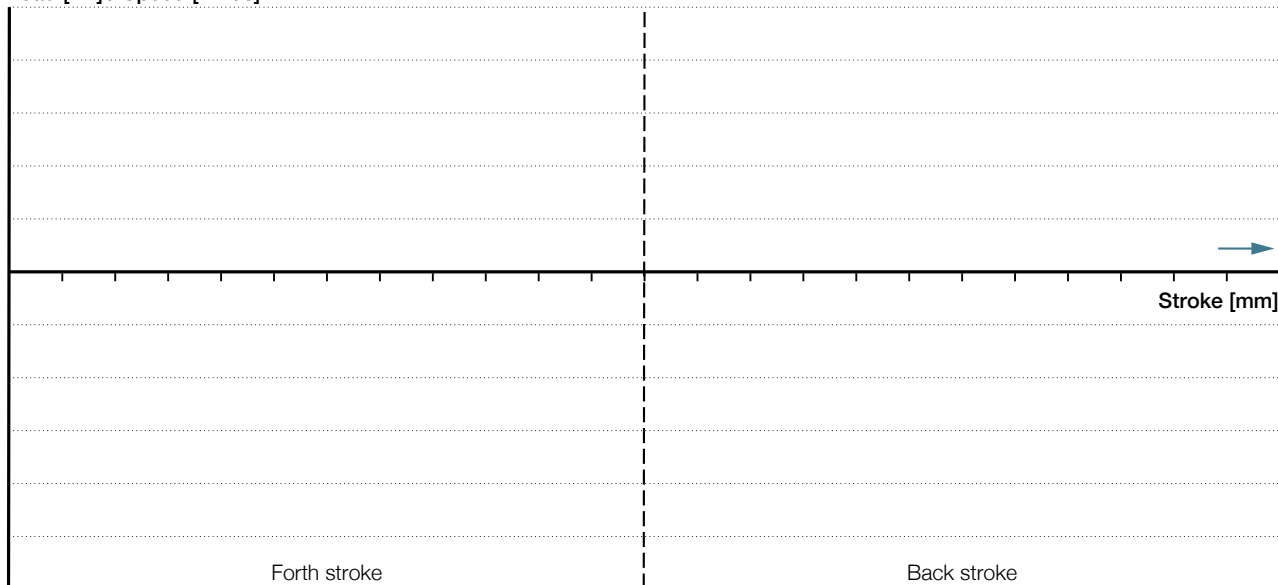
Maximum dynamic tension load .....N  
Maximum dynamic compression load .....N  
Maximum static or shock tension load .....N  
Maximum static or shock compression load .....N  
Maximum linear speed .....m/min  
Maximum acceleration .....m/s<sup>2</sup>

### Service life

Stroke (1 cycle = 2 strokes) ..... mm  
Cycles/hour.....  
Hours/day.....  
Days/year.....  
Years .....

## Duty cycle description

Load [kN] / Speed [mm/s]



## Mounting conditions

Position of the screw  
Rotating component  
Screw end mounting conditions

- ☐ Vertical  
☐ Screw shaft  
☐ ●●  
☐ ●●●  
☐ ●●●●

- ☐ Horizontal  
☐ Nut  
(fixed, free)  
(fixed, radial support)  
(fixed, fixed)

## Other pertinent information

.....  
.....  
.....

Ball screw catalogue, ball screw 2D prints and 3D models are available on [www.ewellix.com](http://www.ewellix.com)  
Please send inquiry form to your Ewellix sales office. For contact information, please visit [www.ewellix.com](http://www.ewellix.com)

