NOZAG
Transmission

System Program

About us

What counts is success – We help you achieve it
Today clear competitive advantages and opportunities depend on flexibility, speed, innovation and continuous improvement. We understand that time has become one of the most significant competitive factors. In clearly defined markets, we offer advanced solutions that aim at optimum customer value. With internationally recognized quality, – our entire company is certified according to ISO 9001:2008 – high stock availability and maximum reliability, we aim at being a true partner for our customers. We are aware that a lasting partnership is built on mutual trust and understanding and will be further strengthened by absolute liability. Nozag employees commit themselves every day to win the confidence of clients and suppliers. Highly, above-average skilled employees and state-of-the art facilities are the basis for that.

In-house manufacturing is supported by high-performance logistics; this going along with simple, direct and to-the-point communication with our partners. We respect and comply with all pertinent laws, especially those that protect the environment and the health and safety of our workers.

Product overview

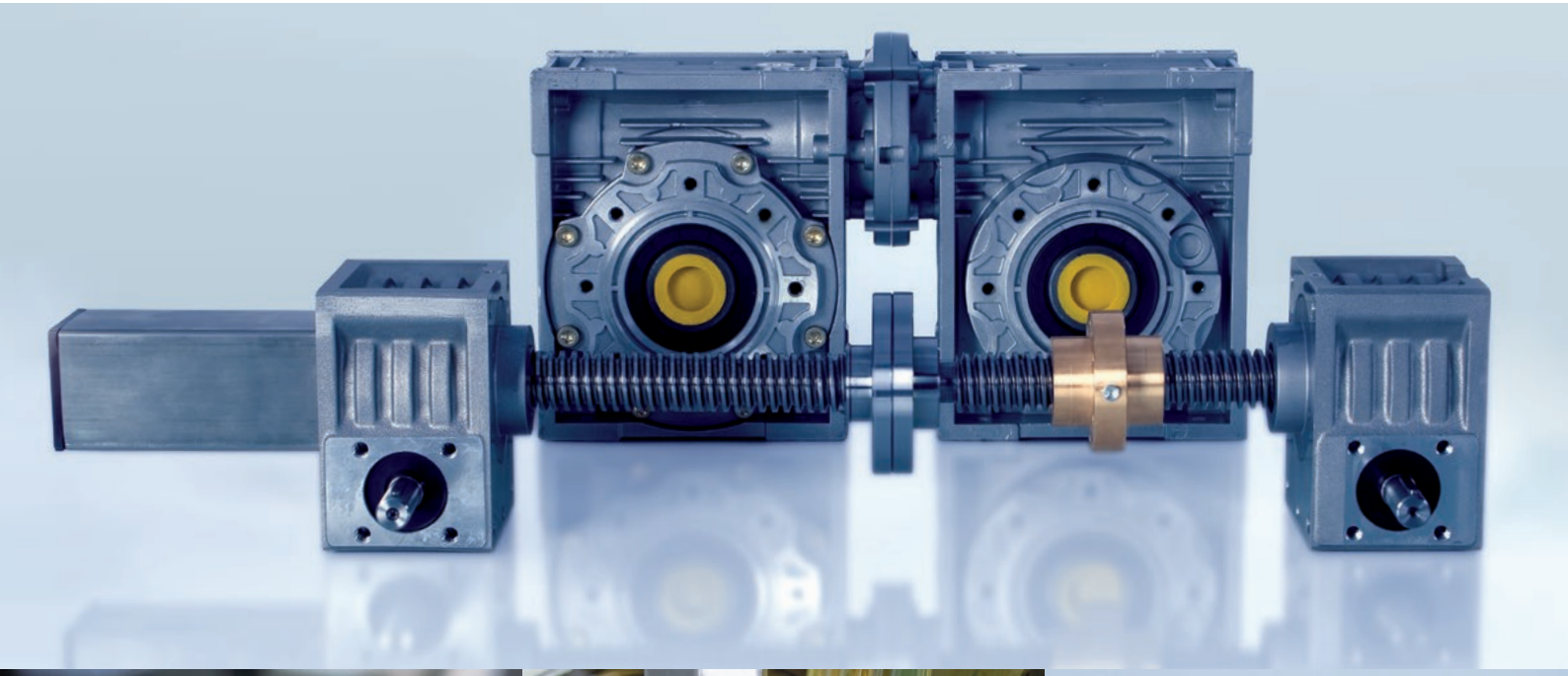
System Program

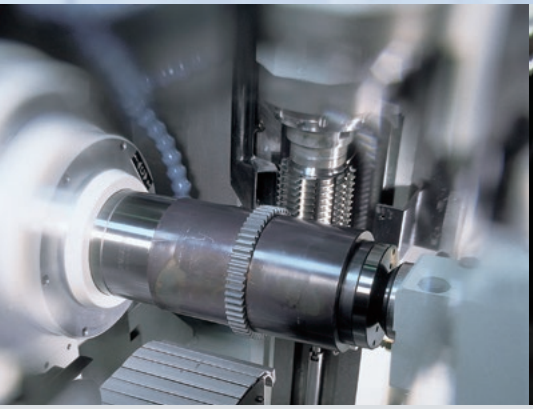
1 Screw jacks
2 Bevel gearboxes
3 Connecting shafts
4 Linear drives
5 Gear, worm gear
6 Customer-specific construction group

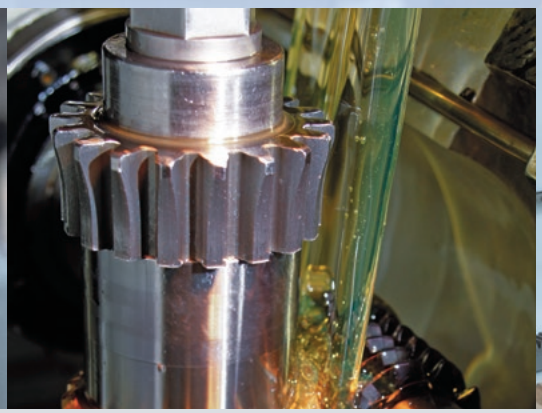
Standard Program

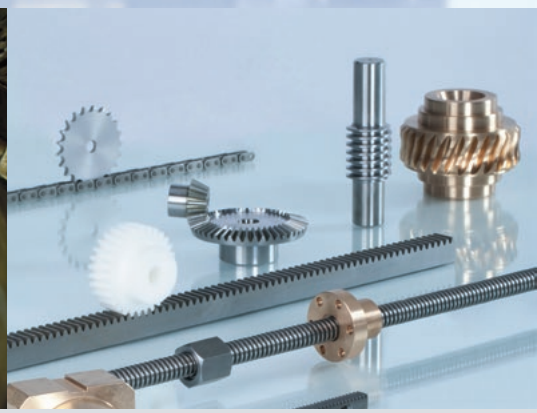
1 Spur gears module 0.3 to 8
2 Bevel gears up to module 6
3 Worms and worm wheels
4 Standard racks
5 Trapezoid threaded screws, trapezoid threaded nuts
6 Chains and chain wheels
7 Couplings
8 Hardened precision steel shafts
9 Manufacturing according to drawing

Request our separate catalog «Standard Program»









It couldn't be easier: www.nozag.ch

- **User-friendly catalog. If required, download individual catalog pages for your documentation.**
- **3D-CAD download from the entire range of Nozag products**

If you wish to be advised or supported in any way, we will be pleased to do this by phone or on site.

As a drive systems specialist, we deal with the development, manufacture and sale of standard or custom-designed gear components, sprockets, screw jacks, bevel gear drives, linear drives as well as other drive system components and special gears.

Nozag's products are manufactured mainly at the Swiss headquarters in Pfäffikon/ZH. We have subsidiaries in Switzerland, Germany and France and are represented by business partners in many other industrial countries worldwide.

At Nozag you will find

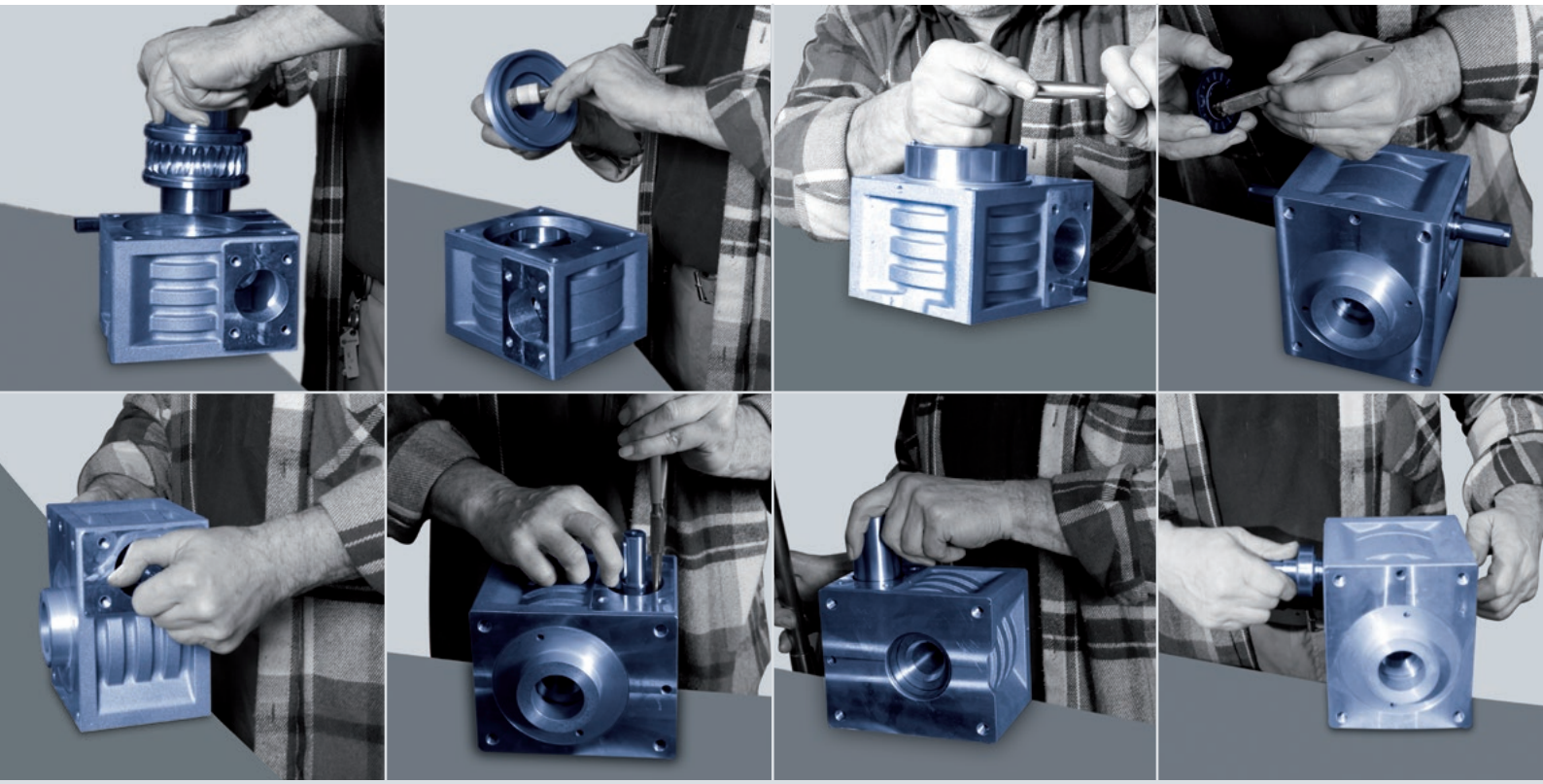
- in-house production and assembly
- Development, technical consultation
- Fast delivery service – many components from stock
- Continuity: on the market since 1966
- More than 35 years' experience in the manufacturing of gears
- Quality according to ISO 9001 : 2008

Contents

Screw jack

Individual products and services

We reserve the right on printing and dimension errors, as well as technical changes and improvements.



Screw jacks from our own production facility

To view the screw jack in all its facets as a standard machine element, that is a dream of many designers and machine builders.

We have already accepted this challenge a few years ago and today, offer the market a comprehensive delivery program and product range of screw jacks and accessories. Even the very first series, attachments and accessories were conceived and developed with the thought of one day being able to make from them, a large modular kit for individual and operationally safe drive-technology solutions.

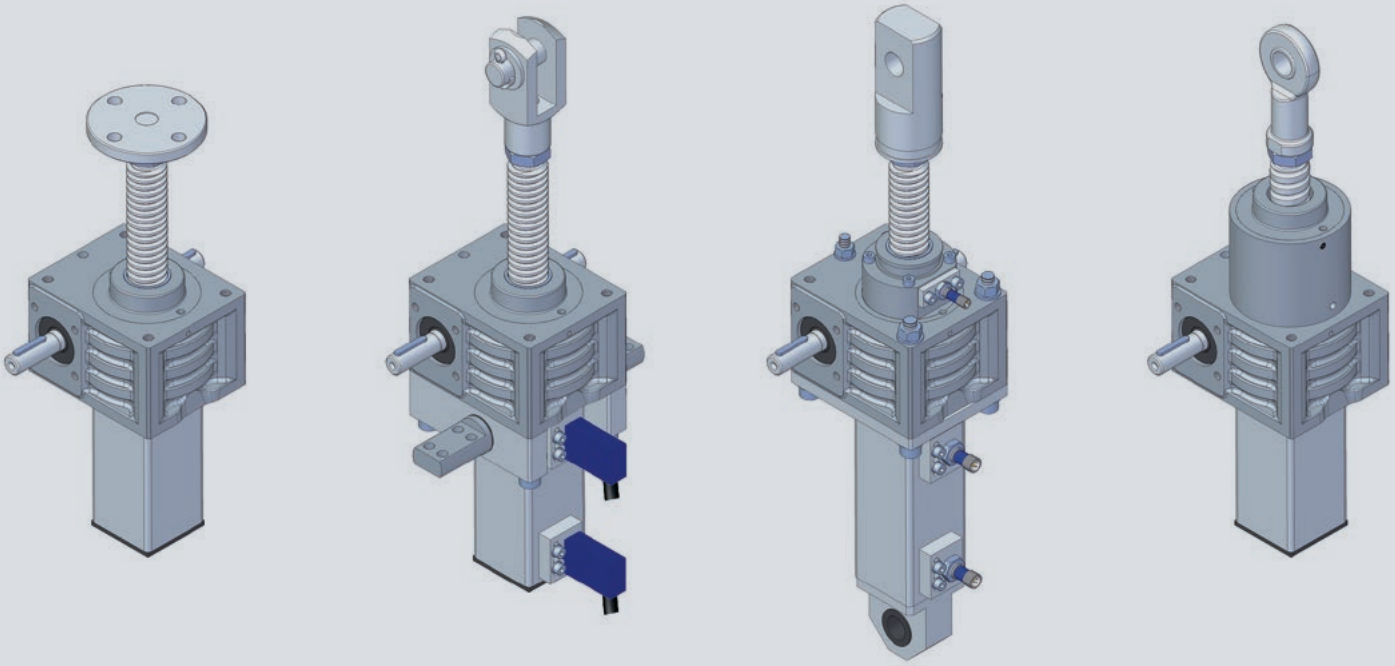
To put it succinctly: A lot should be moved with as little effort as possible, and in doing so, the investment, maintenance, repair and operating costs must stay within narrow limits. Screw jacks such as the ones developed, produced and sold by Nozag, solve drive-engineering tasks and problems in a comparably simple, and above all economical and cost-effective manner.

The customer thus receives, from a single responsible source, a complete, ready-to-install lifting/lowering/drawing/pushing system with defined interfaces. The possibilities of use are almost unlimited and as widespread as the supply program and product range. They range from the task analysis and the design calculation and manufacture, right up to the supply of the ready-to-install unit.

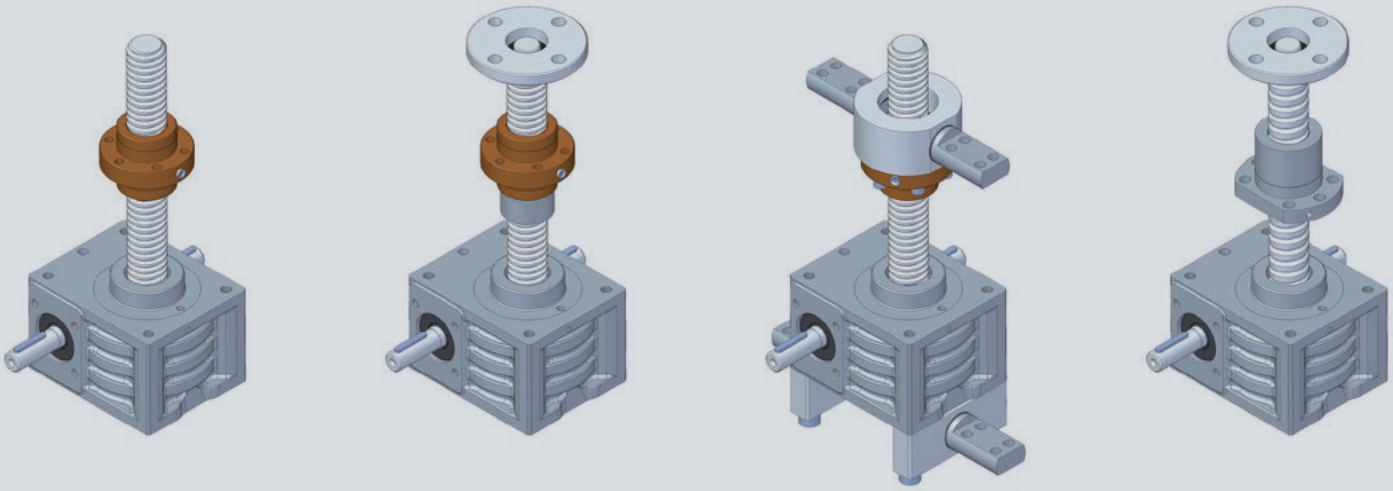
Nozag modular kit

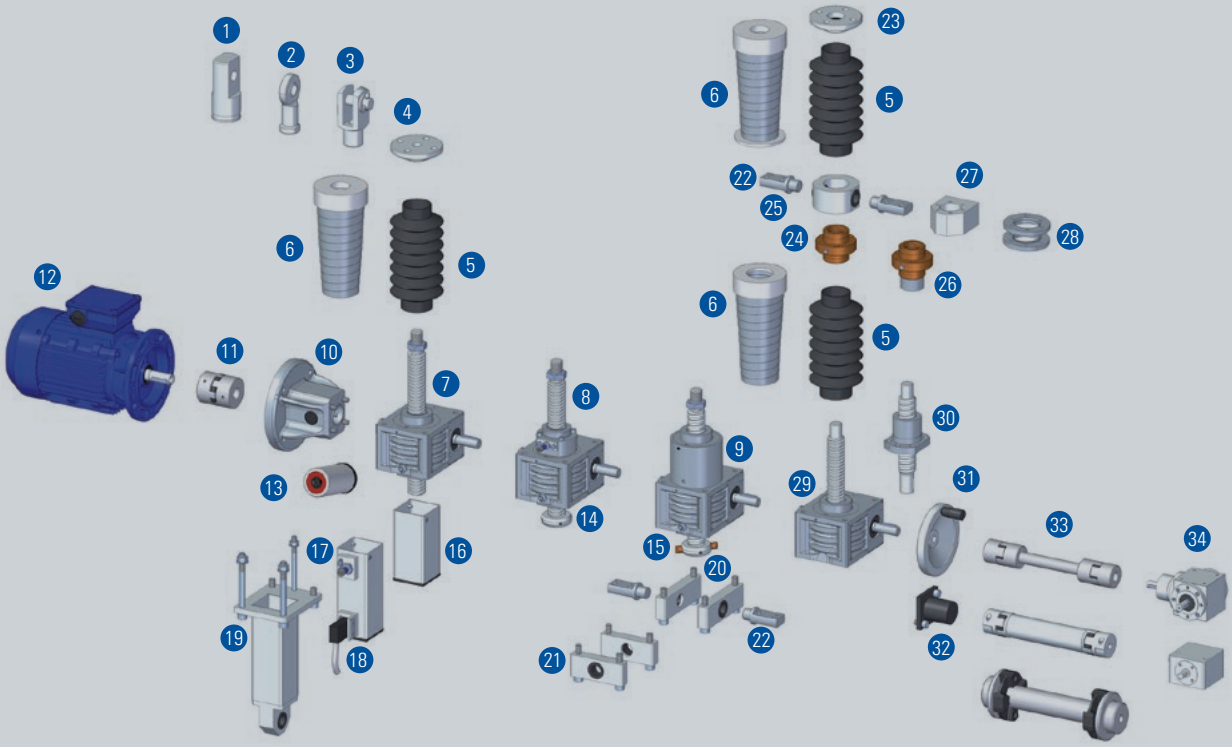
Defined force up to 1000 kN
- Rational design through complete modular sets – through-and-through compatible
- Everything from a single source minimises the procurement effort
- Supply of pre-assembled units and assemblies including motors
- Short delivery times
- Modern design
- Same force forward/backwards
- Constant speed forward and back, corresponding to the rotational speed of the drive motor
- Adjustable stroke

Non-rotating spindle
The worm wheel is provided with a female thread and converts the rotational movement into an axial movement of the spindle, when the latter is prevented from rotating (through its design or by means of an anti-rotation protection in the protection tube).



Rotating spindle
The spindle has a fixed connection to the worm wheel and rotates with it. The nut therefore screws itself up and down.





The modular, flexible and innovative screw jack kit in a wide performance range from 2 to 1000kN makes perfect drive solutions from low-cost standard components. Through the new gearbox series N, the kit not only includes the use of high-quality materials, innovative coatings and high-performance components, but is also subject to the highest standards of functionality, quality and design.

Your construction will be simpler and cost effective

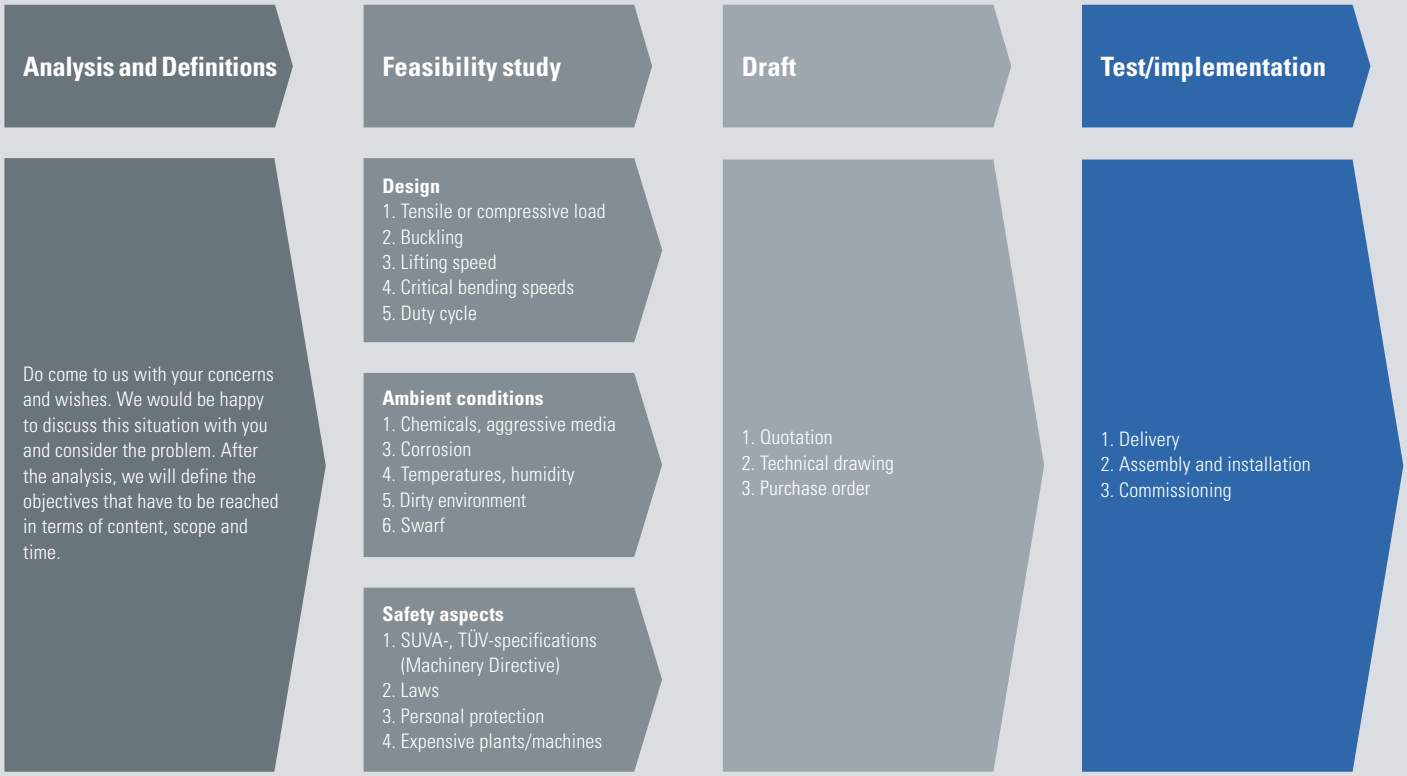
> Easy assembly with standardized individual components from the kit.
You save time

> less specific designs, because of a wide range of options to choose from

Complete drive systems – all from one source

> Whether motor, position measuring system, position switches or special requirements – you have one partner

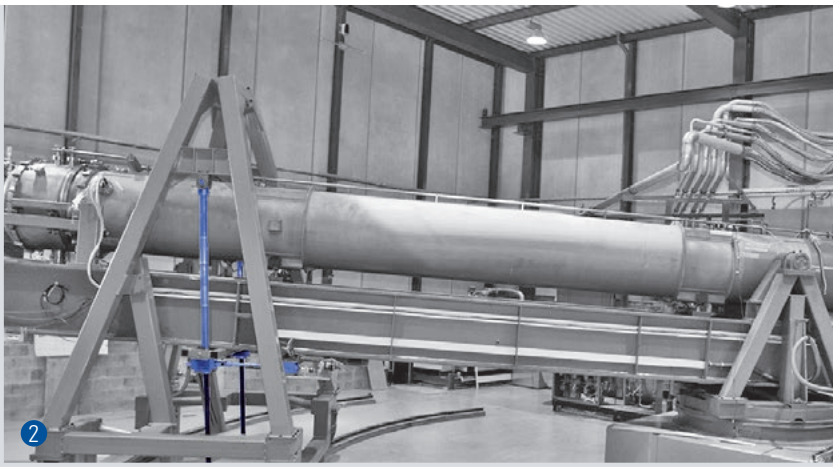
1 Swivel bearing head
2 Ball joint head
3 Fork head
4 Mounting flange
5 Bellows
6 Spiral spring cover
7 Screw jacks, non-rotating
8 Screw jacks, non-rotating with safety trap nut
9 Screw jacks, non-rotating with ball screw
10 Motor adapter
11 Flexible coupling
12 Motor/brake motor
13 Lubricant dispenser
14 Unscrew protection
15 Anti rotation lock
16 Protection tube
17 Limit switch inductive
18 Limit switch mechanical
19 Support tube
20 Suspension adapter long
21 Suspension adapter short
22 Suspension bolt
23 Flange bearing
24 Flange nut/Duplex nut
25 Suspension adapter for flange nut
26 Safety trap nut
27 Carrier flange
28 Calotte disks
29 Screw jack, rotating
30 Ball screw flange nut
31 Hand wheel
32 Protection cap
33 Connecting shafts
34 Bevel gearboxes



Screw jacks as linear movement drives, are appliable wherever controllable, raising, lowering, pushing, pressing, tilting, swivelling and similar movement sequences involving positioning, with millimetre accuracy, are to be carried out, in a constantly variable (i.e. stepless) manner, i.e. where rotational movements have to be converted into linear movements. Here, it is insignificant whether the linear movements take place horizontally, vertically, for pushing or pulling. Trouble-free functioning is guaranteed in all installation positions.

The advantages of the screw jacks with trapezoidal thread spindles and nuts as compared to other systems are, for example, in the self-locking feature, given from the design, when the drive is at standstill, and the minimal maintenance complexity. Screw jacks are closed drive concepts, in a compact construction, robust, impact-damping and silent.

Our planned procedures result in achieving the goal
Regardless of the type of challenge that you are confronting; it is always worthwhile to place an inquiry with us. Your goal is a mere four steps away.



Practical applications

1 Packaging
Correct height setting for filling

2 Research
Exact positioning of the measuring instrument for sunlight

3 Sunshade
Opening and closing the sunshade

4 Silo cover
Controlled closing and opening of the cover

5 Textile industry
Reliable positioning despite vibrations

6 Solar tracker
Fine-positioning of solar panels

7 Space Travel
Exact levelling, due to individually controllable lifting jacks

8 Lifting carriage
Manual positioning of pipes

9 Garage lift
Space-saving solution through lifting one of the vehicles

10 Vacuum chamber
Positioning and adjusting the chamber

11 Production machine
One motor drives four lifting jacks, mechanically synchronised

12 Silo
Construction and lifting help for large silo construction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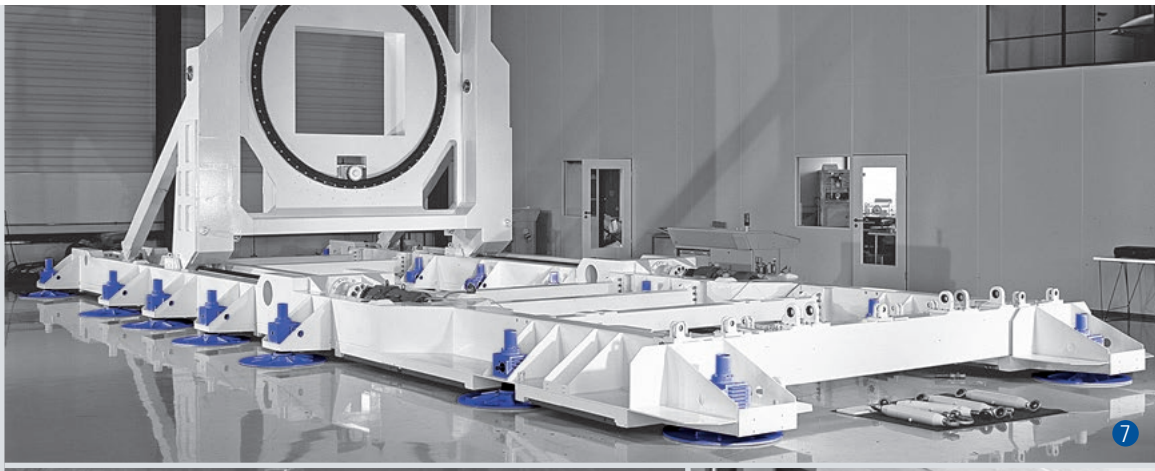
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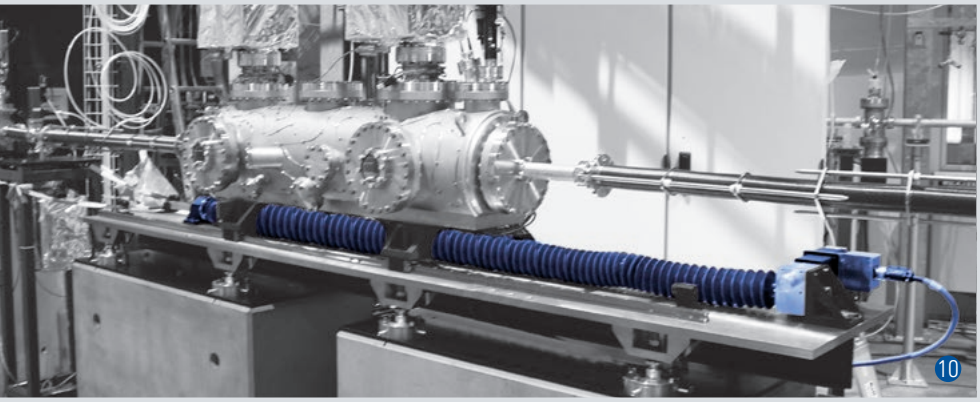
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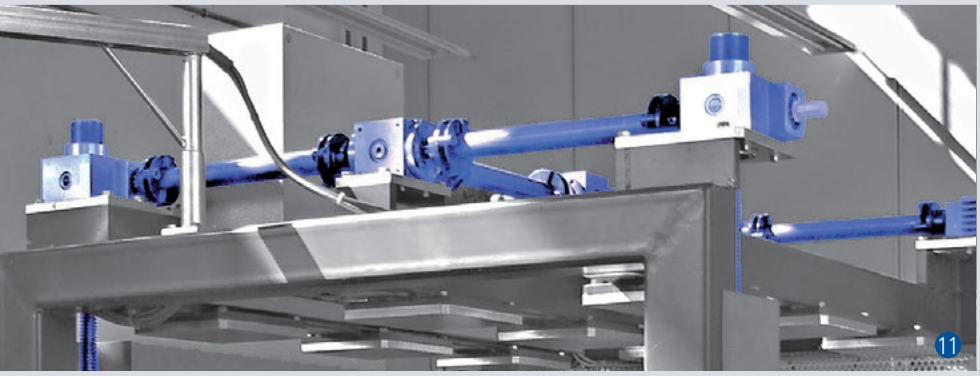
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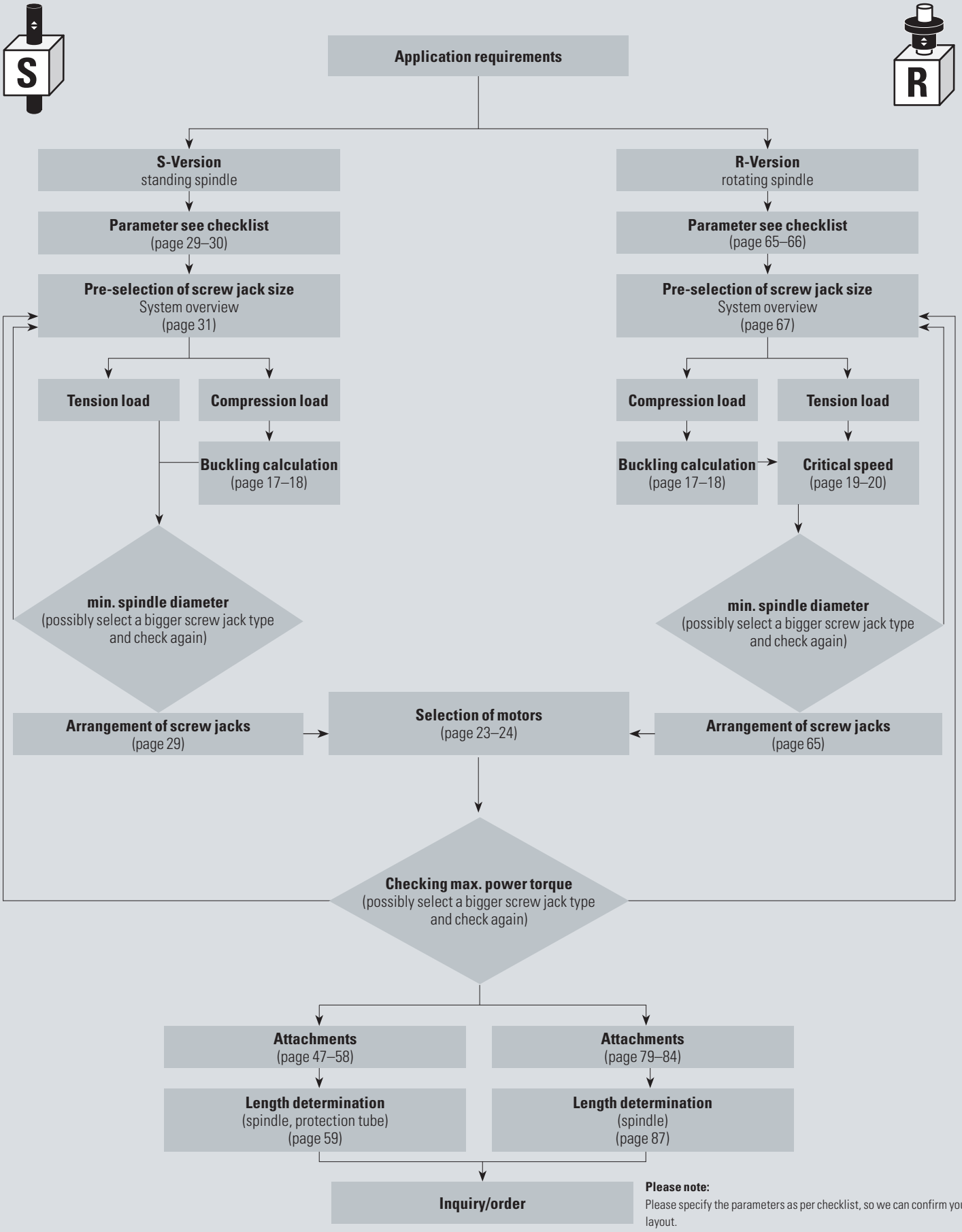
Selection of Screw Jack System and Arrangement



Please note:
Please specify the parameters as per checklist, so we can confirm your layout.

Construction and layout
The selection or the dimensioning is determined by the customer, since we are not familiar with the construction conditions like the place of application and the type of operation. If desired, we can be of help for the selection and design of the layout, and can generate assembly drawings and calculations for you on the basis of your rating parameters, as suggestions. The gearboxes are conceived in accordance with the load and duty cycle shown in the catalogue, for industrial purposes. We request you to check with us for any requirements over and above these. We generally supply subject to our current terms and conditions of supply.

Lifting speed
Normal version N:
1 mm stroke per drive shaft revolution
(exception NSE2-N with 0.8 mm)
gives, at 1500 min^{-1} > 25 mm/s
or 20 mm/s
respectively

Slow version L:
0.25 mm stroke per drive shaft revolution
(exception NSE2-L with 0.2 mm)
gives, at 1500 min^{-1} > 6.25 mm/s
or 5.00 mm/s
respectively

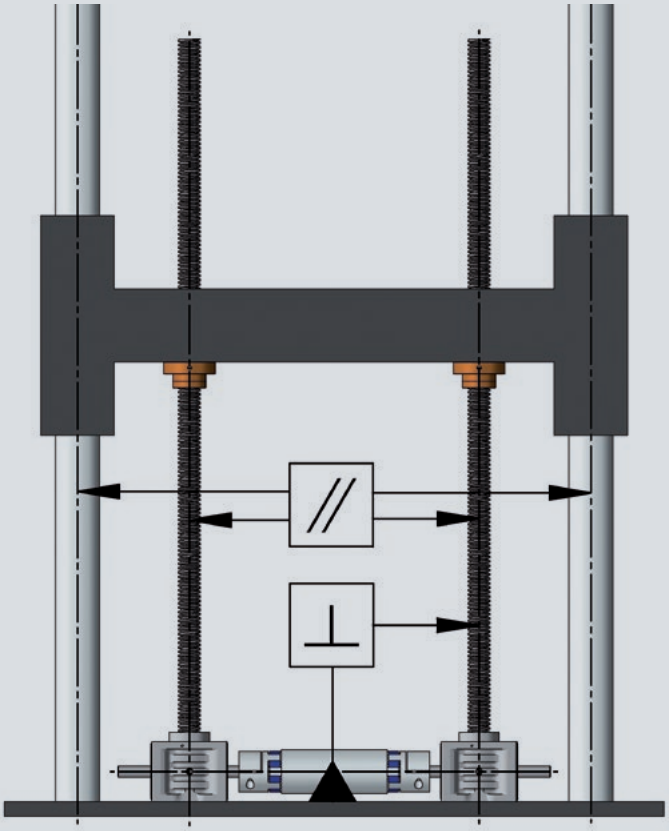
Possibilities of influencing the lifting speeds
Increasing
- Double-thread spindle (usually not an in-stock item): Doubling the speed (Caution: max. input drive torque, not self locking, brake required)
- Reinforced spindle for R-version (spindle of the next bigger gearbox): depending on the gearbox size, somewhat greater pitch/lifting speed
- Ball screw spindle: different pitches available
- Frequency converter: The motor rotation speed can be increased to more than 1400.

Reduction
> Motors with a higher number of poles/smaller rotation speed (6-, 8-pole)
> Frequency converter (Attention: in case of prolonged operation below 25 Hz, sufficient cooling of the motor must be ensured, e.g.: external fan)
> Geared motor (Attention: maximum input drive torque)
> Bevel gearbox with reduction (only possible with some arrangements)

Temperature and duty cycle
Screw jacks are basically not suitable for continuous operation. In borderline cases, choose a larger gearbox or contact us.
The operating temperature may not exceed 80°C (higher upon request).

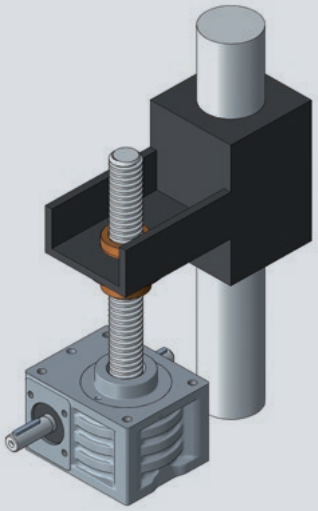
Parallelism and angularity
Attention must be paid to parallelism and angularity of the screw-on surfaces, gearboxes, nuts and guides with respect to one another. Also, exact alignment of the gearbox, pedestal bearings, connecting shafts and motors to one another.

If lifting jacks are used in machine building, there are hardly ever any problems, since the surfaces are machined. However, in plant construction, with steel structures, there are very frequently errors in the geometry of the welding construction despite meticulous working. Geometric errors can also occur owing to the interplay between different components. Here, the following must be remembered: The parallelism of the spindles to one another and to



the guides must be guaranteed, otherwise, the system can get stuck during operation. Also, the fastening surfaces of the gearbox must be exactly at right angles to the guides, otherwise jamming can occur. This results in faster wear and/or destruction. Basically, mounting surfaces for the nuts must also be at an angle. To save time and costs in this respect, the compensating nuts can be used. Another possibility of balancing out certain inaccuracies in the design is the use of Cardan adapters.

Guides
The play of the guide bushing in the gearbox neck is toleranced between 0.2 and 0.6 mm depending on the size. This is a secondary support and does not replace a guidance system for absorbing lateral forces.



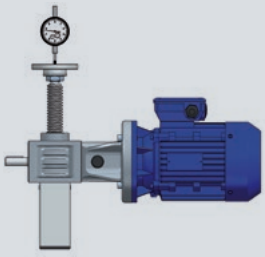
Lateral forces
Lateral forces acting on the spindle are to be absorbed by additional guides (1 N lateral force > 4 N more lifting force). Loads must be led externally as far it is possible.

Anti-rotation lock
In the case of non-rotating version S, the spindle is loosely screwed into the gearbox (worm wheel). Because the spindle would also rotate owing to the friction in the worm wheel, it must be locked against rotation. This can be achieved by the spindle linkage to your construction (e.g. external guide) or by means of an anti-rotation lock in the protection tube.

Fastening
A plane-machined base surface is required. The fastening screws are designed for the static nominal load of the gearbox for tension and compression. Additional impact loads etc. must be taken into account. The screw-in depth must be maintained. For the main load direction, the fastening screws should be mounted for «Pressure». In case of unknown factors like impact and vibration, we recommend an additional securing of the lifting jack by means of beams and threaded rods. This will secure the maximum load for tension and compression.

Safety distance
The safety distance between the movable and the fixed components must not be underrun, otherwise, there is a danger of jamming. A lifting system must never come to a mecanical stop.

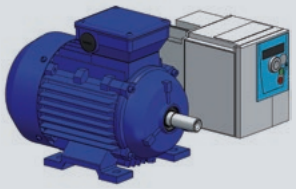
Accuracy
The repeat accuracy of the gearbox is up to 0.05 mm, when moving to the same position again under the same circumstances. This requires drive-side measures such as the use of a three-phase braking motor in conjunction with a frequency converter and rotary pulse transmitter or a servomotor with resolver, etc.
The pitch accuracy is ± 0.2 mm over a spindle length of 300 mm in the case of trapezoidal spindles, and with ball screw spindles, 0.05 mm over 300 mm spindle length. With alternating loads, the axial play can be up to 0.4 mm in the case of trapezoid threads and 0.08 mm in the case of ball screws.



Direction of Rotation and Movement
Note the direction of rotation of the system and indicate it in the drawing or select one of our standard arrangements (page 20). In the case of T-bevel gear drives with a through-drive shaft, the direction of rotation can be changed by simply inversing the gearbox

Self-locking/overrun
Screw jacks with a single-start trapezoid thread spindle are self-locking to a limited extent and that too, not always reliably in case of impact loads or vibrations (brake recommended).
The overrun, after switching off the motor, is different depending on the application. To reduce the overrun to a minimum, we recommend using a braking motor. In case of double-thread spindles or ball screws, a braking motor is necessary, as these are not self locking.

Drive
For uniform starting and braking ramps, we recommend the use of a frequency converter. This increases the life of the system and the starting noises are minimised.



Trial operation
To ensure safe working, a test run at no-load and under load in real-time operation is required. It is necessary to run the trials at your premises, to achieve an impeccable geometry through exact assembly, as well as to eliminate influences that could disturb the working.

Spare Parts
For protection from production downtimes, in case of a long duty cycle or a high load, we recommend stocking a gearbox set (incl. threaded spindles and accessories) either with you or your customer.

Stage construction
We supply lifting jack systems according to the current stage building specifications.

Land-, air and water vehicles
Our machine elements, used in all vehicles that run on land or water or in the air, are generally exempted from the product liability. Individual agreements can be drawn up with us.

Ambient conditions
If your ambient conditions are not similar to those of a normal industrial workshop, please specify accordingly (checklist for non-rotating, page 29; checklist for rotating, page 65).

Operation
The loads, rotation speeds, duty cycles and operating conditions assumed for the screw jacks and attached elements may not be exceeded – not even for a short time – (even a one-off excess can result in permanent damage). Good spindle lubrication ensures optimum operating and wear conditions.

Maintenance
In screw jack systems, good, permanent lubrication between the spindle and the spindle nut (worm wheel) is essential. They must be kept free of grease residues. After a short operating time, all the fastening screws should be tightened. At intervals that are laid down according to the prevailing operating conditions, the wear of the spindle nut (safety trap nut) should be checked on the basis of the thread play. If the thread play is more than 1/4th the thread pitch, the spindle nut (worm wheel) should be replaced.

For ensuring reliable lubrication of the spindle or in case of prolonged duty cycles of the gearbox, we recommend an automatic grease dispenser.

The gearboxes are lubricated for life under standard conditions, no grease nipples available for future use.

Lubrication of screw jacks type NSE
Lubrication is done with grease, option oil. The gearboxes are lubricated for life under standard conditions.

Lubricants for spindles:
Klüber: Microlube GBU Y 131
Other lubricants provided upon request.

CAD-files
To support you in your design, you can download our components in the form of CAD files from our homepage www.nozag.ch.

Data sheets
For every screw jack, a summary is available under the product data sheets in the downloads section at www.nozag.ch.

Screw Jacks «Gold» – For Extreme Environmental and Operational Conditions

The shiny casing, mounting flange and cover indicate the highest degree of corrosion resistance. In simple terms, the conventional aluminum components as well as the external parts have been replaced by components made of the aluminum bronze material CuAl10Fe5Ni5. All the spindles and shafts as well as the internal elements are manufactured from stainless steel or synthetic material (seals).

- High corrosion stability combined with a high degree of wearing resistance and cavitation protection through CuAl10Fe5Ni5
- Resistance against mechanical damages due to an oxide protection film (basically Al203) that immediately forms on the material surface
- Excellent performance in applications with gases, fluids and solid materials

The CuAl10Fe5Ni5 material

- features high scaling resistance (up to 800°)
- has a lower degree of corrosion resistance to strongly acidic media with high oxidation potential (such as nitric acid) as well as alkaline materials, because these will dissolve the oxide coating and prevent its formation.
- has a lower tendency to selective corrosion (dealumination)

Areas of Application
Screw jacks of this design may be used for instance in industrial applications in the vicinity of saline water or sulfuric oxide, in slightly oxidizing and weak alkaline areas, in brackish water, in organic acids (acetate) and in reducing as well as slightly oxidizing mineral acids (diluted hydrochloric, hydrofluoric or phosphoric acid), in environments containing sulfuric acid at room temperature or at elevated temperatures.


Statik
Reibung
K 11
Keile
Schrauben
Krafteck, Hebel, Drehmoment
Hebel und Drehmoment
Auflagerkräfte
Feste Rolle
TESA
IP67
NOZAG

TR-spindle, single-thread
Efficiency

TR	P	η lubricated	Core-Ø	Flanks-Ø
14	4	0.50	9.5	12.0
18	4	0.42	13.5	16.0
20	4	0.40	15.5	18.0
24	5	0.41	18.5	21.5
30	6	0.40	23.0	27.0
40	7	0.36	32.0	36.5
50	8	0.34	43.0	46.0
60	9	0.32	50.0	55.5
80	16	0.40	62.0	72.0
100	16	0.34	84.0	92.0
120	16	0.30	104.0	112.0
140	20	0.31	118.0	130.0
160	20	0.28	138.0	150.0

The efficiency of trapezoid thread spindles is far lower as compared to ball screw spindles because of the sliding friction. However, the trapezoidal screw is technically simpler and less expensive. Any securing, for example by a brake, should be examined individually, owing to the limited self-locking of trapezoidal screws.

TR-spindle, double-thread
Efficiency

TR	P	η lubricated	Core-Ø	Flanks-Ø
14	8	0.71	9.5	12.0
18	8	0.63	13.5	16.0
20	8	0.60	15.5	18.0
24	10	0.61	18.5	21.5
30	12	0.60	23.0	27.0
40	14	0.56	32.0	36.5
50	16	0.53	43.0	46.0
60	18	0.51	50.0	55.5
80	32	0.60	62.0	72.0
100	32	0.53	84.0	92.0
120	32	0.48	104.0	112.0
140	40	0.50	118.0	130.0
160	40	0.46	138.0	150.0

In the case of ball screw spindles, an efficiency of < = 0.9 can be reckoned with. Here, a brake must always be provided.

Efficiency

Size	N	L
2	0.76	0.45
5	0.84	0.62
10	0.86	0.69
25	0.87	0.69
50	0.89	0.74
100	0.85	0.65
150	0.84	0.67
250	0.86	0.72
350	0.87	0.70
500	0.84	0.62
750	–	–
1000	–	–

No-load torque

Size	N	L
2	0.21	0.11
5	0.10	0.08
10	0.26	0.16
25	0.36	0.26
50	0.76	0.54
100	1.68	1.02
150	1.90	1.20
250	2.64	1.94
350	3.24	2.20
500	3.96	2.84
750	–	–
1000	–	–

Efficiency of drive components

Coupling	η = 0.99
Connecting shaft	η = 0.98
Bevel gear	η = 0.97

Critical buckling force of the lifting spindle

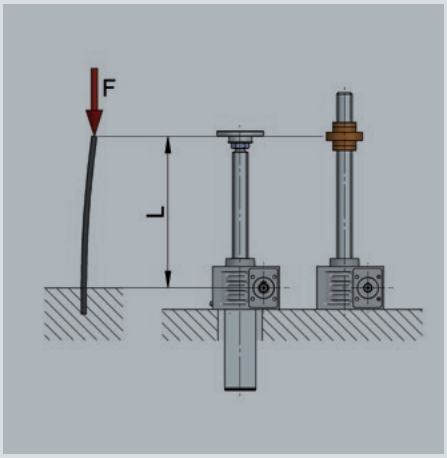
Explanation

I = moment of area of the 2nd degree in mm^4
F = max. 1 load/gearbox in N
L = free spindle length in mm
E = modulus of elasticity for steel (210000 N/mm^2)
s = safetyfactor (normally 3)
d = minimum core diameter of the spindle

Base de conception

F = 19000 N/gearbox
L = 836 mm
s = 3

Load case 1



Formula

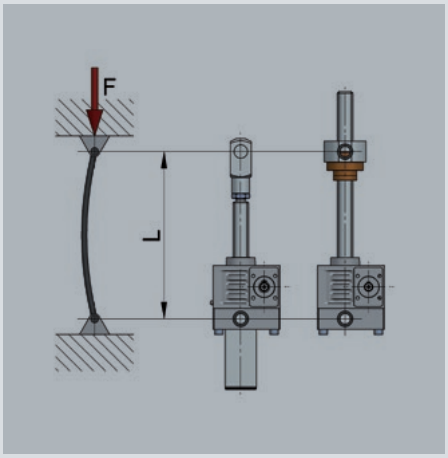
$$I = \frac{F \times s \times (L \times 2)^2}{\pi^2 \times E} \quad \text{then} \quad d = \sqrt[4]{\frac{I \times 64}{\pi}}$$

Example

$$I = \frac{19000 \times 3 \times (836\ mm \times 2)^2}{\pi^2 \times 210000 N/mm^2} = \frac{15.9348^{10}\ mm^4}{2072616.9} = 76882.7\ mm^4$$

$$d = \sqrt[4]{\frac{19000 \times 3 \times (836\ mm \times 2)^2}{\pi^2 \times 210000 N/mm^2}} = 35.3\ mm \text{ minimum core diameter}$$
$$= \text{NSE100 (core-Ø = 50.0 mm)}$$

Load case 2



Formula

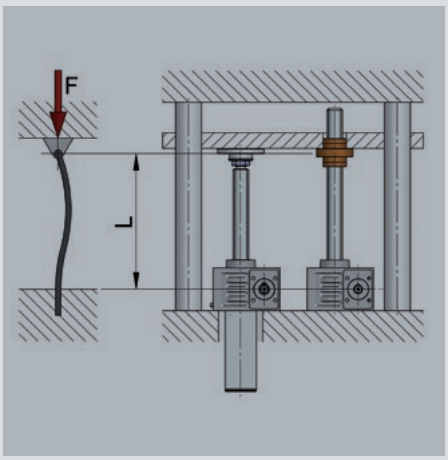
$$I = \frac{F \times s \times L^2}{\pi^2 \times E} \quad \text{then} \quad d = \sqrt[4]{\frac{I \times 64}{\pi}}$$

Example

$$I = \frac{19000 \times 3 \times 836\ mm^2}{\pi^2 \times 210000 N/mm^2} = \frac{3.98371^{10}\ mm^4}{2072616.9} = 19220.7\ mm^4$$

$$d = \sqrt[4]{\frac{19220.7\ mm^4 \times 64}{\pi}} = 25.0\ mm \text{ minimum core diameter}$$
$$= \text{NSE50 (core-Ø = 32.0 mm)}$$

Load case 3



Formula

$$I = \frac{F \times s \times (L \times 0.7)^2}{\pi^2 \times E} \quad \text{then} \quad d = \sqrt[4]{\frac{I \times 64}{\pi}}$$

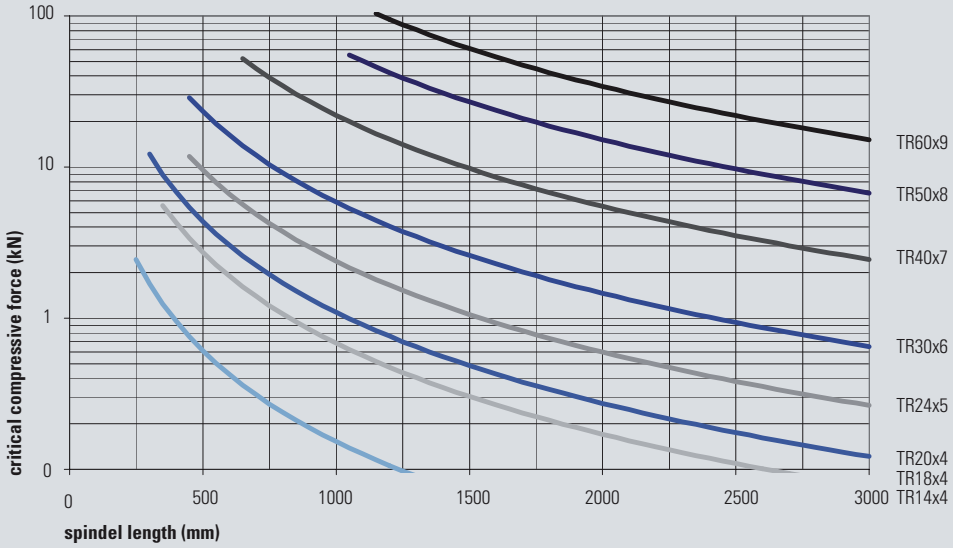
Example

$$I = \frac{19000N \times 3 \times (836\ mm \times 0.7)^2}{\pi^2 \times 210000 N/mm^2} = \frac{1.9520^{10}\ mm^4}{2072616.9} = 9418.1\ mm^4$$

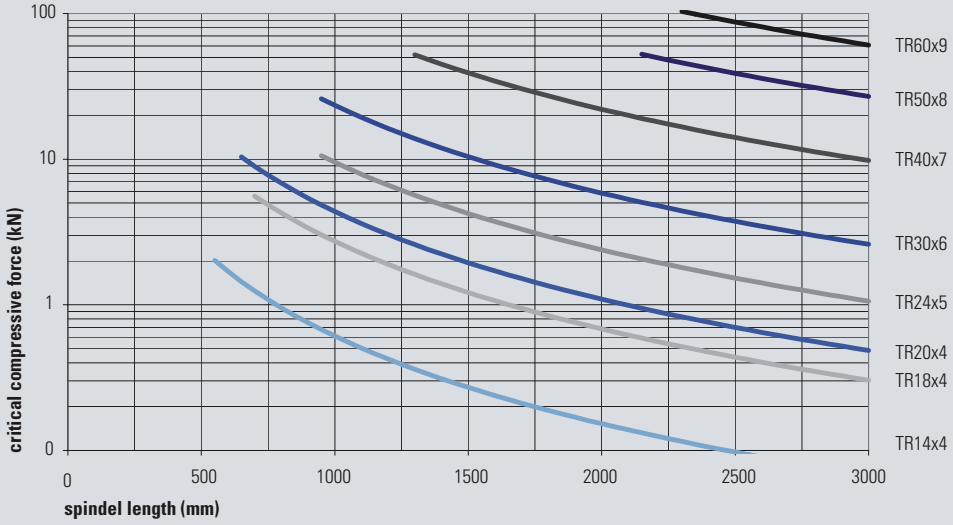
$$d = \sqrt[4]{\frac{9418.1\ mm^4 \times 64}{\pi^2 \times 210000 N/mm^2}} = 20.9\ mm \text{ minimum core diameter}$$
$$= \text{NSE25 (core-Ø = 23.0 mm)}$$

In the diagram below (calculated with safety 1) with the corresponding load case (1/2/3), determine the point of intersection of buckling force F and the free spindle length L. The point of intersection must be below the line of demarcation of the selected spindle diameter. If this is not the case, a larger spindle or the next larger gearbox should be selected.

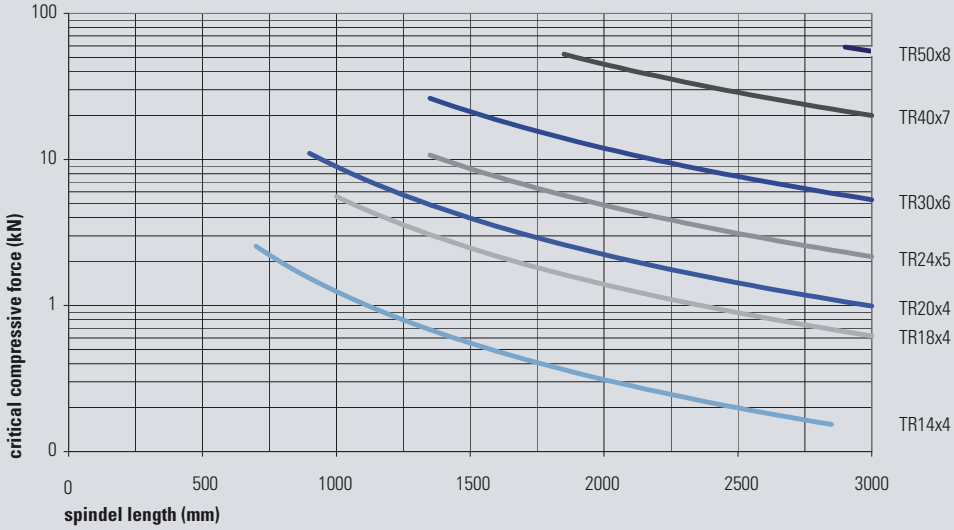
Load case 1



Load case 2



Load case 3



Bending critical speed of trapezoid thread spindle

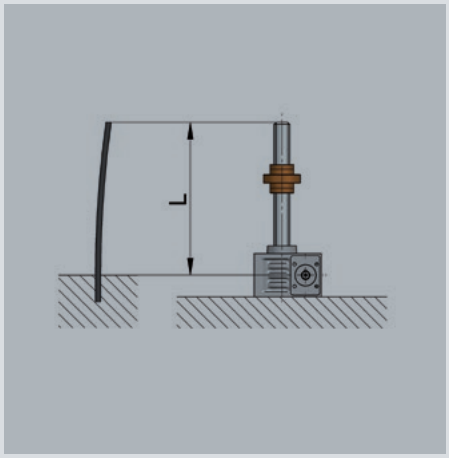
Explanation

C_P = Spring constant
I = Second moment of area (mm^4)
L_K = Free spindle length (mm)
E = Modulus of elasticity (N/mm^2)
d_F = Flank diameter of the spindle (mm)
m_{a1} = Weight of the spindle (kg/m)
s = Safetyfactor (normally 3)
n_K = Crit. rotation speed (min^{-1})

Base de conception

d_F = 27.00 mm (TR 30 x 6)
L_K = 2000 mm
s = 3
$ma1$ = 4.5 kg/m

Load case 1



Formula

$$I = \frac{\pi \times d_F^4}{64} \quad \text{then} \quad m = \frac{L_K}{1000} \times ma1 \quad \text{then} \quad C_P = \frac{48 \times E \times I}{L_k^3}$$

$$n_k = 150 \times \sqrt{\frac{C_P}{m}}$$

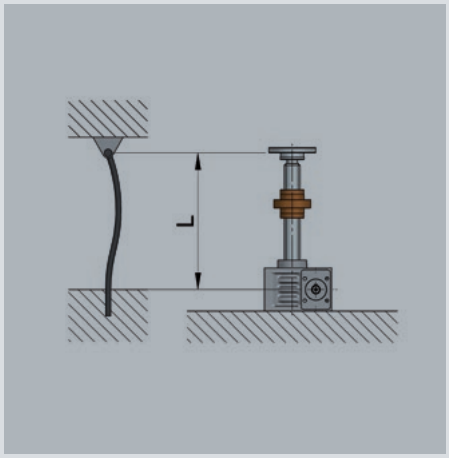
Example

$$I = \frac{\pi \times 27.00^4}{64} = 26087\ mm^4 \qquad m = \frac{2000mm}{1000} \times 4.5\ kg/m = 9\ kg$$

$$C_P = \frac{48 \times 210000 \times 26087}{2000^3} = 32.9$$

Case 1 according to Euler: $n_{k1} = 150 \times \sqrt{\frac{32.9}{9}} = 287\ min^{-1}$

Load case 3



Formula

$$I = \frac{\pi \times d_F^4}{64} \quad \text{then} \quad m = \frac{L_K}{1000} \times \text{Weight/m} \quad \text{then} \quad C_P = \frac{48 \times E \times I}{L_k^3}$$

$$n_k = 420 \times \sqrt{\frac{C_P}{m}}$$

Example:

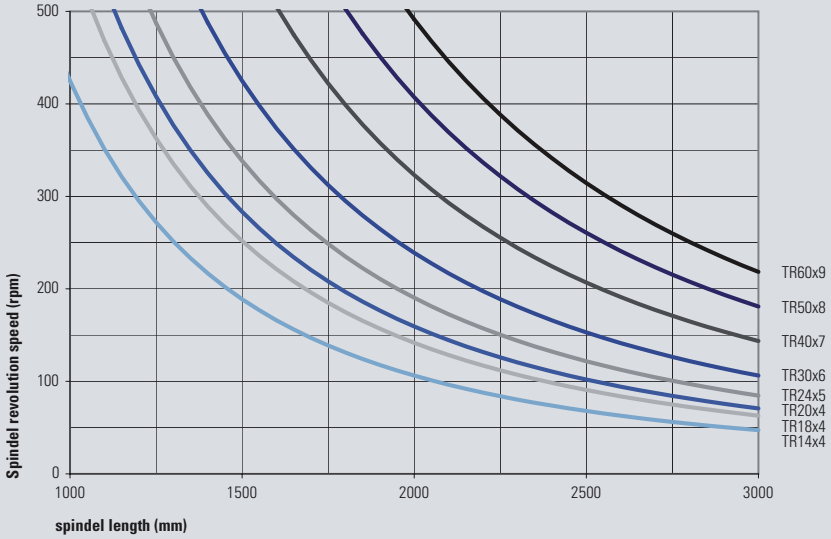
$$I = \frac{\pi \times 27.00^4}{64} = 26087\ mm^4 \qquad m = \frac{2000mm}{1000} \times 4.5\ kg/m = 9\ kg$$

$$C_P = \frac{48 \times 210000 \times 26087}{2000^3} = 32.9$$

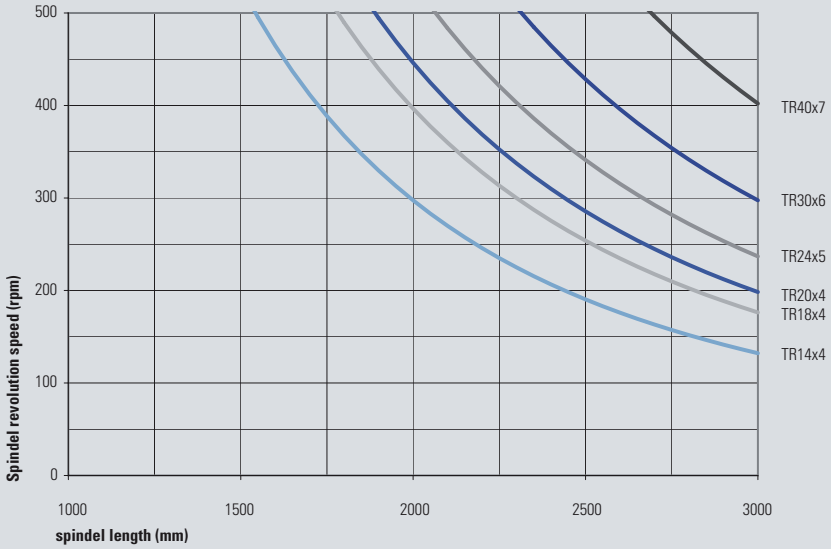
Case 3 according to Euler: $n_{k3} = 420 \times \sqrt{\frac{32.9}{9}} = 803\ min^{-1}$

In the diagram below (calculated with safety 1) with the corresponding load case (1/2/3), determine the point of intersection of the spindle rotation speed and the free spindle length L. The point of intersection must be below the line of demarcation of the selected spindle diameter. If this is not the case, a larger spindle or the next larger gearbox should be selected.

Load case 1



Load case 3



Heat balance

In the case of screw jacks with trapezoidal thread spindles, only a small part of the drive power is converted into lifting force.

There are losses in the worm drive and at the trapezoidal thread, which have to be dissipated in the form of heat.

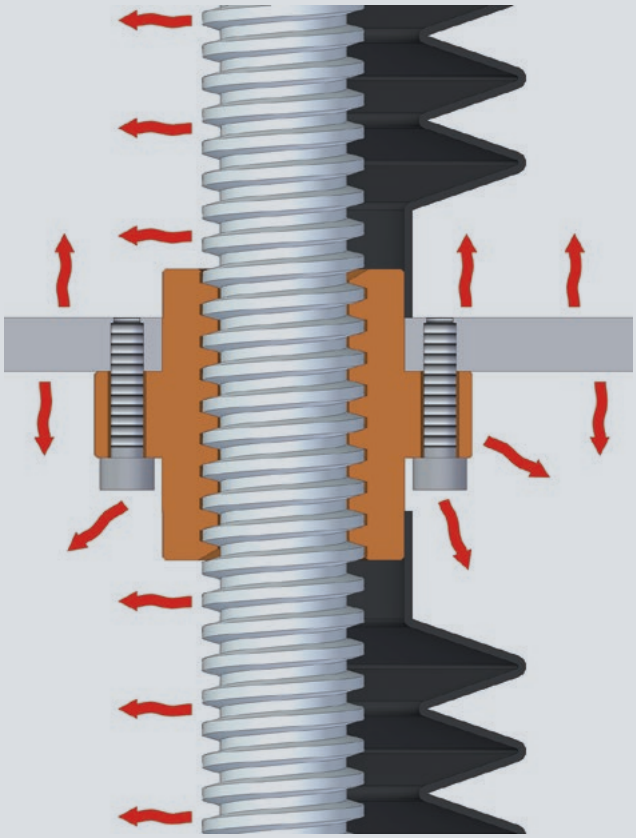
In the case of screwjacks with a non-rotating spindle, the gearbox power loss and the spindle power loss are generated in the gearbox and emitted outwards through the gearbox housing. In the case of the rotating spindle, the gearbox power loss originates in the gearbox and is dissipated through the gearbox housing; the spindle power loss originates between the spindle and the nut and must be dissipated via the surface of the nut, the spindle and the support plate.

When bellows are used with rotating spindles, particular attention must be paid to the heat balance. Experience has shown that only about 50% of the generated heat can dissipated with the bellows. Therefore, the possible duty cycle is reduced by 50% as compared to an identical design without bellows.

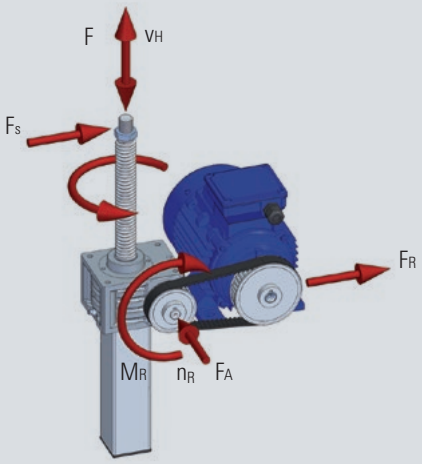
In the case of gearboxes with non-rotating spindles, the bellows are not a problem, since the heat is mostly emitted from the housing.

Influence of the ambient temperature
If the ambient temperature is higher than 20°C, the load must be reduced, since the higher heat level cannot be emitted. For every 10 °C higher ambient temperature, the load must be reduced by approx. 15–20 %.

Air holes must be made by the customer, depending on the speed.



Maximum Forces/torques



For selecting a suitable screw jack, please check the information on the following technical information pages, since various influences and assumptions can only be estimated according to experienced values. In case of doubt, please contact our engineering department.

Load definitions

F – Lifting load tension and/or compression
F_S – Lateral load of the spindle
v_H – Movement speed of the spindle (or nut in case of the rotating version)
F_A – Axial loading of the input drive shaft
F_R – Radial loading of the input drive shaft
M_R – Input drive shaft torque
n_R – Input drive rotational speed

Lateral forces on the lifting spindle

The maximum permissible lateral forces can be seen from the table below. Basically, lateral forces should be absorbed by means of guides. The guide bushing in the gearbox has only a secondary guiding function. The maximum lateral forces that actually act must be below the values in the table. Caution: only statically permissible

Maximum lateral force FS [N] (static)

	deployed spindle length in mm														
	100	200	300	400	500	600	700	800	900	1000	1200	1500	2000	2500	3000
NSE2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
NSE5	360	160	100	70	55	45	38	32	28	25	20	18	12	–	–
NSE10	600	280	180	130	100	80	70	60	50	47	40	30	20	15	–
NSE25	900	470	300	240	180	150	130	110	100	90	70	60	45	35	30
NSE50	3000	2000	1300	900	700	600	500	420	380	330	280	230	160	130	100
NSE100	5000	4000	3000	2300	1800	1500	1300	1100	950	850	700	600	400	350	250
NSE150	5500	5000	3900	2800	2300	1800	1500	1300	1200	1000	850	750	500	400	350
NSE250	9000	9000	6500	4900	3800	3000	2500	2200	2000	1900	1450	1250	900	760	660
NSE350	15000	13000	12000	10000	8800	7000	6000	5500	4800	4300	3500	3000	2000	1600	1400
NSE500	29000	29000	29000	29000	29000	24000	20000	17000	15000	14000	12000	9000	7000	5600	4900
NSE650	34800	34800	34800	34800	34800	28800	24000	20400	18000	16800	14400	10800	8400	6720	5880
NSE750	46000	46000	39000	36000	32000	30000	25000	29000	25000	23500	20000	17000	12000	10000	8000

Max. drive torque

The values given below must not be exceeded. In case of several gearboxes one after another, the drive shaft torque is higher. In case of more than six gearboxes in series, please contact our engineering department.

– Please note that the starting torque is about 1.5 times the operating torque
– Limit values are mechanical
– Thermal factors must be taken into account, depending on the duty cycle

	M_R SN/RN 1500 min^{-1}	M_R SL/RL 1500 min^{-1}
NSE2	2.50	0.80
NSE5	5.60	2.00
NSE10	10.50	4.20
NSE25	22.50	7.80
NSE50	51.00	18.00
NSE100	60.20	20.20

	M_R SN/RN 1500 min^{-1}	M_R SL/RL 1500 min^{-1}
NSE150	67.3	17.3
NSE250	118.4	23.5
NSE350	187.0	40.2
NSE500	204.3	42.8
NSE650	268.3	62.8
NSE750	415.0	83.0

Radial loading of the drive shaft

When using chain drives or belt drives, the radial forces FR given below may not be exceeded.

maximum radial loading of the input drive shaft FR [N]

	F_R (N)
NSE2	18
NSE5	110
NSE10	215
NSE25	300
NSE50	520
NSE100	800

	F_R (N)
NSE150	810
NSE250	1420
NSE350	2100
NSE500	3780
NSE650	4536
NSE750	–

Drive torque of a lifting jack

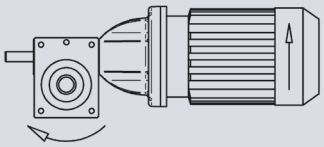
Explanations

M_{Ge}	Drive torque [Nm] for one gearbox
F	Lifting load (dynamic) [kN]
η_{Ge}	Efficiency of the lift drive (without spindle)
η_{Sp}	Efficiency of the spindlel
P_{Sp}	Spindle pitch [mm]
i	Ratio of the lifting jack
M_L	no-load torque [Nm]
P_{Ge}	Drive rating
P_1	Drive rating, motor, effective
η_{Ku}	Efficiency of the coupling
n_{Ku}	Number of couplings
n	Motor rpm

Base de conception

NSE25-RN with F = 16 kN

η_{Ge} = 0.87
η_{Sp} = 0.40
η_{Ku} = 0.99
n_{Ku} = 1
n = 1400 min^{-1}



Drive torque

$$M_{Ge} = \frac{F\,(kN) \times P_{Sp}\,(mm)}{2 \times \pi \times \eta_{Ge} \times \eta_{Sp} \times i} + M_L\,(Nm)$$

Base de conception

$$M_{Ge} = \frac{16 \times 6}{2 \times \pi \times 0.87 \times 0.40 \times 6} + 0.36 = 7.67\ Nm$$

Motor output

$$P_{Ge} = \frac{M_{Ge}\,(Nm) \times n\,(min^{-1})}{9550}$$

$$P_1 = \frac{P_{Ge}}{(\eta_{Ku})^{n\,Ku}}$$

$$P_{Ge} = \frac{7.67 \times 1400}{9550} = 1.12\ kW$$

$$P_{1eff} = \frac{1.12}{(0.99)^1} = 1.13\ kW$$

We recommend that you multiply the calculated value by a safetyfactor of 1.3 to 1.5 (in the case of small systems, up to 2).

1.13 x 1.5 = 1.7 > Motor with 2.2 kW

In the case of gearboxes with single-start trapezoid thread spindles, a simplified form of calculation can also be used, which is given on the respective catalogue gearbox page (non-rotating version Chapter 2/rotating version Chapter 3) or in the product data sheets.

Base values for calculation (Summary from page 16)

TR Spindle pitch (P)

TR	P
14	4
18	4
20	4
30	6
40	7
60	9

Efficiency

Size	N	L
2	0.76	0.45
5	0.84	0.62
10	0.86	0.69
25	0.87	0.69
50	0.89	0.74
100	0.85	0.65

No-load torque

Size	N	L
2	0.21	0.11
5	0.10	0.08
10	0.26	0.16
25	0.36	0.26
50	0.76	0.54
100	1.68	1.02

Drive torque of a lifting system

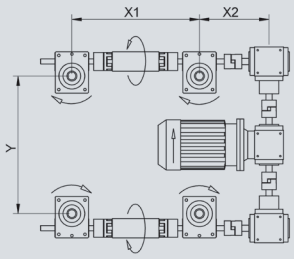
Explanations

M_{Ge}	Drive torque [Nm] for one gearbox
F	Lifting load (dynamic) [kN]
η_{Ge}	Efficiency of the lift drive (without spindle)
η_{Sp}	Efficiency of the spindlel
P_{Sp}	Spindle pitch [mm]
i	Ratio of the lifting jack
M_L	no-load torque [Nm]
P_{Ge}	Drive rating
P_1	Drive rating, motor, effective
η_{Ku}	Efficiency of the coupling
n_{Ku}	Number of couplings
η_{Ke}	Efficiency of the bevel gearbox
n_{Ke}	Number of bevel gearboxes
η_V	Efficiency of the connecting shaft
n_V	Number of connecting shafts
n_{NSE}	Number of screw jacks

Base de conception

NSE25-RN with F = 14 kN

η_{Ge}	= 0.87
η_{Sp}	= 0.40
η_{Ku}	= 0.99
n_{Ku}	= 4
η_{Ke}	= 0.97
n_{Ke}	= 3
η_V	= 0.98
n_V	= 2
n_{NSE}	= 4
n	= 1400 min^{-1}



Drive torque

$$M_{Ge} = \frac{F\,(kN) \times P_{Sp}\,(mm)}{2 \times \pi \times \eta_{Ge} \times \eta_{Sp} \times i} + M_L\,(Nm)$$

Base de conception

$$M_{Ge} = \frac{14 \times 6}{2 \times \pi \times 0.87 \times 0.40 \times 6} + 0.36 = 6.76\ Nm$$

Motor output

$$P_{Ge} = n_{NSE} \times \frac{6 M_{Ge}\,(N_m) \times n\,(min^{-1})}{9550}$$

$$P_1 = \frac{P_1}{(\eta_{Ku})^{nKu} \times (\eta_{Ke})^{nKe} \times (\eta_V)^{nv}}$$

$$P_{Ge} = 4 \times \frac{6.76 \times 1400}{9550} = 3.96\ kW$$

$$P_1 = \frac{3.96}{(0.99)^4 \times (0.97)^3 \times (0.98)^2} = 4.70\ kW$$

We recommend that you multiply the calculated value by a safetyfactor of 1.3 to 1.5 (in the case of small systems, up to 2).

4.70 x 1.5 = 7.06 > Motor with 7.5 kW

Base values for calculation (Summary from page 16)

TR Spindle pitch (P)

TR	P
14	4
18	4
20	4
30	6
40	7
60	9

Efficiency

Size	N	L
2	0.76	0.45
5	0.84	0.62
10	0.86	0.69
25	0.87	0.69
50	0.89	0.74
100	0.85	0.65

No-load torque

Size	N	L
2	0.21	0.11
5	0.10	0.08
10	0.26	0.16
25	0.36	0.26
50	0.76	0.54
100	1.68	1.02

2. Screw jacks, non-rotating

2. Screw jacks, non-rotating

The worm wheel is provided with a female thread and converts the rotational movement into an axial movement of the spindle, when the latter is prevented from rotating (through its design or by means of an anti-rotation protection in the protection tube).

The innovative Nozag screw jack kit makes possible, perfect drive solutions from cost-effective standard components. The kit is subject to the highest standards of functionality, quality and design. A lot can be moved with very little expense and the investment, maintenance and operating costs remain within limits.

Screw jacks developed and manufactured by Nozag solve this task in a simple, inexpensive manner.

Screw Jacks «Gold» – For Extreme Environmental and Operational Conditions

The shiny casing, mounting flange and cover indicate the highest degree of corrosion resistance. In simple terms, the conventional aluminum components as well as the external parts have been replaced by components made of the aluminum bronze material CuAl10Fe5Ni5. All the spindles and shafts as well as the internal elements are manufactured from stainless steel or synthetic material (seals).

- High corrosion stability combined with a high degree of wearing resistance and cavitation protection through CuAl10Fe5Ni5
- Resistance against mechanical damages due to an oxide protection film (basically Al203) that immediately forms on the material surface
- Excellent performance in applications with gases, fluids and solid materials

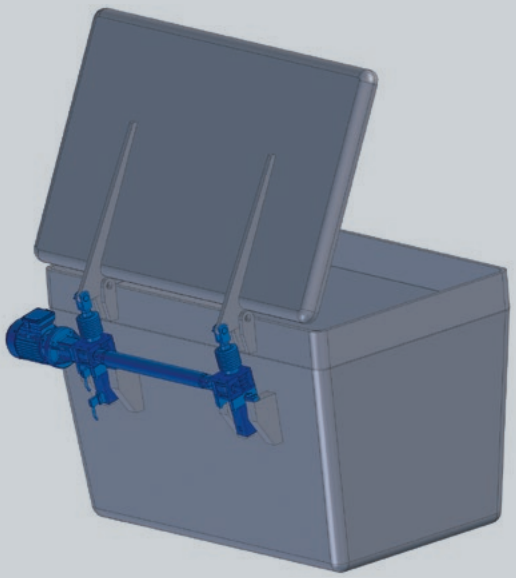
The CuAl10Fe5Ni5 material

- features high scaling resistance (up to 800°)
- has a lower degree of corrosion resistance to strongly acidic media with high oxidation potential (such as nitric acid) as well as alkaline materials, because these will dissolve the oxide coating and prevent its formation.
- has a lower tendency to selective corrosion (dealumination)

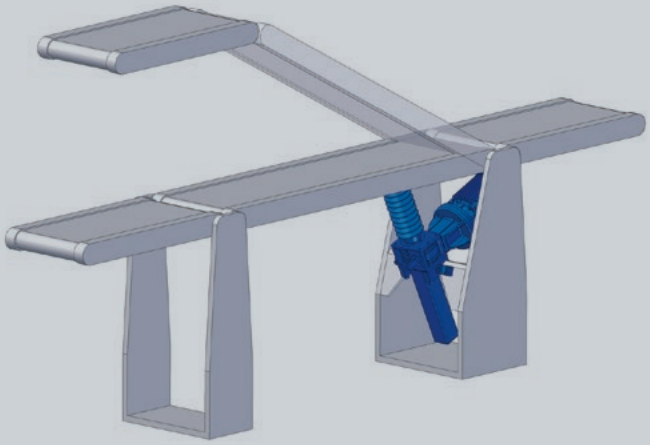
Areas of Application

Screw jacks of this design may be used for instance in industrial applications in the vicinity of saline water or sulfuric oxide, in slightly oxidizing and weak alkaline areas, in brackish water, in organic acids (acetate) and in reducing as well as slightly oxidizing mineral acids (diluted hydrochloric, hydrofluoric or phosphoric acid), in environments containing sulfuric acid at room temperature or at elevated temperatures.

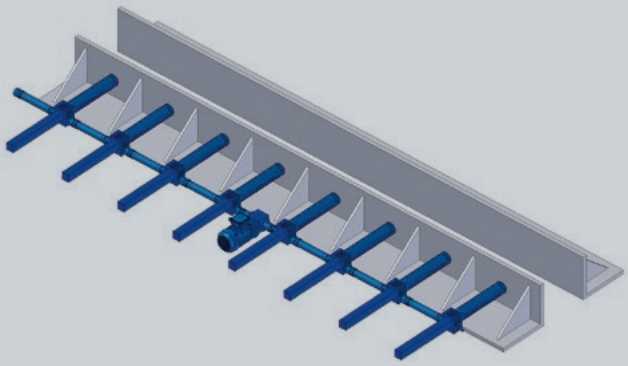
Tank opening



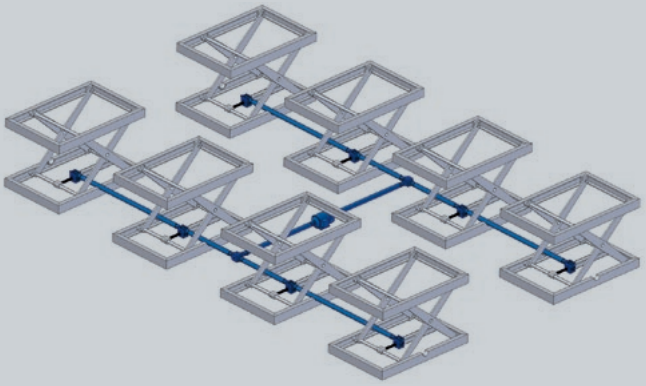
Conveyor belt height adjustment



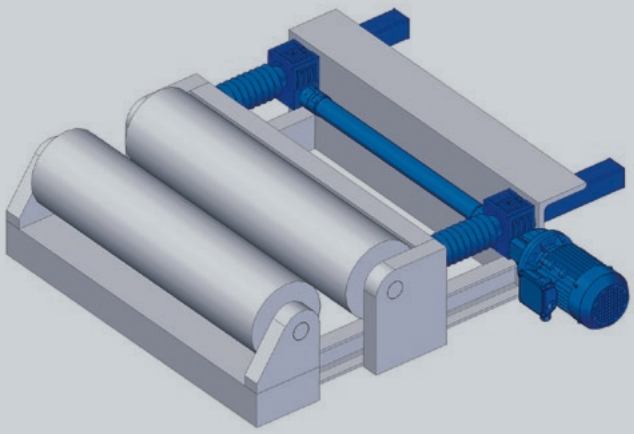
Synchronous concrete shuttering adjustment



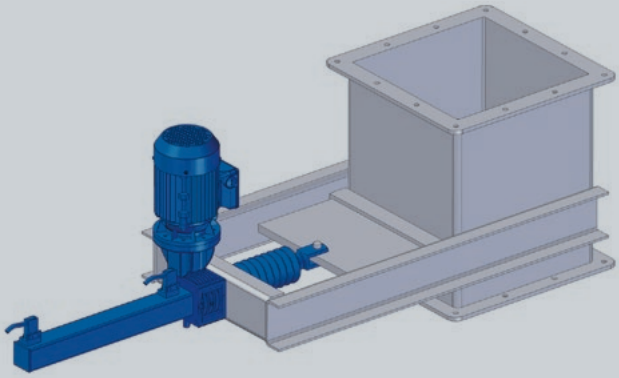
Scissor lifting tables



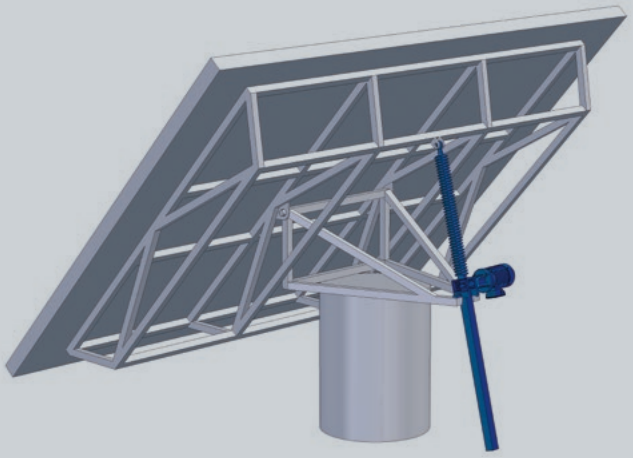
Precise roller setting



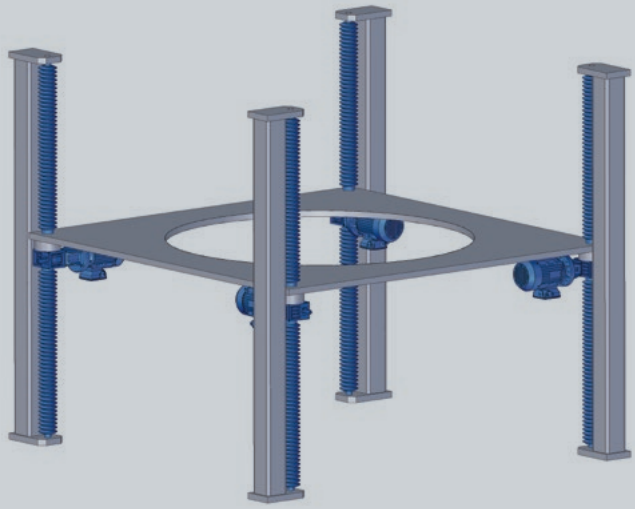
Slider adjustment in silo



Solar panel



Lifting platforms



Non-rotating version

Mail info@nozag.ch
FAX-Nozag CH +41 (0)44 805 17 18

Company: _____ Date: _____
Address: _____ Tel.: _____
_____ Fax: _____
Contact person: _____ Mail: _____

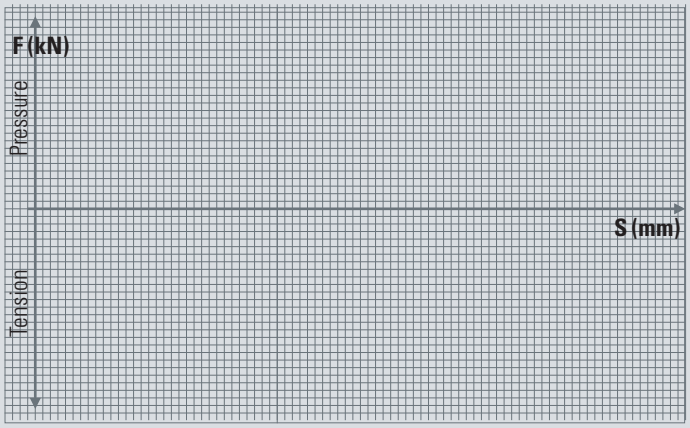
Lifting force in kN

_____ kN per gearbox
_____ kN under tensile load
_____ kN static load
_____ kN entire installation
_____ kN under compressive load
_____ kN dynamic load

Installation position

☐ vertical ☐ horizontal

Force flow

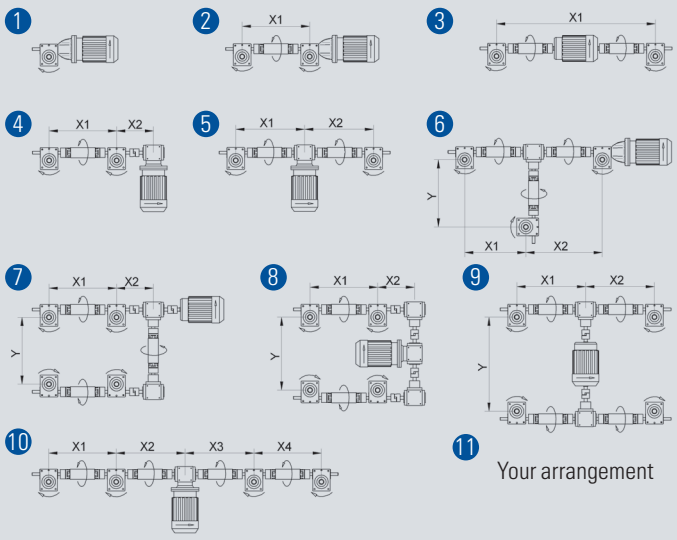


(F=force, S=stroke)

Conditions (operational demands)

☐ steady (constant)
☐ vibrations (alternating)
☐ impact loading (swelling)
☐ _____

Arrangement



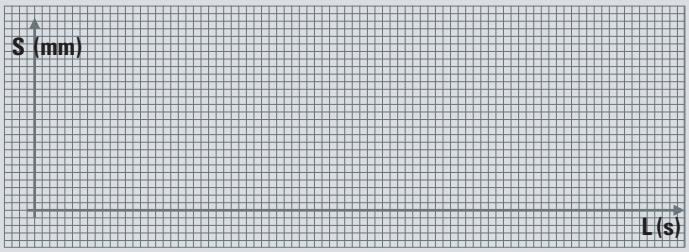
Stroke

_____ mm stroke _____ mm spindle length

Lifting speed (in case of a drive with 1500 min^{-1})

☐ Type = 25 mm/s (NSE2-SN = 20 mm/s)
☐ Type = 6.25 mm/s (NSE2-SL = 5.00 mm/s)

Working cycle



(S=stroke, L=time)

Duty cycle, working cycle

_____ Strokes per day
_____ Strokes per hour

Hours per day

☐ 8 ☐ 16 ☐ 24 ☐ _____
_____ % duty cycle (ED) referred to 10 min

Motor

☐ Three-phase Motor ☐ Braking motor
☐ Manual drive ☐ _____

Operating conditions

☐ Dryness ☐ Dust
☐ Humidity ☐ Swarf

Ambient temperature

_____ °C min. _____ °C max.

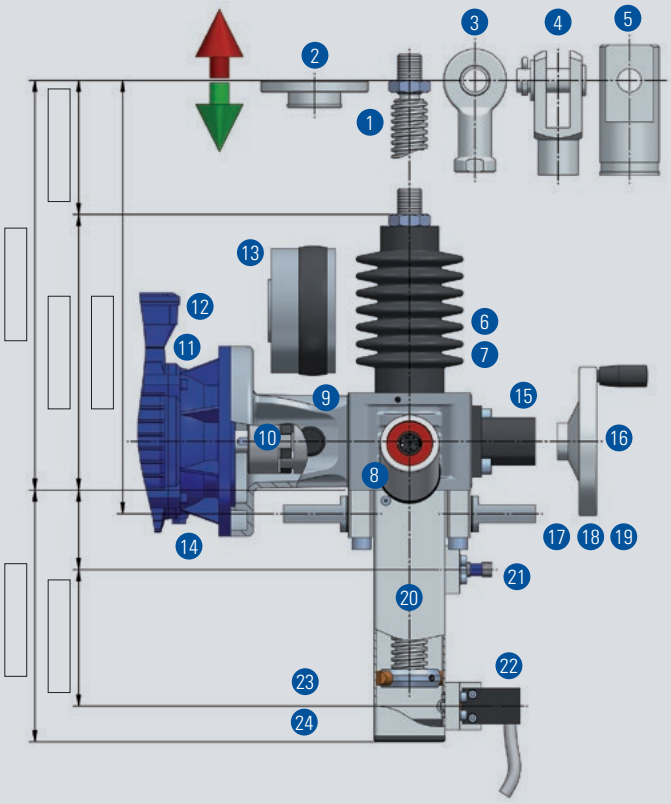
Quantity

_____ pieces ☐ prototype first

Desired delivery dates

_____ for quote _____ for delivery

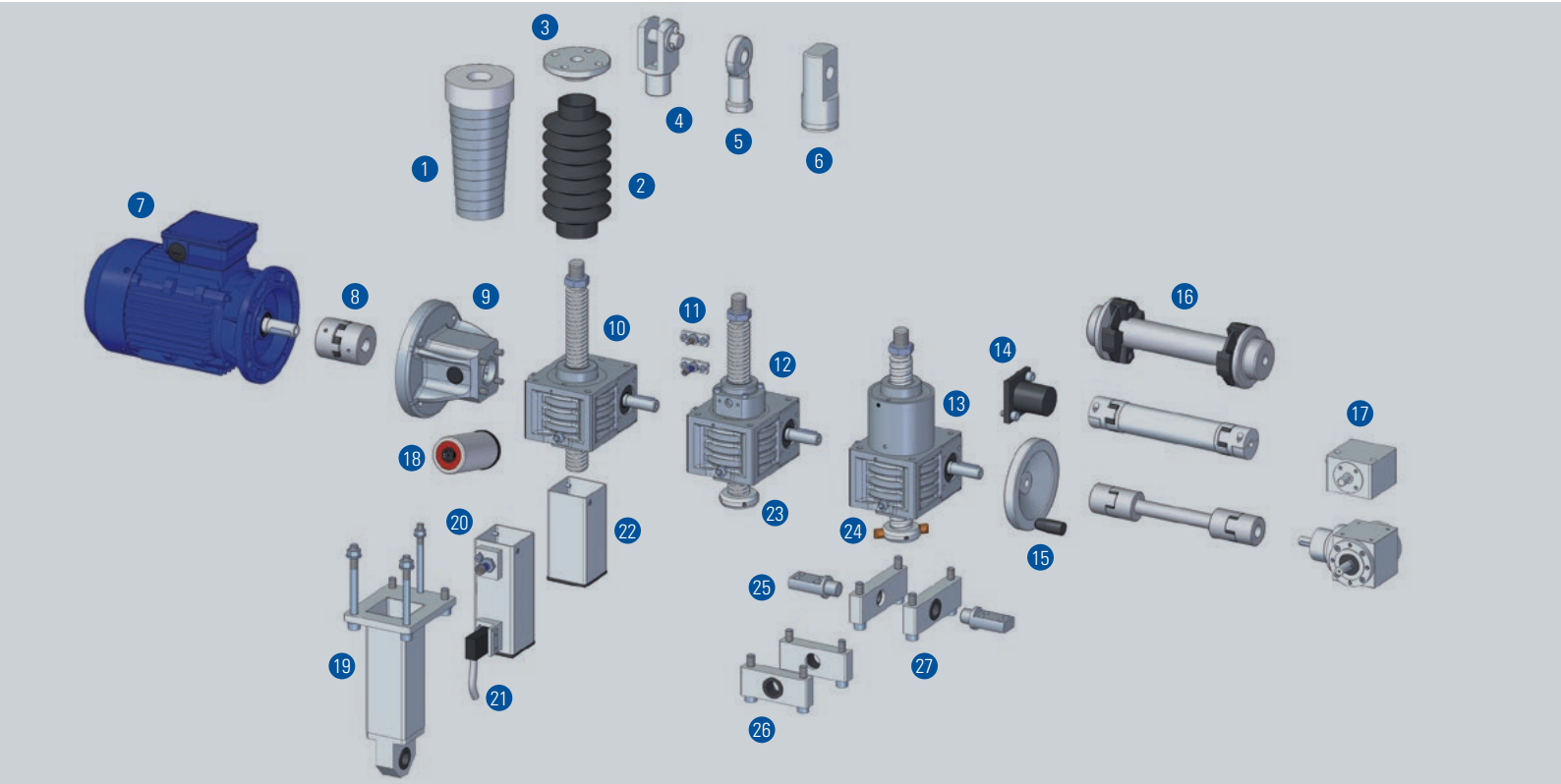
Non-rotating version



1	Spindle	☐
2	Mounting flange	☐
3	Ball joint head	☐
4	Fork head	☐
5	Swivel bearing head	☐
6	Bellows	☐
7	Spiral spring cover	☐
8	Lubricant dispenser	☐
9	Motor adapter	☐
10	Flexible coupling	☐
11	Motor	☐
12	Brake motor	☐
13	Spring brake	☐
14	Rotary pulse encoder	☐
15	Protection cap	☐
16	Hand wheel	☐
17	Suspension adapter long	☐
18	Suspension adapter short	☐
19	Suspension bolt	☐
20	Protection tube	☐
21	Limit switch inductive	☐
22	Limit switch mechanical	☐
23	Screw out protection	☐
24	Anti rotation lock	☐