6

Symbols

# Symbols

|                     |                               |                                                                                         |
|---------------------|-------------------------------|-----------------------------------------------------------------------------------------|
| $\alpha$            | [°]                           | Helix angle of the thread                                                               |
| $\eta$              | –                             | Theoretical direct efficiency                                                           |
| $\eta'$             | –                             | Theoretical indirect efficiency                                                         |
| $\eta_p$            | –                             | Practical direct efficiency                                                             |
| $\eta'_p$           | –                             | Practical indirect efficiency                                                           |
| $\mu_{\text{prac}}$ | –                             | Practical coefficient of friction                                                       |
| $\mu_{\text{ref}}$  | –                             | Reference coefficient of friction                                                       |
| $\mu_s$             | –                             | Coefficient of friction when starting                                                   |
| $\sigma$            | [MPa]                         | Nominal axial stress                                                                    |
| $\sigma_p$          | [MPa]                         | Real axial stress                                                                       |
| $\sigma_t$          | [MPa]                         | Total stress                                                                            |
| $\tau$              | [MPa]                         | Nominal shear stress                                                                    |
| $\tau_p$            | [MPa]                         | Real shear stress                                                                       |
| $B$                 | [mm]                          | Wiper overhang (protuding from nut length A)                                            |
| $C_{0a}$            | [kN]                          | Static load carrying capacity of a roller screw                                         |
| $C_a$               | [kN]                          | Dynamic load carrying capacity of a roller screw                                        |
| $C_{\text{req}}$    | [kN]                          | Required basic dynamic load carrying capacity                                           |
| $D_0$               | [mm]                          | Nominal nut diameter for an inverted roller screw                                       |
| $D_2$               | [mm]                          | Wiper outside diameter (= inner diameter of wiper recess)                               |
| $D_3$               | [mm]                          | Wiper outside diameter in the plane of nut end face                                     |
| $d_0$               | [mm]                          | Nominal diameter of screw shaft                                                         |
| $d_1$               | [mm]                          | Outside diameter of screw shaft                                                         |
| $d_2$               | [mm]                          | Root diameter of screw shaft                                                            |
| $d_b$               | [mm]                          | Bore diameter of a hollow screw shaft                                                   |
| $e$                 | [mm]                          | Depth of the keyway on shaft end machining                                              |
| $F$                 | [N]                           | Axial load                                                                              |
| $F_c$               | [N]                           | Buckling strength                                                                       |
| $F_m$               | [N]                           | Equivalent constant cubic mean axial load                                               |
| $F_{\text{pr}}$     | [N]                           | Internal preload force between a nut half (or a nut) and the shaft                      |
| $F_q$               | [N]                           | Squeeze load applied to two nut halves (or two nuts) by the housing or by fixing bolts  |
| $f_1$               | –                             | Mounting factor for calculation of critical speed of screw shaft                        |
| $f_3$               | –                             | Mounting factor for calculation of buckling strength of screw shaft                     |
| $f_4$               | –                             | Stress concentration factor for shaft end calculation for torsional stress              |
| $f_5$               | –                             | Stress concentration factor for shaft end calculation for axial stress                  |
| $g$                 | [m/s <sup>2</sup> ]           | Acceleration of gravity = 9,8 m/s <sup>2</sup>                                          |
| <b>HRC</b>          | HRC                           | Rockwell hardness                                                                       |
| <b>HV</b>           | HV                            | Vickers hardness                                                                        |
| $I$                 | [kgm <sup>2</sup> ]           | Inertia                                                                                 |
| $I_L$               | [kgm <sup>2</sup> ]           | Inertia of load                                                                         |
| $I_M$               | [kgm <sup>2</sup> ]           | Inertia of motor                                                                        |
| $I_{nn}$            | [kgmm <sup>2</sup> ]          | Inertia of a rotating nut                                                               |
| $I_{ns}$            | [kgmm <sup>2</sup> ]          | Inertia of rollers with rotating shaft                                                  |
| $I_s$               | [kgmm <sup>2</sup> /m]        | Inertia of screw shaft per meter of shaft length                                        |
| $K_F$               | –                             | Correction factor for basic relubrication interval to account for operating load        |
| $K_s$               | [h]                           | Basic relubrication interval related to maximum speed                                   |
| $K_T$               | –                             | Correction factor for basic relubrication interval to account for operating temperature |
| $L$                 | [mm]                          | Length of stroke in a duty cycle                                                        |
| $L_{10}$            | [10 <sup>6</sup> revolutions] | $L_{10}$ basic life rating, millions of revolutions                                     |
| $L_{10h}$           | [h]                           | $L_{10h}$ basic life rating, operating hours                                            |
| $L_n$               | [10 <sup>6</sup> revolutions] | Calculated life with reliability factor                                                 |
| $L_{tp}$            | [mm]                          | Maximum total shaft length                                                              |
| $l_0$               | [mm]                          | Nominal travel: Nominal lead multiplied by the number of revolutions                    |
| $l_1$               | [mm]                          | Threaded length                                                                         |
| $l_{cr}$            | [mm]                          | Free length, or distance between the two supports for shaft critical speed calculation  |
| $l_{rs}$            | [mm]                          | Length of roller set in an inverted roller screw                                        |
| $m_L$               | [kg]                          | Mass of the load                                                                        |
| $m_n$               | [kg]                          | Mass of the nut with standard number of rollers                                         |
| $m_s$               | [kg/m]                        | Mass of the screw shaft per meter                                                       |
| $n_{cr}$            | [r/min]                       | Critical speed                                                                          |
| $P$                 | [W]                           | Power                                                                                   |
| $P_h$               | [mm]                          | Lead of a roller screw                                                                  |

|                       |                    |                                                                              |
|-----------------------|--------------------|------------------------------------------------------------------------------|
| <b>Q</b>              | [mm]               | Fixing hole for the grease fitting, or lubrication hole for cylindrical nuts |
| <b>R<sub>n</sub></b>  | [N/μm]             | Nut stiffness                                                                |
| <b>R<sub>ng</sub></b> | [N/μm]             | Minimum nominal stiffness of a nut assembly                                  |
| <b>R<sub>nr</sub></b> | [N/μm]             | Reference nominal stiffness of a nut assembly                                |
| <b>R<sub>s</sub></b>  | [N/μm]             | Shaft stiffness                                                              |
| <b>R<sub>t</sub></b>  | [N/μm]             | Static axial stiffness of the roller screw assembly                          |
| <b>S</b>              | [mm]               | Maximum stroke for an inverted roller screw                                  |
| <b>S<sub>ap</sub></b> | [mm]               | Maximum axial play                                                           |
| <b>T</b>              | [Nm]               | Input torque in steady state                                                 |
| <b>T<sub>b</sub></b>  | [Nm]               | Back-driving and braking torque                                              |
| <b>T<sub>be</sub></b> | [Nm]               | Torque without backlash                                                      |
| <b>T<sub>f</sub></b>  | [Nm]               | Torque from friction in support bearings, motor, seals, etc.                 |
| <b>T<sub>pr</sub></b> | [Nm]               | Preload torque                                                               |
| <b>T<sub>t</sub></b>  | [Nm]               | Total driving torque                                                         |
| <b>u</b>              | [°]                | Angular position of lubrication hole on flanged nut                          |
| <b>Z<sub>0</sub></b>  | [cm <sup>3</sup> ] | Total grease quantity for the screw shaft and the nut                        |
| <b>Z<sub>n</sub></b>  | [cm <sup>3</sup> ] | Grease quantity for the nut                                                  |
| <b>Z<sub>s</sub></b>  | [cm <sup>3</sup> ] | Grease quantity for screw shaft                                              |





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