Operation description / comments / assembls drawing

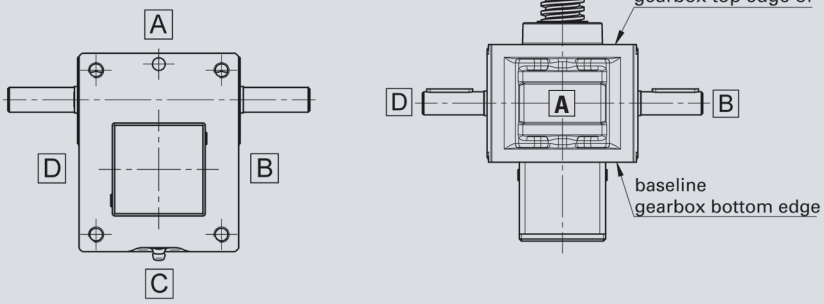
Attachment ☐ CAD File STEP/Iges/dxf or ☐ PDF or ☐ _____



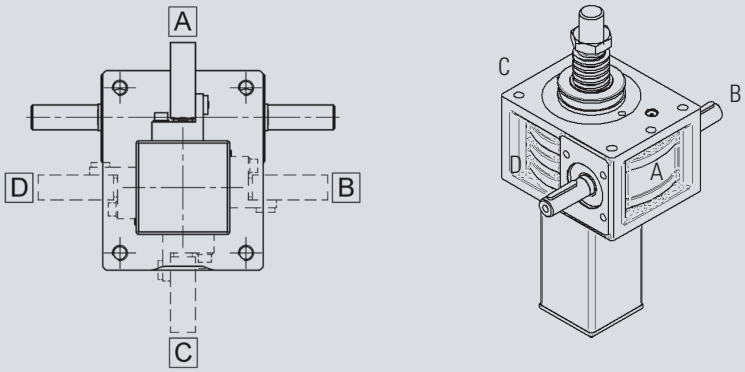
1 Spiral spring cover
2 Bellows
3 Mounting flange
4 Fork head
5 Ball joint head
6 Swivel bearing head
7 Motor/brake motor
8 Flexible coupling
9 Motor adapter
10 Screw jacks, non-rotating
11 Wear control
12 Screw jacks, non-rotating with safety trap nut
13 Screw jacks, non-rotating with ball screw
14 Protection cap
15 Hand wheel
16 Connecting shafts
17 Bevel gearboxes
18 Lubricant dispenser
19 Support tube
20 Limit switch inductive
21 Limit switch mechanical
22 Protection tube
23 Unscrew protection
24 Anti rotation lock
25 Suspension bolt
26 Suspension adapter short
27 Suspension adapter long

Size		NSE2	NSE5	NSE10	NSE25	NSE50	NSE100
maximum lifting capacity (kN)		2	5	10	25	50	100
Standard spindle		TR14x4	TR18x4	TR20x4	TR30x6	TR40x7	TR60x9
Ratio (i)	N	5:1	4:1	4:1	6:1	7:1	9:1
	L	20:1	16:1	16:1	24:1	28:1	36:1
Maximum driveshaft speed (min^{-1}) (higher on request)		1800	1800	1800	1800	1800	1800
Max. driving torque (Nm) (based on 1500 min^{-1})	N	2.50	5.60	10.50	22.50	51.00	60.20
	L	0.80	2.00	4.20	7.80	18.00	20.20
Stroke per revolution (mm)	N	0.80	1.00	1.00	1.00	1.00	1.00
	L	0.20	0.25	0.25	0.25	0.25	0.25
Efficiency gearbox (grease)	N	0.76	0.84	0.86	0.87	0.89	0.85
	L	0.45	0.62	0.69	0.69	0.74	0.65
Efficiency gearbox (oil)	N	0.86	0.87	0.96	0.98	0.94	0.95
	L	0.64	0.66	0.77	0.75	0.81	0.72
Efficiency spindle		0.50	0.42	0.40	0.40	0.36	0.32
Lubrication		Grease	Grease	Grease	Grease	Grease	Grease
Screw jack weight without spindle (kg)		0.64	1.06	1.98	3.62	10.02	16.80
Spindle weight (kg/m)		1.05	1.58	2.00	4.50	8.00	19.00

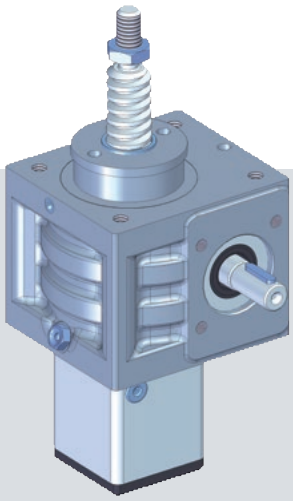
Orientation point

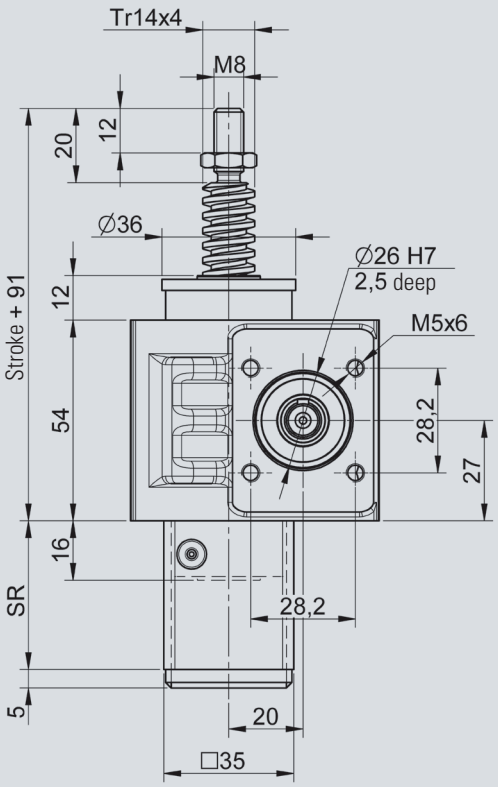


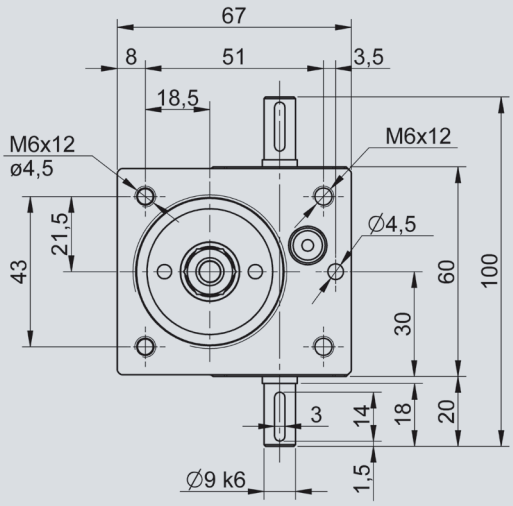
Limit switch position



NSE 2-SN/SL







Maximum lifting capacity:	2 kN (200 kg)
Maximum driveshaft speed:	1800 min^{-1} (higher on request)
Spindle:	TR 14x4 (standard)

Material

Material (housing):	Aluminium, option CuAL10Fe5Ni5
Lubrication:	Grease, option oil

Weight

Screw jack weight:	0.64 kg (with grease/without spindle)
Spindle weight:	1.05 kg/m

Versions

Safety trap nut (SFM)	see page 43
Ball screw (KGT)	see page 44

Available on request:

- Double-threaded trapezoidal screw
- Stainlesssteel spindle (INOX)
- Surface-treated spindle

More informations

Please find CAD - Data and productdatasheets under www.nozag.ch

Features

	Ratio	Stroke per revolution	Drive-torque[1]	Max. torque	Drive through torque[2]
	i	mm	Nm	Nm	Nm
NSE2-SN	5:1	0.80	F(kN) x 0.34 + 0.21	2.50	12
NSE2-SL	20:1	0.20	F(kN) x 0.14 + 0.11	0.80	12

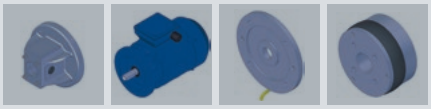
1) Factor includes efficiency, ratio and safety 1

2) With more than six gearboxes in series, please contact our technicians

Attachments > chapter 2.5

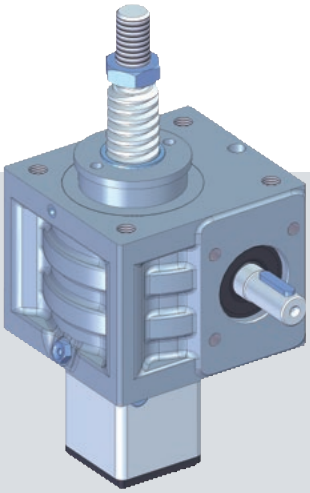
Drive components > chapter 4

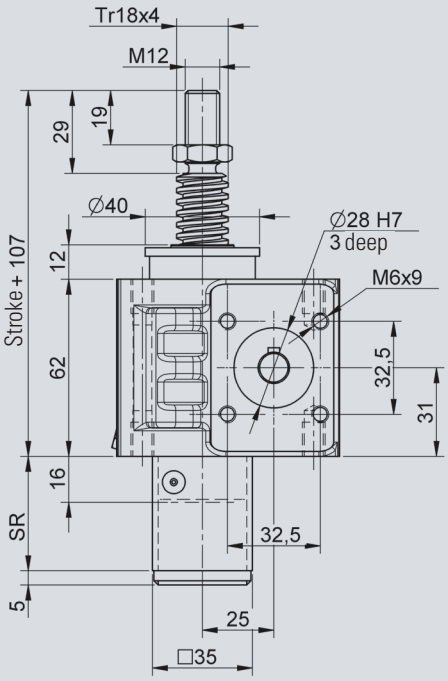
Motor mounting > chapter 5

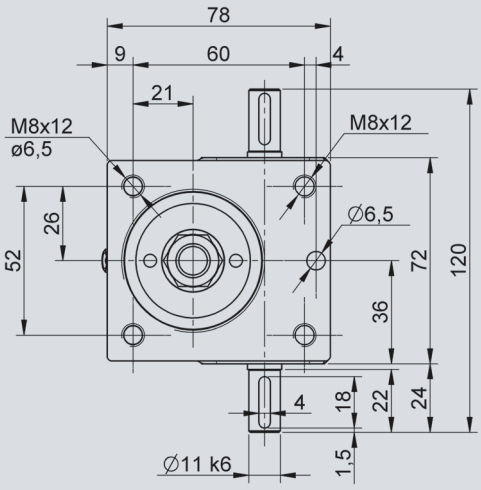


Rotating vers. > chapter 3

NSE 5-SN/SL







Maximum lifting capacity: 5 kN (500 kg)
Max. Maximum driveshaft speed: 1800 min^{-1} (higher on request)
Spindle: TR 18x4 (standard)

Material
Material (housing): Aluminium, option CuAL10Fe5Ni5
Lubrication: Grease, option oil

Weight
Screw jack weight: 1.06 kg (with grease/without spindle)
Spindle weight: 1.58 kg/m

Versions
Safety trap nut (SFM) see page 43
Ball screw (KGT) see page 44

Available on request:
- Double-threaded trapezoidal screw
- Stainlesssteel spindle (INOX)
- Surface-treated spindle

More Informations
Please find CAD - Data and productdatasheets under www.nozag.ch

Features

	Ratio	Stroke per revolution	Drive-torque[1]	Max. torque	Drive through torque[2]
	i	mm	Nm	Nm	Nm
NSE5-SN	4:1	1.00	F(kN) x 0.45 + 0.10	5.60	23
NSE5-SL	16:1	0.25	F(kN) x 0.15 + 0.08	2.00	23

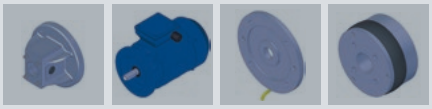
1) Factor includes efficiency, ratio and safety 1

2) With more than six gearboxes in series, please contact our technicians

Attachments > chapter 2.5

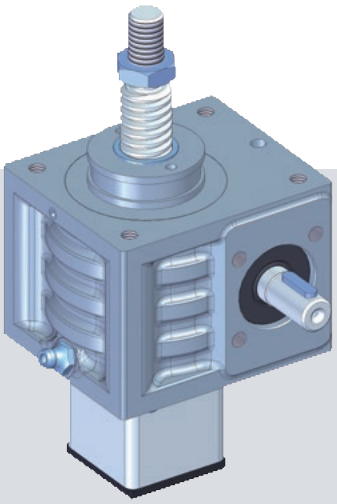
Drive components > chapter 4

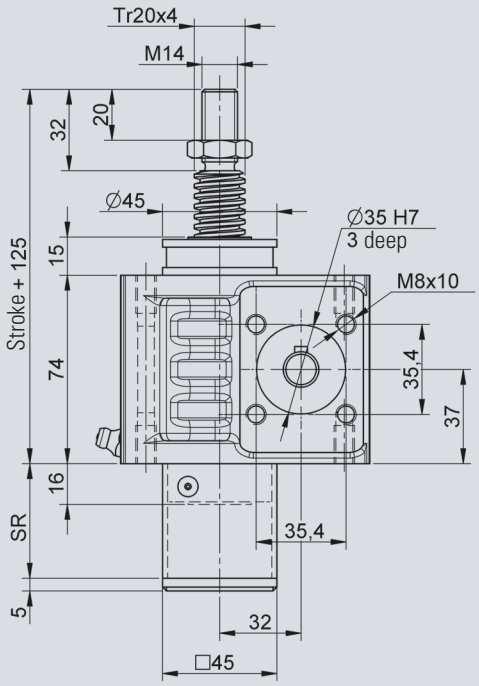
Motor mounting > chapter 5

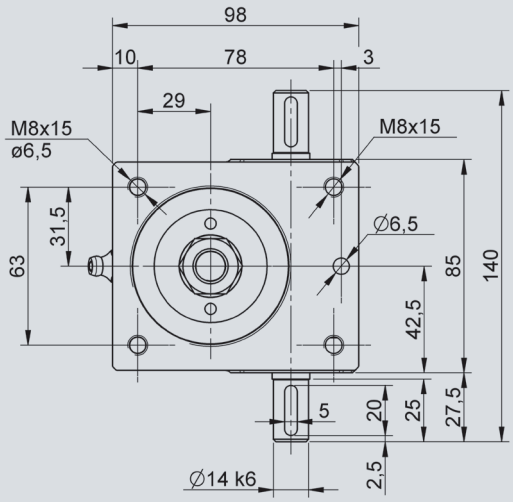


Rotating vers. > chapter 3

NSE 10-SN/SL







Maximum lifting capacity: 10 kN (1000 kg)
Maximum driveshaft speed: 1800 min^{-1} (higher on request)
Spindle: TR 20x4 (standard)

Material
Material (housing): Aluminium, option CuAL10Fe5Ni5
Lubrication: Grease, option oil

Weight
Screw jack weight: 1.98 kg (with grease/without spindle)
Spindle weight: 2.00 kg/m

Versions
Safety trap nut (SFM) see page 43
Ball screw (KGT) see page 44

Available on request:
- Double-threaded trapezoidal screw
- Stainlesssteel spindle (INOX)
- Surface-treated spindle

More informations
Please find CAD - Data and productdatasheets under www.nozag.ch

Features

	Ratio	Stroke per revolution	Driving torque[1]	Max torque	Drive through torque[2]
	i	mm	Nm	Nm	Nm
NSE10-SN	4:1	1.00	F(kN) x 0.46 + 0.26	10.50	42
NSE10-SL	16:1	0.25	F(kN) x 0.14 + 0.16	4.20	42

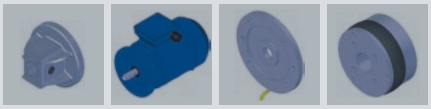
1) Factor includes efficiency, ratio and safety 1

2) With more than six gearboxes in series, please contact our technicians

Attachments > chapter 2.5

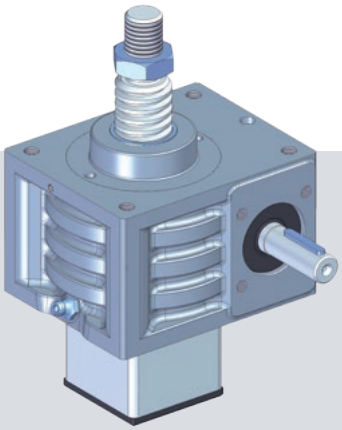
Drive components > chapter 4

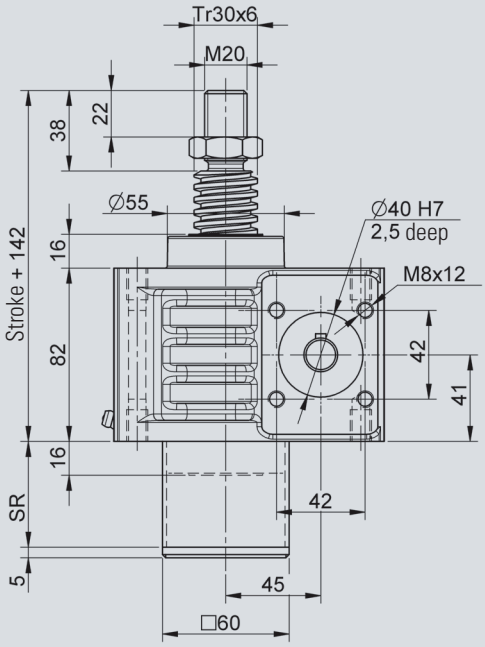
Motor mounting > chapter 5

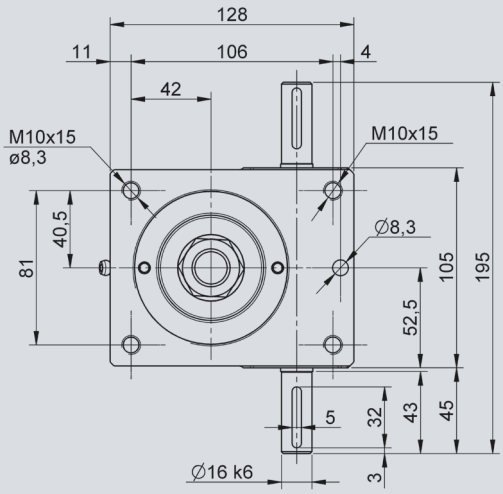


Rotating vers. > chapter 3

NSE 25-SN/SL







Maximum lifting capacity:	25 kN (2500 kg)
Maximum driveshaft speed:	1800 min^{-1} (higher on request)
Spindle:	TR 30x6 (standard)

Material

Material (housing):	Aluminium, option CuAL10Fe5Ni5
Lubrication:	Grease, option oil

Weight

Screw jack weight:	3.62 kg (with grease/without spindle)
Spindle weight:	4.50 kg/m

Versions

Safety trap nut (SFM)	see page 43
Ball screw (KGT)	see page 44

Available on request:

- Double-threaded trapezoidal screw
- Stainlesssteel spindle (INOX)
- Surface-treated spindle

More informations

Please find CAD - Data and productdatasheets under www.nozag.ch

Features

	Ratio	Stroke per revolution	Driving torque[1]	Max torque	Drive through torque[2]
	i	mm	Nm	Nm	Nm
NSE25-SN	6:1	1.00	F(kN) x 0.46 + 0.36	22.50	86
NSE25-SL	24:1	0.25	F(kN) x 0.14 + 0.26	7.80	86

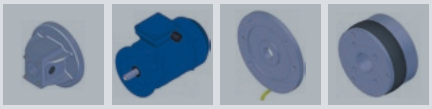
1) Factor includes efficiency, ratio and safety 1

2) With more than six gearboxes in series, please contact our technicians

Attachments > chapter 2.5

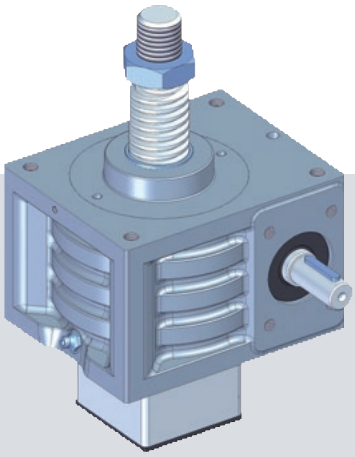
Drive components > chapter 4

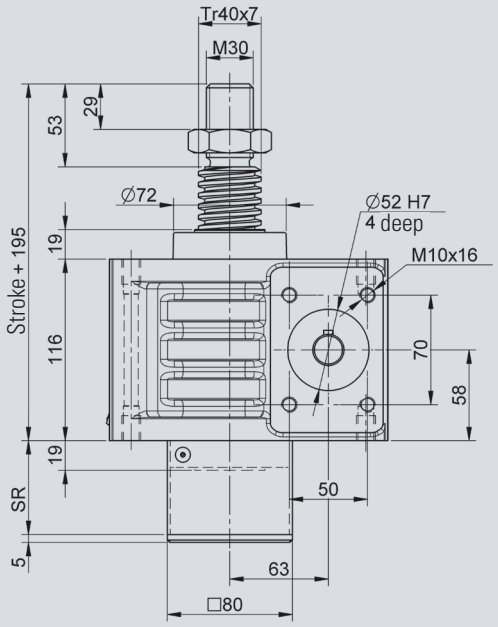
Motor mounting > chapter 5

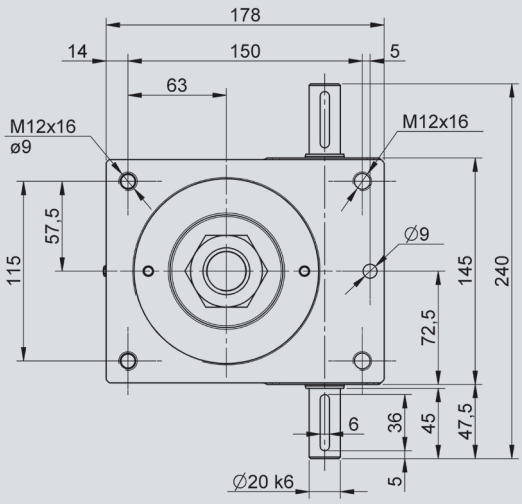


Rotating vers. > chapter 3

NSE 50-SN/SL







Maximum lifting capacity:	50 kN (5000 kg)
Maximum driveshaft speed:	1800 min^{-1} (highter on request)
Spindle:	TR 40x7 (standard)

Material

Material (housing):	Aluminium, option CuAL10Fe5Ni5
Lubrication:	Grease, option oil

Weight

Screw jack weight:	10.02 kg (with grease/without spindle)
Spindle weight:	8.00 kg/m

Versions

Safety trap nut (SFM)	see page 43
Ball screw (KGT)	see page 44

Available on request:

- Double-threaded trapezoidal screw
- Stainlesssteel spindle (INOX)
- Surface-treated spindle

More informations

Please find CAD - Data and productdatasheets under www.nozag.ch

Features

	Ratio	Stroke per revolution	Driving torque[1]	Max. torque	Drive through torque[2]
	i	mm	Nm	Nm	Nm
NSE50-SN	7:1	1.00	F(kN) x 0.50 + 0.76	51.00	150
NSE50-SL	28:1	0.25	F(kN) x 0.15 + 0.54	18.00	150

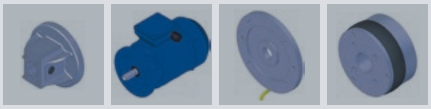
1) Factor includes efficiency, ratio and safety 1

2) With more than six gearboxes in series, please contact our technicians

Attachments > chapter 2.5

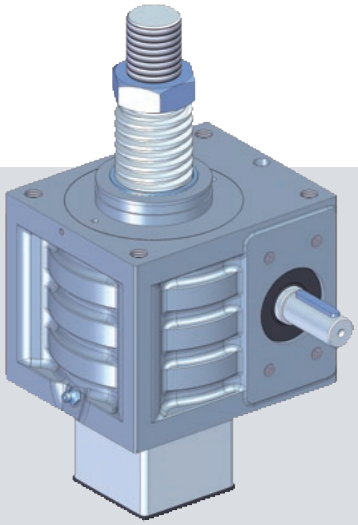
Drive components > chapter 4

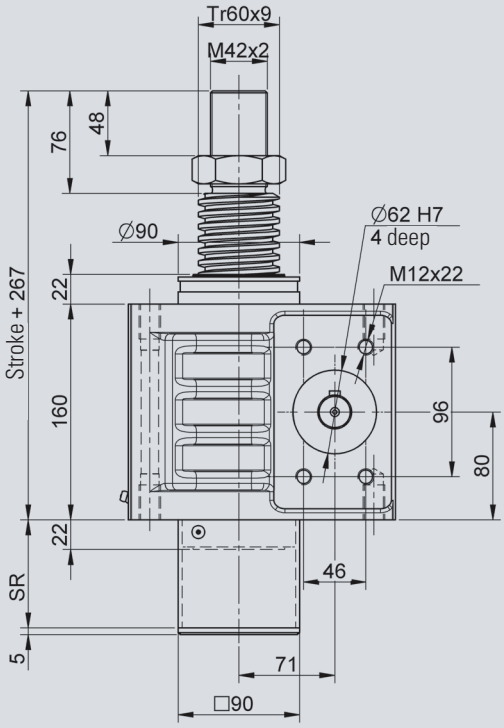
Motor mounting > chapter 5

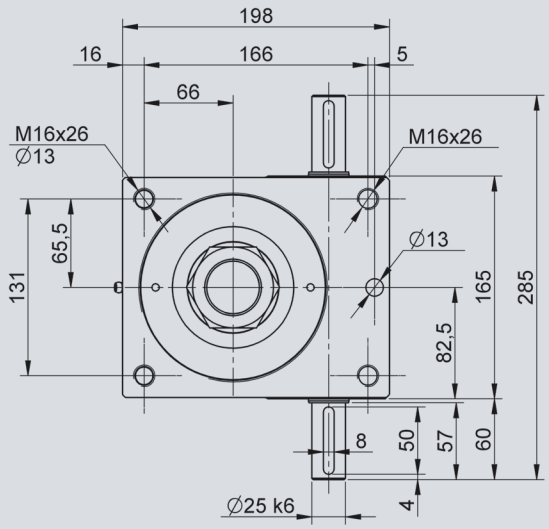


Rotating vers. > chapter 3

NSE 100-SN/SL







Maximum lifting capacity:	100 kN (10000 kg)
Maximum driveshaft speed:	1800 min^{-1} (higher on request)
Spindle:	TR 60x9 (standard)

Material

Material (housing):	Aluminium, option CuAL10Fe5Ni5
Lubrication:	Grease, option oil

Weight

Screw jack weight:	16.80 kg (with grease/without spindle)
Spindle weight:	19.00 kg/m

Versions

Safety trap nut (SFM)	see page 43
Ball screw (KGT)	see page 44

Available on request:

- Double-threaded trapezoidal screw
- Stainlesssteel spindle (INOX)
- Surface-treated spindle

More informations

Please find CAD - Data and productdatasheets under www.nozag.ch

Features

	Ratio	Stroke per revolution	Driving-torque[1]	Max. torque	Drive through torque2
	i	mm	Nm	Nm	Nm
NSE100-SN	9:1	1.00	F(kN) x 0.59 + 1.68	60.20	315
NSE100-SL	36:1	0.25	F(kN) x 0.19 + 1.02	20.20	315

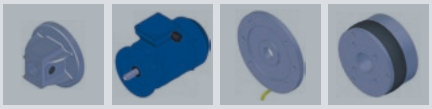
1) Factor includes efficiency, ratio and safety 1

2) With more than six gearboxes in series, please contact our technicians

Attachments > chapter 2.5

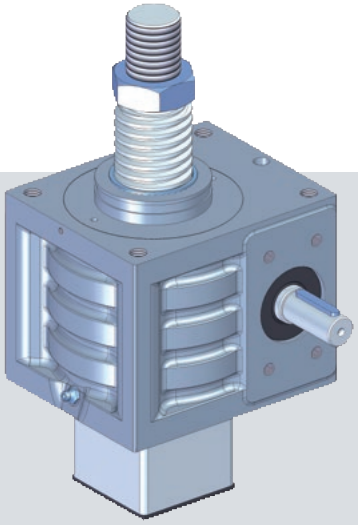
Drive components > chapter 4

Motor mounting > chapter 5



Rotating vers. > chapter 3

NSE 150–1000-SN/SL



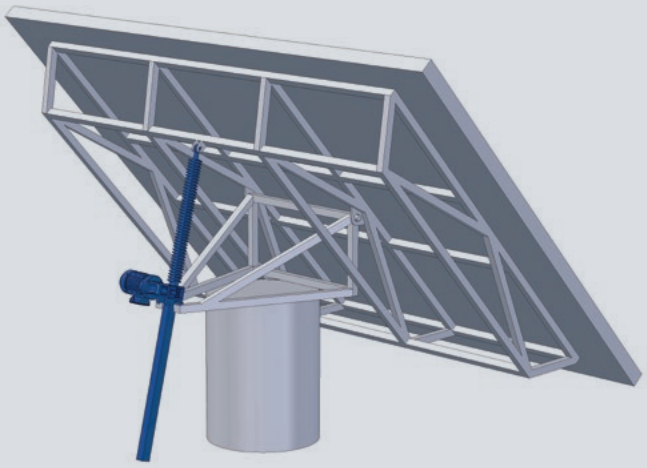
Individual and needs-oriented design
Screw jacks from size 150kN usually are used for complex tasks. We develop, manufacture or combine these dimensions individually for your needs. Take advantage of our experience and expertise in simple and complex projects with power requirements over 100kN. We provide very economical solutions, thanks to the modular system, yet also custom-made screw jacks for your needs.

These screw jacks are available in different versions, for example,
- Material (housing): cast Iron / steel
- Double-threaded trapezoidal screws
- Stainless steel screws (INOX)
- Surface-treated screws
- Ball screw s(KGT)
- Safety trap nut (SFM)

	Maximum lifting capacity
NSE150-SN	150kN
NSE150-SL	150kN
NSE250-SN	250kN
NSE250-SL	250kN
NSE350-SN	350kN
NSE350-SL	350kN
NSE500-SN	500kN
NSE500-SL	500kN
NSE750-SN	750kN
NSE750-SL	750kN
NSE1000-SN	1000kN
NSE1000-SL	1000kN

Standard Sizes
The screw jacks are available with the following lifting forces.

Details and advice on request
We are happy to help and assist you in details, design and calculation. CAD data or a checklist are available. Please contact us or send us your requirements.



Large spindles for long hubs

With longer strokes, usually the spindle diameter is the determining factor for dimensioning and consequently the gearbox will be over dimensioned the NSE25-SN/SL and the NSE50-SN/SL have been specially designed with larger spindles (buckling) – for applicatons with long strokes.

Therefore a compact gearbox can be used, In spite of longer strokes.
Other sizes on request.

Maximum lifting capacity:	25 kN (2500 kg)
Maximum driveshaft speed:	1800 min^{-1} (higher on request))
Spindle:	TR 36x6

Material

Material (housing):	Aluminium
Lubrication:	Grease

Weight

Screw jack weight:	3.62 kg (with grease / without spindle)
Spindle weight:	6.55 kg/m

Available on request

- Double-threaded trapezoidal screw
- Stainlesssteel spindle (INOX)
- Surface-treated spindle

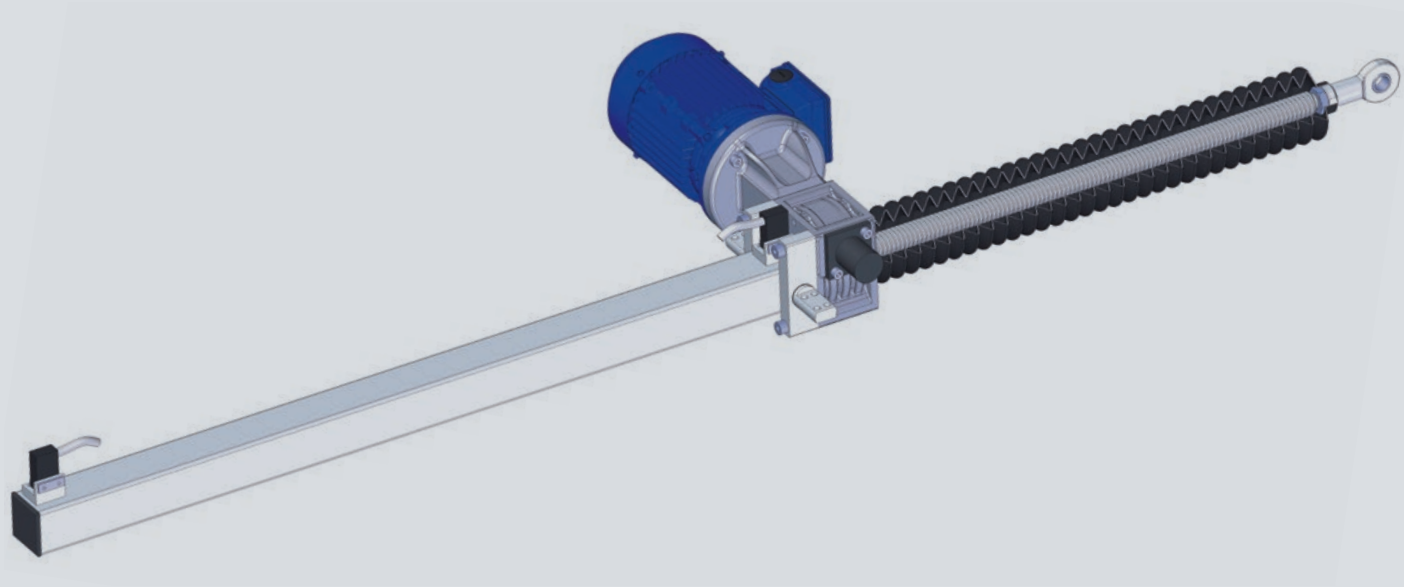
More informations

Please find CAD - Data and productdatasheets under www.nozag.ch

Features

	Ratio	Stroke per revolution	Driving torque[1]	Max torque
	i	mm	Nm	Nm
NSE25-SN-LH	6:1	1.00	F(kN) x 0.46 + 0.36	22.50
NSE25-SL-LH	24:1	0.25	F(kN) x 0.14 + 0.26	7.80

1) Factor includes efficiency, ratio and safety 1



Maximum lifting capacity: 50 kN (5000 kg)
Maximum driveshaft speed: 1800 min^{-1} (higher on request)
Spindle: TR 50x8

Material
Material (housing): Aluminium
Lubrication: Grease

Weight
Screw jack weight: 10.02 kg (with grease/without spindle)
Spindle weight: 13.00 kg/m

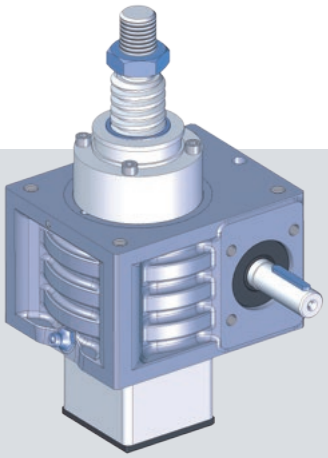
Available on request
- Double-threaded trapezoidal screw
- Stainlesssteel spindle (INOX)
- Surface-treated spindle

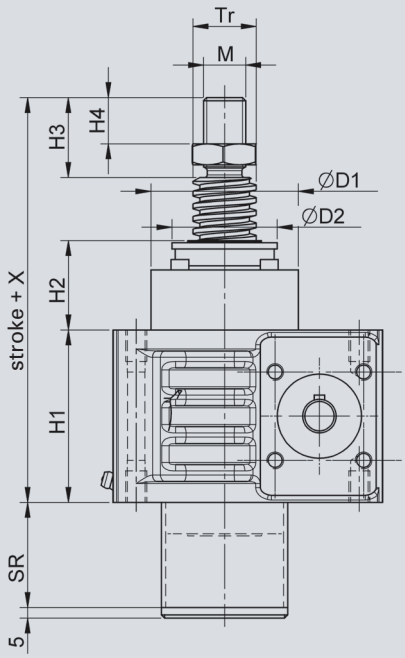
More informations
Please find CAD - Data and productdatasheets under www.nozag.ch

Features

	Ratio	Stroke per revolution	Driving torque[1]	Max torque
	i	mm	Nm	Nm
NSE50-SN-LH	7:1	1.14	F(kN) x 0.60 + 0.76	51.00
NSE50-SL-LH	28:1	0.29	F(kN) x 0.18 + 0.54	18.00

1) Factor includes efficiency, ratio and safety 1





Ordering example

Size	Version	Model	Sensor
NSE5 –	SN	– SFM	– INM

Function
The safety trap nut protects the load in one direction only. If the main nut should fail the safety trap nut will carry the full load.

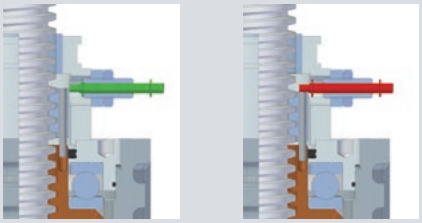
As soon as the thread of the worm wheel has worn more than 20% of the thread pitch (= 40% of tooth dimension), the worm wheel (or the whole gearbox, most cost effective for gearbox sizes up to NSE50) should be replaced.

Direction of load
Carefully check the direction of load (tension or compression)! A drawing with an application view is necessary to ensure correct specification. For a combination of SFM in tension with protection against rotation VS please contact our technical department.

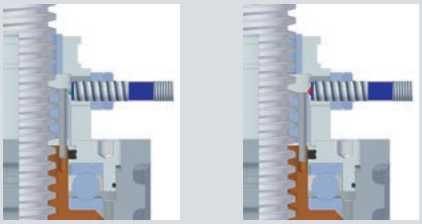
Rotation sensor
The rotation sensor is mounted on the last gearbox of each drive chain and detects possible failure of all the transmission components (coupling, ...).

Wear control
The wear of the nut, causes a corresponding reduction of the air gap which has to be monitored, this gap must not reduce more than 20%. During operation, the customer has provide a solution to monitor this air gap. We can optionally provide either a mechanical or inductive alternative.

Mechanical wear control (NSE-INM)

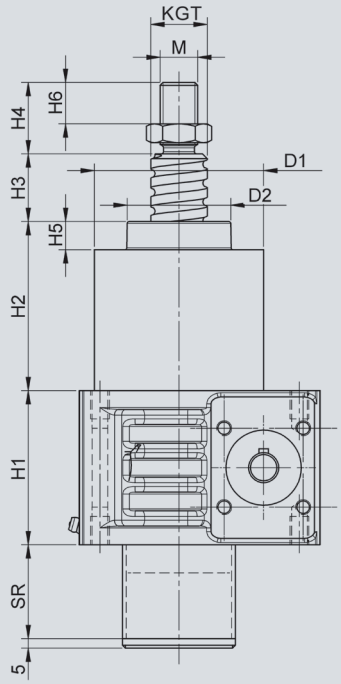


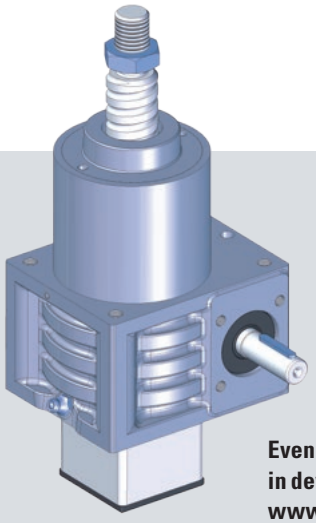
Inductive wear control (NSE-INI)



	SN	SL	TR	D1	D2	H1	H2 (min.)	H3	H4	M
NSE5	4:1	16:1	18x4	54	40	62	32.0	29	19	M12
NSE10	4:1	16:1	20x4	60	45	74	34.0	32	20	M14
NSE25	6:1	24:1	30x6	70	50	82	42.5	38	22	M20
NSE50	7:1	28:1	40x7	100	70	116	38.5	53	29	M30
NSE100	9:1	36:1	60x9	128	90	160	42.0	76	48	M42x2

NSE2 on request





Even more compact designs in development; current status www.nozag.ch

Ordering example

Size	Version	Model
NSE10 –	SL	– 25x10

Accuracy of pitch
0.05mm/300mm

Self-locking
None! Therefore, braking motor or spring-loaded brake FDB necessary

Fouling
Nuts are always fitted with scrapers. In case of serious fouling and fine dust/chips, we recommend preferably installing bellows or a spiral spring cover.

Lubrication
Adequate lubrication is an important factor to insure the life of the system, reducing friction and ensuring smooth running. For KGT we use the same lubricants as for ball bearings.

Protection
The spindle nut must not be removed from the spindle. Screw out protection should be used with the S version.

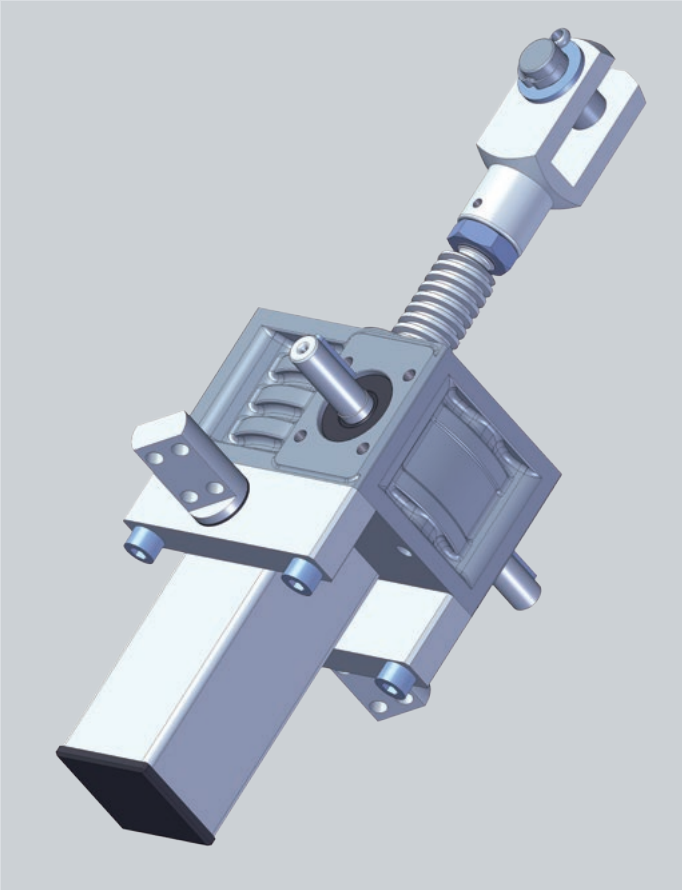
System starting and braking
Especially with high pitches and large gearboxes we recommend the use of a frequency inverter for a soft start for acceleration and deceleration. This provides protection for the whole system. Subject to a suitable control system being used the safety distance may be reduced. Please contact the technical department for more information.

Switching-on time
Owing to the lower heat generation with ball screws, you can multiply the switching-on times (ED in % per 10') by a factor of 2. Please contact us regarding applications with a switching-on time greater than 40 % (4 min per 10 min).

	KGT	SN*	SL*	D1	D2	H1	H2	H3 (min.)	H4	H5	H6	M	Axial play [max.]	Load rating [kN] dynamic	static
NSE5	16x05	1.25	0.31	55	40	62	66	10	29	12	19	M12	0.08	9.3	13.1
	16x10	2.50	0.63	55	40	62	66	20	29	12	19	M12	0.08	15.4	26.5
NSE10	25x05	1.25	0.31	70	45	74	76	10	32	14	20	M14	0.08	12.3	22.5
	25x10	2.50	0.63	70	45	74	76	20	32	14	20	M14	0.08	13.2	25.3
	25x25	6.25	1.56	70	45	74	76	50	32	14	20	M14	0.08	16.7	32.2
	25x50	12.50	3.13	70	45	74	76	100	32	14	20	M14	0.15	15.4	31.7
NSE25	32x05	0.83	0.21	90	55	82	90	10	38	15	22	M20	0.08	21.5	49.3
	32x10	1.67	0.42	90	55	82	90	20	38	15	22	M20	0.08	33.4	54.5
	32x20	3.33	0.83	90	55	82	90	40	38	15	22	M20	0.08	29.7	59.8
	32x40	6.67	1.67	90	55	82	90	80	38	15	22	M20	0.08	14.9	32.4
NSE50	40x05	0.71	0.18	130	72	116	84	10	53	19	29	M30	0.08	23.8	63.1
	40x10	1.43	0.36	130	72	116	84	20	53	19	29	M30	0.08	38.0	69.1
	40x20	2.86	0.72	130	72	116	84	40	53	19	29	M30	0.08	33.3	76.1
	40x40	5.71	1.43	130	72	116	84	80	53	19	29	M30	0.08	35.0	101.9
NSE100	50x10	1.11	0.28	150	90	160	92	20	76	22	48	M42x2	0.08	68.7	155.8
	50x20	2.22	0.56	150	90	160	92	40	76	22	48	M42x2	0.08	60.0	136.3

* Stroke per revolution (mm)

Actuator with hinged bearing plate



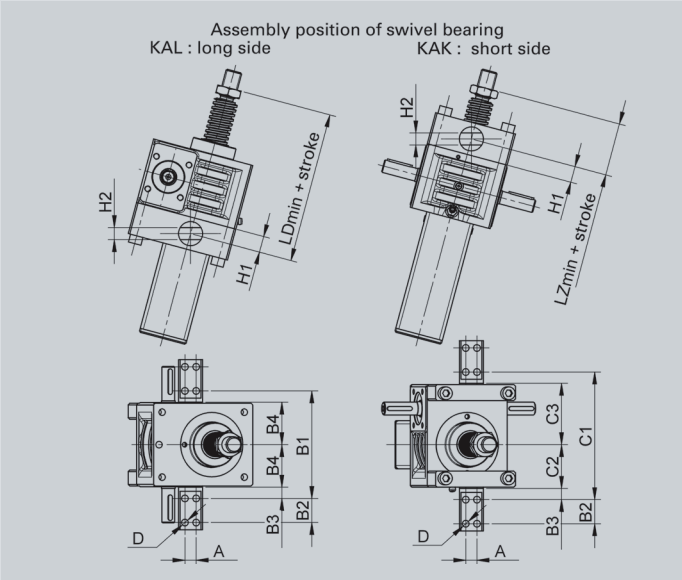
Actuators are designed for tension and compression loads with «eye to eye» function.

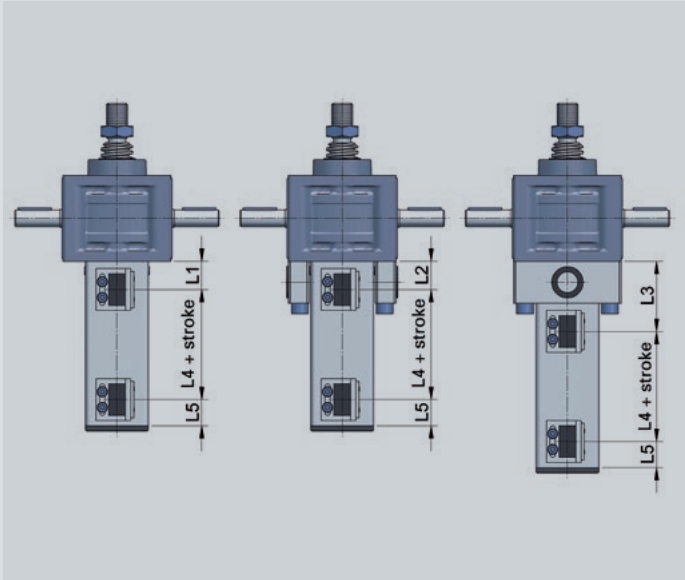
Max. storke: buckling calculation (dimension: eye to eye)!
When using a hinged bearing plate please consider moments caused by motor weight etc. Support is necessary!

If the main load direction is in tension it is recommended to mount the hinged bearing plate on the spindle side to avoid tension load on the mounting screws.

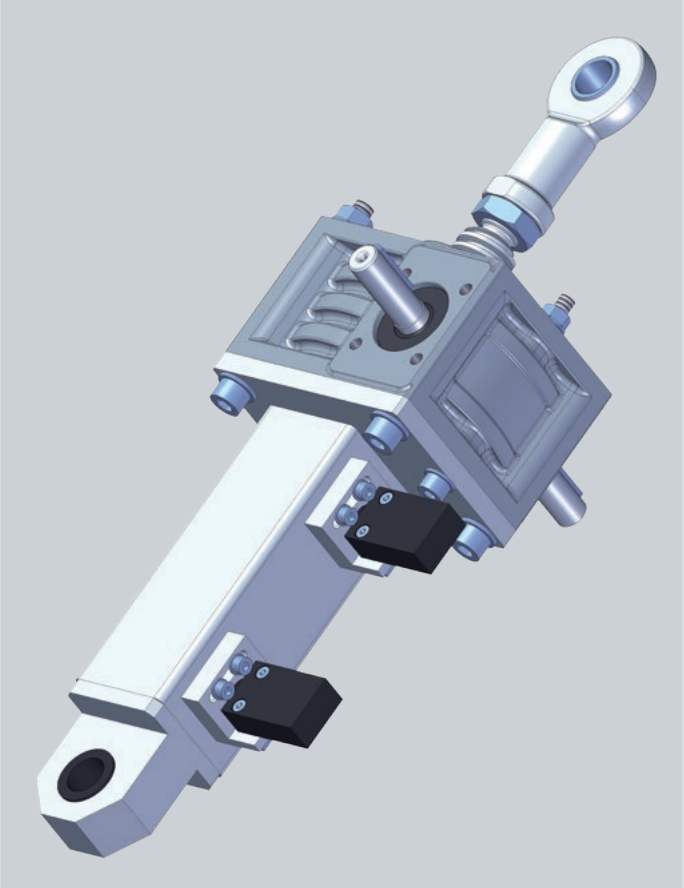
«A» is the standard position of limit switch and lubrication strip (with anti rotation lock VS). Please specify if another position is required!

	A	B1	B2	B3	B4	C1	C2	C3	D	H1	H2	L1	L2	L3	L4	L5
NSE2	10	79	15	9	30.5	87	27.5	41.5	5.5	12.5	9	25	50	50	5	25
NSE5	12	98	20	13	36.0	106	31.0	49.0	6.5	15.0	12	25	55	55	5	25
NSE10	12	111	20	13	42.5	126	40.0	60.0	6.5	15.0	12	25	25	55	5	25
NSE25	14	134	30	14	53.0	159	54.5	76.5	8.5	20.0	15	27	27	65	5	25
NSE50	18	177	35	15	73.5	212	79.0	103.0	10.5	30.0	20	33	33	85	10	31
NSE100	20	199	50	17	82.5	234	83.0	117.0	12.5	37.5	30	38	38	100	10	37





Actuator with support tube for pivot bearing STR



Max. storke for actuators STR 500 mm
When using a support tube for pivot bearing please consider moments caused by motor weight etc. Support is necessary!

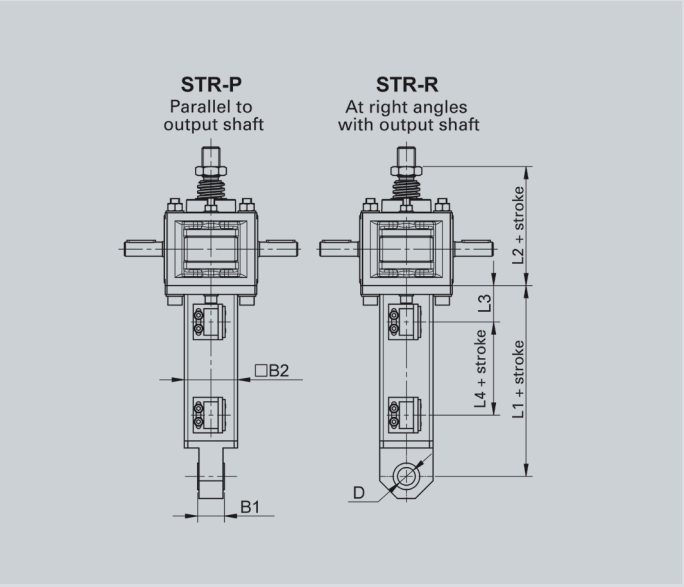
It is recommended to use the hinged bearing plate KAL/KAK option where possible: with this version the weight of the gearbox and motor ist directly at the privat point.

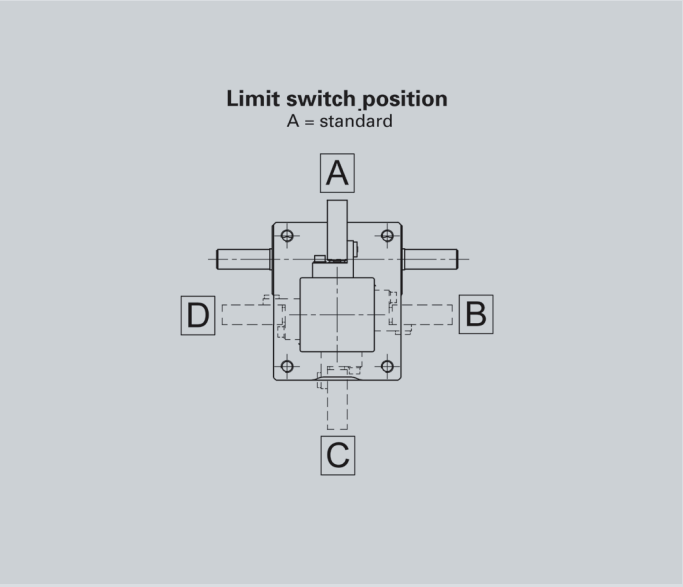
«A» is the standard position of limit switch and lubrication strip (with anti rotation lock VS). Please specify if another position is required!

Ordering example

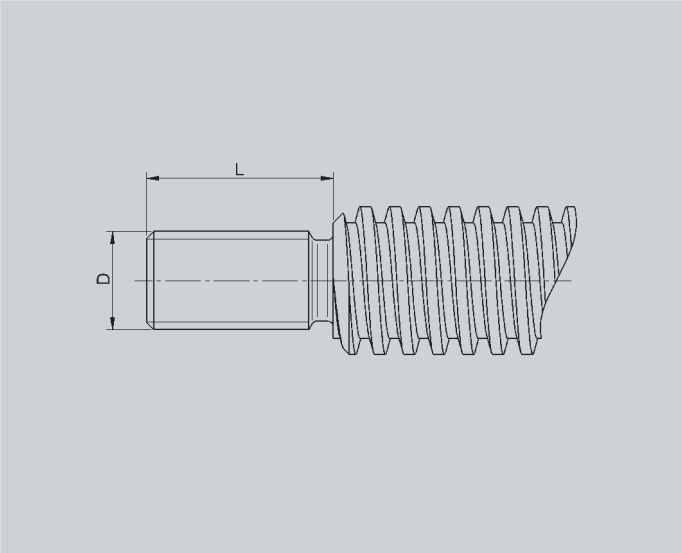
Size	Version		Model
NSE25	– SN	–	STR

	B1	B2	D	L1	L2	L3	L4
NSE2	20	35	12	100	79	38	5
NSE5	20	35	12	100	88	38	5
NSE10	30	45	20	106	105	38	5
NSE25	30	60	20	113	120	41	5
NSE50	50	80	40	143	166	46	10
NSE100	50	90	40	146	219	49	10





Spindle end, non-rotating



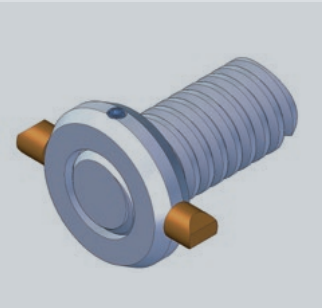
	TR	D	L
NSE2-TS	TR14x4	M 8	20
NSE5-TS	TR18x4	M 12	29
NSE10-TS	TR20x4	M 14	32
NSE25-TS	TR30x6	M 20	38
NSE50-TS	TR40x7	M 30	53
NSE100-TS	TR60x9	M 42x2	76

Screw out protection AS

The screw out protection prevents the screw from being screwed out of the gearbox. Especially recommended for ball screws. Do not use the screw out protection as a mechanical stop.

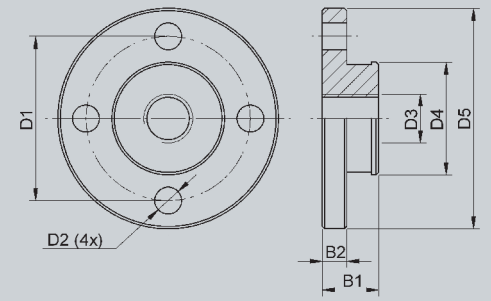
The screw out protection is required when used in combination with limit swichtes.

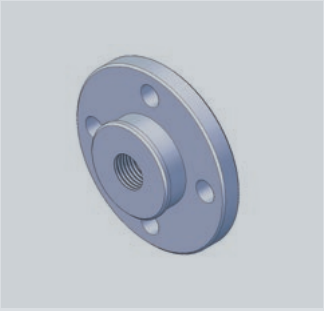
Anti rotation lock VS



Anti rotation lock is required to prevent the screw from rotating or when used in combination with limit switches or ball joint head KGK.

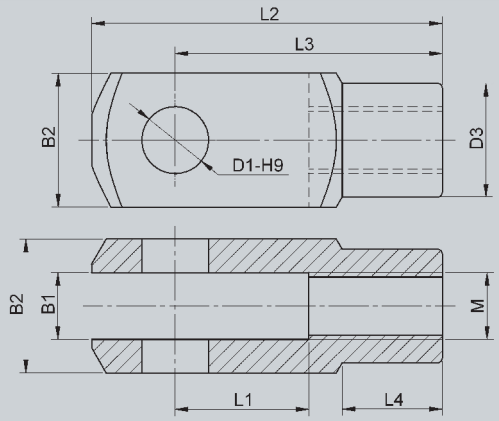
Mounting flange BF

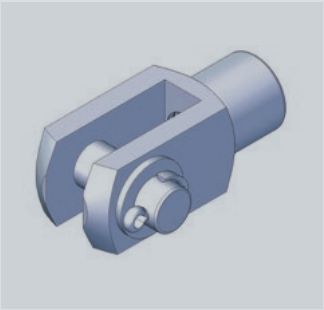




	B1	B2	D1	D2	D3	D4	D5
NSE2-BF	20	6	36	5.8	M 8	20	46
NSE5-BF	20	7	48	9.0	M 12	29	65
NSE10-BF	21	8	60	11.0	M 14	38	80
NSE25-BF	23	10	67	11.0	M 20	46	90
NSE50-BF	30	15	85	13.0	M 30	60	110
NSE100-BF	50	20	117	17.0	M 42x2	85	150

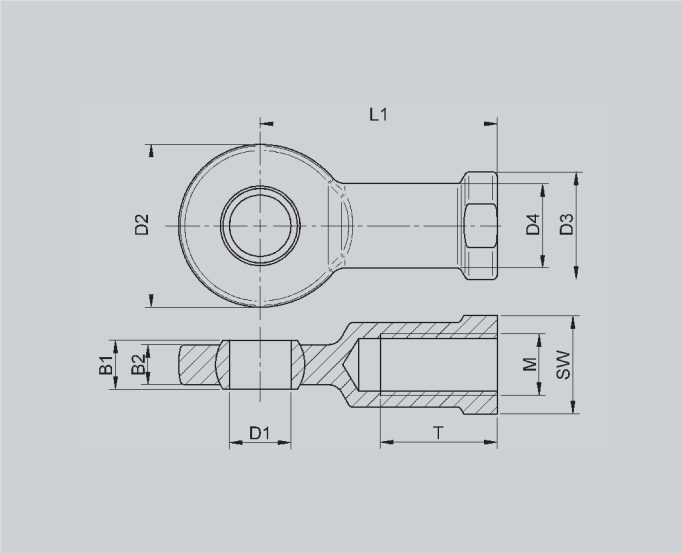
Fork head GK

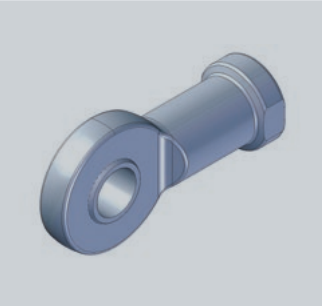




	B1	B2	D1	D3	L1	L2	L3	L4	M
NSE2-GK	8	16	8	14	16	42	32	12.0	M 8
NSE5-GK	12	24	12	20	24	61	48	18.0	M 12
NSE10-GK	14	28	14	24	28	72	56	22.5	M 14
NSE25-GK	20	40	20	34	40	105	80	30.0	M 20
NSE50-GK	30	60	30	52	60	160	120	42.0	M 30
NSE100-GK	40	85	40	70	84	232	168	63.5	M 42x2

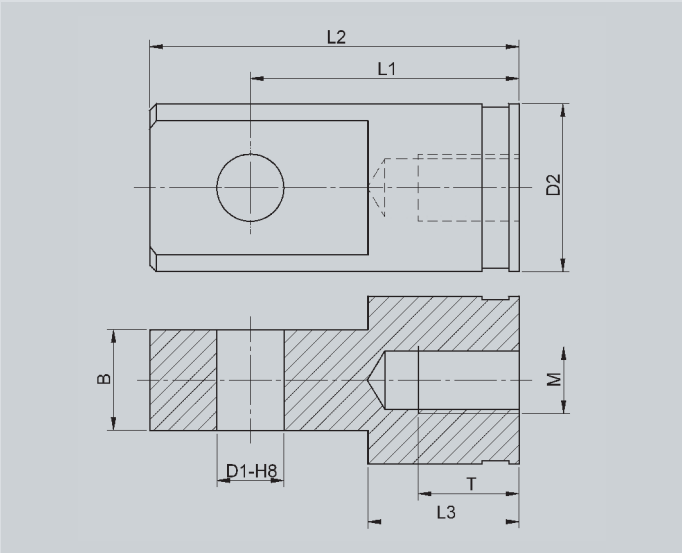
Ball joint head KGK

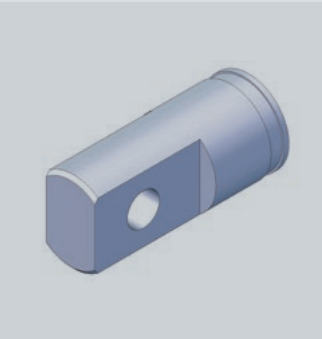




	B1	B2	D1	D2	D3	D4	L1	M	SW	T
NSE2-KGK	8	6	8	24	16	12.5	36	M 8	14	16
NSE5-KGK	10	8	12	34	22	17.5	50	M 12	19	22
NSE10-KGK	12	10	15	40	26	21.0	61	M 14	22	29
NSE25-KGK	16	13	20	53	35	27.5	77	M 20	32	35
NSE50-KGK	22	19	30	73	43	40.0	110	M 30	41	56
NSE100-KGK	23	28	40	92	65	52.0	142	M 42x2	55	60

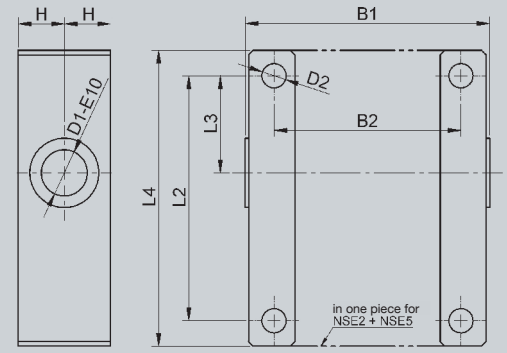
Swivel bearing head SLK

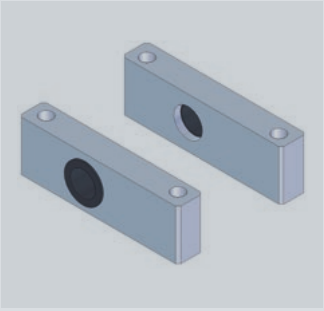




	B	D1	D2	L1	L2	L3	M	T
NSE5-SLK	18	12	30	48	65	25	M 12	22
NSE10-SLK	24	14	40	56	80	25	M 14	25
NSE25-SLK	30	20	50	80	110	45	M 20	25
NSE50-SLK	35	30	60	92	130	50	M 30	33
NSE100-SLK	57	50	100	155	210	90	M 42x2	70

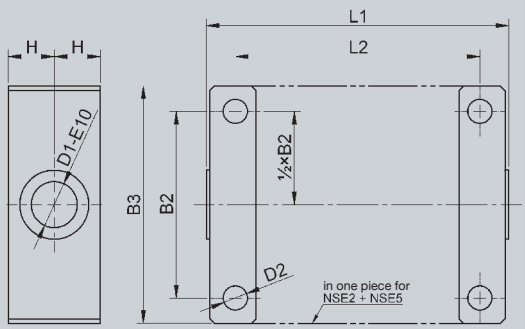
Suspension adapter plate long KAL

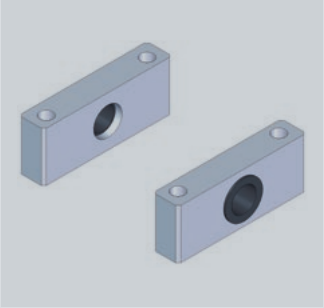




	B1	B2	D1	D2	H	L2	L3	L4
NSE2-KAL	61	43	10	6.5	12.5	51	18.5	67
NSE5-KAL	72	52	15	8.5	15.0	60	21.0	78
NSE10-KAL	85	63	15	8.5	15.0	78	29.0	98
NSE25-KAL	106	81	20	10.5	20.0	106	42.0	128
NSE50-KAL	147	115	30	13.0	30.0	150	63.0	178
NSE100-KAL	165	131	40	17.0	37.5	166	66.0	196

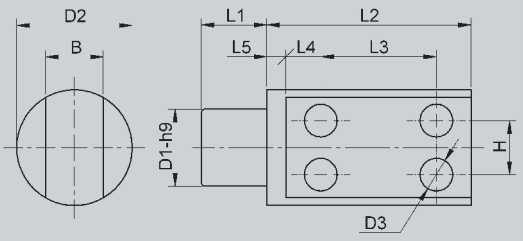
Suspension adapter plate short KAK

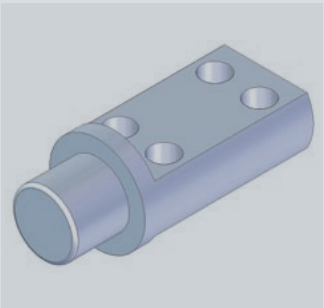




	B2	B3	D1	D2	H	L1	L2
NSE2-KAK	43	59	10	6.5	12.5	69	51
NSE5-KAK	52	70	15	8.5	15.0	80	60
NSE10-KAK	63	83	15	8.5	15.0	100	78
NSE25-KAK	81	103	20	10.5	20.0	131	106
NSE50-KAK	115	143	30	13.0	30.0	182	150
NSE100-KAK	131	161	40	17.0	37.5	200	166

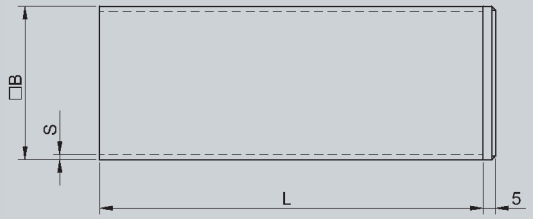
Suspension adapter bolt KB

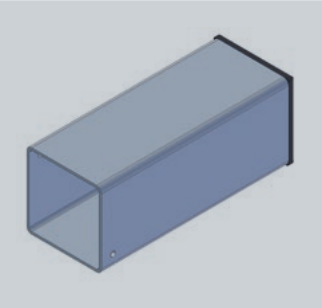




	B	D1	D2	D3	H	L1	L2	L3	L4	L5
NSE2-KB	9	10	20	5.5	10	10	30	15	6	3
NSE5-KB	12	15	25	6.5	12	10	40	20	8	5
NSE10-KB	12	15	25	6.5	12	10	40	20	8	5
NSE25-KB	15	20	30	8.5	14	16	53	30	9	5
NSE50-KB	20	30	40	10.5	18	21	60	35	10	5
NSE100-KB	30	40	50	12.5	20	31	80	50	12	5

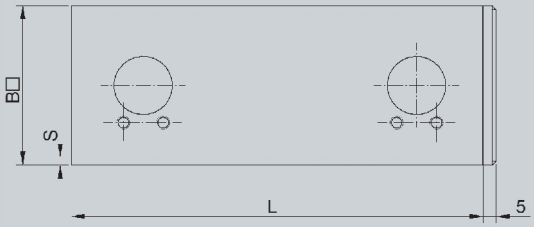
Protection tube SR

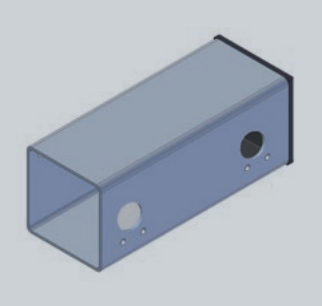




	B	S
NSE2-SR	35	2
NSE5-SR	35	2
NSE10-SR	45	2
NSE25-SR	60	3
NSE50-SR	80	3
NSE100-SR	90	4

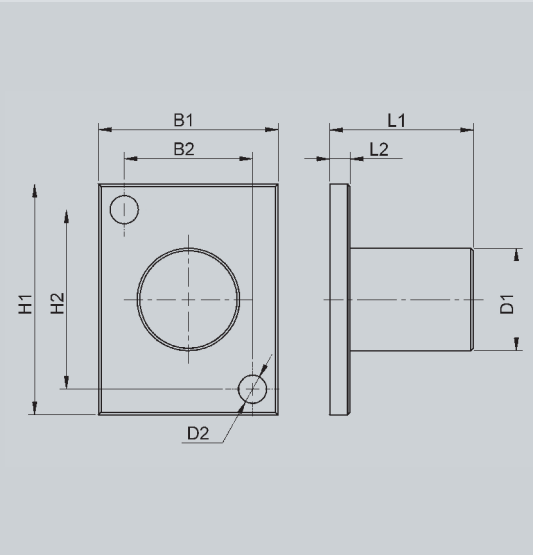
Protection tube for limit switch SR-ES

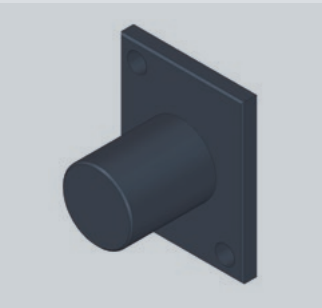




	B	S
NSE2-SR-ES	35	2
NSE5-SR-ES	35	2
NSE10-SR-ES	45	2
NSE25-SR-ES	60	3
NSE50-SR-ES	80	3
NSE100-SR-ES	90	4

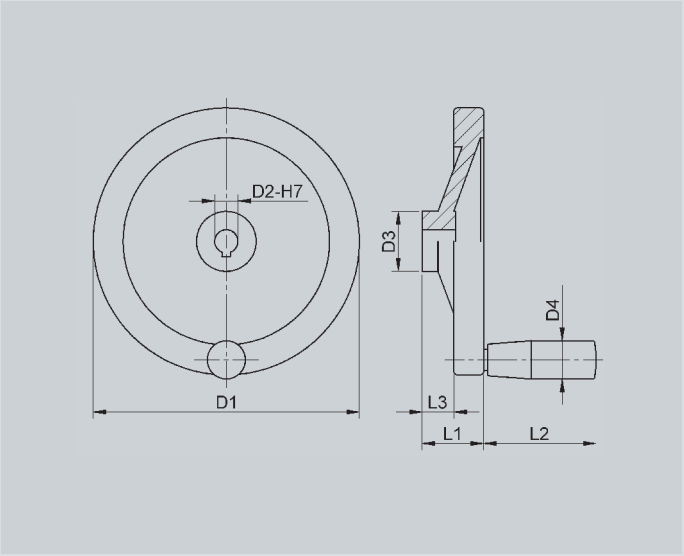
Protection cap SK





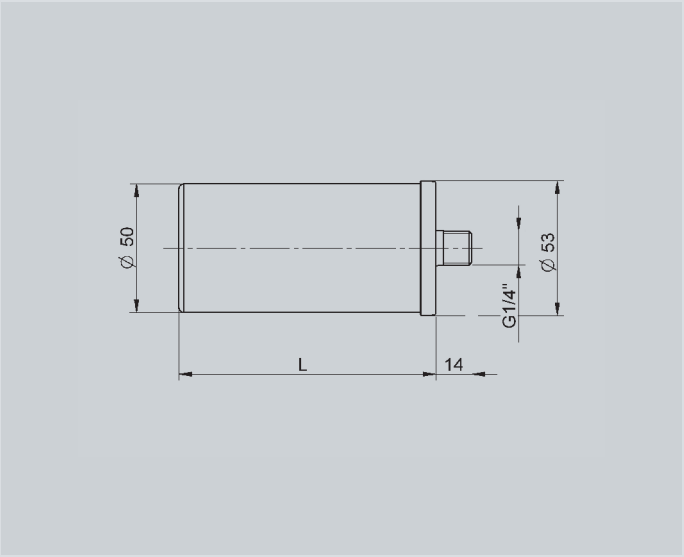
	B1	B2	D1	D2	H1	H2	L1	L2
NSE2-SK	38	28.2	30	5.5	49	28.2	25	6
NSE5-SK	45	32.5	30	7.0	45	32.5	32	8
NSE10-SK	50	35.4	30	9.0	50	35.4	35	8
NSE25-SK	60	42.0	40	9.0	60	42.0	53	8
NSE50-SK	70	50.0	40	11.0	90	70.0	56	8
NSE100-SK	70	46.0	50	13.5	120	96.0	70	8

Hand wheel HR

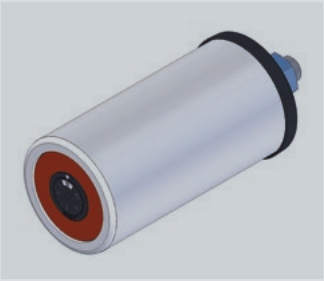


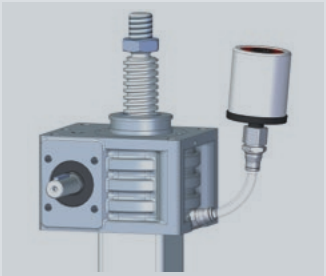
	D1	D2 with keyway	D3	D4	L1	L2	L3
HR-60	60	09/11	18	21	22	52.5	15
HR-80	80	11	26	18	26	42.5	16
HR-125	125	11/14	31	23	33	67.5	18
HR-160	160	14/16	36	26	39	82.5	20
HR-200	200	16/20	42	26	45	82.5	24
HR-250	250	20/25	48	28	51	92.5	28

Lubricant dispenser SSG



Depending on the required amount of lubrication, the dispensers last for 1 up to 12 months.
We would gladly supply you with accsessories (tube, busching, etc.)

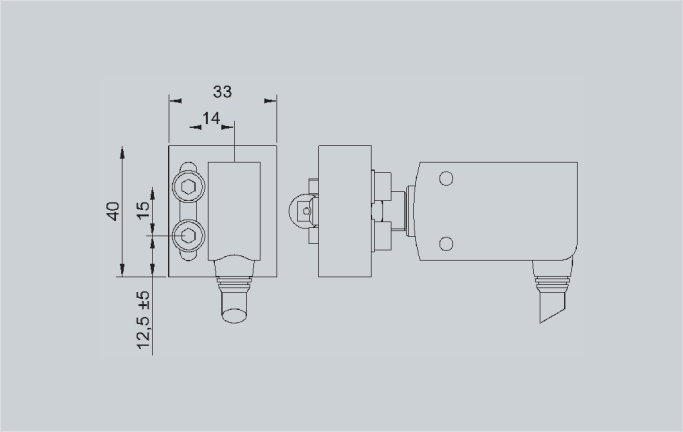


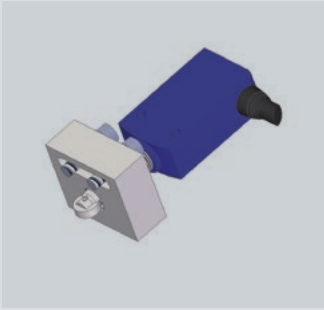


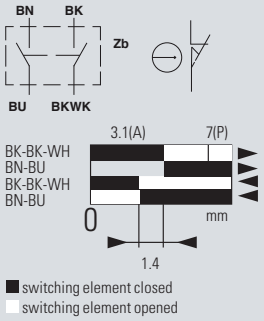
	L	Filling
SSG-60-UM	62	60 ml Universal grease with MoS2
SSG-125-UM	100	125 ml Universal grease with MoS2
SSG-125-L	100	125 ml Food fat

	SSG	SSG with flexible tube
NSE2	**SSG-RED-M6/-G1/8**	**SSG-RED-M6 + SSG-S**
NSE5	**SSG-RED-M6/-G1/8**	**SSG-RED-M6 + SSG-S**
NSE10-SN/SL*	**SSG-RED-G1/8**	**SSG-S**
NSE25	**SSG-RED-G1/8**	**SSG-S**
NSE50	**SSG-RED-G1/8**	**SSG-S**
NSE100	**SSG-RED-G1/8**	**SSG-S**

Limit switch mechanical ESM



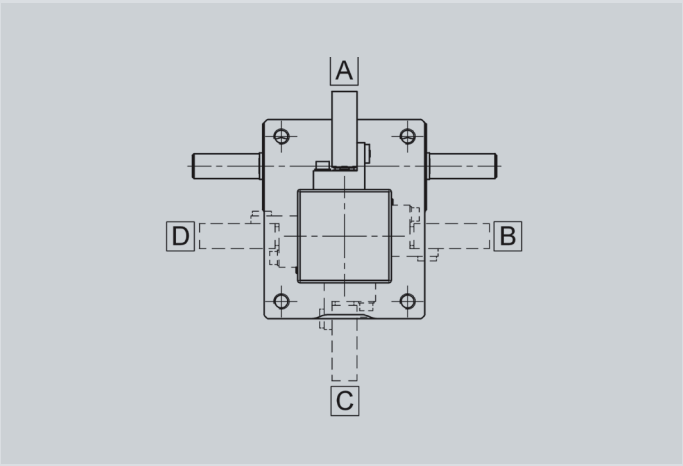




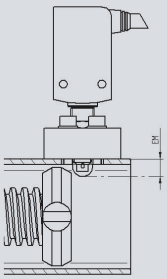
Limit switch with 4-pole cable, mounting plate and 2 screws

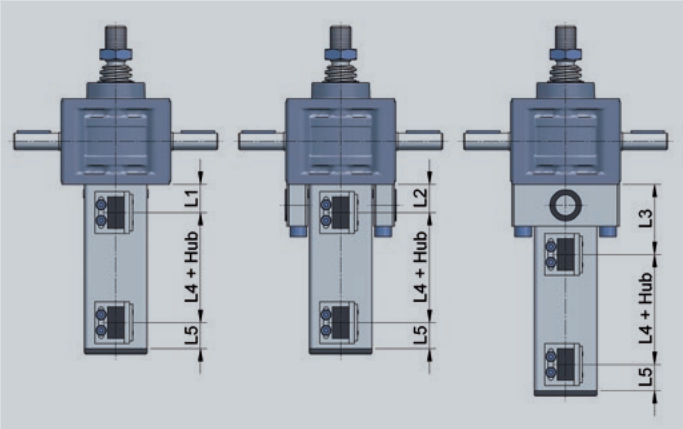
- 240V
- IP 65
- Technology: «closer» (NC) and «opener» (NO)
- Opener (NO): Cable color BK (black) and BK-WH (black / white)
- Closer (NC): Cable color BU (blue) and BN (brown)
- IEC / EN 60947-5-1
- Cable length ~ 1 m

Limit switch position



EM	EM (mm)
NSE2	6.0
NSE5	6.0
NSE10	6.5
NSE25	7.5
NSE50	8.0
NSE100	8.5

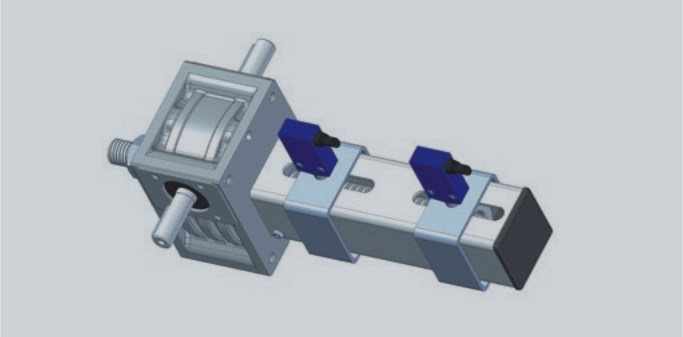




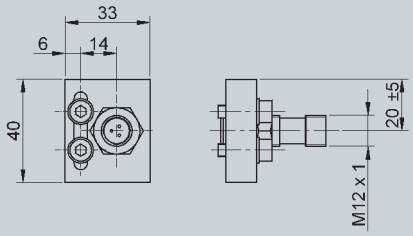
	TR	L1	L2	L3	L4	L5
NSE2	TR14x4	25	50	50	5	25
NSE5	TR18x4	25	55	55	5	25
NSE10	TR20x4	25	25	55	5	25
NSE25	TR30x6	27	27	65	5	25
NSE50	TR40x7	33	33	85	10	31
NSE100	TR60x9	38	38	100	10	37

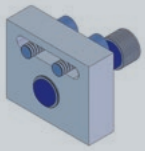
Mechanical limitswitch, shiftable ESMV

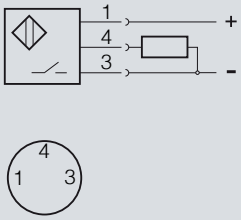
approach for limitswitches with bigger movable distance



Limit switch inductive ESI



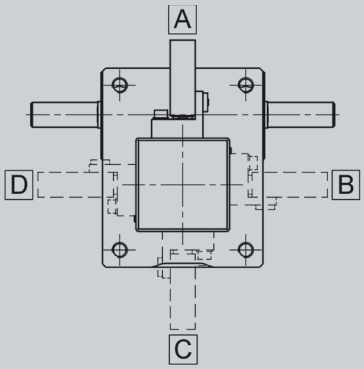




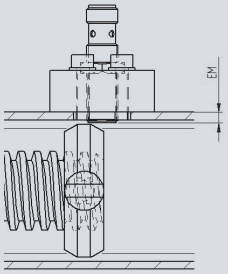
The inductive proximity switches are mounted on the square end protection tube with a bracket. The desired positions of the proximity switches can be exactly fixed in alignment.

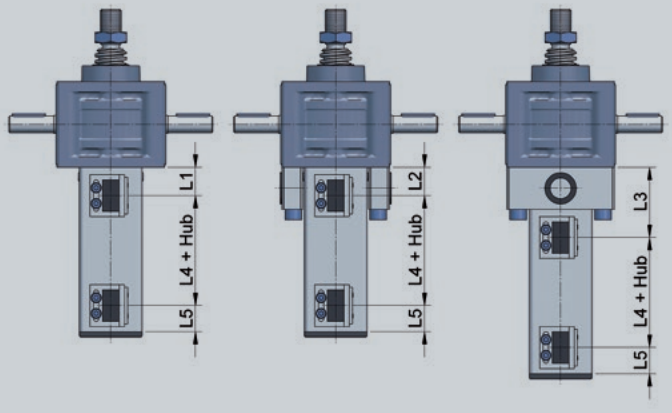
The following standard types are available and can be supplied:
- DC from 10 V to 30 V, max. 200 mA
- PNP
- Switching distance: 2mm
- Output function: «Normally closed» (NC), option «Normally open» (NO) on request

Limit switch position



EM	EM (mm)
NSE2	2.0
NSE5	2.0
NSE10	2.0
NSE25	3.0
NSE50	3.0
NSE100	4.0

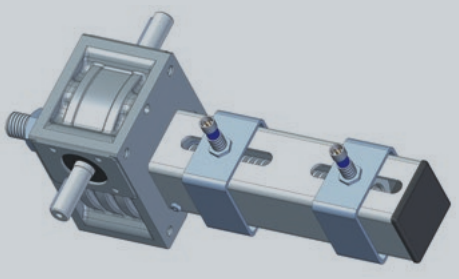


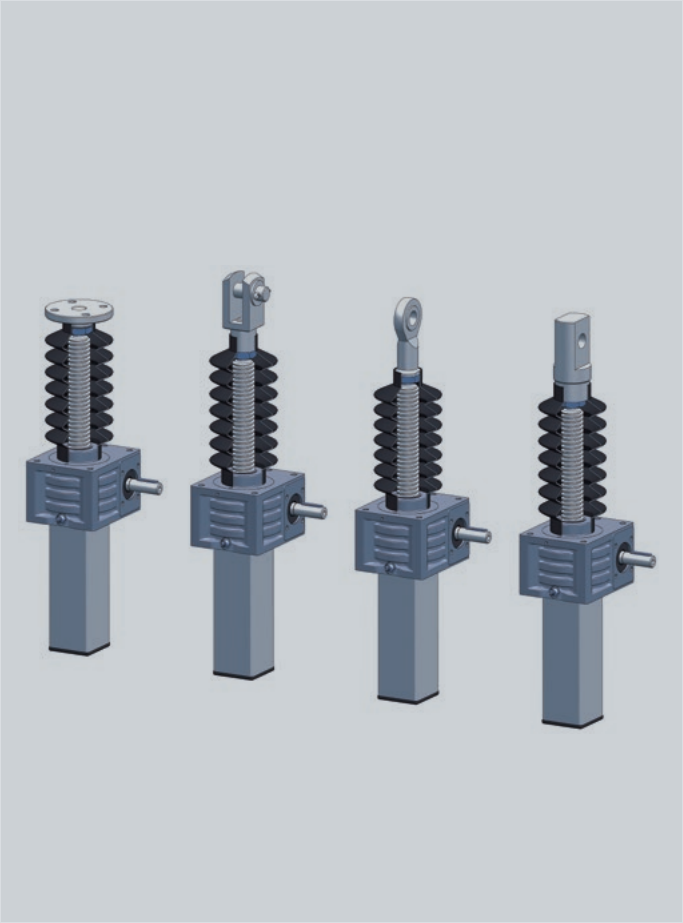


	TR	L1	L2	L3	L4	L5
NSE2	TR14x4	25	50	50	5	25
NSE5	TR18x4	25	55	55	5	25
NSE10	TR20x4	25	25	55	5	25
NSE25	TR30x6	27	27	65	5	25
NSE50	TR40x7	33	33	85	10	31
NSE100	TR60x9	38	38	100	10	37

Inductive limitswitch, shiftable ESIV

approach for limitswitches with bigger movable distance





Bellows protect the screw against dirt and moisture.

Particularly in the case of on-site assembly, they protect the spindles from: construction dust, grinding dust from angle grinders, welding spatters, etc. Protect the bellows from direct sunlight. Please note also that the maximum duration of switching on of the lifting jacks is reduced by the heat-insulating action of bellows.

Attention:
The bellows must not be compressed below the dimension ZD or extended beyond the dimension AZ. (For strokes greater than 1000 mm, use the bellows with support rings.) Take into consideration that, for horizontal installation of the bellows, it must not come into contact with screw: Serious wear will occure! This can be avoided by the use of support rings.

Air holes must be made by the customer, depending on the speed.

Ordering example for bellows

Type
Number of bellows
Gaite diameter 1/2

FB90-15-30/40

Screw jack NSE2–NSE5

	L	ZD*	AZ*	D1	D2	D3	D4
FB52	10	2.1	10.5	26	34	30	52

* per fold
Standard is FB52-29-26/34-300 mit ZD = 60mm

Material: NBR
Temperature range: -20 … +80 °C

Screw jack NSE10–NSE50 (NSE5)

	L	ZD*	AZ*	D1	D2	D3	D4
FB90	20	3.5	24.5	30/40/50	30/40/50	50	90

* per fold

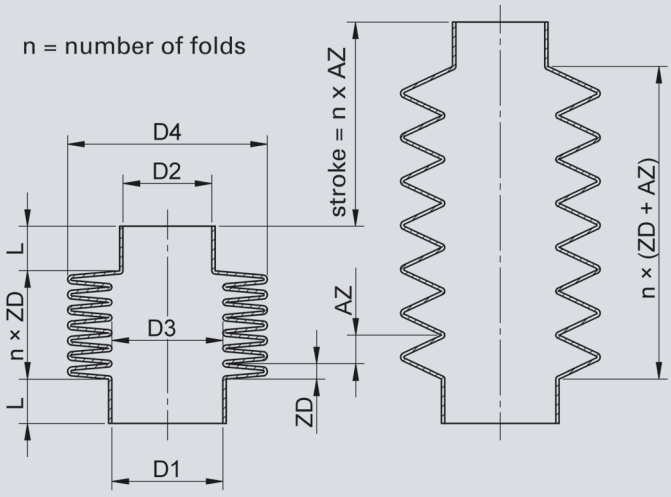
Material: Nitril, black
Temperature range: -20 … +80 °C

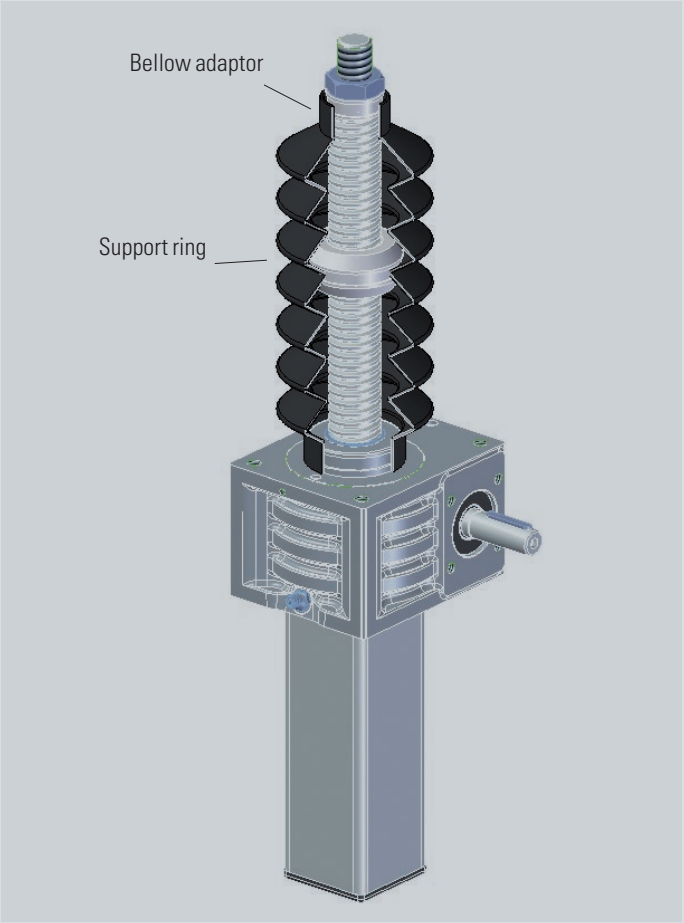
Screw jack NSE100

	L	ZD*	AZ*	D1	D2	D3	D4
FB130	20	2.0	26.0	68/88	68/88	70	130

* per fold

Material: NBR
Temperature range: -20 … +80 °C





Depending on accessory, a bellows adapter must be used. Depending on the travel of support rings yet to be built.

Bellow adaptor for spindle end

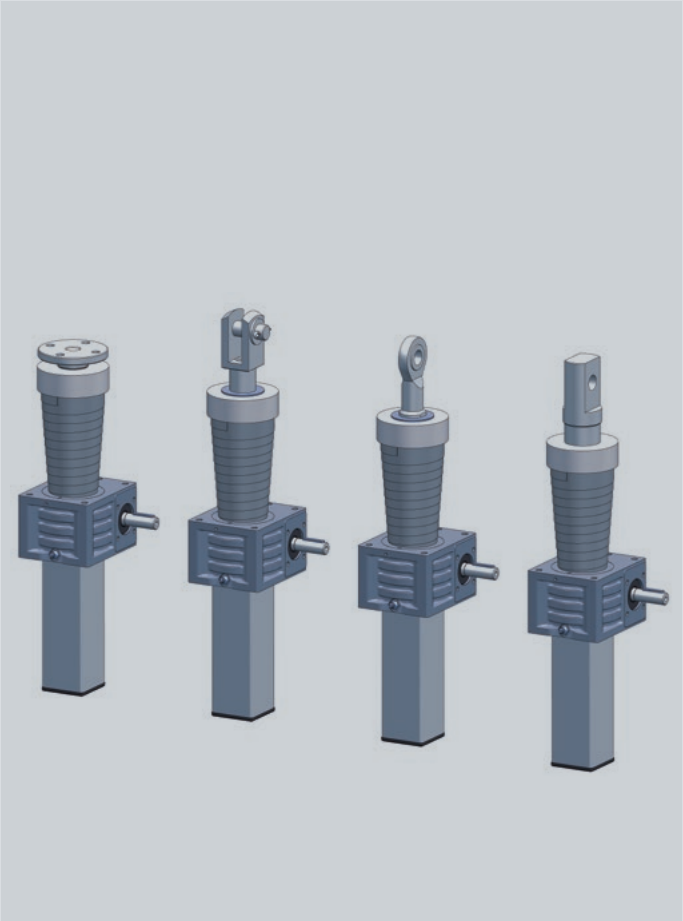
	D
NSE 2-FBAS	30
NSE 5-FBAS	30
NSE 10-FBAS	40
NSE 25-FBAS	40

Internal support ring fitting FB52

NSE2-FB52-STR
NSE5-FB52-STR

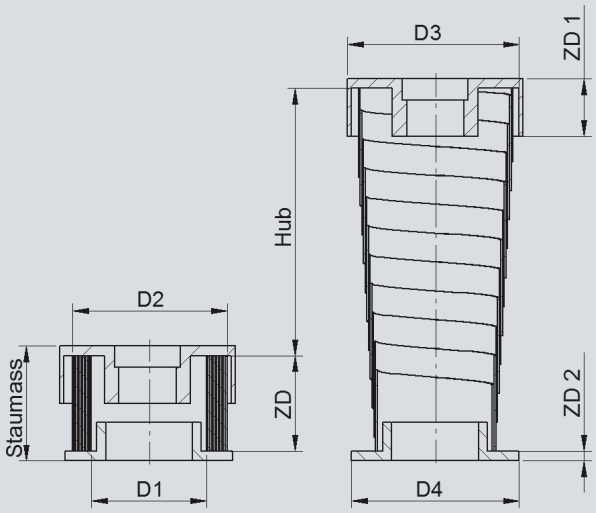
Internal support ring fitting FB90

NSE5-FB90-STR
NSE10-FB90-STR
NSE25-FB90-STR
NSE50-FB90-STR



Spiral spring covers can be used for different applications. If you want to combine different add-on components, centering sleeves are required, which we would be happy to supply.

Important: The spiral spring cover must not be allowed to uncoil. Please specify if the spiral spring cover SF is to be installed vertically or horizontally. We recommend placing the large diameter facing up for vertical installation, and for horizontal installation the large diameter in the direction of the swarf. A light film of oil improves operation and increases the operating life.



Screw jack NSE5

	D1	D2	ZD	Stroke horizontal	Stroke vertical
045/350/030	45	65	30	260	320
045/550/050	45	68	50	400	500

Screw jack NSE10

	D1	D2	ZD	Stroke horizontal	Stroke vertical
050/350/030	50	73	30	260	320
050/550/050	50	73	50	400	500
050/750/060	50	80	60	570	690
050/1100/100	50	77	100	800	1000

Screw jack NSE25

	D1	D2	ZD	Stroke horizontal	Stroke vertical
060/350/050	60	78	50	200	300
060/550/060	60	81	60	370	490
060/750/075	60	89	75	525	675
060/1100/075	60	102	75	875	1025

Screw jack NSE50

	D1	D2	ZD	Stroke horizontal	Stroke vertical
075/350/050	75	95	50	200	300
075/750/060	75	109	60	570	690
075/1100/100	75	108	100	800	1000
075/1500/100	75	120	100	1200	1400

Screw jack NSE100

	D1	D2	ZD	Stroke horizontal	Stroke vertical
100/350/060	100	126	60	170	290
100/800/075	100	138	75	575	725
100/1200/100	100	137	100	900	1100
100/1800/150	100	151	150	1350	1650

Ordering example

Spiral spring
Smallest diameter D1
Longest length AZ
Smallest length ZD
Mounting H/V (horizontal/vertical)

SF-050-0550-050-V

By means of the following table, you can determine the required spindle and protection tube lengths. So that you can quickly calculate the installation dimensions of your screw jack. These allowances are the minimum required. For special installation situations, please make a drawing or contact us.

Explanation
Spindle length = stroke + basic length + attachments

Calculation example

NSE25-SN with 210 mm stroke, anti rotation lock and bellow

Spindle length
210 + 164 + 15 + 31.5 = 420.5 mm spindle length

Smallest length bellow
$^{210}/_{24.5}$ = 8.57 > 9 x 3.5 = 31.5

Protective tube length
210 + 25 + 32 = 267

Spindle length

	NSE2	NSE5	NSE10	NSE25	NSE50	NSE100
TR-basic length*	110	127	145	164	221	298
KGT-basic length**		193 16x05	217 25x05	245 32x05	292 40x05	390 50x10
		213 16x10	237 25x10	265 32x10	312 40x10	430 50x20
			297 25x25	305 32x20	352 40x20	
			397 25x50	385 32x40	432 40x40	
Basic lengths without protection	102	119	137	152	207	280
Anti rotation lock (VS) / Screw out protection (AS)	15	15	15	15	24	24
bellows adapter***	8	8	7	6	7	9
Smallest length bellow	$^{Stroke}/_{10.5}$ = ... x 2.1 *round number*	$^{Stroke}/_{10.5}$ = ... x 2.1 *round number*	$^{Stroke}/_{24.5}$ = ... x 3.5 *round number*	$^{Stroke}/_{24.5}$ = ... x 3.5 *round number*	$^{Stroke}/_{24.5}$ = ... x 3.5 *round number*	$^{Stroke}/_{26.0}$ = ... x 2.0 *round number*

* Contains 2 x the safety distance (spindle pitch)
** Contains 4 x the safety distance (spindle pitch)
Subject to dimension changes
*** depending on accessory, a bellows adapter must be used

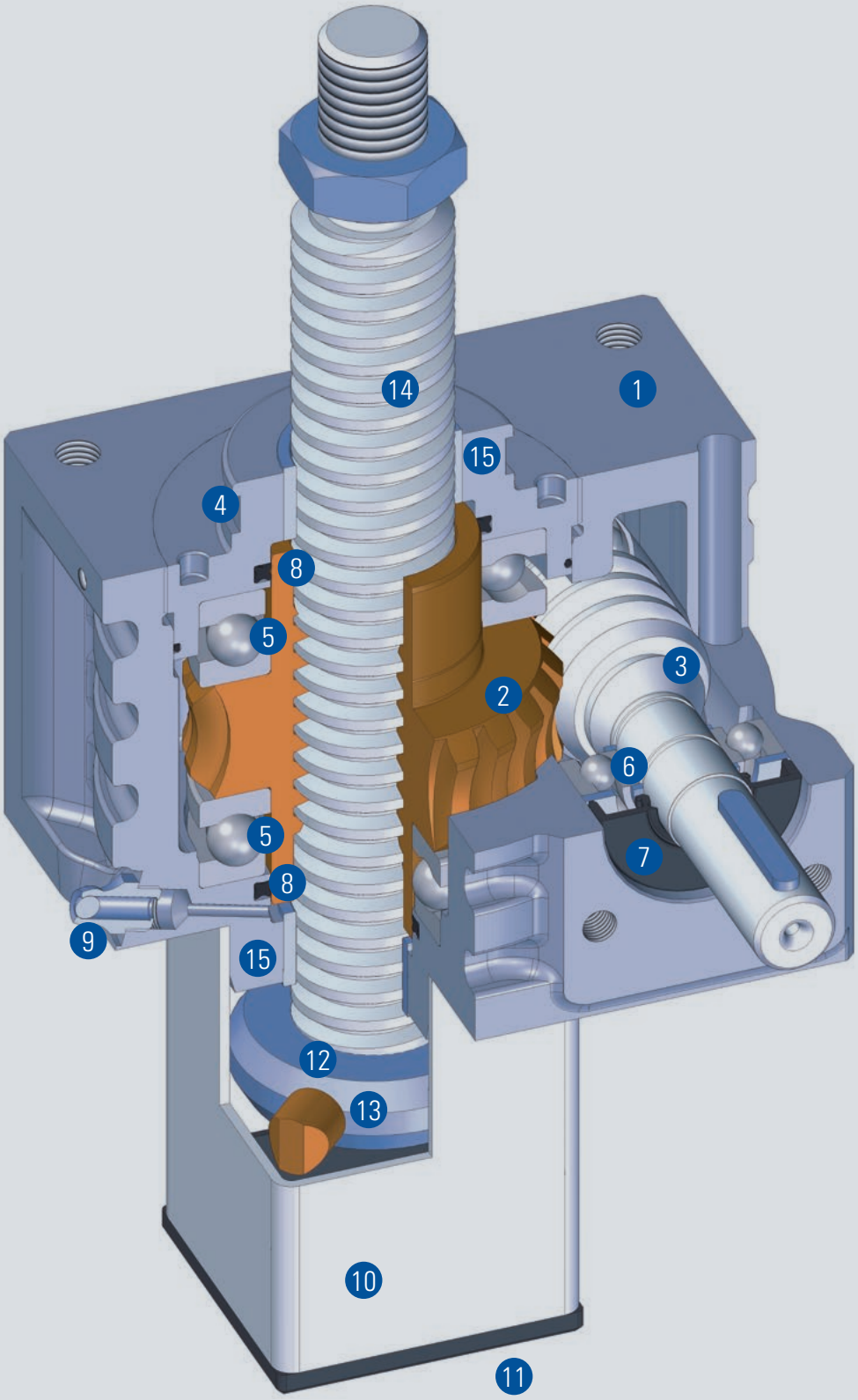
Protective tube length SR

	NSE2	NSE5	NSE10	NSE25	NSE50	NSE100
TR-basic length	21	21	21	25	30	37
KGT-basic length*		65 16x05	65 25x05	65 32x05	80 40x05	103 50x05
		85 16x10	85 25x10	85 32x10	100 40x10	143 50x10
			145 25x25	125 32x20	140 40x20	
			245 25x50	205 32x40	220 40x40	
Anti rotation lock (VS) / Screw out protection (AS)	34	34	34	32	44	48

* KGT requires anti-rotation lock VS as being absolutely essential; > included in basic length
Subject to dimension changes

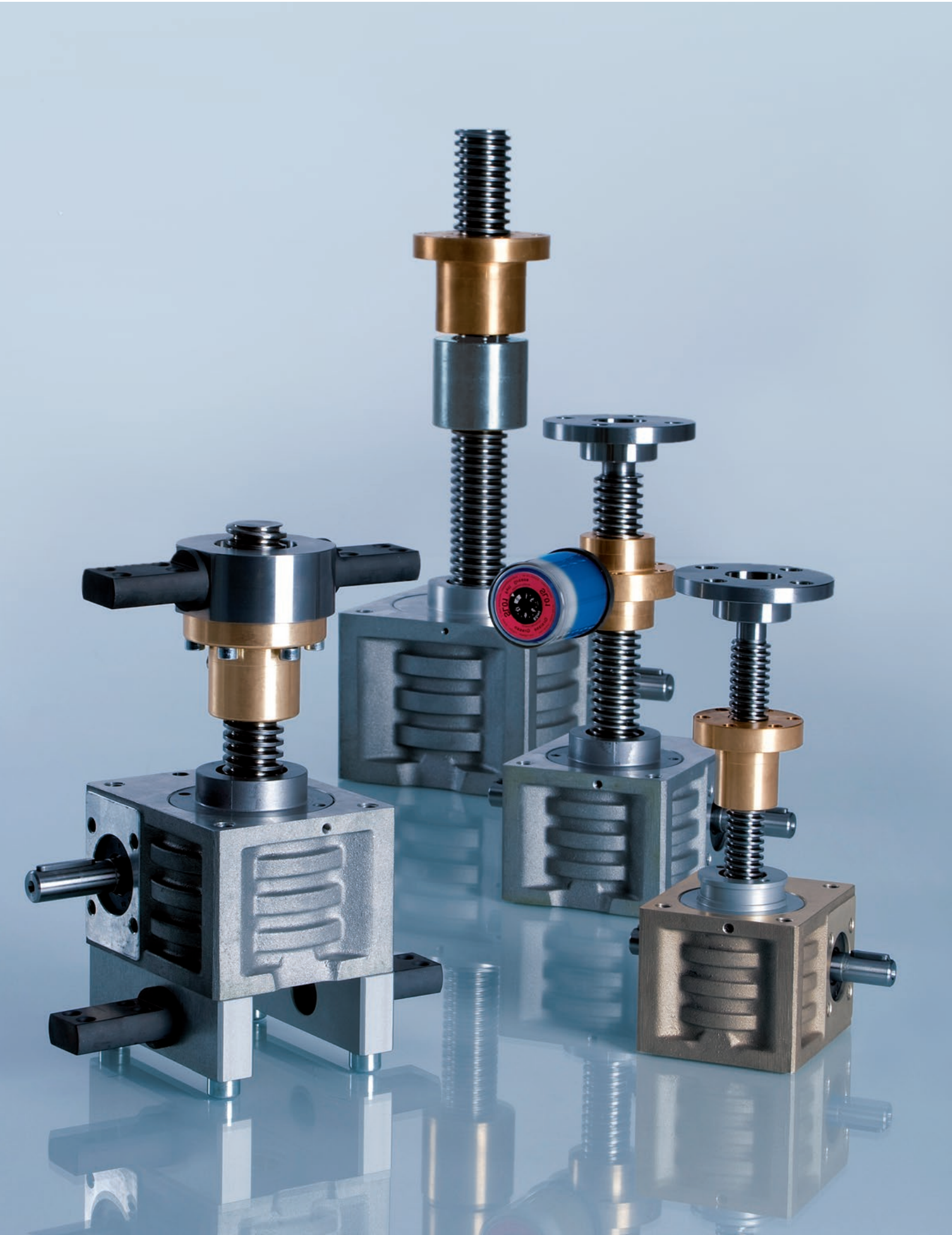
- Limit switches ESI/ESM are always in combination with anti rotation lock VS or screw out protection AS
- Spiral spring covers SF: As the extension of the spiral spring covering differs depending on the attachment, this option has to be calculated graphically. If necessary we would be pleased to generate this drawing.

CAD-Datas please look at www.nozag.ch



1 Housing
2 Worm wheel
3 Worm
4 Bearing cap
5 Deep groove ball thrust bearing
6 Deep groove ball bearing
7 oil seal
8 x-ring / o-ring
9 Grease nipple for spindle
10 Protection tube
11 Sealing cover
12 Screw out protection
13 Anti rotation lock
14 Spindle
15 Spindle guide

3. Screw jacks, rotating



3. Screw jacks, rotating

The spindle has a fixed connection to the worm wheel and rotates with it. The nut therefore screws itself up and down.

The innovative Nozag screw jack kit makes it possible to create perfect drive solutions from cost-effective standard components. The kit is subject to the highest standards of functionality, quality and design. A lot can be moved with very little expense and the investment, maintenance and operating costs remain within limits.

Screw jacks developed and manufactured by Nozag solve this task in a simple, inexpensive manner.

Screw Jacks «Gold» – For Extreme Environmental and Operational Conditions

The shiny casing, mounting flange and cover indicate the highest degree of corrosion resistance. In simple terms, the conventional aluminum components as well as the external parts have been replaced by components made of the aluminum bronze material CuAl10Fe5Ni5. All the spindles and shafts as well as the internal elements are manufactured from stainless steel or synthetic material (seals).

- High corrosion stability combined with a high degree of wearing resistance and cavitation protection through CuAl10Fe5Ni5
- Resistance against mechanical damages due to an oxide protection film (basically Al203) that immediately forms on the material surface
- Excellent performance in applications with gases, fluids and solid materials

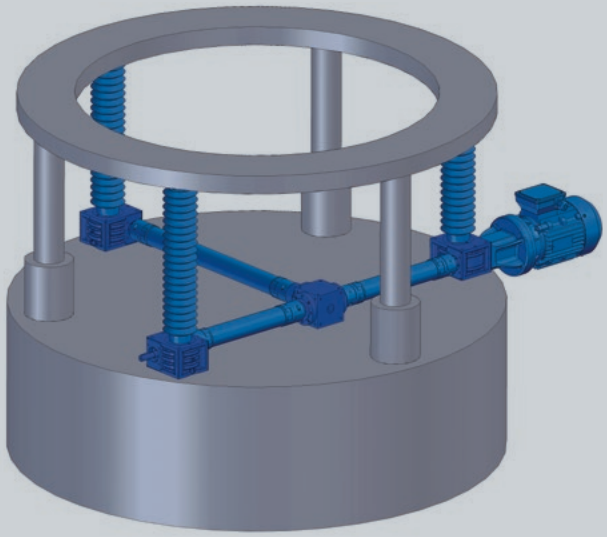
The CuAl10Fe5Ni5 material

- features high scaling resistance (up to 800°)
- has a lower degree of corrosion resistance to strongly acidic media with high oxidation potential (such as nitric acid) as well as alkaline materials, because these will dissolve the oxide coating and prevent its formation.
- has a lower tendency to selective corrosion (dealumination)

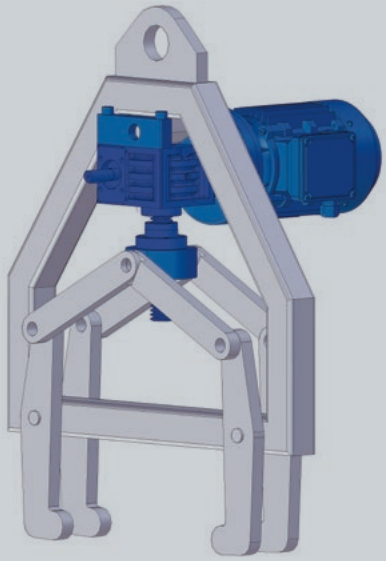
Areas of Application

Screw jacks of this design may be used for instance in industrial applications in the vicinity of saline water or sulfuric oxide, in slightly oxidizing and weak alkaline areas, in brackish water, in organic acids (acetate) and in reducing as well as slightly oxidizing mineral acids (diluted hydrochloric, hydrofluoric or phosphoric acid), in environments containing sulfuric acid at room temperature or at elevated temperatures.

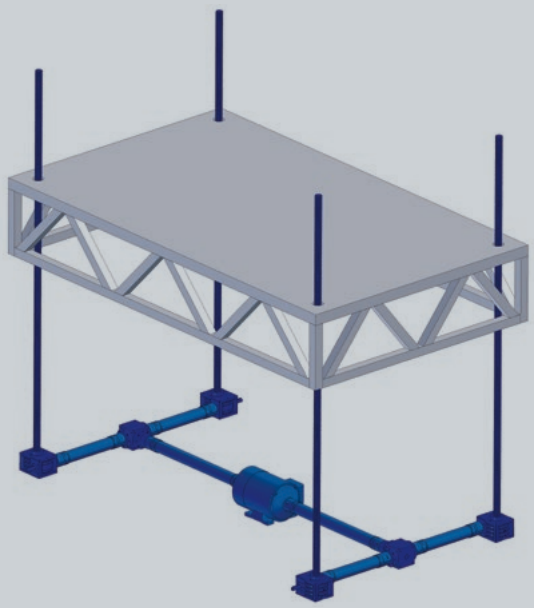
Device adjustment



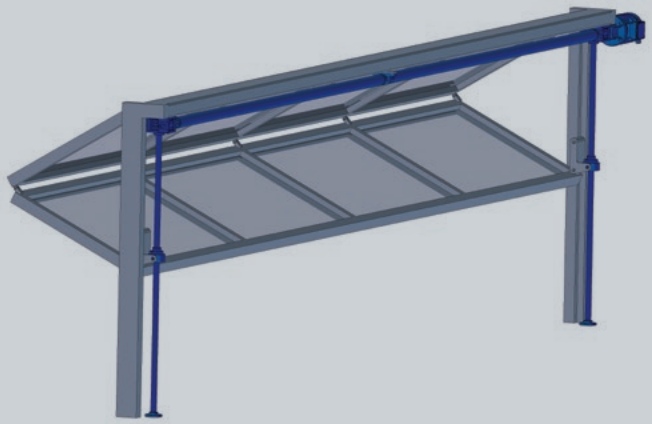
Gripper



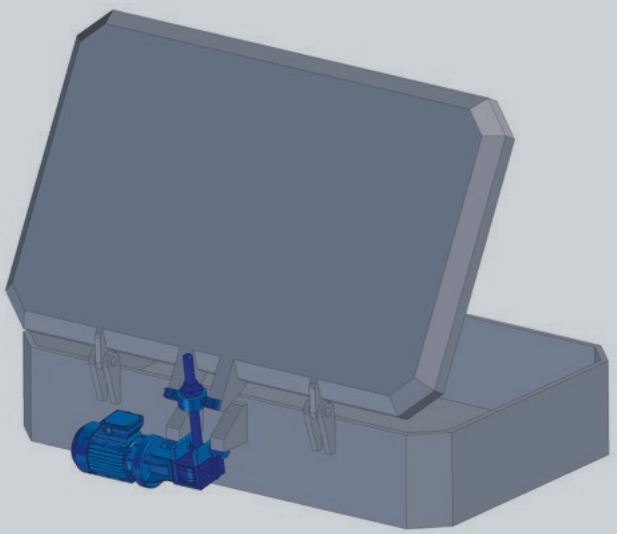
Height adjustment of a platform



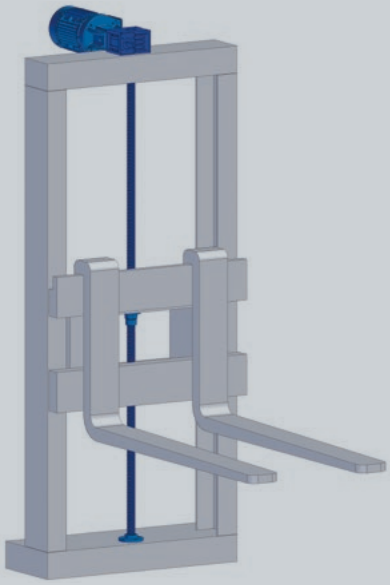
Gate opening



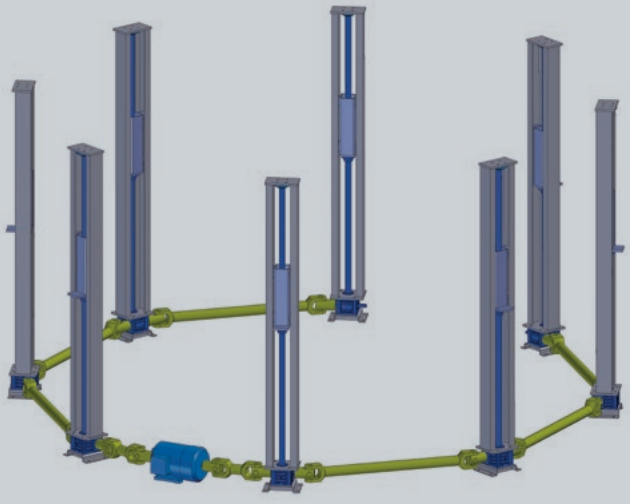
Cover adjustment



Lifting movement of a forklift truck



Hub device for silo assembly



Rotating version

Mail info@nozag.ch
FAX-Nozag CH +41 (0)44 805 17 18

Company: _____ Date: _____
Address: _____ Tel.: _____
_____ Fax: _____
Contact person: _____ Mail: _____

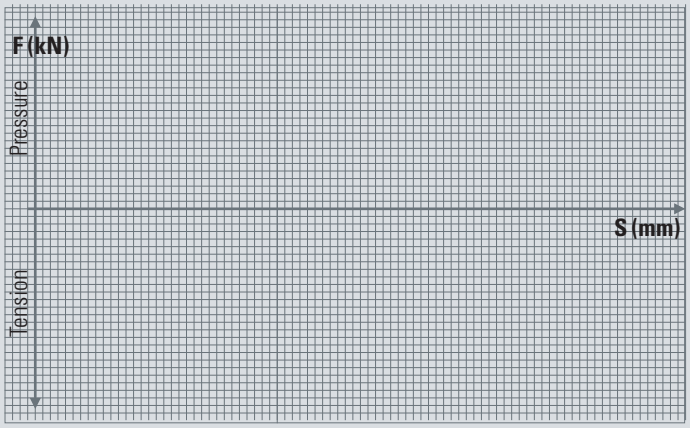
Lifting force in kN

_____ kN per gearbox
_____ kN under tensile load
_____ kN static load
_____ kN entire installation
_____ kN under compressive load
_____ kN dynamic load

Installation position

☐ vertical ☐ horizontal

Force flow

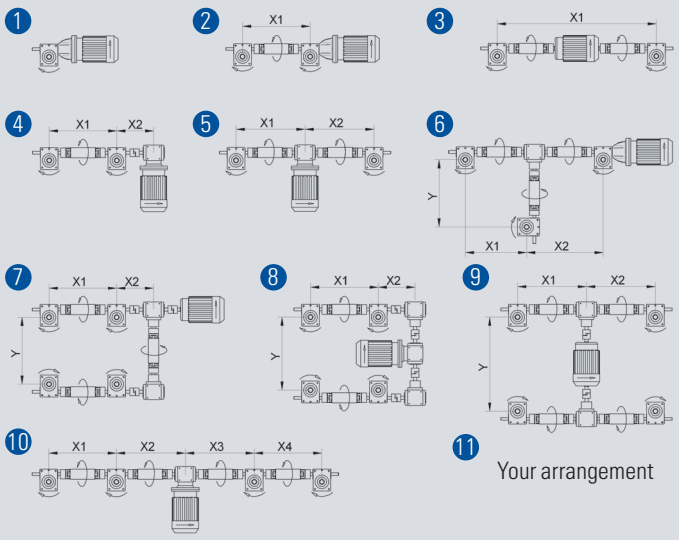


(F=force, S=stroke)

Conditions (operational demands)

☐ Steady (constant) ☐ Impact loading (swelling)
☐ Vibrations (alternating) ☐ _____

Arrangement



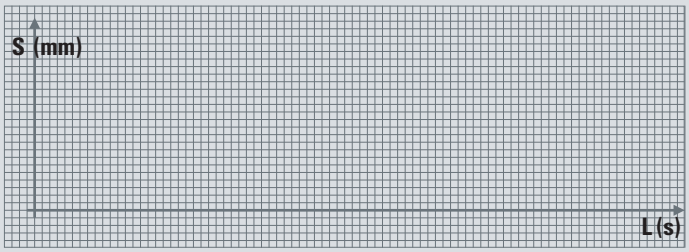
Stroke

_____ mm stroke _____ mm spindle length

Lifting speed (in case of a drive with 1500 min^{-1})

☐ Type RN = 25 mm/s (NSE2-RN = 20 mm/s)
☐ Type RL = 6.25 mm/s (NSE2-RL = 5.00 mm/s)

Working cycle



(S=stroke, L=time)

Duty cycle, working cycle

_____ Strokes per day
_____ Strokes per hour

Hours per day

☐ 8 ☐ 16 ☐ 24 ☐ _____
_____ % duty cycle (ED) referred to 10 min

Motor

☐ Three-phase Motor ☐ Braking motor
☐ Manual drive ☐ _____

Operating conditions

☐ Dryness ☐ Dust
☐ Humidity ☐ Swarf

Ambient temperature

_____ °C min. _____ °C max.

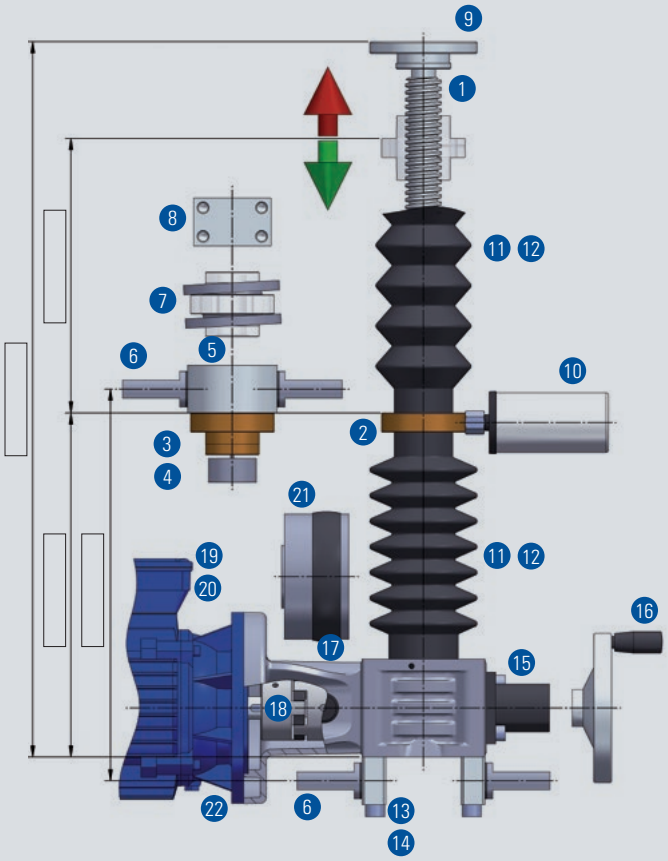
Quantity

_____ pieces ☐ prototype first

Desired delivery dates

_____ for quote _____ for delivery

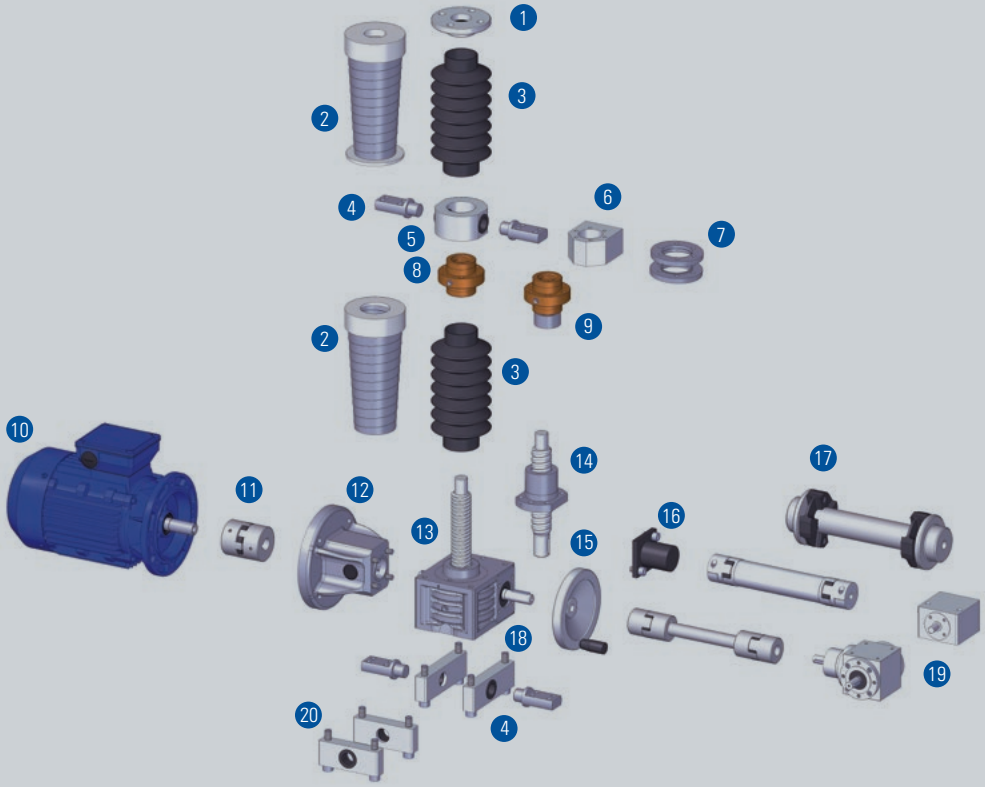
Rotating version



1	Spindle	☐
2	Duplex nut	☐
3	Flange nut	☐
4	Safety trap nut	☐
5	Suspension adapter for flange nut	☐
6	Suspension bolt	☐
7	Calotte disks	☐
8	Carrier flange	☐
9	Flange bearing	☐
10	Lubricant dispenser	☐
11	Bellow	☐
12	Spiral spring cover	☐
13	Suspension adapter long	☐
14	Suspension adapter short	☐
15	Protection cap	☐
16	Hand wheel	☐
17	Motor adapter	☐
18	Flexible coupling	☐
19	Motor	☐
20	Brake motor	☐
21	Spring brake	☐
22	Rotary pulse encoder	☐

Description of function / notes / installation diagramm

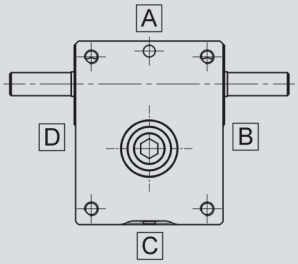
Attachment ☐ CAD File STEP/LGES/DXF or ☐ PDF or ☐ _____

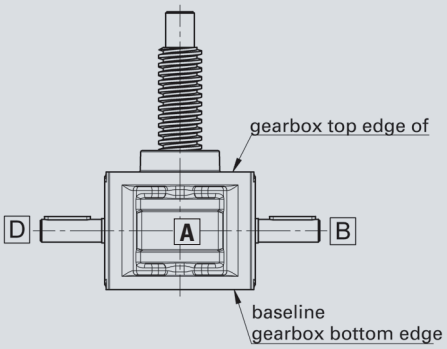


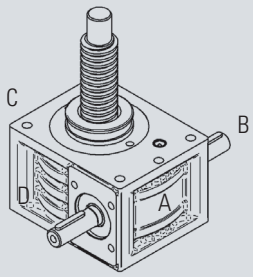
1 Flange bearing
2 Spiral spring cover
3 Bellows
4 Suspension bolt
5 Suspension adapter for flange nut
6 Carrier flange
7 Calotte disks
8 Flange nut/Duplex nut
9 Safety trap nut
10 Motor/brake motor
11 Flexible coupling
12 Motor adapter
13 Screw jack, rotating
14 Ball screw flange nut
15 Hand wheel
16 Protection cap
17 Connecting shafts
18 Suspension adapter long
19 Bevel gearboxes
20 Suspension adapter short

Size		NSE2	NSE5	NSE10	NSE25	NSE50	NSE100
maximum lifting capacity (kN)		2	5	10	25	50	100
Standard spindle		TR14x4	TR18x4	TR20x4	TR30x6	TR40x7	TR60x9
Ratio (i)	N	5:1	4:1	4:1	6:1	7:1	9:1
	L	20:1	16:1	16:1	24:1	28:1	36:1
Maximum driveshaft speed (min^{-1}) (higher on request)		1800	1800	1800	1800	1800	1800
Max. driving torque (Nm) (based on 1500 min^{-1})	N	2.50	5.60	10.50	22.50	51.00	60.20
	L	0.80	2.00	4.20	7.80	18.00	20.20
Stroke per revolution (mm)	N	0.80	1.00	1.00	1.00	1.00	1.00
	L	0.20	0.25	0.25	0.25	0.25	0.25
Efficiency gearbox (grease)	N	0.76	0.84	0.86	0.87	0.89	0.85
	L	0.45	0.62	0.69	0.69	0.74	0.65
Efficiency gearbox (oil)	N	0.86	0.87	0.96	0.98	0.94	0.95
	L	0.64	0.66	0.77	0.75	0.81	0.72
Efficiency spindle		0.50	0.42	0.40	0.40	0.36	0.32
Lubrication		Grease	Grease	Grease	Grease	Grease	Grease
Weight screw jack without spindle (kg)		0.64	1.06	1.98	3.62	10.02	16.80
Weight spindle (kg/m)		1.05	1.58	2.00	4.50	8.00	19.00

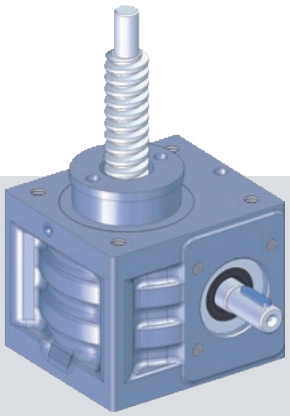
Orientation point

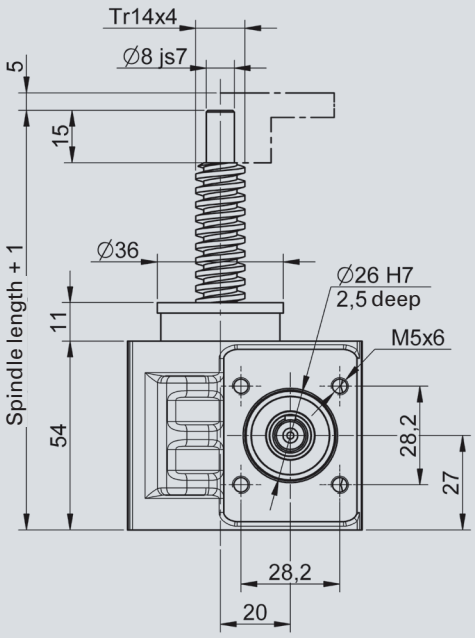


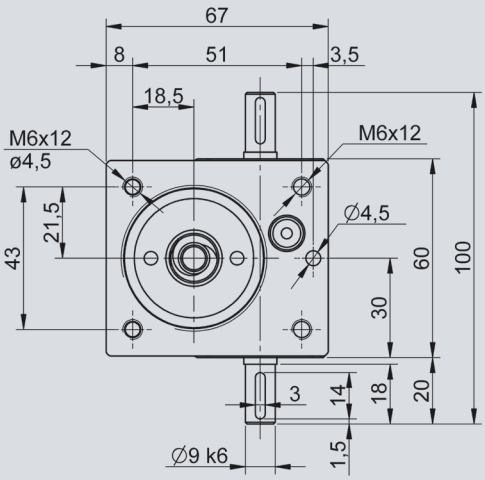




NSE 2-RN/RL







Maximum lifting capacity:	2 kN (200 kg)
Maximum driveshaft speed:	1800 min^{-1} (higher on request)
Spindle:	TR 14x4 (standard)
	TR 18x4 (optional, strengthened version)

Material

Material (housing):	Aluminium, option CuAL10Fe5Ni5
Lubrication:	Grease, option oil

Weight

Screw jack weight:	0.64 kg (with grease / without spindle)
Spindle weight:	1.05 kg/m

Versions

Safety trap nut (SFM)	see page 77
Ball screw (KGT)	see page 78

Available on request:

- Double-threaded trapezoidal screw
- Stainlesssteel spindle (INOX)
- Surface-treated spindle

More informations

Please find CAD - Data and productdatasheets under www.nozag.ch

Features

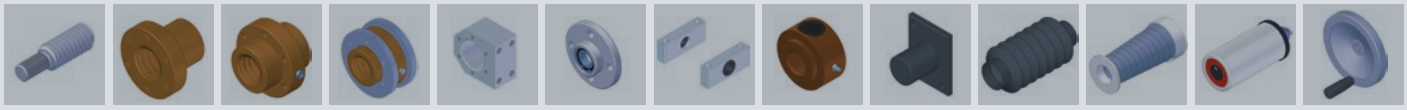
	Ratio	Stroke per revolution	Driving torque[1]	Max. torque	Drive through torque[2]
	i	mm	Nm	Nm	Nm
NSE2-RN	5:1	0.80	F(kN) x 0.34 + 0.21	2.50	12
NSE2-RL	20:1	0.20	F(kN) x 0.14 + 0.11	0.80	12
NSE2-RN[3]	5:1	0.80	F(kN) x 0.40 + 0.21	2.50	12
NSE2-RL[3]	20:1	0.20	F(kN) x 0.17 + 0.11	0.80	12

1) Factor includes efficiency, ratio and safety 1

2) With more than six gearboxes in series, please contact our technicians

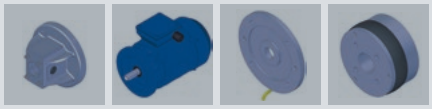
3) Optional, strengthened version TR18/4

Attachments > chapter 3.5



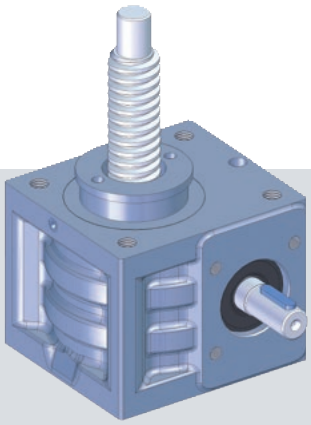
Drive components > chapter 4

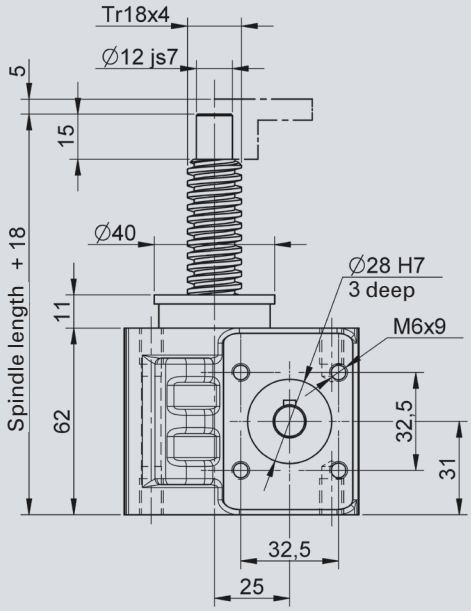
Motor mounting > chapter 5

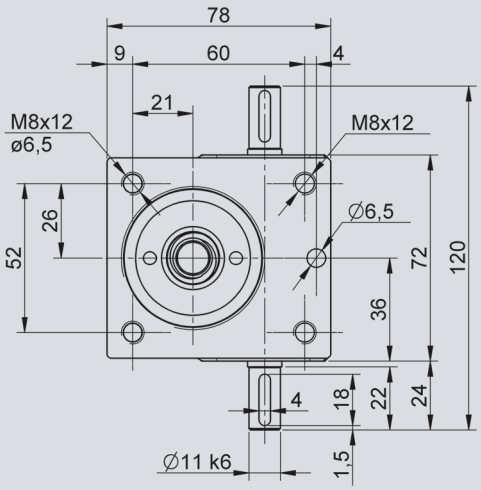


Non-rotating version > chapter 2

NSE 5-RN/RL







Maximum lifting capacity:	5 kN (500 kg)
Maximum driveshaft speed:	1800 min^{-1} (higher on request)
Spindle:	TR 18x4 (standard)
	TR 24x5 (optional, strengthened version)

Material

Material (housing):	Aluminium, option CuAL10Fe5Ni5
Lubrication:	Grease, option oil

Weight

Screw jack weight:	1.02 kg (with grease / without spindle)
Spindle weight:	1.58 kg/m

Versions

Safety trap nut (SFM)	see page 77
Ball screw (KGT)	see page 78

Available on request:

- Double-threaded trapezoidal screw
- Stainlesssteel spindle (INOX)
- Surface-treated spindle

More informations

Please find CAD - Data and productdatasheets under www.nozag.ch

Features

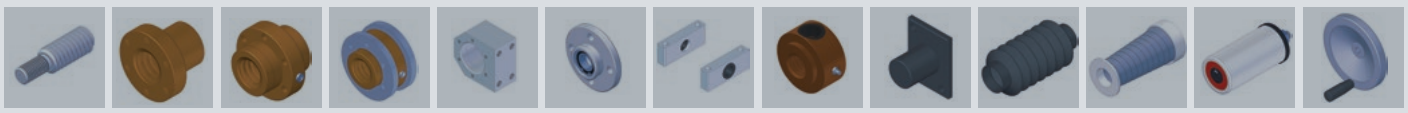
	Ratio	Stroke per revolution	Driving torque[1]	Max. torque	Drive-through torque[2]
	i	mm	Nm	Nm	Nm
NSE5-RN	4:1	1.00	F(kN) x 0.45 + 0.10	5.60	23
NSE5-RL	16:1	0.25	F(kN) x 0.15 + 0.08	2.00	23
NSE5-RN[3]	4:1	1.25	F(kN) x 0.58 + 0.10	5.60	23
NSE5-RL[3]	16:1	0.31	F(kN) x 0.20 + 0.08	2.00	23

1) Factor includes efficiency, ratio and safety 1

2) With more than six gearboxes in series, please contact our technicians

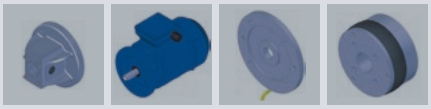
3) Optional, strengthened version TR24/5

Attachments > chapter 3.5



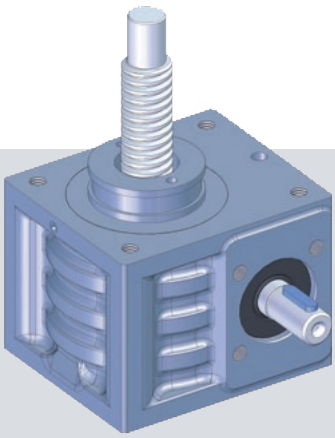
Drive components > chapter 4

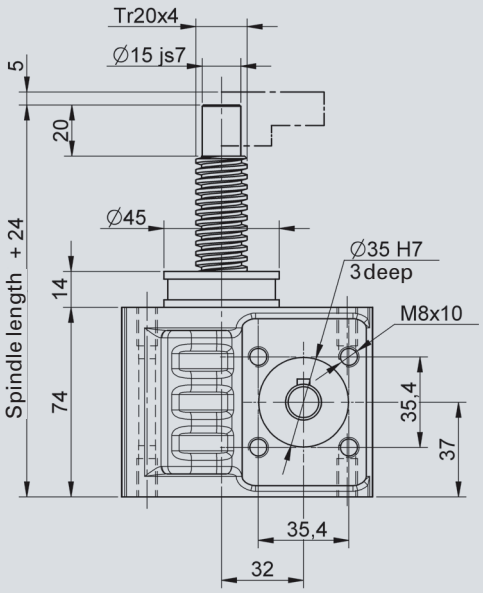
Motor mounting > chapter 5

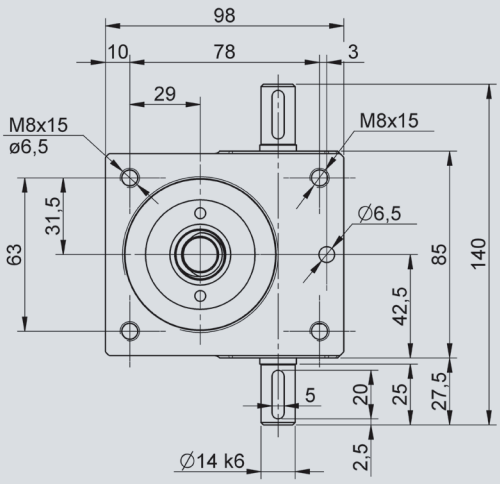


Non-rotating version > chapter 2

NSE 10-RN/RL







Maximum lifting capacity:	10 kN (1000 kg)
Maximum driveshaft speed:	1800 min^{-1} (higher on request)
Spindle:	TR 20x4 (standard)
	TR 24x5 (optional, strengthened version))

Material

Material (housing):	Aluminium, option CuAL10Fe5Ni5
Lubrication:	Grease, option oil

Weight

Screw jack weight:	1.92 kg (with grease / without spindle)
Spindle weight:	2.00 kg/m

Versions

Safety trap nut (SFM)	see page 77
Ball screw (KGT)	see page 78

Available on request:

- Double-threaded trapezoidal screw
- Stainlesssteel spindle (INOX)
- Surface-treated spindle

More informations

Please find CAD - Data and productdatasheets under www.nozag.ch

Features

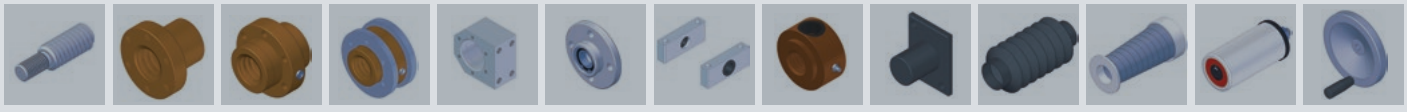
	Ratio	Stroke per revolution	Driving torque[1]	Max. torque	Drive-through torque[2]
	i	mm	Nm	Nm	Nm
NSE10-RN	4:1	1.00	F(kN) x 0.46 + 0.26	10.50	42
NSE10-RL	16:1	0.25	F(kN) x 0.14 + 0.16	4.20	42
NSE10-RN[3]	4:1	1.25	F(kN) x 0.56 + 0.26	10.50	42
NSE10-RL[3]	16:1	0.31	F(kN) x 0.18 + 0.16	4.20	42

1) Factor includes efficiency, ratio and safety 1

2) With more than six gearboxes in series, please contact our technicians

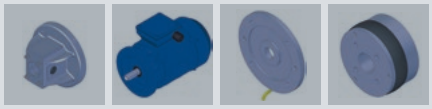
3) Optional, strengthened version TR24/5

Attachments > chapter 3.5



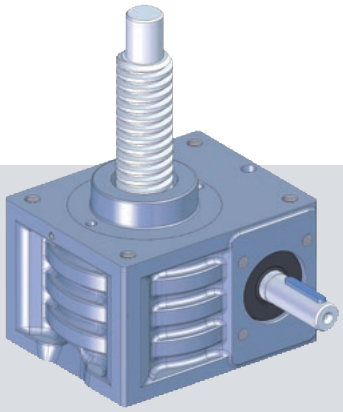
Drive components > chapter 4

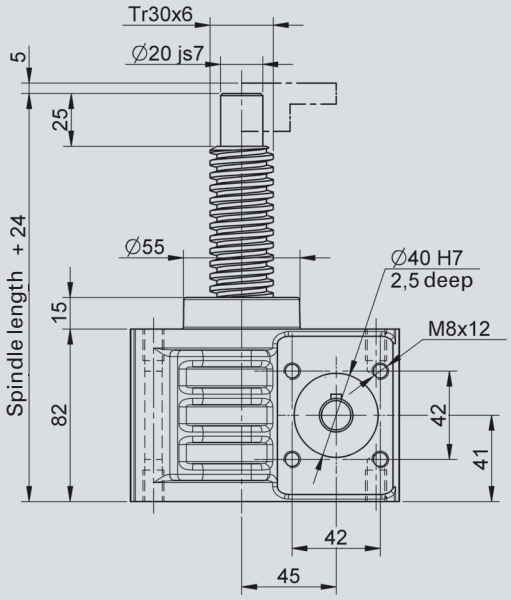
Motor mounting > chapter 5

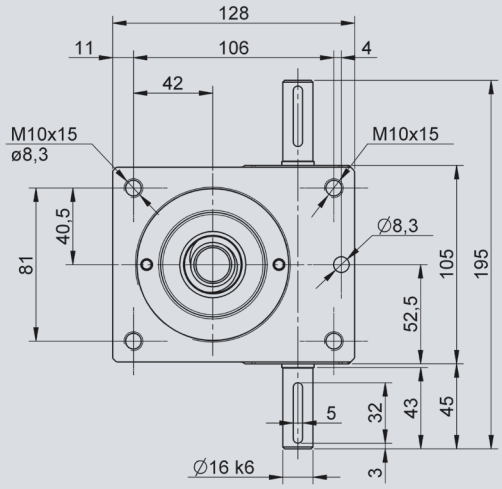


Non-rotating version > chapter 2

NSE 25-RN/RL







Maximum lifting capacity:	25 kN (2500 kg)
Maximum driveshaft speed:	1800 min^{-1} (higher on request)
Spindle:	TR 30x6 (standard)
	TR 40x7 (optional, strengthened version)

Material

Material (housing):	Aluminium, option CuAL10Fe5Ni5
Lubrication:	Grease, option oil

Weight

Screw jack weight:	3.54 kg (with grease / without spindle)
Spindle weight:	4.50 kg/m

Versions

Safety trap nut (SFM)	see page 77
Ball screw (KGT)	see page 78

Available on request:

- Double-threaded trapezoidal screw
- Stainlesssteel spindle (INOX)
- Surface-treated spindle

More informations

Please find CAD - Data and productdatasheets under www.nozag.ch

Features

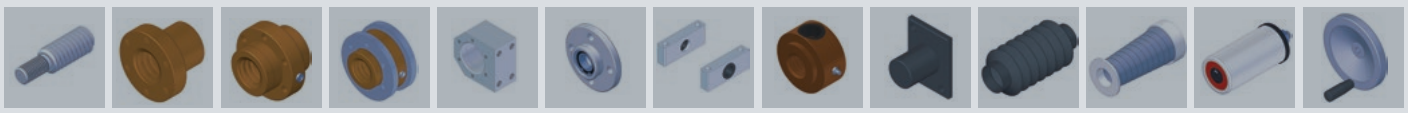
	Ratio	Stroke revolution	Driving torque[1]	Max. torque	Drive through torque[2]
	i	mm	Nm	Nm	Nm
NSE25-RN	6:1	1.00	F(kN) x 0.46 + 0.36	22.50	86
NSE25-RL	24:1	0.25	F(kN) x 0.14 + 0.26	7.80	86
NSE25-RN[3]	6:1	1.17	F(kN) x 0.59 + 0.36	22.50	86
NSE25-RL[3]	24:1	0.29	F(kN) x 0.19 + 0.26	7.80	86

1) Factor includes efficiency, ratio and safety 1

2) With more than six gearboxes in series, please contact our technicians

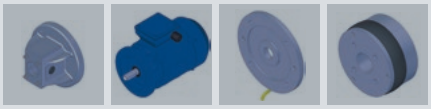
3) Optional, strengthened version TR40/7

Attachments > chapter 3.5



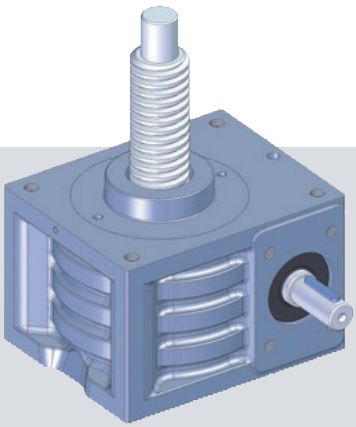
Drive components > chapter 4

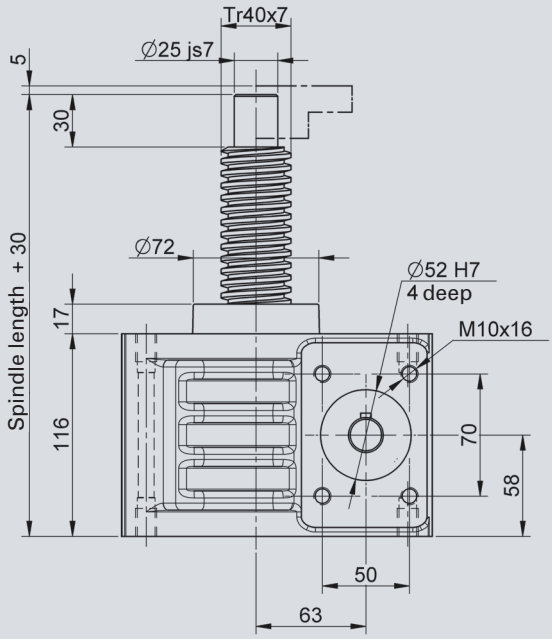
Motor mounting > chapter 5

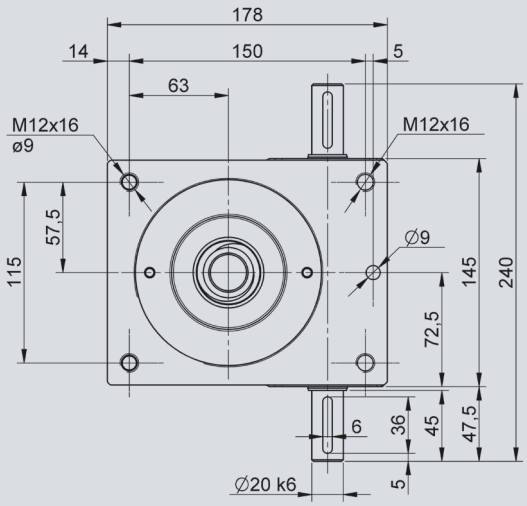


Non-rotating version > chapter 2

NSE 50-RN/RL







Maximum lifting capacity:	50 kN (5000 kg)
Maximum driveshaft speed:	1800 min^{-1} (higher on request)
Spindle:	TR 40x7 (standard)
	TR 50x8 (optional, strengthened version)

Material

Material (housing):	Aluminium, option CuAL10Fe5Ni5
Lubrication:	Grease, option oil

Weight

Screw jack weight:	9.98 kg (with grease / without spindle)
Spindle weight:	8.00 kg/m

Versions

Safety trap nut (SFM)	see page 77
Ball screw (KGT)	see page 78

Available on request:

- Double-threaded trapezoidal screw
- Stainlesssteel spindle (INOX)
- Surface-treated spindle

More informations

Please find CAD - Data and productdatasheets under www.nozag.ch

Features

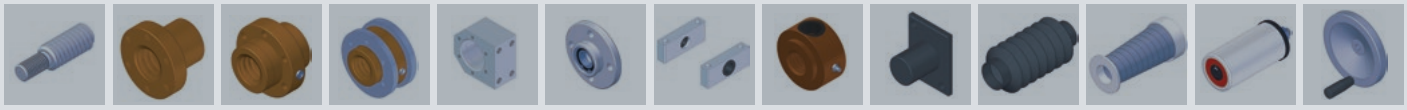
	Ratio	Stroke per revolution	Driving torque[1]	Max. torque	Drive through torque[2]
	i	mm	Nm	Nm	Nm
NSE50-RN	7:1	1.00	F(kN) x 0.50 + 0.76	51.00	150
NSE50-RL	28:1	0.25	F(kN) x 0.15 + 0.54	18.00	150
NSE50-RN[3]	7:1	1.14	F(kN) x 0.60 + 0.76	51.00	150
NSE50-RL[3]	28:1	0.29	F(kN) x 0.18 + 0.54	18.00	150

1) Factor includes efficiency, ratio and safety 1

2) With more than six gearboxes in series, please contact our technicians

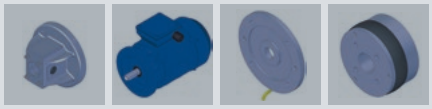
3) Optional, strengthened version TR50/8

Attachments > chapter 3.5



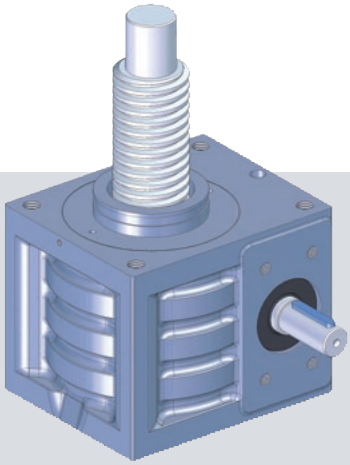
Drive components > chapter 4

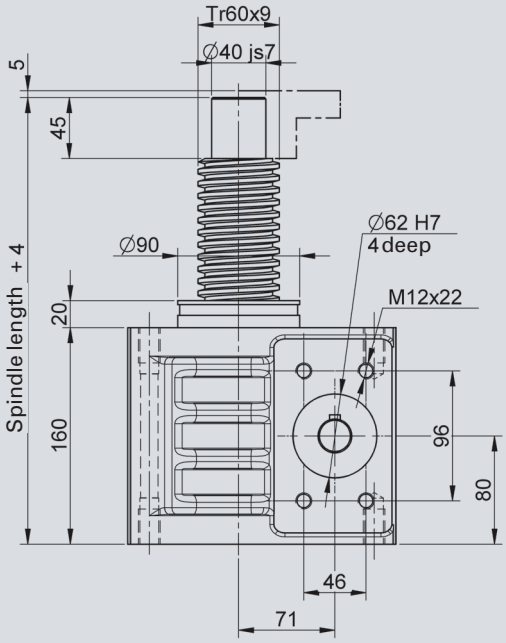
Motor mounting > chapter 5

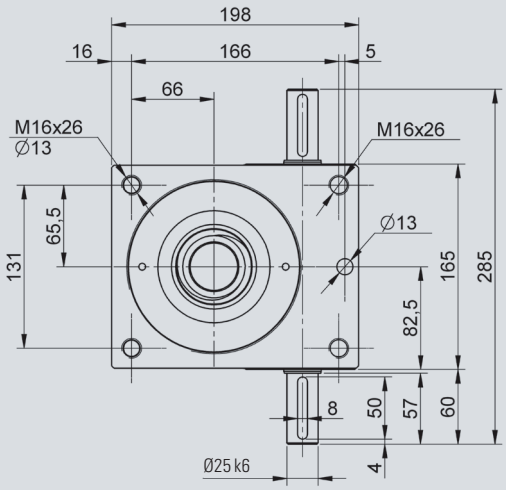


Non-rotating version > chapter 2

NSE 100-RN/RL







Maximum lifting capacity:	100 kN (10000 kg)
Maximum driveshaft speed:	1800 min^{-1} (higher on request)
Spindle:	TR 60x9 (standard)

Material

Material (housing):	Aluminium, option CuAL10Fe5Ni5
Lubrication:	Grease, option oil

Weight

Screw jack weight:	16.70 kg (with grease / without spindle))
Spindle weight:	19.00 kg/m

Versions

Safety trap nut (SFM)	see page 77
Ball screw (KGT)	see page 78

Available on request:

- Double-threaded trapezoidal screw
- Stainlesssteel spindle (INOX)
- Surface-treated spindle

More informations

Please find CAD - Data and productdatasheets under www.nozag.ch

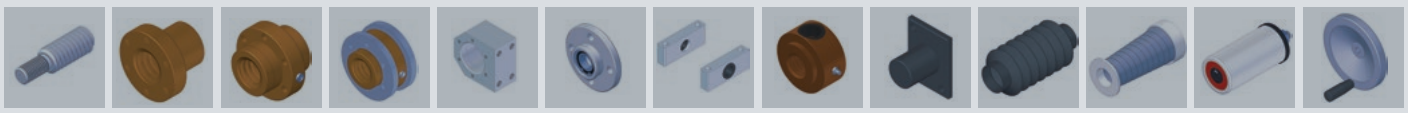
Features

	Ratio	Stroke per revolution	Driving torque[1]	Max. torque[1]	Drive through torque[2]
	i	mm	Nm	Nm	Nm
NSE100-RN	9:1	1.00	F(kN) x 0.59 + 1.68	60.20	315
NSE100-RL	36:1	0.25	F(kN) x 0.19 + 1.02	20.20	315

1) Factor includes efficiency, ratio and safety 1

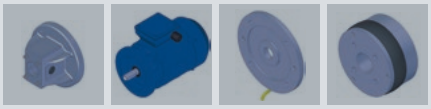
2) With more than six gearboxes in series, please contact our technicians

Attachments > chapter 3.5

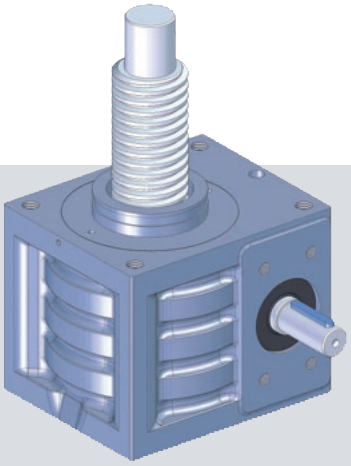


Drive components > chapter 4

Motor mounting > chapter 5



Non-rotating version > chapter 2



NSE 150-1000-RN/RL

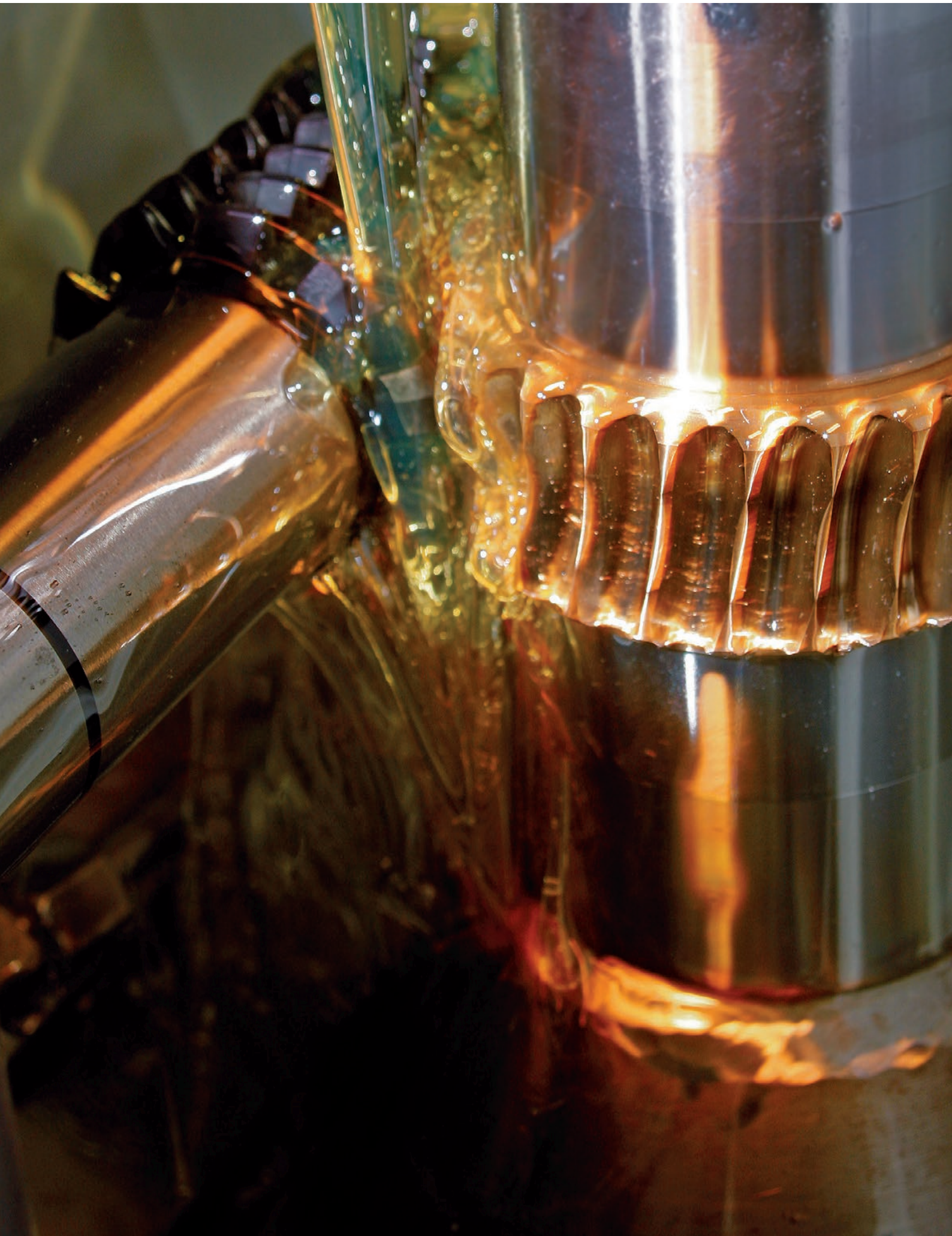
Individual and needs-oriented design
Screw jacks from size 150kN usually are used for complex tasks. We develop, manufacture or combine these dimensions individually for your needs. Take advantage of our experience and expertise in simple and complex projects with power requirements over 100kN. We provide very economical solutions, thanks to the modular system, yet also custom-made screw jacks for your needs.

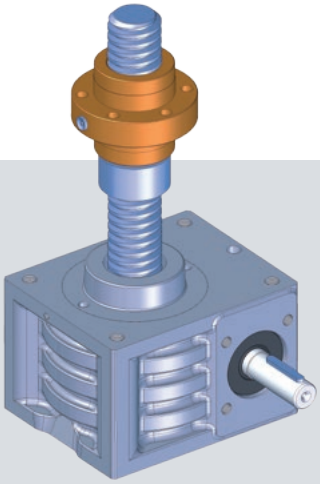
These screw jacks are available in different versions, for example,
- Material (housing): cast Iron / steel
- Double-threaded trapezoidal screws
- Stainless steel screws (INOX)
- Surface-treated screws
- Ball screw s(KGT)
- Safety trap nut (SFM)

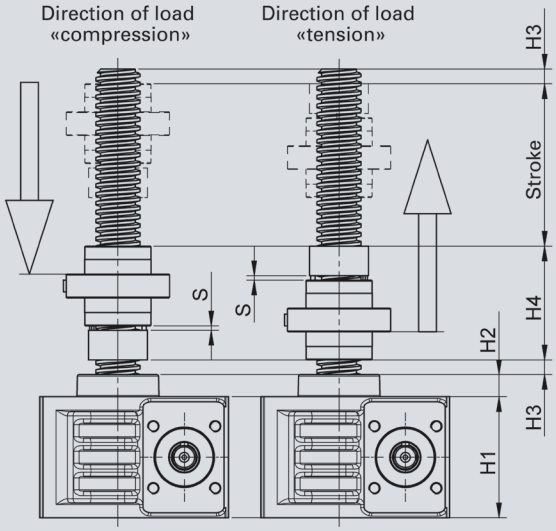
	Maximum lifting capacity
NSE150-RN	150kN
NSE150-RL	150kN
NSE250-RN	250kN
NSE250-RL	250kN
NSE350-RN	350kN
NSE350-RL	350kN
NSE500-RN	500kN
NSE500-RL	500kN
NSE750-RN	750kN
NSE750-RL	750kN
NSE1000-RN	1000kN
NSE1000-RL	1000kN
NSE1000-SL	1000kN

Standard Sizes
The screw jacks are available with the following lifting forces.

Details and advice on request
We are happy to help and assist you in details, design and calculation. CAD data or a checklist are available. Please contact us or send us your requirements.







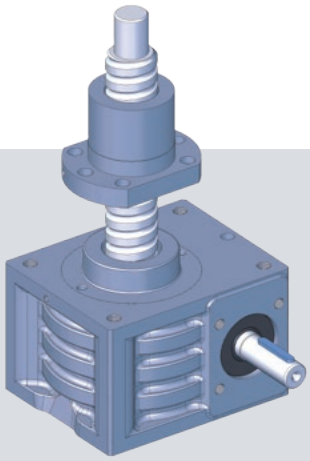
	H1	H2	H3	H4	S
NSE2	54	11	4	49.0	2.0
NSE5	62	11	4	49.0	2.0
NSE10	74	14	4	60.0	2.0
NSE25	82	15	6	77.0	3.0
NSE50	116	17	7	97.5	3.5
NSE100	160	20	9	134.5	4.5

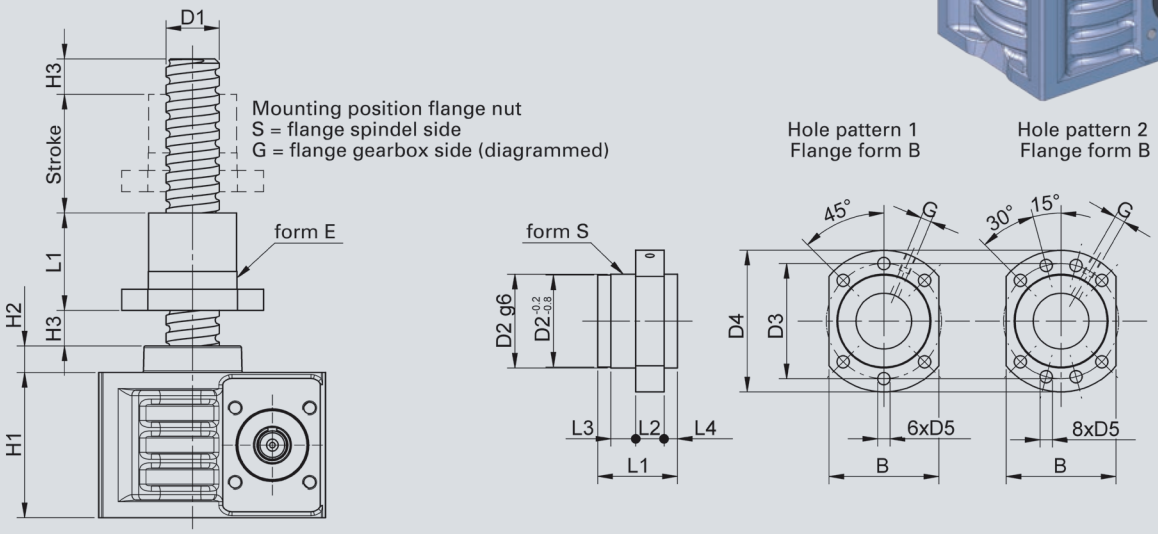
Function
The safety trap nut acts in only one direction, it runs alongside without load. In case of fracture of the travelling nut, the load bears on the trap nut.

The wear can be checked through the distance «S». As soon as the dimension «S» is reduced by more than 20% of the thread pitch (= 40% of the tooth thickness), the travelling nut must be replaced.

Load direction
Please exactly check the load direction (tension or compression). A drawing with a depiction of the functions is necessary to ensure the safety function.

Electronic wear monitoring is available upon request.





Pitch accuracy
0,05 mm/300 mm

Self-locking
None! Therefore, braking motor or spring-loaded brake FDB necessary

Fouling
Nuts are always fitted with scrapers. In case of serious fouling and fine dust/ swarf, we recommend installing bellows or a spiral spring cover.

Lubrication
Adequate lubrication is an important factor to insure the life of the system, reducing friction and ensuring smooth running. For KGT we use the same lubricants as for ball bearings.

Locking
The spindles or nuts must not be unscrewed or disengaged under any circumstances.

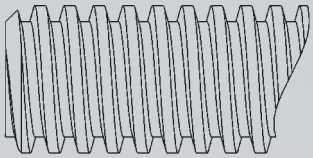
System starting and braking
Especially with high pitches and large gearboxes we recommend the use of a frequency inverter or a soft start for acceleration and deceleration. This provides protection for the whole system. Subject to a suitable control system being used the safety distance may be reduced. Please contact the technical department for more information.

Switching-on time
Owing to the lower heat generation with ball screws, you can multiply the switching-on times (ED in % per 10') by a factor of 2. Please contact us regarding applications with a switching-on time greater than 40 % (4 min per 10 min).

																			Load rating [kN]	
	KGT	RN*	RL*	Nut shape	Hole pattern	B	D2	D3	D4	D5	G	H1	H2	H3 (min.)	L1	L2	L3	L4	Axial play (max)	dy-namic	static
NSE5	16x5	1.25	0.31	E	1	40	28	38	48	5.5	M6	62	11	10	42	10	10	–	0.08	9.3	13.1
	16x10	2.50	0.63	E	1	40	28	38	48	5.5	M6	62	11	20	55	10	10	–	0.08	15.4	26.5
NSE10	25x5	1.25	0.31	E	1	48	40	51	62	6.6	M6	74	14	10	42	10	10	–	0.08	12.3	22.5
	25x10	2.50	0.63	E	1	48	40	51	62	6.6	M6	74	14	20	55	10	16	–	0.08	13.2	25.3
	25x25	6.25	1.56	S	1	48	40	51	62	6.6	M6	74	14	50	35	10	9	8	0.08	16.7	32.2
	25x50	12.50	3.13	S	1	48	40	51	62	6.6	M6	74	14	100	58	10	10	10	0.08	15.4	31.7
NSE25	32x5	0.83	0.21	E	1	62	50	65	80	9.0	M6	82	15	10	55	12	10	–	0.08	21.5	49.3
	32x10	1.67	0.42	E	1	62	53	65	80	9.0	M6	82	15	20	69	12	16	–	0.08	33.4	54.5
	32x20	3.33	0.83	E	1	62	53	65	80	9.0	M8x1	82	15	40	80	12	16	–	0.08	29.7	59.8
	32x40	6.67	1.67	S	6x60°	(round)	53	68	80	7.0	M6	82	15	80	45	16	14	7.5	0.08	14.9	32.4
NSE50	40x5	0.71	0.18	E	2	70	63	78	93	9.0	M6	116	17	10	57	14	10	–	0.08	23.8	63.1
	40x10	1.43	0.36	E	2	70	63	78	93	9.0	M8x1	116	17	20	71	14	16	–	0.08	38.0	69.1
	40x20	2.86	0.71	E	2	70	63	78	93	9.0	M8x1	116	17	40	80	14	16	–	0.08	33.3	76.1
	40x40	5.71	1.43	S	2	(round)	63	78	93	9.0	M8x1	116	17	80	85	14	16	7.5	0.08	35.0	101.9
NSE100	50x10	1.25	0.31	E	2	85	75	93	110	11.0	M8x1	160	20	20	95	16	16	–	0.08	68.7	155.8
	50x20	2.50	0.63	E	2	95	85	103	125	11.0	M8x1	160	20	40	95	18	22	–	0.08	60.0	136.3

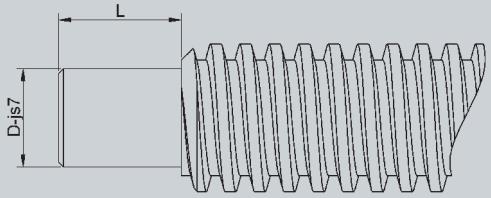
* Stroke per revolution (mm)

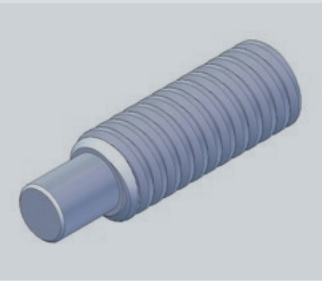
Spindle end, rotating spindle TR



	TR
NSE2-TR	TR14x4
NSE5-TR	TR18x4
NSE10-TR	TR20x4
NSE25-TR	TR30x6
NSE50-TR	TR40x7
NSE100-TR	TR60x9

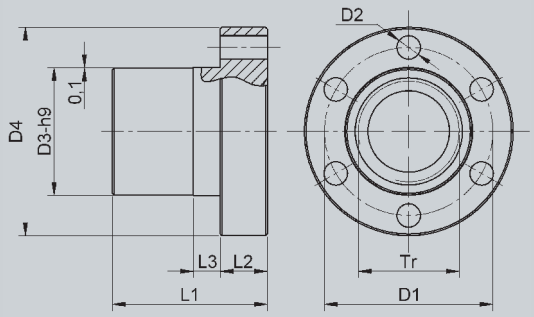
Spindle end, rotating spindle TRZ

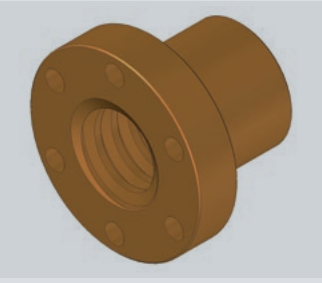




	TR	D	L
NSE2-TRZ	TR14x4	8	15
NSE5-TRZ	TR18x4	12	15
NSE10-TRZ	TR20x4	15	20
NSE25-TRZ	TR30x6	20	25
NSE50-TRZ	TR40x7	25	30
NSE100-TRZ	TR60x9	40	45

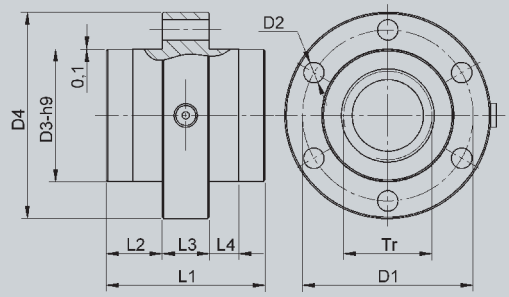
Flange nut FM

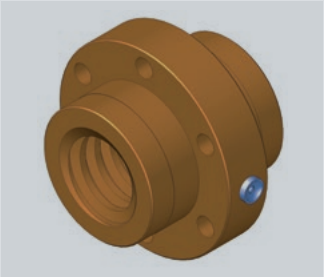




	TR	D1	D2	D3	D4	L1	L2	L3
NSE2-FM	TR14x4	38	6	28	48	35	12	8
NSE5-FM	TR18x4	38	6	28	48	35	12	8
NSE10-FM	TR20x4	45	7	32	55	44	12	8
NSE25-FM	TR30x6	50	7	38	62	46	14	8
NSE50-FM	TR40x7	78	9	63	95	66	16	12
NSE100-FM	TR60x9	110	13	88	130	90	20	16

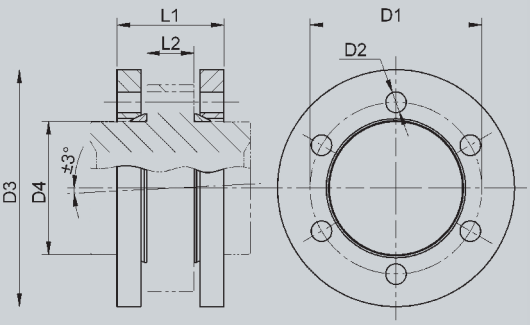
Duplex nut DMN

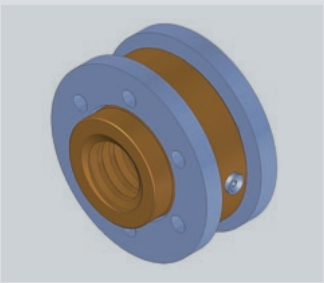




	TR	D1	D2	D3	D4	L1	L2	L3	L4
NSE2-DMN	TR14x4	38	6	28	48	35	11.5	12	8
NSE5-DMN	TR18x4	38	6	28	48	35	11.5	12	8
NSE10-DMN	TR20x4	45	7	32	55	44	16.0	12	8
NSE25-DMN	TR30x6	58	7	45	70	54	19.0	16	10
NSE50-DMN	TR40x7	78	9	63	95	66	25.0	16	12
NSE100-DMN	TR60x9	110	13	88	130	90	35.0	20	16

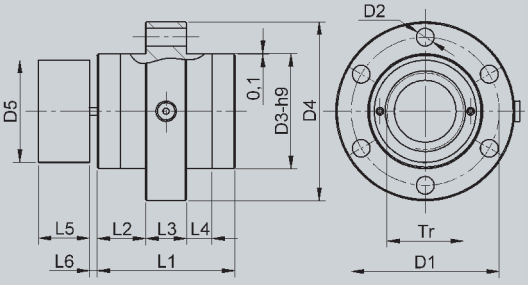
Calotte disks KS fitting duplex nut DMN

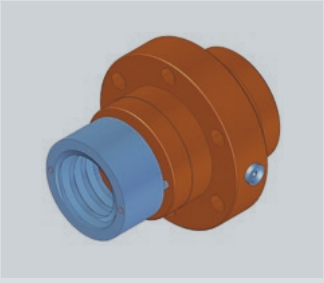




	TR	D1	D2	D3	D4	L1	L2
NSE2-KS	TR14x4	38	6	50	28	27	12
NSE5-KS	TR18x4	38	6	50	28	27	12
NSE10-KS	TR20x4	45	7	60	32	32	12
NSE25-KS	TR30x6	58	7	80	45	36	16
NSE50-KS	TR40x7	78	9	100	63	42	16
NSE100-KS	TR60x9	110	13	140	88	52	20

Safety trap nut SFM

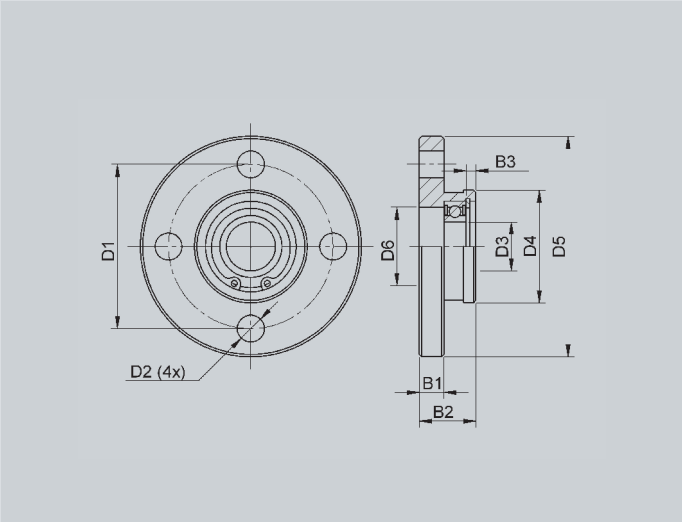


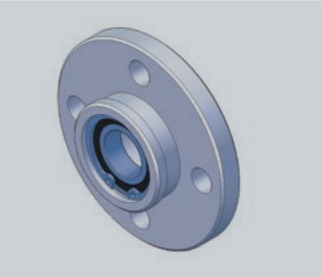


	D5	L5	L6
NSE2-R-SFM	25	12	2.0
NSE5-R-SFM	25	12	2.0
NSE10-R-SFM	31	14	2.0
NSE25-R-SFM	40	20	3.0
NSE50-R-SFM	58	28	3.5
NSE100-R-SFM	74	40	4.5

Remaining dimensions are the same as duplex nut

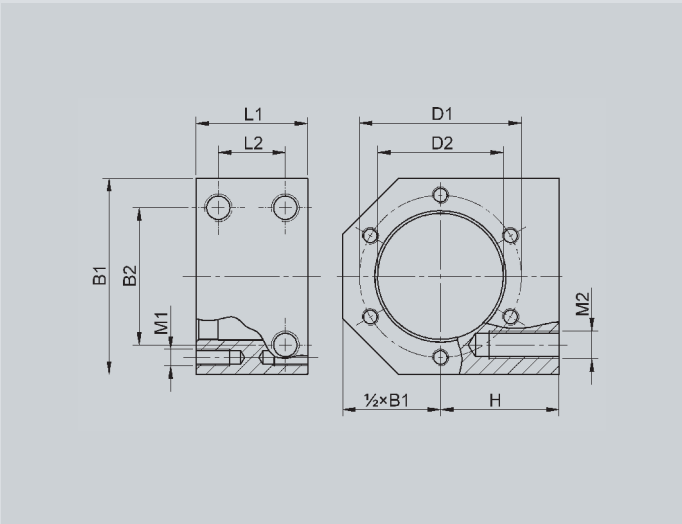
Flange bearing FL

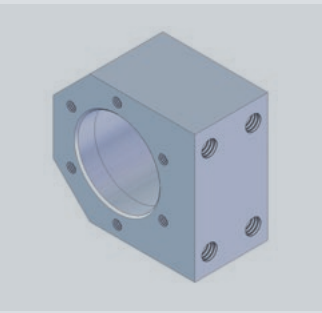




	B1	B2	B3	D1	D2	D3	D4	D5	D6
NSE2-FL	7	20	5	48	9	8	29	65	18
NSE5-FL	7	20	5	48	9	12	29	65	20
NSE10-FL	8	21	5	60	11	15	39	80	28
NSE25-FL	10	23	5	67	11	20	46	90	32
NSE50-FL	15	30	5	85	13	25	60	110	42
NSE100-FL	20	50	4	117	17	40	85	150	60

Carrier flange TRMFL for duplex nut or flange nut

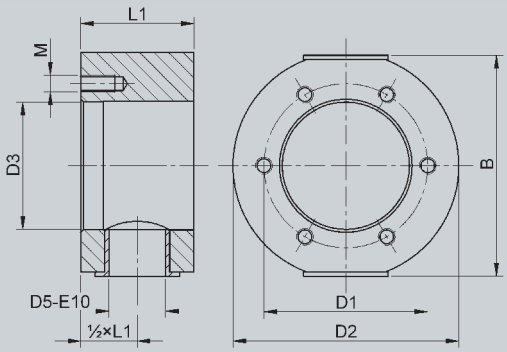


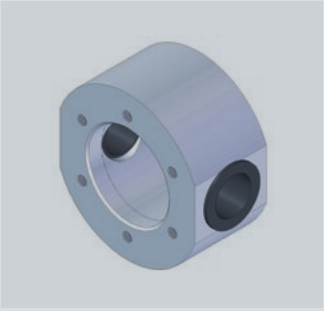


	B1	B2	D1	D2	H	L1	L2	M1	M2
NSE2-TRMFL	50	34	38	28	35.0	40	24	M5x10	M8x25
NSE5-TRMFL	50	34	38	28	35.0	40	24	M5x10	M8x25
NSE10-TRMFL	58	39	45	32	37.5	40	24	M6x12	M8x25
NSE25-TRMFL*	70	49	58	45	42.5	40	24	M6x12	M10x25
NSE50-TRMFL	100	76	78	63	70.0	65	41	M8x16	M14x43

NSE-100 TRMFL on request
* fits only on duplex nuts DMN

Cardan adapter KAM for duplex or flange nut



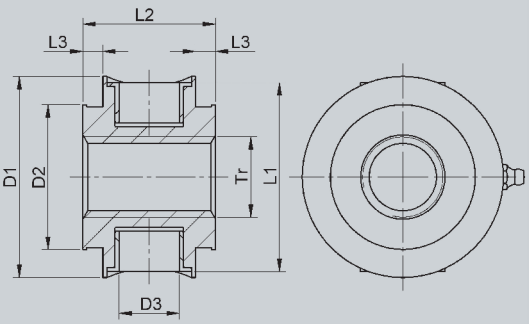


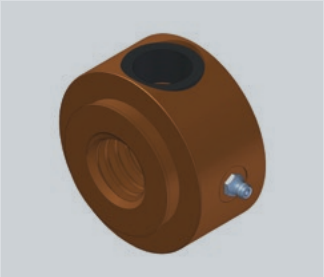
	B	D1	D2	D3	D5	L1	M
NSE5-KAM	50	38	58	28	15	30	M5x10
NSE10-KAM	57	45	60	32	15	30	M6x12
NSE25-KAM*	78	58	80	45	20	40	M6x12
NSE50-KAM	105	78	110	63	30	60	M8x14
NSE100-KAM	150	110	155	88	40	75	M12x20

* fits only on duplex nuts DMN

Cardan Nut KM

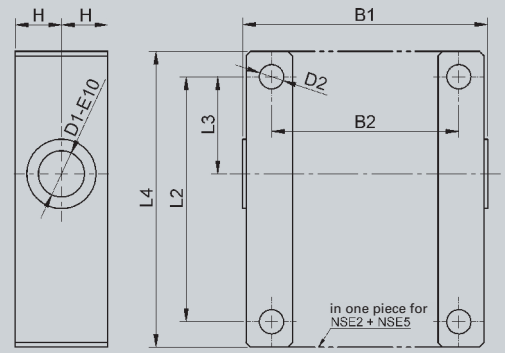
on request

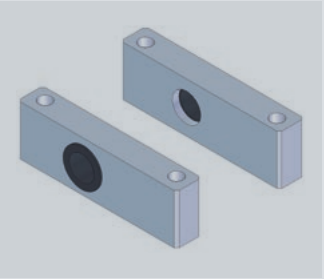




	TR	D1	D2	D3	L1	L2	L3
NSE2-KM	TR14x4	44	44	10	40	35	8
NSE5-KM	TR18x4	50	50	15	46	40	8
NSE10-KM	TR20x4	54	54	15	50	44	10
NSE25-KM	TR30x6	74	74	20	70	54	10
NSE50-KM	TR40x7	100	72	30	94	66	10
NSE100-KM	TR60x9	140	90	40	134	90	10

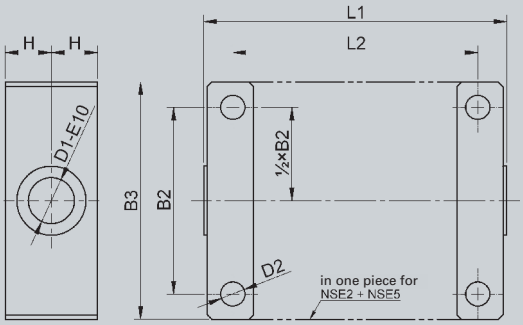
Suspension adapter plate long KAL

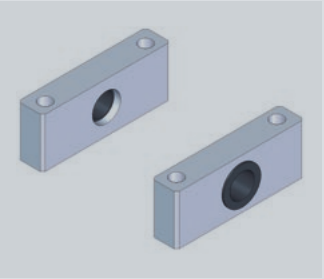




	B1	B2	D1	D2	H	L2	L3	L4
NSE2-KAL	61	43	10	6.5	12.5	51	18.5	67
NSE5-KAL	72	52	15	8.5	15.0	60	21.0	78
NSE10-KAL	85	63	15	8.5	15.0	78	29.0	98
NSE25-KAL	106	81	20	10.5	20.0	106	42.0	128
NSE50-KAL	147	115	30	13.0	30.0	150	63.0	178
NSE100-KAL	165	131	40	17.0	37.5	166	66.0	196

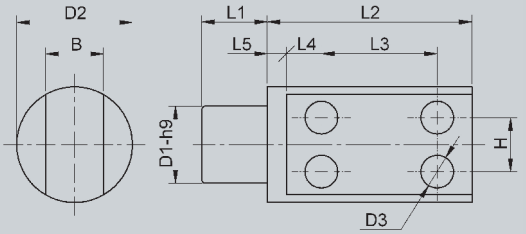
Suspension adapter plate short KAK

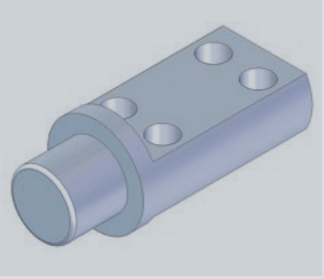




	B2	B3	D1	D2	H	L1	L2
NSE2-KAK	43	59	10	6.5	12.5	69	51
NSE5-KAK	52	70	15	8.5	15.0	80	60
NSE10-KAK	63	83	15	8.5	15.0	100	78
NSE25-KAK	81	103	20	10.5	20.0	131	106
NSE50-KAK	115	143	30	13.0	30.0	182	150
NSE100-KAK	131	161	40	17.0	37.5	200	166

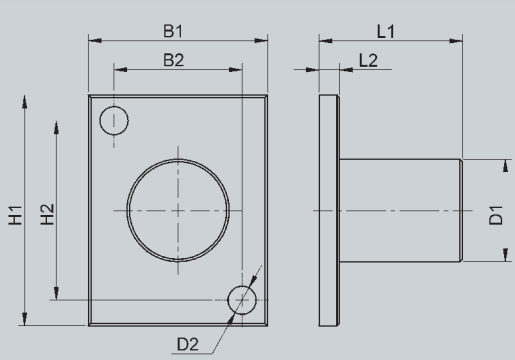
Suspension adapter bolt KB

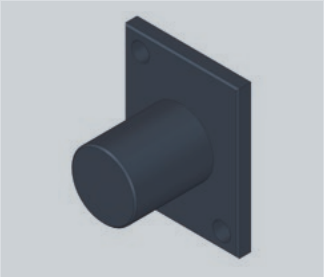




	B	D1	D2	D3	H	L1	L2	L3	L4	L5
NSE2-KB	9	10	20	5.5	10	10	30	15	6	3
NSE5-KB	12	15	25	6.5	12	10	40	20	8	5
NSE10-KB	12	15	25	6.5	12	10	40	20	8	5
NSE25-KB	15	20	30	8.5	14	16	53	30	9	5
NSE50-KB	20	30	40	10.5	18	21	60	35	10	5
NSE100-KB	30	40	50	12.5	20	31	80	50	12	5

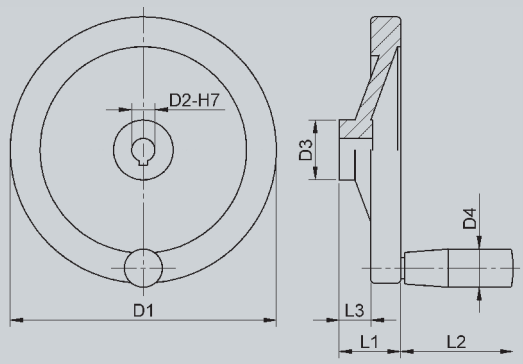
Protection cap SK





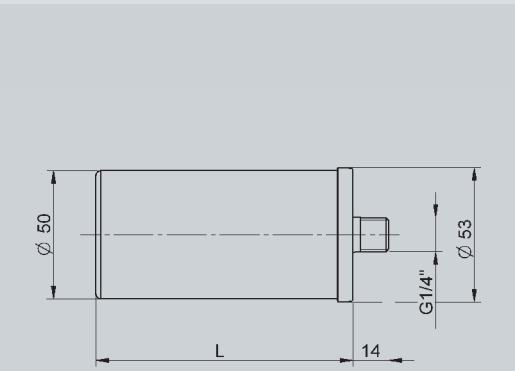
	B1	B2	D1	D2	H1	H2	L1	L2
NSE2-SK	38	28.2	30	5.5	49	28.2	25	6
NSE5-SK	45	32.5	30	7.0	45	32.5	32	8
NSE10-SK	50	35.4	30	9.0	50	35.4	35	8
NSE25-SK	60	42.0	40	9.0	60	42.0	53	8
NSE50-SK	70	50.0	40	11.0	90	70.0	56	8
NSE100-SK	70	46.0	50	13.5	120	96.0	70	8

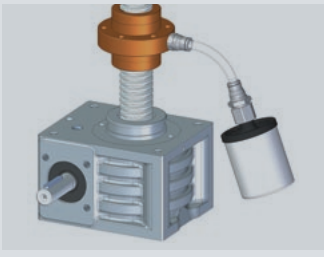
Hand wheel HR



	D1	D3	D4	L1	L2	L3	D2 with keyway
HR-60	60	18	21	22	52.5	15	09/11
HR-80	80	26	18	26	42.5	16	11
HR-125	125	31	23	33	67.5	18	11/14
HR-160	160	36	26	39	82.5	20	14/16
HR-200	200	42	26	45	82.5	24	16/20
HR-250	250	48	28	51	92.5	28	20/25

Lubricant dispenser SSG

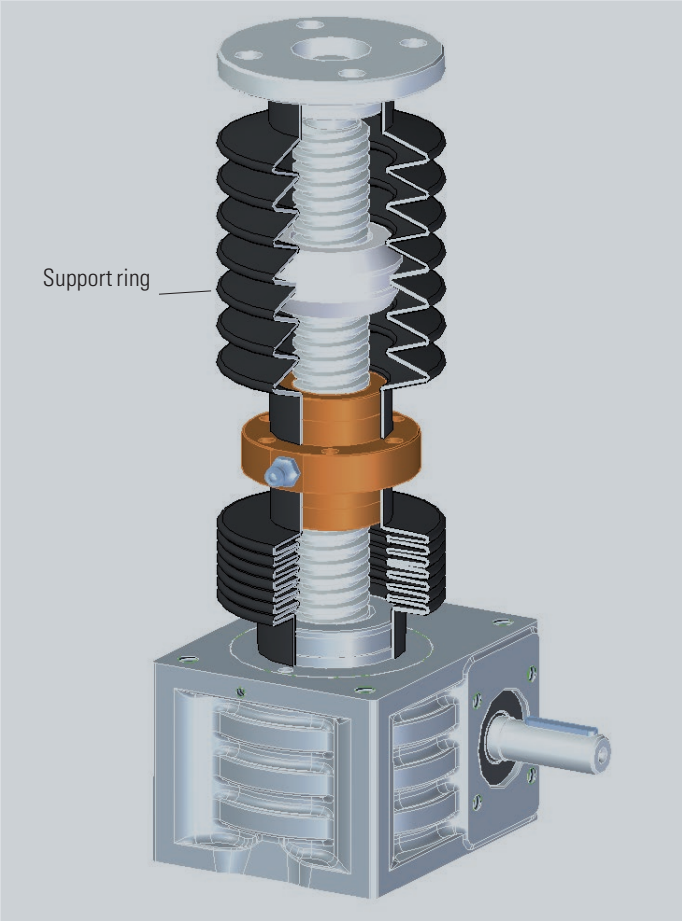




	L	Filling
SSG-60-UM	62	60 ml Universal grease with MoS2
SSG-125-UM	100	125 ml Universal grease with MoS2
SSG-125-L	100	125 ml Food fat

	SSG	SSG mit Schlauch
NSE2	**SSG-RED-M6/-G1/8**	**SSG-RED-M6 + SSG-S**
NSE5	**SSG-RED-M6/-G1/8**	**SSG-RED-M6 + SSG-S**
NSE10-RN/RL*	**SSG-RED-M6/-G1/8**	**SSG-RED-M6 + SSG-S**
NSE25	**SSG-RED-G1/8**	**SSG-S**
NSE50	**SSG-RED-G1/8**	**SSG-S**
NSE100	**SSG-RED-G1/8**	**SSG-S**

Depending on the required amount of lubrication, the dispensers last for 1 up to 12 months.
We would gladly supply you with accsessories (tube, busching, etc.)

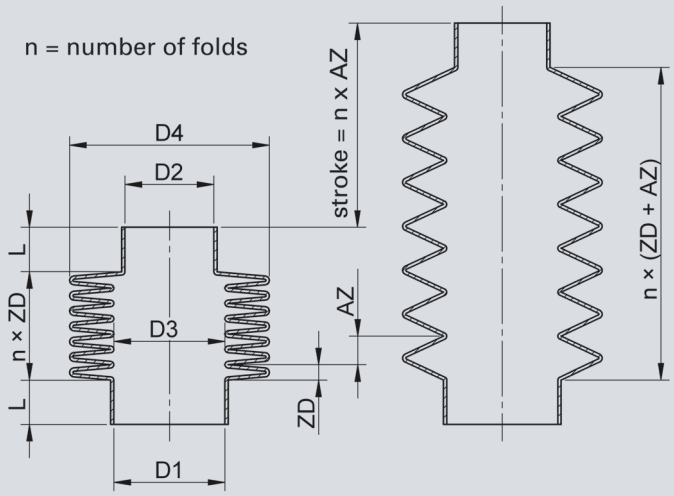


The bellows protect the spindle from dirt and moisture.

Particularly in the case of on-site assembly, they protect the spindles from: construction dust, grinding dust from angle grinders, welding spatters, etc. Protect the bellows from direct sunlight. Please note also that the maximum operation time is reduced by the heat-insulating of the gearboxes effect of the bellows.

Attention:
The bellows must not be compressed below the dimension ZD or extended beyond the dimension AZ. (For strokes greater than 1000 mm, use the bellows with support rings.) Take into consideration that, for horizontal installation of the bellows, it must not come into contact with screw: Serious wear will occure! This can be avoided by the use of support rings.

Air holes must be made by the customer, depending on the speed.



Example for ordering

Type
Number of folds
Gaiter diameter 1/2

FB90-15-30/40

Screw jack NSE2–NSE5

	L	ZD*	AZ*	D1	D2	D3	D4
FB52	10	2.1	10.5	26	34	30	52

* per fold
Standard is FB52-29-26/34-300 mit ZD = 60mm

Material: NBR
Temperature range: -20 … +80 °C

Screw jack NSE10–NSE50

	L	ZD*	AZ*	D1	D2	D3	D4
FB90	20	3.5	24.5	30/40/50	30/40/50	50	90

* per fold

Material: Nitril, black
Temperature range: -20 … +80 °C

Screw jack NSE100

	L	ZD*	AZ*	D1	D2	D3	D4
FB130	20	2.0	26.0	68/88	68/88	70	130

* per fold

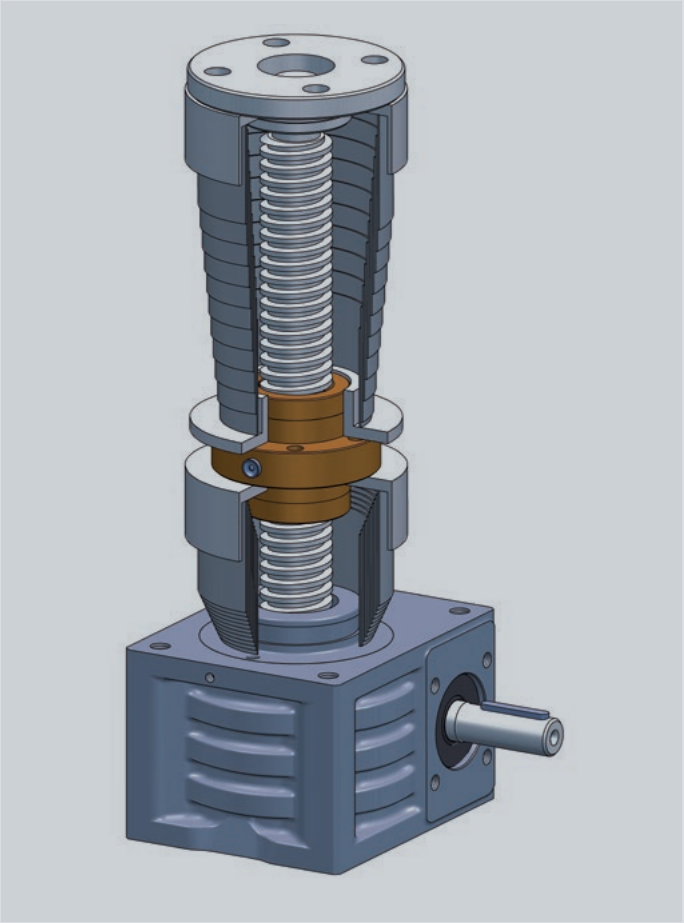
Material: NBR
Temperature range: -20 … +80 °C

Internal support ring fitting FB52

NSE2-FB52-STR
NSE5-FB52-STR

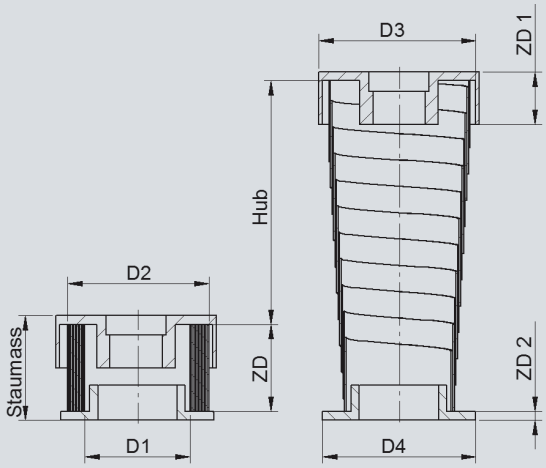
Internal support ring fitting FB90

NSE5-FB-STR
NSE10-FB-STR
NSE25-FB-STR
NSE50-FB-STR



Spiral spring covers can be used for different applications. If you want to combine different add-on components, centering sleeves are required, which we would be happy to supply.

Important: The spiral spring cover must not be allowed to uncoil. Please specify if the spiral spring cover SF is to be installed vertically or horizontally. We recommend placing the large diameter facing up for vertical installation, and for horizontal installation the large diameter in the direction of the swarf. A light film of oil improves operation and increases the operating life.



Screw jack NSE5

	D1	D2	ZD	Stroke horizontal	Stroke vertical
045/350/030	45	65	30	260	320
045/550/050	45	68	50	400	500

Screw jack NSE10

	D1	D2	ZD	Stroke horizontal	Stroke vertical
050/350/030	50	73	30	260	320
050/550/050	50	73	50	400	500
050/750/060	50	80	60	570	690
050/1100/100	50	77	100	800	1000

Screw jack NSE25

	D1	D2	ZD	Stroke horizontal	Stroke vertical
060/350/050	60	78	50	200	300
060/550/060	60	81	60	370	490
060/750/075	60	89	75	525	675
060/1100/075	60	102	75	875	1025

Screw jack NSE50

	D1	D2	ZD	Stroke horizontal	Stroke vertical
075/350/050	75	95	50	200	300
075/750/060	75	109	60	570	690
075/1100/100	75	108	100	800	1000
075/1500/100	75	120	100	1200	1400

Screw jack NSE100

	D1	D2	ZD	Stroke horizontal	Stroke vertical
100/350/060	100	126	60	170	290
100/800/075	100	138	75	575	725
100/1200/100	100	137	100	900	1100
100/1800/150	100	151	150	1350	1650

Example for ordering

Spiral spring cover
Interal diameter D1
Longest length AZ
Smallest length ZD
Installation H/V (horizontal/vertical)

SF-050-0550-050-V

By means of the following table, you can determine the required spindle lengths. So that you can quickly calculate the installation dimensions of your screw jack. These allowances are the minimum required. For special installation situations, please make a drawing or contact us.

Explanation
Spindle length = stroke + basic length + attachments

Calculation example

NSE25-RL with 270 mm stroke with pin for flange bearing, Duplex nut and bellow

Spindle length
270 + 110 + 54 + 42 = 476 mm spindle length

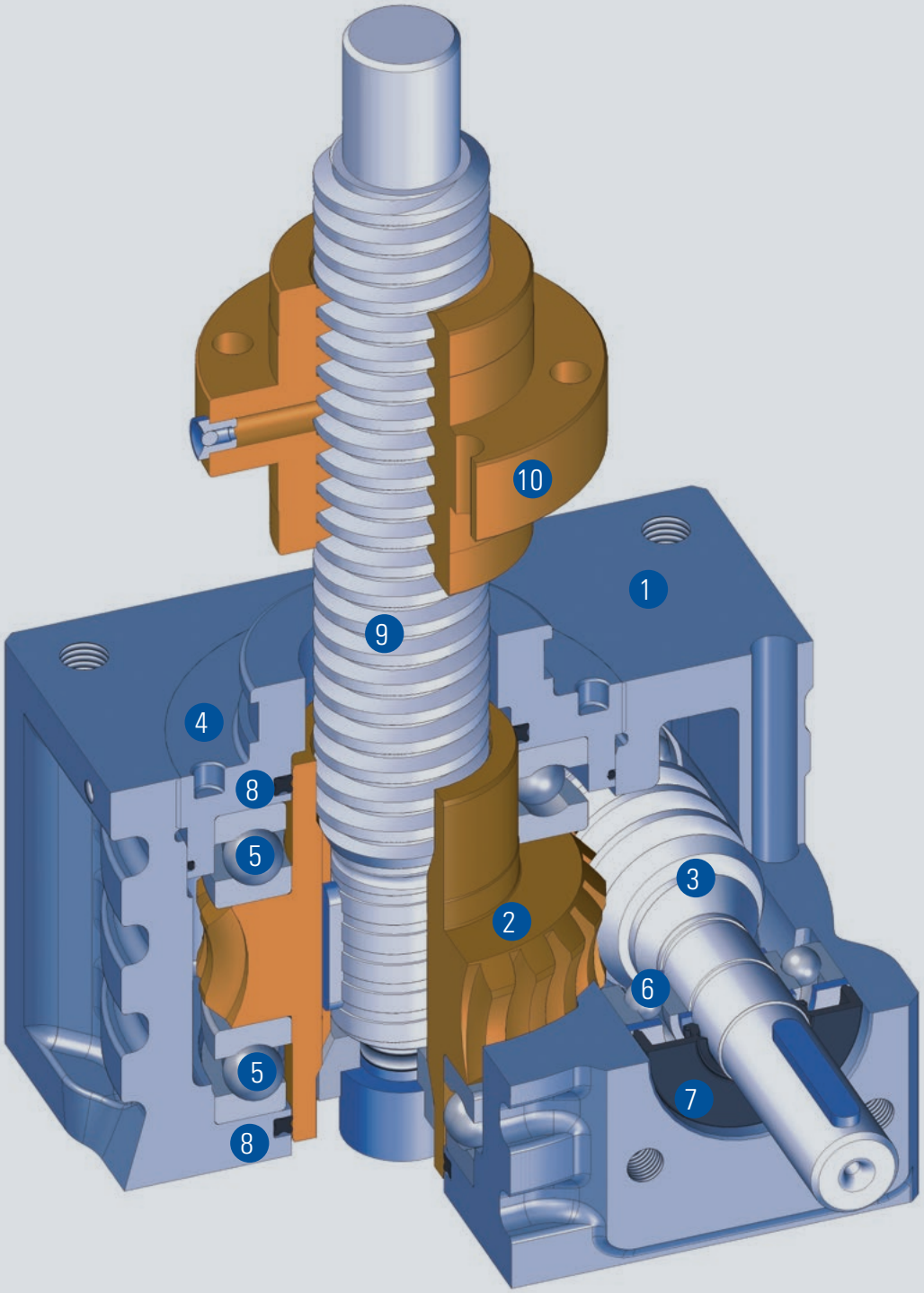
Smallest length bellow
$^{270}/_{24.5} = 11.02 > 12 \times 3.5 = 42$

	NSE2	NSE5	NSE10	NSE25	NSE50	NSE100
TR-basic length*	72	63	72	85	117	194
KGT-basic length**		75 16x05	84 25x05	93 32x05	123 40x05	216 50x10
		95 16x10	104 25x10	113 32x10	143 40x10	256 50x20
			164 25x25	153 32x20	183 40x20	
			264 25x50	233 32x40	263 40x40	
Basic length without safety	64	55	64	73	103	176
Pin length	15	15	20	25	30.0	45.0
Flange nut	35	35	44	46	66.0	90.0
Flange nut with SFM	49	49	60	69	97.5	134.5
Duplex nut	35	35	44	54	66.0	90.0
Duplex nut with SFM	49	49	60	77	97.5	134.5
KGT-nut L1 see page 78		42 16x05	42 25x05	55 32x05	57	95 50x10
		55 16x10	55 25x10	69 32x10	71 40x10	95 50x10
			35 25x25	80 32x20	80 40x20	
			58 25x50	45 32x40	85 40x40	
Smallest length bellow	$^{Stroke}/_{10.5}$ = ... x 2.1 *round number*	$^{Stroke}/_{10.5}$ = ... x 2.1 *round number*	$^{Stroke}/_{24.5}$ = ... x 3.5 *round number*	$^{Stroke}/_{24.5}$ = ... x 3.5 *round number*	$^{Stroke}/_{24.5}$ = ... x 3.5 *round number*	$^{Stroke}/_{26.0}$ = ... x 2.0 *round number*

* Contains 2 x the safety distance (spindle pitch)
** Contains 4 x the safety distance (spindle pitch)
Subject to dimension changes

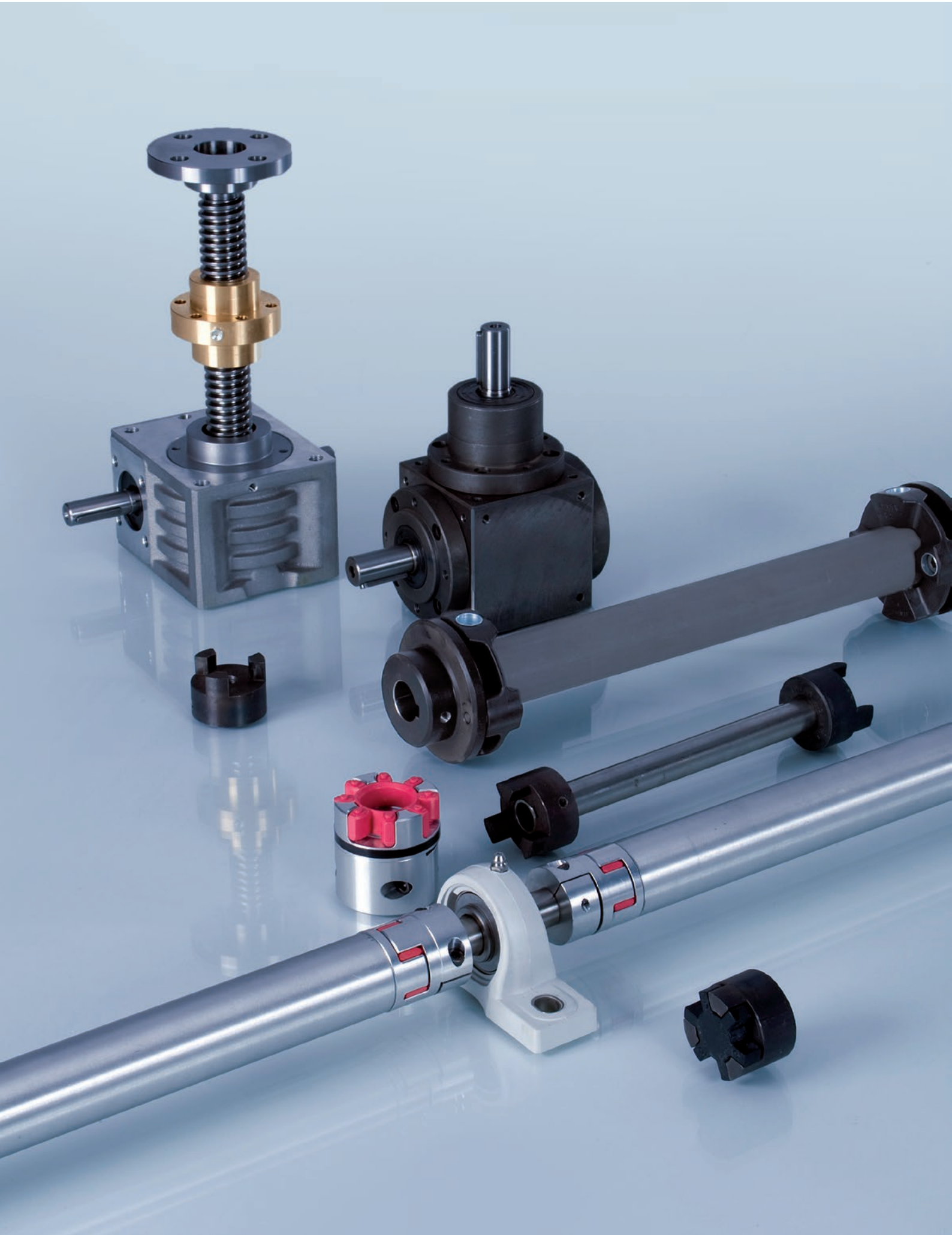
- Spiral spring cover SF: As the extension in case of a spiral spring cover is different depending on the attachment, this option has to be determined graphically. We would be happy to generate this drawing for you.

CAD data can be found at www.nozag.ch



1 Housing
2 Worm wheel
3 Worm
4 Bearing cap
5 Deep groove ball thrust bearing
6 Deep groove ball bearing
7 Oil seal
8 X-ring/O-ring
9 Spindle
10 Duplex nut

4. Drive components



4. Drive components

Force easily redirected and transmitted.
To deliver the required torque for the lifting system at the correct place, you will find in this chapter, the corresponding bevel gear boxes with linking elements like shafts, couplings and bearings.

Connecting shaft VW

Properties
- Radial mounting possible with split hubs
- Extreamly short assembling and disassembling times
- Spans distances of up to 4 m (13.12 ft)
- No intermediate bearing support required
- Low moment of inertia
- Damps vibration
- Plug-in design
- Free from backlash

Material
– Clamping hub: up to series 450 high strength aluminum, from series 800, steel

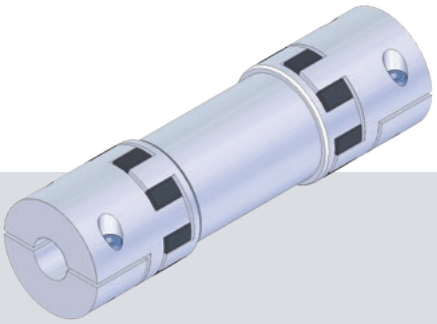
Elastomer insert
– precision molded, wear resistant and thermally stable polymer

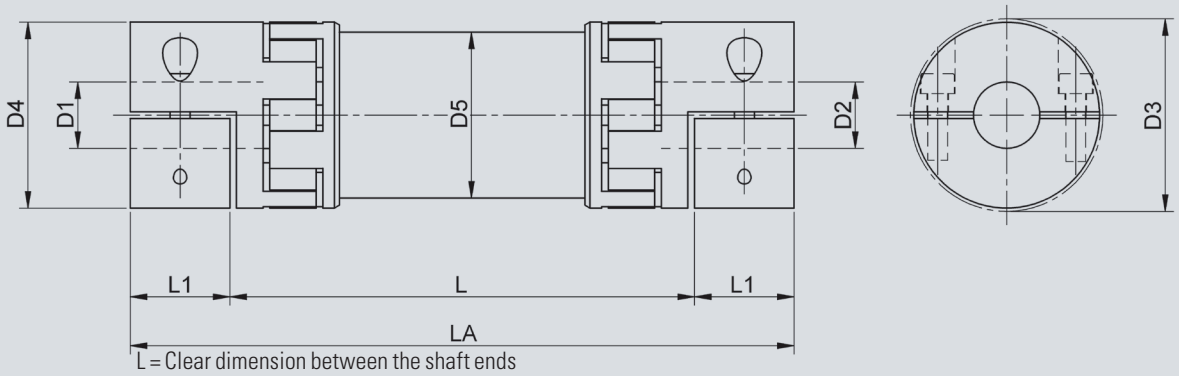
Intermediate tube
- precision aluminum tube
- steel and CFK tubes are also available

Design
- Two coupling hubs are concentrically machined with concave driving jaws
- Elastomer inserts are available in type A or B
- The two coupling elements are connected with a precise and concentrically optimized aluminum tube

Speed
- Please advise the application speed when ordering or inquiring so we can check the critical bending speeds.

Tolerance
- On the hub/shaft connection 0.01 to 0.05 mm





L = Clear dimension between the shaft ends

		VW28		VW35		VW50		VW60		VW76		VW90		VW120	
Type (Elastomer insert)		A	B	A	B	A	B	A	B	A	B	A	B	A	B
Rated torque (Nm)	TKN	12.5	16	17	21	60	75	160	200	325	405	530	660	950	1100
Max. torque* (Nm)	TKmax	25.0	32	34	42	120	150	320	400	650	810	1060	1350	1900	2150
Overall length (mm)	LA	95 up to 4000		130 up to 4000		175 up to 4000		200 up to 4000		245 up to 4000		280 up to 4000		320 up to 4000	
Outer diameter hub (mm)	D4	32		42		56		66.5		82		102		136.5	
Outer diameter tube (mm)	D5	28		35		50		60		76		90		120	
Outer diameter with screwhead (mm)	D3	32		44.5		57		68		85		105		139	
Inner diameter range from Ø to Ø H7 (mm)	D1/2	5–16		8–25		14–32		19–36		19–45		24–60		35–80	
Mounting screw (ISO 4762/12.9)		M4		M5		M6		M8		M10		M12		M16	
Tightening torque of the mounting screw (Nm)		4		8		15		35		70		120		290	
Mounting length (mm)	L1	15		17		30		35		40		50		60	
Moment of inertia per hub half (10–3 kgm²)	J_1/J_2	0.01		0.02		0.15		0.21		1.02		2.3		17	
Inertia of tube per meter (10–3 kgm²)	J3	0.075		0.183		0.66		1.18		2.48		10.6		38	
Torsion ridgidity of both couplings (Nm/rad)	$CTdyn^E$	270	825	1270	2220	3970	5950	6700	14650	11850	20200	27700	40600	41300	90000
Torsion ridgidity of 1m of tbe (Nm/rad)	CT^{ZWR}	321		1530		6632		11810		20230		65340		392800	

* Maximum transferable torque of the clamping hub depends on the bore diameters

Connecting shaft VW

Maximum transferable torque of the clamping hub depends on the bore diameters (Nm)

	Ø 8	Ø 16	Ø 19	Ø 25	Ø 30	Ø 32	Ø 35	Ø 45	Ø 50	Ø 55	Ø 60	Ø 65	Ø 70	Ø 75	Ø 80
VW28	30	40	50	65											
VW35		65	120	150	180	200									
VW50			180	240	270	300	330								
VW60			300	340	450	520	570	630							
VW76					630	720	770	900	1120	1180	1350				
VW90							1050	1125	1200	1300	1400	1450	1500	1550	1600

Description of elastomer insert

Type	Shore hardness	Colour	Material	relative Absorption	Temperature range	Property
A	98 Sh A	red	TPU	0.4 – 0.5	-30° C until +100° C	good absorption
B	64 Sh D	green	TPU	0.3 – 0.4	-30° C until +120° C	high torsion stiffness

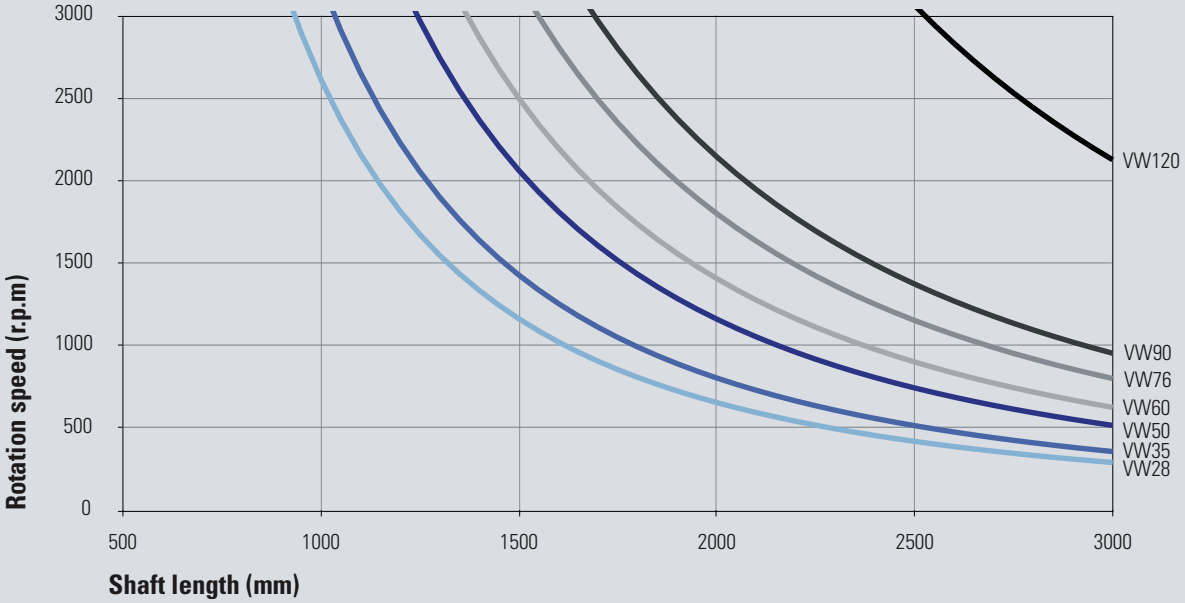
Ordering example

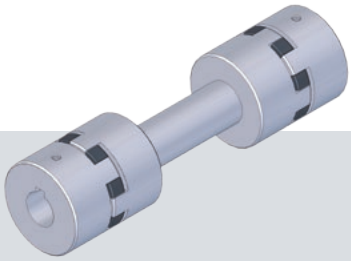
Type
Installation length
Type Elastomer insert
Bore Ø D1 H7
Bore Ø D2 H7

VW60 – LA972–A – 19/24

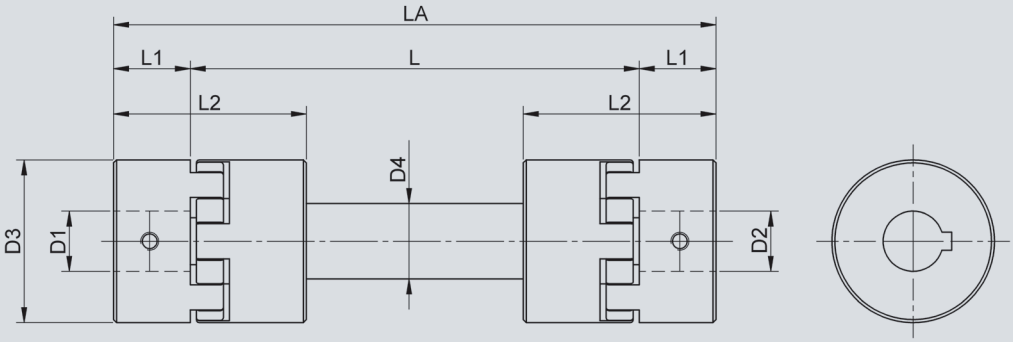
For us to be able to check your information, please specify the type of arrangement and the spindle distance.

RPM-dependent length determination





Connecting shaft LJ



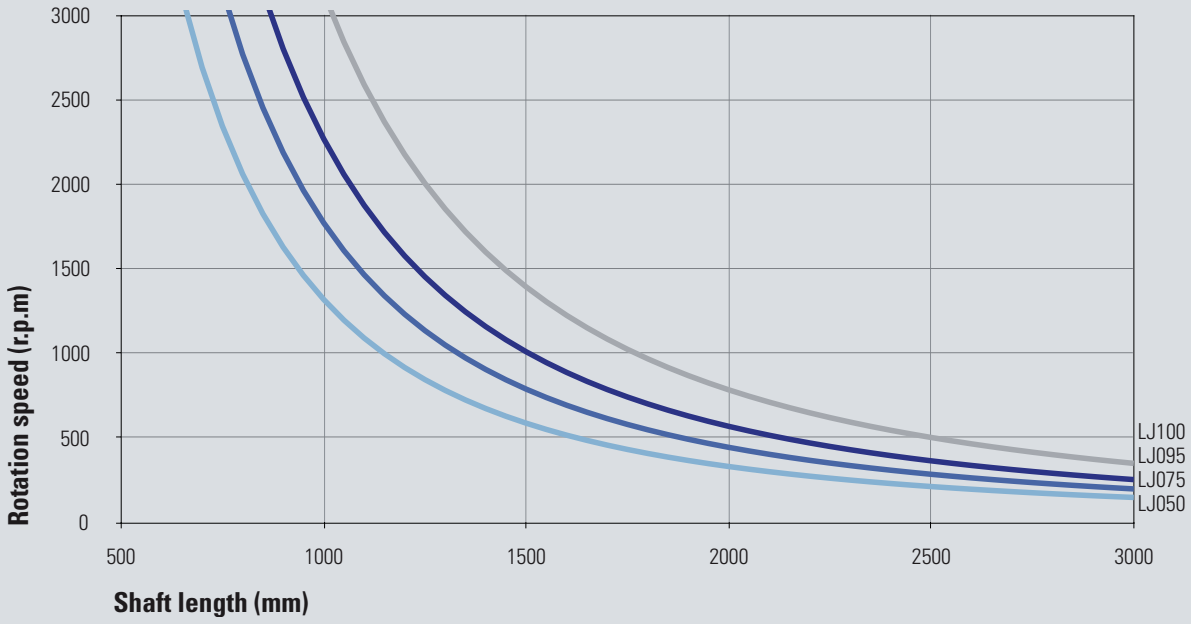
L = Clear dimension between the shaft ends

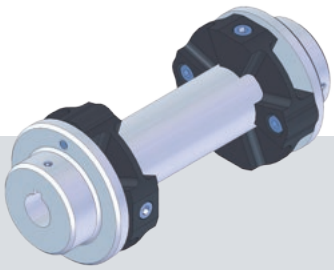
The connecting shafts LJ are an inexpensive alternative to the drive shafts, but with limited rotational speeds.

On request availible with clamping hub coupling KNK.

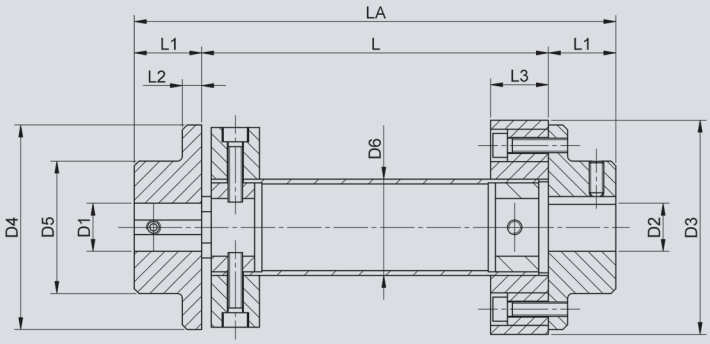
	Torque (Nm)	D1/D2 min./max.	D3	D4	L1	L2
LJ050-…	2.9	6.4 – 15	28	15	15.0	44
LJ075-…	10.1	6.4 – 22	45	20	20.5	54
LJ095-…	21.7	11.1 – 28	54	25	25.5	64
LJ100-…	46.7	11.1 – 34	65	35	35.0	89

RPM-dependent length determination





Connecting shaft GX



L = Clear dimension between the shaft ends

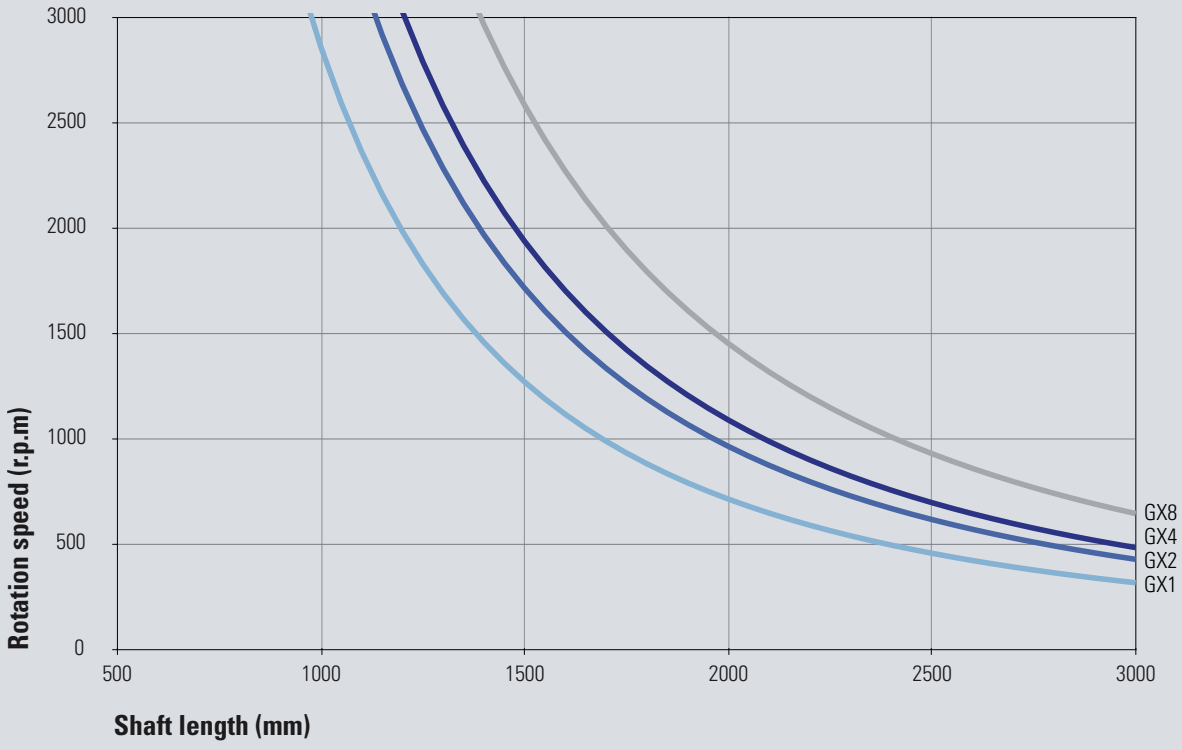
Elastic drive shafts serve for joining several screw jacks to one another, or screw jack and drive. They dampen noise, torsional vibrations and impacts, and balance out axial, radial and angular displacements. Elastic drive shafts are maintenance-free, the middle part can be radially (laterally) dismantled without axial displacement of the connected assemblies. Except with very long connections, generally, pedestal bearings are not required.

Features

- particularly torsion-proof
- temperature and oil resistant
- for long lengths and high rotational speeds
- shaft angle max. 1°

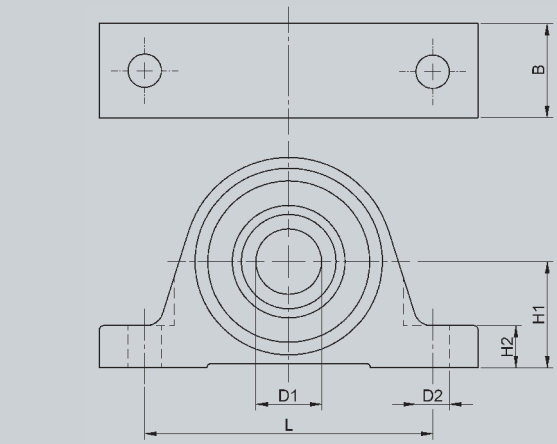
	Torque [Nm]	D1/D2 min./max.		D3	D4	D5	D6	L1	L2	L3	L min.	Tk/Pitch
GX1	10	8	25	58	56	36	30	24	7	24	87	44/2
GX2	30	12	38	88	86	55	40	28	8	24	88	68/2
GX4	60	16	45	100	100	65	45	30	8	26	99	80/3
GX8	120	20	55	125	120	80	60	42	10	32	120	100/3

RPM-dependent length determination

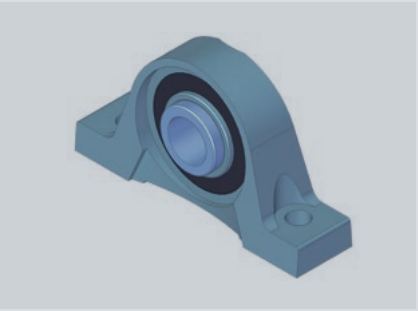


Pedestal bearings for connecting shafts (STL)

If the connecting shafts or the drive shafts, as the case may be, exceed a certain length and/or rotational speed, pedestal bearings should be used.



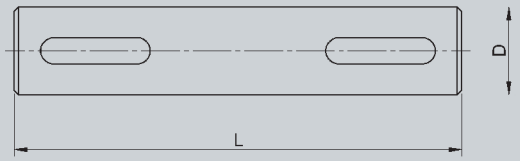
Symbol diagram

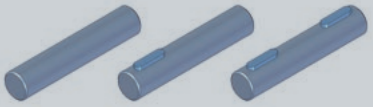


	B	D1	D2	H1	H2	L
STL075	38	20	13	36.5	15.0	105
STL095	48	25	17	42.9	17.0	121
STL100	54	35	17	49.2	18.0	137
STLG1	48	30	17	47.6	18.0	127
STLG2	54	40	17	54.0	20.0	146
STLG4	60	45	20	57.2	21.0	159
STL15	25	15 H6	9	22.2	3.2	68
STL20*	32	20 H6	9	25.4	3.2	76
STL25*	32	25 H6	11	28.6	4.0	86
STL35*	42	35 H6	11	39.7	4.6	106

* clamping sleeve on demand. (dimensional variation)

Shaft extension

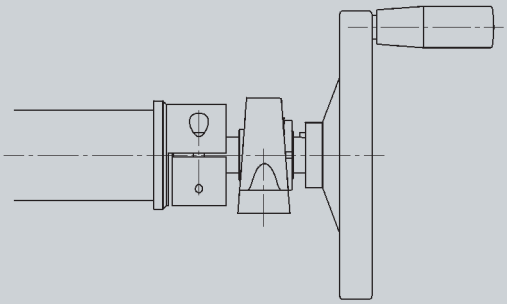


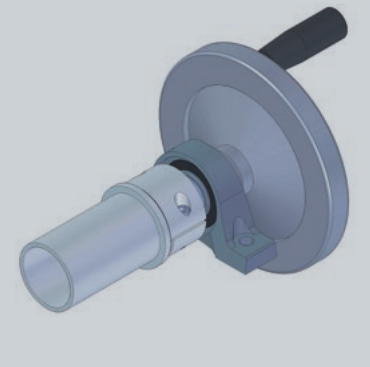


	D	L
WZ15/80	15	80
WZ20/80	20	80
WZ25/100	25	100
WZ35/120	35	120

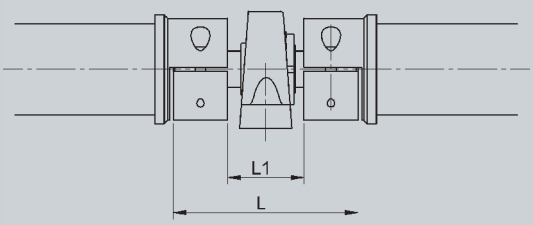
Respectively in the options **0K** (no key), **1K** (key on one side), **2K** (key on both sides)

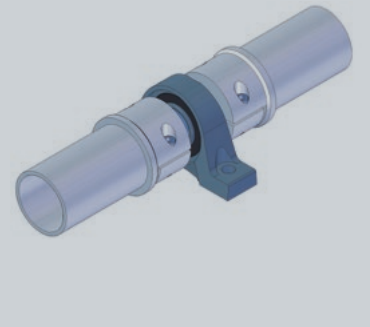
Pedestal bearing with connecting shaft and hand-wheel

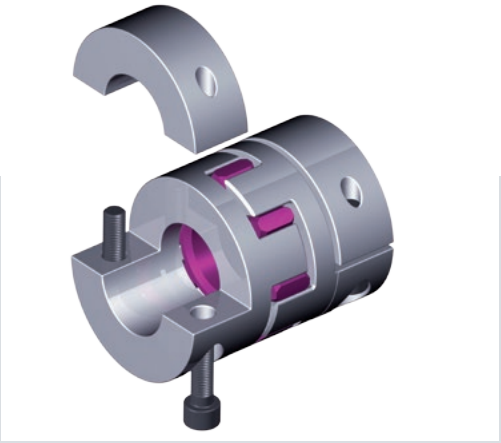




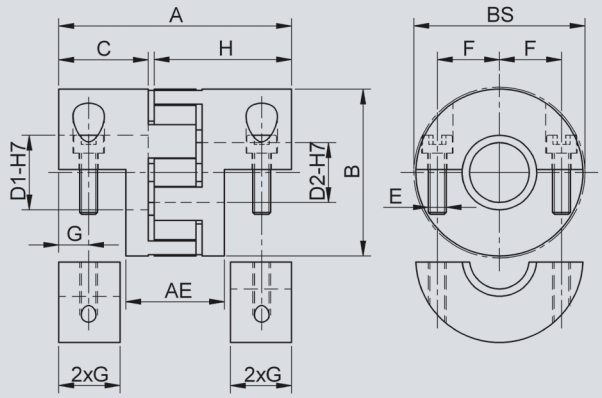
Pedestal bearing with connecting shaft







Friction coupling KNK



Properties clamp coupling KNK

- radial mounting possible
- high concentricity
- damps vibrations
- electrical insulating
- easy mounting /
- free from backlash
- plug-in design

Design

Both clamping hubs are fully separable due to split hubs and 2 × ISO 4762 screws per hub. The constructional imbalance of the clamping hubs are counterbalanced due to balancing holes on the innerside.

Material

Clamping hub: up to series 450 high strength aluminum, from series 800, steel, Elastomer insert: precision molded, wear resistant, and thermally stable polymer.

Dimensions, performance list

Elastomer insert	Rated torque Nm / TKN			Max. torque* Nm / TKmax		
	A	B	C	A	B	C
KNK010	12.6	16	4	25	32	6
KNK020	17	21	6	34	42	12
KNK060	60	75	20	120	150	35
KNK150	160	200	42	320	400	85
KNK300	325	405	84	650	810	170
KNK450	530	660	95	1060	1350	190
KNK800	950	1100	240	1900	2150	400

* Maximum transferable torque of the clamping hub depends on the bore diameters

ordering example

		Type Elastomer insert		Bore Ø D1 H7	Bore Ø D2 H7
KNK060	–	A	–	19	/ 24

Maximum transferable torque of the clamping hub depends on the bore diameters

	Ø6	Ø8	Ø16	Ø19	Ø25	Ø30	Ø32	Ø35	Ø45	Ø50	Ø55	Ø60	Ø65	Ø70	Ø75	Ø80
KNK010	6	12	32													
KNK020		30	40	50	65											
KNK060			65	120	150	180	200									
KNK150				180	240	270	300	330								
KNK300				300	340	450	520	570	630							
KNK450						630	720	770	900	1120	1180	1350				
KNK800								1050	1125	1200	1300	1400	1450	1500	1550	1600

Higher torque through additional keyway possible

Friction coupling KNK

Dimensions

Type Elastomer insert			KNK010	KNK020	KNK060	KNK150	KNK300	KNK450	KNK800
Overall length	mm	A	53	66	78	90	114	126	162
Insertion length	mm	AE	20	28	33	37	49	51	65
Outer diameter	mm	B	33	42	56	66.5	82	102	136.5
Outer diameter with screwhead	mm	BS	32	44.5	57	68	85	105	139
Mounting length	mm	C	20	25	30	35	45	50	65
Inner diameter range from Ø to Ø H7	mm	$D_{1/2}$	6 – 16	8 – 25	12 – 32	19 – 36	20 – 45	28 – 60	35 – 80
Inner diameter max.(elastomer)	mm	D_E	14.2	19.2	26.2	29.2	36.2	46.2	60.5
Mounting screw (ISO 4762/12.9)		E	M4	M5	M6	M8	M10	M12	M16
Tightening torque of the Mounting screw	Nm	E	4	8	15	35	70	120	290
Distance between centers	mm	F	10.5	15.5	21	24	29	38	50.5
Distance	mm	G	7.5	8.5	10	12	15	17.5	23
Hub length	mm	H	31	39	46	52.5	66	73	93.5
Moment of inertia per Hub	10^{-3} kgm²	J_1/J_2	0.005	0.02	0.06	0.1	0.4	1	9.5
Coupling weight	kg		0.08	0.15	0.35	0.6	1.1	1.7	10

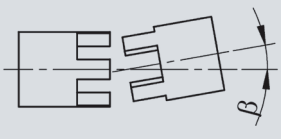
Elastomer insert for friction coupling

Type	Shore hardness	Couleur	Matière	Relative Absorption	Temperature range	Property
A	98 Sh A	rot	TPU	0.4 – 05.5	-30° C – +100° C	high damping
B	64 Sh D	grün	TPU	0.3 – 04.5	-30° C – +120° C	high torsion stiffness
C	80 Sh A	gelb	TPU	0.3 – 0.4	-30° C – +100° C	very high damping

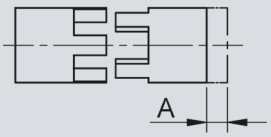
Technical specifications

	Type	Torsion stiffness static	Dynamic Torsional stiffness	Angle displacement (degree) ß	Axial displacement A	Radial displacement R
	A	260	541	1		0.1
GS010	B	600	1650	0.8	±1	0.08
	C	90	224	1.2		0.22
	A	1140	2540	1		0.1
GS020	B	2500	4440	0.8	±2	0.08
	C	520	876	1.2		0.15
	A	3290	7940	1		0.12
GS060	B	9750	11900	0.8	±2	0.1
	C	1400	1350	1.2		0.15
	A	4970	13400	1		0.15
GS150	B	10600	29300	0.8	±2	0.12
	C	1130	3590	1.2		0.2
	A	12400	23700	1		0.18
GS300	B	18000	40400	0.8	±2	0.14
	C	1280	6090	1.2		0.25
	A	15100	55400	1		0.2
GS450	B	27000	81200	0.8	±2	0.18
	C	4120	11600	1.2		0.25
	A	41300	82600	1		0.25
GS800	B	66080	180150	0.8	±2	0.2
	C	10320	28600	1.2		0.3

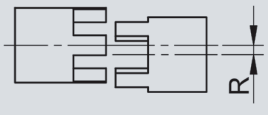
Angle displacaement

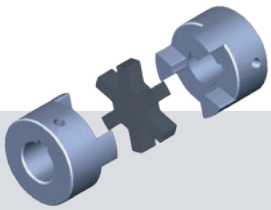


Axial displacement



Radial displacement

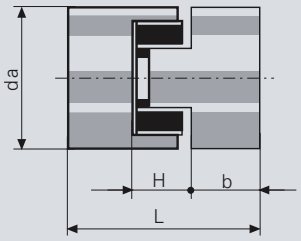




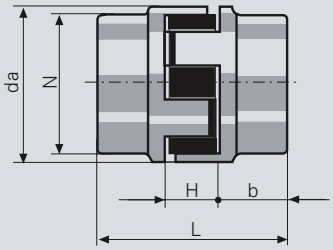
Flexible couplings

Design
These elastique and maintenance free claw couplings are suitable for a problemless usage in general mechanical engineering. They are attractive due to their compact design and comparativly high torque transfer. The couplings are made of two sintered flanges and an elastic insert.

Type 035-150 Made of sintered steel



Type 190 of aluminium



	Torque with			Speed min-1						Material	weight	D min	D max
	SOX/Snap	Urethan	Hytrel	Bronze		da	N	L	b	H		kg		
035	0.4	–	–	–	10000	16	–	21	7.0	7	steel	0.05	3.2	9
050	2.9	4.5	5.6	5.6	10000	28	–	44	16.0	12	steel	0.14	6.4	15
070	4.8	7.3	12.8	12.8	8000	35	–	51	19.0	13	steel	0.27	6.4	19
075	10.1	15.3	25.4	25.4	6500	45	–	54	20.5	13	steel	0.45	6.4	22
095	21.7	32.9	62.8	62.8	5800	54	–	64	25.4	13	steel	0.81	11.1	28
100	46.7	70.7	127.0	127.0	5000	65	–	89	35.0	19	steel	1.58	11.1	34
110	88.7	134.0	254.0	254.0	4500	84	–	108	43.0	22	steel	3.00	15.9	41
150	139.0	210.0	415.0	415.0	4000	95	–	114	44.5	25	steel	4.10	15.9	47
190	195.0	293.0	529.0	529.0	3500	114	102	133	54.0	25	alu	3.10	0.0	53

The torque and maximum displacement are limited by the chosen flexible transmission element.
(Without further specification, a SOX star will be delivered)

Material of the transmission element		SOX / Buna-N	Hytrel	Bronze	Urethan
Item name		GS	Hy	Bz	UR
Temperature range		-40 – +100° C	-50 – +120° C	-20 – +340° C	-40 – +71° C
Allowable angular displacement		1°	0.5°	0.5°	1°
Allowable lateral displacement		0.40 mm	0.40 mm	0.25 mm	0.40 mm
Allowable axial displacement	035 – 070	0.75 mm	0.75 mm	0.75 mm	0.75 mm
	075 – 190	1.50 mm	1.50 mm	1.50 mm	1.50 mm

Coupling half

With standard bores

Table of Coupling half off stock with finished bores, keyway and set screw

Bore	undrilled	undrilled	undrilled	undrilled	undrilled	undrilled	undrilled	undrilled	undrilled
		6.3	6.3	6.3	11.1	11.1	15.9	15.9	19
ø – H7	035	050	070	075	095	100	110	150	190
D min.	035-0	050-0	070-0	075-0	095-0	100-0	110-0	150-0	190-0
8		-8*							
9		-9							
10		-10	-10*	-10*					
11		-11	-11	-11					
12		-12	-12						
14		-14	-14	-14	-14*				
15		-15	-15	-15		15*			
16			-16	-16					
19			-19	-19	-19		19*		
20				-20	-20				
24					-24	-24			
25					-25	-25			
28					-28	-28	-28		
30						-30	-30		
32						-32	-32		
35							-35		
38							-38		
40							-40		
42							-42		

* without keyway

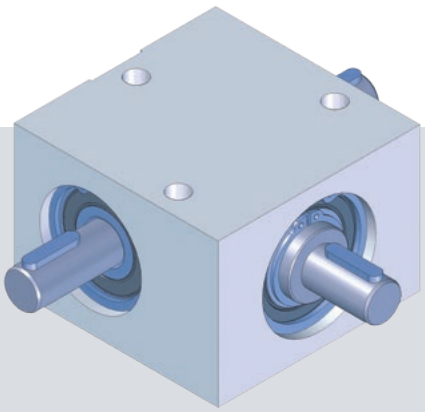
Order example for a 075 coupling with a 14 mm and 20 mm bore

1 Coupling half	075-14
1 Coupling half	075-20
1 SOX Star	075GS

Finished bores according to VSM-H7, Keyways according to VSM 15161-H9 / DIN 6885

Shaft diameter D	bigger than	6 8	8 10	10 12	12 17	17 22	22 30	30 38	38 44	44 50	50 58	58 65	65 75	75 85
Width of keyway H9		2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0
Depth of keyway		1.0	1.4	1.8	2.3	2.8	3.3	3.3	3.3	3.8	4.3	4.4	4.9	5.4

other bores on demand



The light-construction bevel gearboxes LMA are suitable for the most varied applications in general mechanical engineering and jigmaking.

Bevel gearbox LMA
- for general mechanical engineering
- lightweight series
- max. 1000 min^{-1}
- Lubrication: Semi-fluid grease (lifelong lubrication)

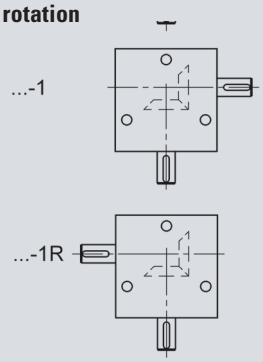
	LMA12		LMA24		LMA60		LMA120		LMA240	
n	P	M	P	M	P	M	P	M	P	M
1000	0.083	0.79	0.204	1.95	0.513	4.90	1.026	9.80	2.084	19.90
800	0.067	0.80	0.164	1.96	0.438	5.23	0.842	10.05	1.795	21.43
600	0.050	0.80	0.124	1.98	0.362	5.76	0.723	11.51	1.422	22.63
400	0.034	0.81	0.084	2.00	0.276	6.59	0.552	13.17	0.964	23.02
200	0.017	0.83	0.043	2.03	0.144	6.89	0.297	14.18	0.496	23.69
100	0.009	0.84	0.022	2.07	0.073	6.98	0.150	14.34	0.255	24.39
80	0.007	0.85	0.017	2.08	0.059	7.01	0.120	14.38	0.206	24.62
60	0.005	0.85	0.013	2.10	0.044	7.05	0.091	14.45	0.157	24.91
40	0.004	0.89	0.009	2.25	0.032	7.57	0.064	15.36	0.112	26.74
20	0.002	1.08	0.007	3.13	0.022	10.51	0.043	20.39	0.075	35.96
10	0.001	1.30	0.005	4.34	0.015	14.60	0.028	27.08	0.047	45.00

Basics:
n = drive rpm (min^{-1})
P = drive power (kW)
M = driving torque (Nm)

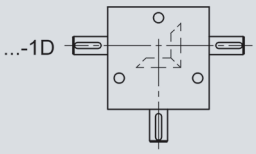
Life:
6000 h impact-free operation

Housing material
- Aluminium

Shaft according to direction of rotation

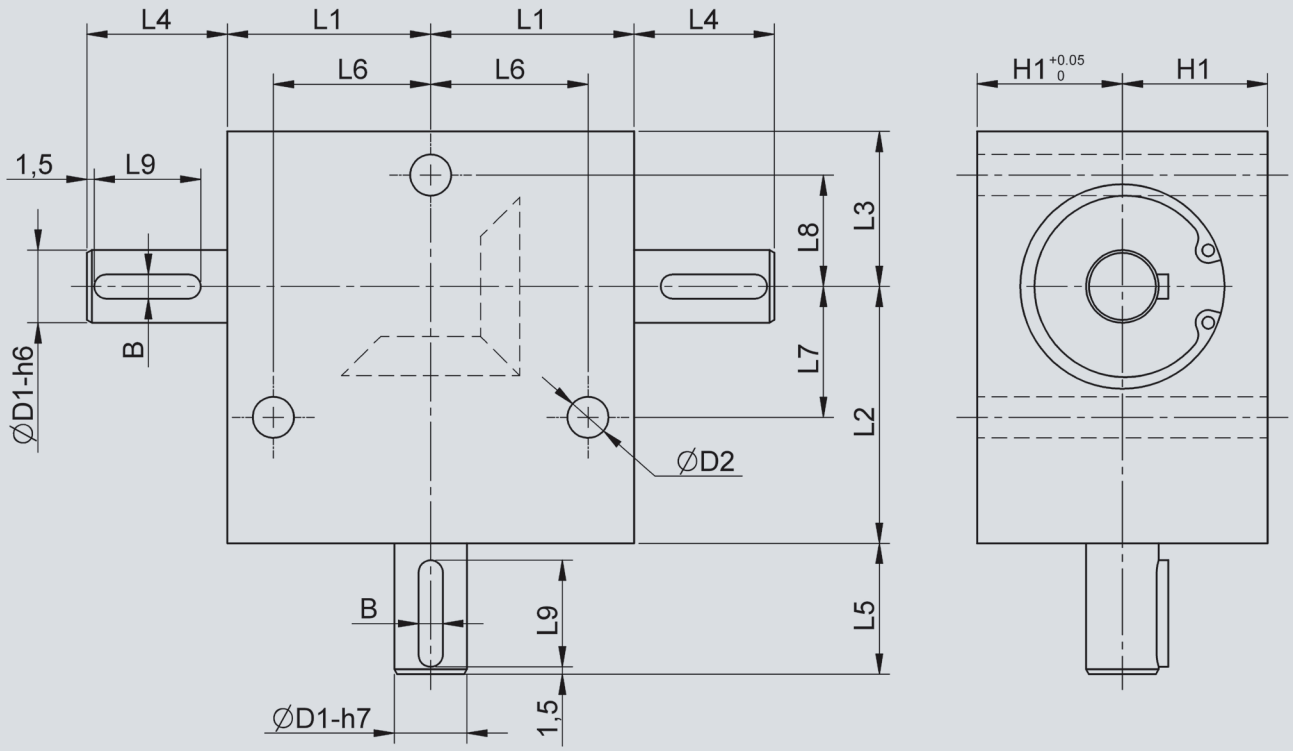


through shaft

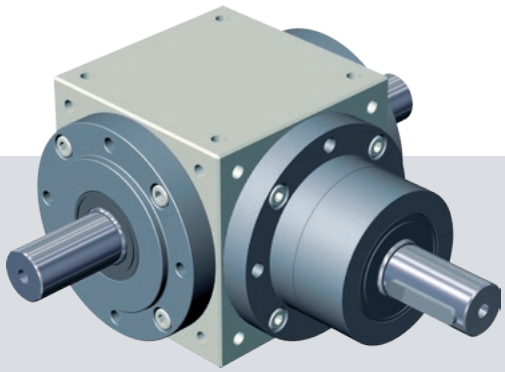


Ordering example

Type	Size	Ratio i	Continuous shaft
LMA	60	– 1	D



	i	B	D1	D2	H1	L1	L2	L3	L4	L5	L6	L7	L8	L9
LMA12–1	1:1	–	6	5.5	16	20	25.0	17.5	20	17	16.0	17	–	–
LMA12–1R	1:1	–	6	5.5	16	20	25.0	17.5	20	17	16.0	17	–	–
LMA12–1D	1:1	–	6	5.5	16	20	25.0	17.5	20	17	16.0	17	–	–
LMA24–1	1:1	2	8	7.0	21	29	37.0	22.0	17	16	23.0	20	–	12
LMA24–1R	1:1	2	8	7.0	21	29	37.0	22.0	17	16	23.0	20	–	12
LMA24–1D	1:1	2	8	7.0	21	29	37.0	22.0	17	16	23.0	20	–	12
LMA60–1	1:1	3	10	8.5	25	35	43.5	27.5	21	19	27.5	23	–	14
LMA60–1R	1:1	3	10	8.5	25	35	43.5	27.5	21	19	27.5	23	–	14
LMA60–1D	1:1	3	10	8.5	25	35	43.5	27.5	21	19	27.5	23	–	14
LMA120–1	1:1	5	15	8.5	30	42	53.0	32.0	29	27	32.5	27	23	22
LMA120–1R	1:1	5	15	8.5	30	42	53.0	32.0	29	27	32.5	27	23	22
LMA120–1D	1:1	5	15	8.5	30	42	53.0	32.0	29	27	32.5	27	23	22
LMA240–1	1:1	5	17	10.5	35	50	64.0	37.5	31	29	40.0	32	28	22
LMA240–1R	1:1	5	17	10.5	35	50	64.0	37.5	31	29	40.0	32	28	22
LMA240–1D	1:1	5	17	10.5	35	50	64.0	37.5	31	29	40.0	32	28	22



The RM gearboxes are made for higher demands, RM gearboxes have ratios up to 1:5 and transmit torques from 19 up to 430 Nm. Thanks to their consistent modular design, they allow a wide range of assembly and combination possibilities, for example in association with screw jacks of Nozag.

Quality features
- Quiet operation
- Maintenance-free, with minimum backlash
- High torques
- High operating period i.e. continuous operation
- High precision components
- Suited for high performance

Production characteristics
- GLEASON spiral toothed, hardened and lapped
- radial sealing generally with dust lip
- Lubrication: oil or low-viscosity grease
- Housing made of cast iron, low distortion and torsion proof
- Standard ratios 1:1 up to 1:5, others on demand
- Motor flange available for IEC-standard motors

	n1	i = 1 : 1		i = 1,5 : 1		i = 2 : 1		i = 3 : 1		i = 4 : 1		i = 5 : 1	
		P1 *	M2	P1 *	M2	P1*	M2	P1*	M2	P1 *	M2	P1 *	M2
RM12	2800	3.08	10.1			1.61	10.6	0.59	5.8				
	2000	2.30	10.6			1.19	10.9	0.46	6.3				
	1500	1.88	11.5			0.94	11.5	0.38	6.9				
	1000	1.36	12.5			0.68	12.5	0.27	7.5				
	800	1.17	13.4			0.59	13.4	0.23	8.1				
	600	0.94	14.4			0.47	14.4	0.19	8.6				
	400	0.67	15.4			0.34	15.4	0.13	8.9				
	100	0.18	16.8			0.09	16.7	0.03	9.4				
	50	0.10	18.2			0.05	18.2	0.02	9.8				
	10	0.02	19.2			0.01	19.2	0.01	10.1				
RM 19	2800	16.27	53.3	7.36	36.1	6.51	42.6	2.40	23.6	2.07	27.1	1.32	21.6
	2000	11.94	54.7	5.38	37.0	4.73	43.4	1.75	24.0	1.5	27.5	0.96	21.9
	1500	9.17	56.1	4.12	37.7	3.60	44.0	1.34	24.5	1.13	27.6	0.72	22.1
	1000	6.26	57.4	2.81	38.6	2.46	45.1	0.91	24.9	0.77	28.3	0.49	22.5
	800	5.07	58.1	2.27	39.0	1.99	45.7	0.73	25.1	0.62	28.5	0.39	22.6
	600	3.85	58.8	1.73	39.6	1.51	46.1	0.55	25.4	0.47	28.8	0.30	22.8
	400	2.62	60.0	1.16	40.0	1.02	46.7	0.37	25.8	0.32	29.0	0.20	22.9
	100	0.69	62.9	0.30	41.5	0.27	48.8	0.10	26.4	0.08	29.7	0.05	23.4
	50	0.35	63.7	0.15	42.0	0.13	49.3	0.05	26.6	0.04	29.9	0.03	23.6
	10	0.07	64.6	0.03	42.5	0.03	49.7	0.01	26.8	0.01	30.2	0.01	23.8
RM 24	2800	17.88	58.6	12.17	59.8	8.15	53.4	3.52	34.6	3.90	51.1	2.67	43.7
	2000	13.38	61.3	8.88	61.1	5.99	54.9	2.58	35.4	2.84	52.0	2.01	46.1
	1500	10.37	63.4	6.79	62.2	4.55	55.7	1.96	36.0	2.16	52.8	1.53	46.8
	1000	7.19	66.0	4.65	63.9	3.09	56.6	1.33	36.6	1.47	53.8	1.04	47.5
	800	5.86	67.2	3.75	64.5	2.50	57.2	1.08	37.2	1.18	54.1	0.84	48.0
	600	4.51	68.9	2.86	65.7	1.89	57.8	0.82	37.4	0.90	54.7	0.65	49.4
	400	3.08	70.6	1.94	66.7	1.28	58.6	0.55	38.0	0.60	55.3	0.44	49.9
	100	0.82	75.3	0.50	69.1	0.32	58.9	0.14	38.9	0.15	56.1	0.11	51.4
	50	0.42	77.0	0.25	70.0	0.16	59.1	0.07	39.0	0.08	57.0	0.06	51.8
	10	0.09	79.5	0.05	71.1	0.03	59.5	0.01	39.2	0.02	57.6	0.01	52.8

* If the bevel gearboxes are used only for one direction of rotation, the performance respectively the torque can be increased by 30%.

Gearbox range of performance

	n1	i = 1 : 1		i = 1,5 : 1		i = 2 : 1		i = 3 : 1		i = 4 : 1		i = 5 : 1	
		P1 *	M2	P1 *	M2	P1*	M2	P1*	M2	P1 *	M2	P1 *	M2
RM 32	2800	40.80	133.4	23.50	115.2	15.50	101.8	7.33	72.0	5.42	71.0	3.52	57.6
	2000	30.40	139.2	17.60	121.0	11.50	105.6	5.76	79.2	4.14	75.8	2.64	60.5
	1500	23.60	144.0	13.70	125.3	8.80	107.5	4.40	80.6	3.14	76.8	2.01	61.4
	1000	16.30	149.8	9.40	129.6	6.00	109.4	2.98	82.1	2.12	77.8	1.36	62.4
	800	13.30	152.6	7.80	133.9	4.90	111.4	2.43	83.5	1.72	78.7	1.11	63.4
	600	10.20	156.5	6.00	136.8	3.70	113.3	1.85	85.5	1.30	79.7	0.85	64.8
	400	7.00	160.3	4.10	141.1	2.5	115.2	1.26	86.4	0.88	80.6	0.57	65.8
	100	1.90	170.9	1.00	144.0	0.60	119.0	0.32	89.3	0.23	84.5	0.15	67.2
	50	0.90	174.7	0.50	146.9	0.30	122.9	0.16	90.7	0.12	96.4	0.07	68.2
	10	0.20	180.5	0.10	149.8	0.10	124.8	0.03	92.2	0.02	88.3	0.02	69.1
RM 38	2800	87.2	285.6	57.7	273.5	29.90	196	15.10	148.0	12.30	161.0	9.90	162.0
	2000	64.1	294.0	41.0	282.0	22.00	201	11.00	152.0	9.00	164.0	7.20	165.5
	1500	49.4	302.0	31.4	288.0	16.90	206	8.40	154.0	6.80	167.0	5.50	168.5
	1000	33.8	310.0	21.4	293.8	11.60	212	5.76	158.0	4.60	170.0	3.70	171.0
	800	27.6	316.5	17.4	300.0	9.40	215	4.66	160.0	3.70	171.0	3.00	173.0
	600	21.1	323.0	13.3	305.0	7.10	218	3.55	162.5	2.80	173.5	2.30	175.0
	400	14.5	331.0	9.0	311.0	4.80	222	2.40	165.0	1.90	176.5	1.50	176.5
	100	3.8	349.0	2.4	325.5	1.50	231	0.62	170.5	0.50	182.0	0.40	182.0
	50	1.9	355.5	1.2	332.5	0.60	234	0.31	172.0	0.25	183.5	0.20	184.0
	10	0.4	367.0	0.2	340.0	0.13	239	0.06	175.0	0.05	186.0	0.04	186.0
RM 42	2800	102.6	334.0	62.5	307.0	35.20	230	17.80	175.0	13.70	180.0	9.90	162.0
	2000	75.4	346.0	46.0	317.0	25.80	237	13.00	178.0	10.00	183.0	7.20	166.0
	1500	58.1	355.0	35.3	324.0	19.80	243	9.90	181.0	7.60	187.0	5.50	178.5
	1000	39.8	365.0	24.3	334.0	13.60	249	6.80	186.0	5.20	191.0	3.70	171.0
	800	32.5	372.0	19.7	339.0	11.00	253	5.50	188.0	4.20	193.0	3.00	173.0
	600	24.9	380.0	15.0	344.0	8.40	257	4.20	191.0	3.20	195.0	2.30	175.0
	400	17.0	390.0	10.3	353.0	5.70	261	2.80	194.0	2.20	198.0	1.50	177.0
	100	4.5	411.0	2.7	370.0	1.50	272	0.70	201.0	0.60	204.0	0.40	182.0
	50	2.3	420.0	1.4	376.0	0.70	278	0.37	203.0	0.25	206.0	0.20	184.0
	10	0.5	432.0	0.3	383.0	0.15	281	0.07	206.0	0.05	209.0	0.04	186.0
RM 55	1500	125.0	763.0	88.7	813.0	44.40	543	20.20	370.0	19.50	478.0	15.00	458.0
	1000	86.0	787.0	60.7	835.0	30.60	561	13.90	382.0	13.30	489.0	10.20	467.0
	800	70.0	800.0	49.4	850.0	23.80	568	11.30	386.0	10.80	495.0	8.20	472.0
	600	53.0	810.0	37.7	864.0	18.80	576	8.50	391.0	8.20	501.0	6.30	478.0
	400	36.6	840.0	26.0	893.0	12.90	591	5.80	398.0	5.60	509.0	4.20	484.0
	100	9.7	896.0	6.9	950.0	3.40	618	41.50	416.0	1.40	529.0	1.10	503.0
	50	5.0	912.0	3.5	972.0	1.70	632	0.80	421.0	0.70	534.0	0.60	508.0
	10	1.0	941.0	0.7	1000.0	0.35	643	0.16	428.0	0.15	543.0	0.10	515.0

* If the bevel gearboxes are used only for one direction of rotation, the performance respectively the torque can be increased by 30%.

Basics
Life: 20000 h
Impact-free operation (F = 1)
Operating time 8 h/day
Direction of rotation: clockwise an anticlockwise
Ambient temperature ca. 20 ° C

For different operating characteristics, please consult the correction factor on page 107

Abbreviations
n1 = drive rpm (min^{-1})
n2 = drive rpm (min^{-1}) (smaller rpm)
P1 = drive power (kW)
M2 = driving torque (Nm)
i = ratio (n^1/n^2)

Note: For continuous operation see page 108

Correction factors

for different operating characteristics

Operation time (correction factor H)

hrs/day	24	18	12	8	4	2	1
H	1.25	1.18	1.1	1.0	0.9	0.8	0.7

Required Life span (correction factor L)

h	60000	40000	20000	15000	10000	5000	3000
L	1.3	1.15	1	0.95	0.9	0.85	0.8

Load factor (correction factor F)

Load	Start ups / hour					
	non uniform	1	5	20	60	120
uniform	1	1	1.4	1.8	2.2	2.7
light shocks	1	1.4	1.8	2.2	2.7	3.2
large shocks	1	1.4	1.8	2.2	2.7	3.2

The corrected torque (Mk) can be determined when the appropriate factors are defined.

$$Mk = M \times (H \times L \times F)$$

at which:

M = theoretically calculated, respectively required torque
Mk = corrected torque basis for the choice of gearbox in the table

Correction factors

Temperature influence (for continuous operation)

In the following table the allowed input power (Pt) is apparent, in which continuous operation (ED 100%) and an ambient temperature of 20°C is not exceeded. A breather is recommended!

	RM 12	RM 19	RM 24	RM 32	RM 38	RM 42	RM 55
Input power Pt (kW)	1.5	3.0	6.0	10.0	15.0	20.0	35.0
n_1	2800	2800	2800	2800	2000	2000	1500

For different ambient temperatures and/or operating times, the following correction factors can be used:

Ambient temperature (correction factor T)

Temperature (°C)	– 10	0	10	20	30	40	50
T	1.3	1.25	1.15	1	0.9	0.8	0.7

Operation time (correction factor ED)

%-operating period	100	80	60	40	20
ED	1	1.2	1.4	1.6	1.8

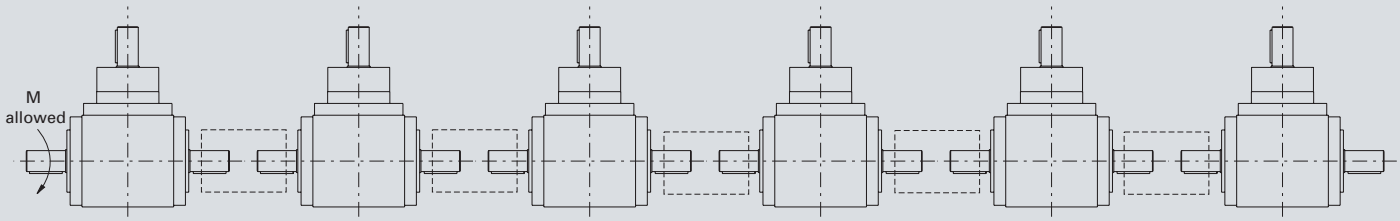
The allowed resulting input power (Pr) can now be calculated as follows:

$$Pr = Pt \times (T \times ED)$$

In case the total actual input power is higher than Pr, the gearbox has to be provided with an external cooling system. In this case, please contact Nozag engineering for advice.

Table values – Gear choice

Bevel gearboxes mounted in series



In this case, the trough torque is to be observed.

	RM 19	RM 24	RM 32	RM 38	RM 42	RM 55
M allowed (Nm)	60	120	300	500	700	1600

Note:
The allowed torque is only for the shaft and is not applicable to the bevel gearing (Toothing). Also the admissable keyed joint contact pressure (Coupling / Shaft) has to be checked.

For higher torque, bevel gearboxes with larger shaft diameter can be used (Version AP see page 116).

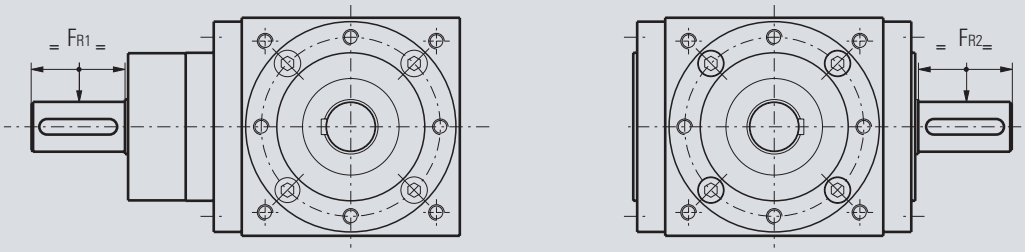
	RM 19 AP	RM 24 AP	RM 32 AP	RM 38 AP	RM 42 AP	RM 55 AP
M allowed (Nm)	120	300	500	700	1000	3000

Gearbox weight

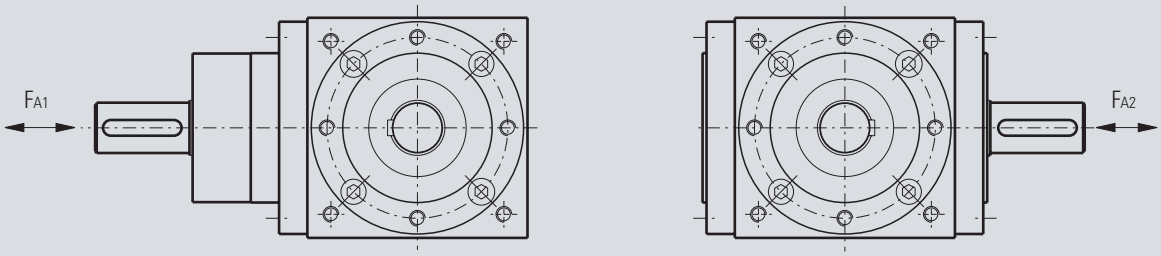
	RM 12	RM 19	RM 24	RM 32	RM 38	RM 42	RM 55
Weight (kg)	2.5	6	12	22	37	57	87

Table values – Gear choice

Permitted shaft loads

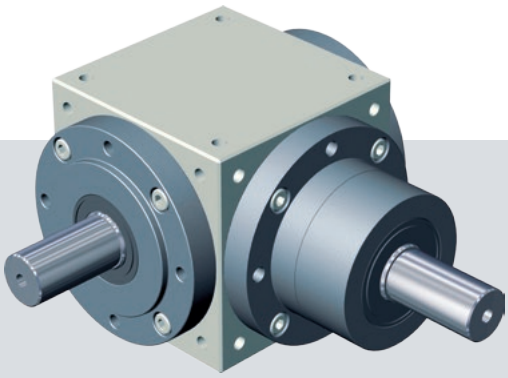


Force	Ratio	RM 12	RM 19	RM 24	RM 32	RM 38	RM 42	RM 55
F_{R1} (N)	1 : 1 2 : 1 3 : 1	550	850	1400	2000	4000	6000	10000
	4 : 1 5 : 1	–	600	850	1400	2000	4000	6000
F_{R2} (N)	All ratios	900	1500	2200	3500	7000	10000	15000



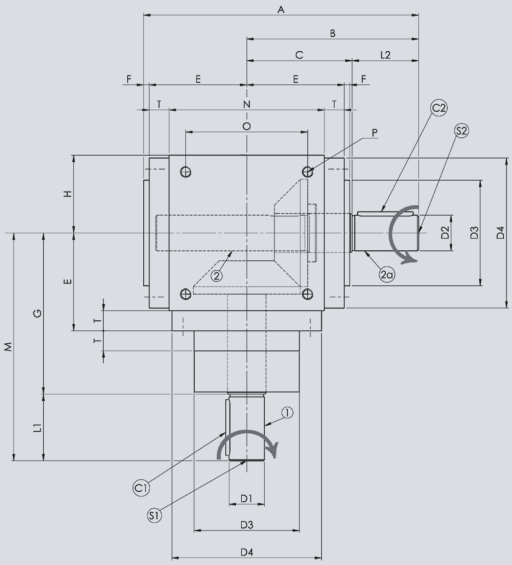
Force	Ratio	RM 12	RM 19	RM 24	RM 32	RM 38	RM 42	RM 55
F_{A1} (N)	1 : 1 2 : 1 3 : 1	300	450	700	1100	1700	2700	5000
	4 : 1 5 : 1	–	400	450	700	1100	1700	2700
F_{A2} (N)	All ratios	500	700	1300	1700	3400	4800	6800

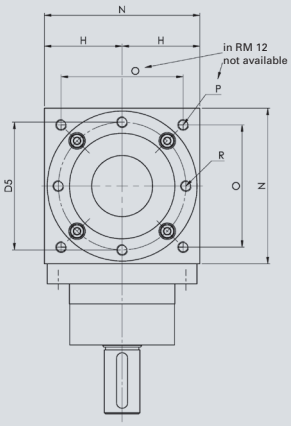
Gearboxes with hollow shaft (Type H) and larger pass through shafts (Version AP see page 116) on demand!



RM, shaft on one side

Entry sense of rotation contrary to output sense of rotation





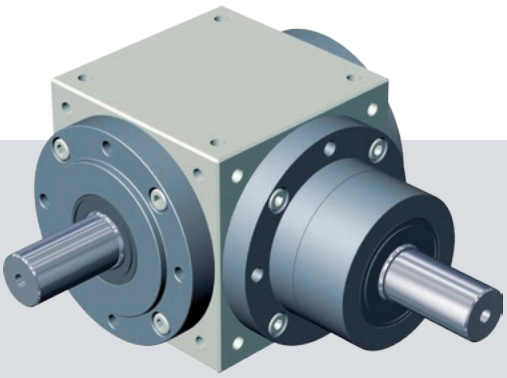
Ordering example

Type Size Ratio i = 1:1

RM 24 – 1

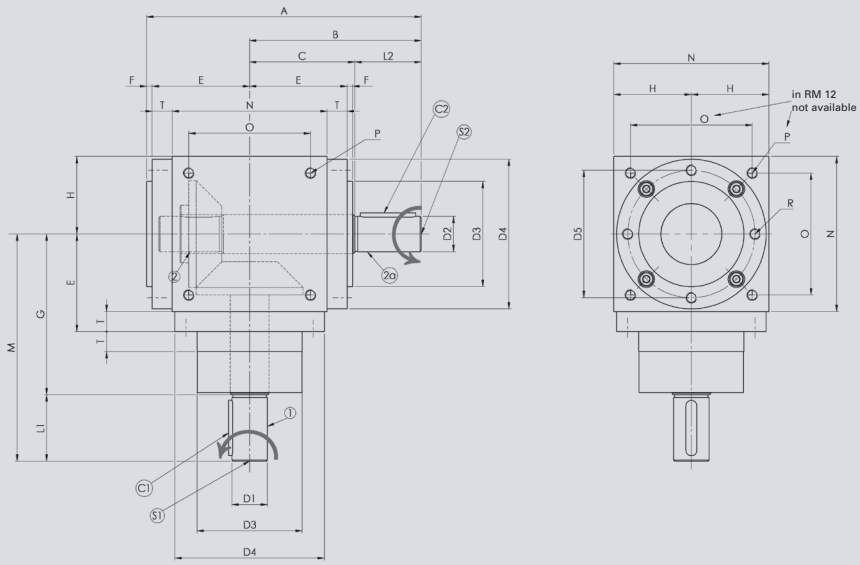
	:1	A	B	C	D1 j6	D2 j6	D3 h7	D4 h7	D5	E	F	G	H	L1	L2
RM 12	1, 2, 3	116	72	46	12	12	44	65	54	42	2	74	32,5	26	26
RM 19	1, 2, 3,	168	105	65	19	19	60	86	72	59	4	100	45,0	40	40
	4, 5				14									30	
RM 24	1, 2, 3,	208	130	80	24	24	70	105	88	73	5	115	55,0	50	50
	4, 5				19									40	
RM 32	1, 2, 3,	248	155	95	32	32	95	135	115	88	5	145	70,0	60	60
	4, 5				24									50	
RM 38	1, 2, 3,	288	180	110	38	38	120	165	145	103	5	170	85,0	70	70
	4, 5				28									60	
RM 42	1, 2, 3,	328	205	125	42	42	135	190	165	118	5	195	100	80	80
	4, 5				32									60	
RM 55	1, 2, 3,	408	260	150	55	55	170	230	205	143	5	245	120	110	110
	4, 5				42									80	

	:1	M	N	O	P	R	S1	S2	C1	C2	T
RM 12	1, 2, 3	100	65	45	M 6	M 6	M4 x 8	M 4 x 8	20 x 4 x 4	20 x 4 x 4	9,5
RM 19	1, 2, 3,	140	90	70	M 6	M 6	M 6 x 12	M 6 x 12	35 x 6 x 6	35 x 6 x 6	14
	4, 5	130					M 5 x 10		25 x 5 x 5	35 x 6 x 6	
RM 24	1, 2, 3,	165	110	88	M 8	M 8	M 8 x 16	M 8 x 16	40 x 8 x 7	40 x 8 x 7	18
	4, 5	155					M 6 x 12		35 x 6 x 6		
RM 32	1, 2, 3,	205	140	110	M 10	M 10	M 10 x 20	M 10 x 20	50 x 10 x 8	50 x 10 x 8	18
	4, 5	195					M 8 x 16		40 x 8 x 7		
RM 38	1, 2, 3,	240	170	136	M 12	M 12	M 12 x 24	M 12 x 24	60 x 10 x 8	60 x 10 x 8	18
	4, 5	230					M 10 x 20		50 x 8 x 7	60 x 10 x 8	
RM 42	1, 2, 3,	275	200	155	M 12	M 12	M 12 x 24	M 12 x 24	70 x 12 x 8	70 x 12 x 8	18
	4, 5	255					M 10 x 20		50 x 10 x 8		
RM 55	1, 2, 3,	355	240	190	M 14	M 14	M 14 x 28	M 14 x 28	100 x 16 x 10	100 x 16 x 10	23
	4, 5	325					M 12 x 24		70 x 12 x 8		



RM, shaft on one side

Entry sense of rotation same as output sense of rotation



Ordering example

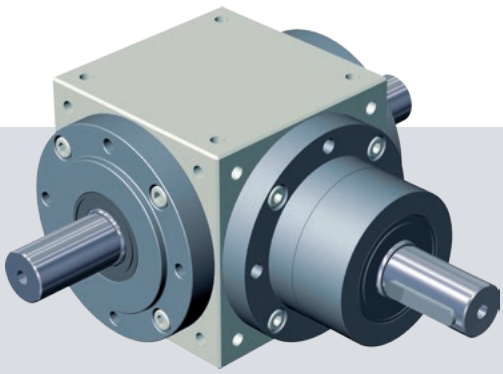
Type
Size
Ratio i = 1:1
Direction of rotation

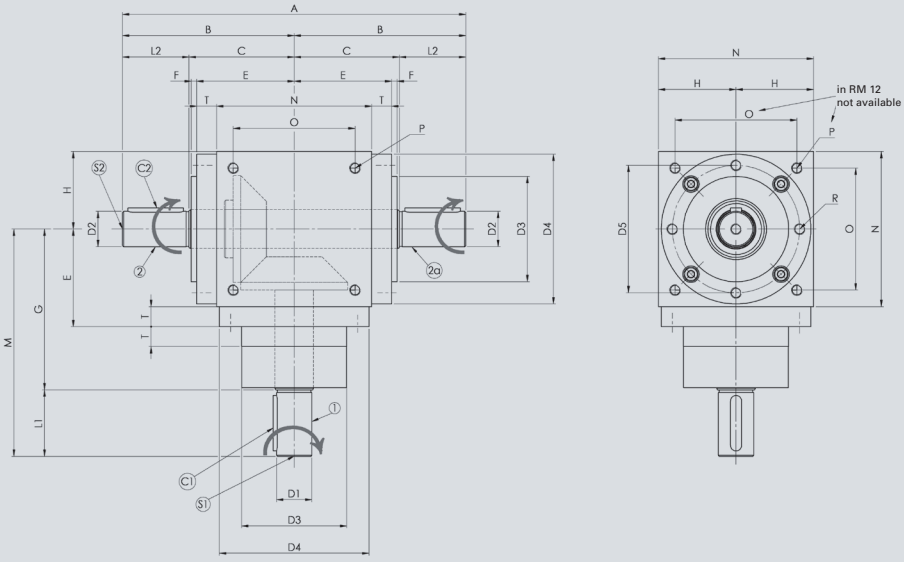
RM 19 – 1 R

	:1	A	B	C	D1 j6	D2 j6	D3 h7	D4 h7	D5	E	F	G	H	L1	L2
RM 12	1, 2, 3	116	72	46	12	12	44	65	54	42	2	74	32,5	26	26
RM 19	1, 2, 3,	168	105	65	19	19	60	86	72	59	4	100	45,0	40	40
	4, 5				14									30	
RM 24	1, 2, 3,	208	130	80	24	24	70	105	88	73	5	115	55,0	50	50
	4, 5				19									40	
RM 32	1, 2, 3,	248	155	95	32	32	95	135	115	88	5	145	70,0	60	60
	4, 5				24									50	
RM 38	1, 2, 3,	288	180	110	38	38	120	165	145	103	5	170	85,0	70	70
	4, 5				28									60	
RM 42	1, 2, 3,	328	205	125	42	42	135	190	165	118	5	195	100	80	80
	4, 5				32									60	
RM 55	1, 2, 3,	408	260	150	55	55	170	230	205	143	5	245	120	110	110
	4, 5				42									80	

	:1	M	N	O	P	R	S1	S2	C1	C2	T	G	H	L1	L2
RM 12	1, 2, 3	100	65	45	M 6	M 6	M4 x 8	M 4 x 8	20 x 4 x 4	20 x 4 x 4	9,5	74	32,5	26	26
RM 19	1, 2, 3,	140	90	70	M 6	M 6	M 6 x 12	M 6 x 12	35 x 6 x 6	35 x 6 x 6	14	100	45,0	40	40
	4, 5	130					M 5 x 10		25 x 5 x 5	35 x 6 x 6				30	
RM 24	1, 2, 3,	165	110	88	M 8	M 8	M 8 x 16	M 8 x 16	40 x 8 x 7	40 x 8 x 7	18	115	55,0	50	50
	4, 5	155					M 6 x 12		35 x 6 x 6					40	
RM 32	1, 2, 3,	205	140	110	M 10	M 10	M 10 x 20	M 10 x 20	50 x 10 x 8	50 x 10 x 8	18	145	70,0	60	60
	4, 5	195					M 8 x 16		40 x 8 x 7					50	
RM 38	1, 2, 3,	240	170	136	M 12	M 12	M 12 x 24	M 12 x 24	60 x 10 x 8	60 x 10 x 8	18	170	85,0	70	70
	4, 5	230					M 10 x 20		50 x 8 x 7	60 x 10 x 8				60	
RM 42	1, 2, 3,	275	200	155	M 12	M 12	M 12 x 24	M 12 x 24	70 x 12 x 8	70 x 12 x 8	18	195	100	80	80
	4, 5	255					M 10 x 20		50 x 10 x 8					60	
RM 55	1, 2, 3,	355	240	190	M 14	M 14	M 14 x 28	M 14 x 28	100 x 16 x 10	100 x 16 x 10	23	245	120	110	110
	4, 5	325					M 12 x 24		70 x 12 x 8					80	

RM, through shaft



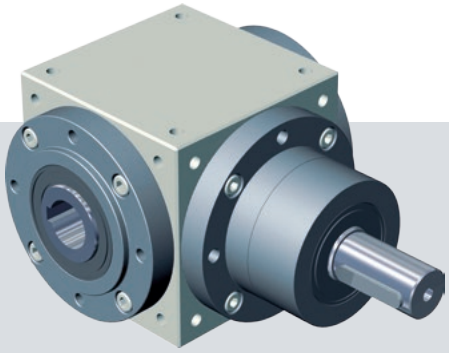


Ordering example

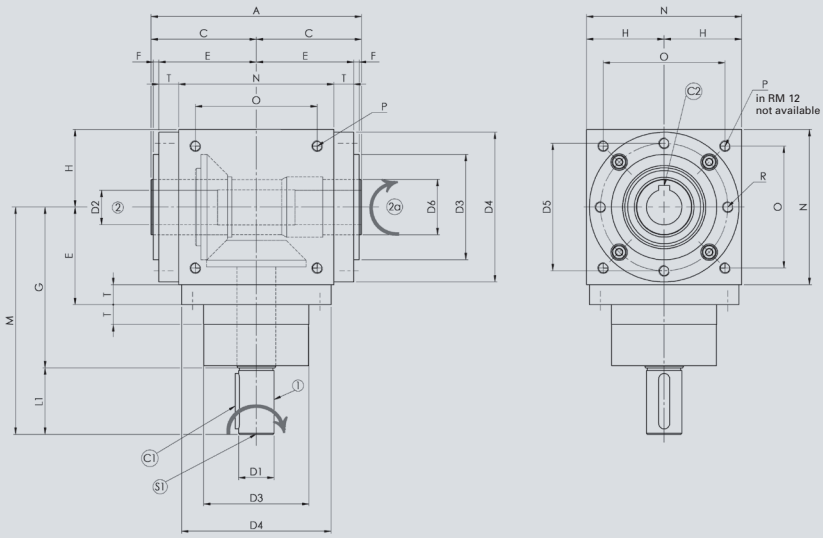
Type	Size	Ratio i = 2:1	through shaft
RM	12 –	2	D

	:1	A	B	C	D1 j6	D2 J6	D3 h7	D4 h7	D5	E	F	G	H	L1	L2
RM 12	1, 2, 3	144	72	46	12	12	44	65	54	42	2	74	32,5	26	26
RM 19	1, 2, 3,	210	105	65	19	19	60	86	72	59	4	100	45,0	40	40
	4, 5				14									30	
RM 24	1, 2, 3,	260	130	80	24	24	70	105	88	73	5	115	55,0	50	50
	4, 5				19									40	
RM 32	1, 2, 3,	310	155	95	32	32	95	135	115	88	5	145	70,0	60	60
	4, 5				24									50	
RM 38	1, 2, 3,	360	180	110	38	38	120	165	145	103	5	170	85,0	70	70
	4, 5				28									60	
RM 42	1, 2, 3,	410	205	125	42	42	135	190	165	118	5	195	100	80	80
	4, 5				32									60	
RM 55	1, 2, 3,	520	260	150	55	55	170	230	205	143	5	245	120	110	110
	4, 5				42									80	

	:1	M	N	O	P	R	S1	S2	C1	C2	T	G	H	L1	L2
RM 12	1, 2, 3	100	65	45	M 6	M 6	M 4 x 8	M 4 x 8	20 x 4 x 4	20 x 4 x 4	9,5	74	32,5	26	26
RM 19	1, 2, 3,	140	90	70	M 6	M 6	M 6 x 12	M 6 x 12	35 x 6 x 6	35 x 6 x 6	14	100	45,0	40	40
	4, 5	130					M 5 x 10		25 x 5 x 5	35 x 6 x 6				30	
RM 24	1, 2, 3,	165	110	88	M 8	M 8	M 8 x 16	M 8 x 16	40 x 8 x 7	40 x 8 x 7	18	115	55,0	50	50
	4, 5	155					M 6 x 12		35 x 6 x 6					40	
RM 32	1, 2, 3,	205	140	110	M 10	M 10	M 10 x 20	M 10 x 20	50 x 10 x 8	50 x 10 x 8	18	145	70,0	60	60
	4, 5	195					M 8 x 16		40 x 8 x 7					50	
RM 38	1, 2, 3,	240	170	136	M 12	M 12	M 12 x 24	M 12 x 24	60 x 10 x 8	60 x 10 x 8	18	170	85,0	70	70
	4, 5	230					M 10 x 20		50 x 8 x 7	60 x 10 x 8				60	
RM 42	1, 2, 3,	275	200	155	M 12	M 12	M 12 x 24	M 12 x 24	70 x 12 x 8	70 x 12 x 8	18	195	100	80	80
	4, 5	255					M 10 x 20		50 x 10 x 8					60	
RM 55	1, 2, 3,	355	240	190	M 14	M 14	M 14 x 28	M 14 x 28	100 x 16 x 10	100 x 16 x 10	23	245	120	110	110
	4, 5	325					M 12 x 24		70 x 12 x 8					80	



RM, hollow shaft



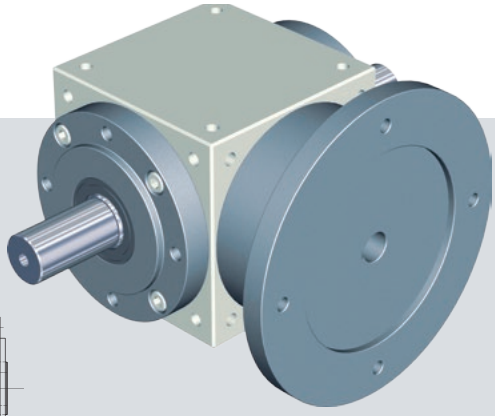
Ordering example

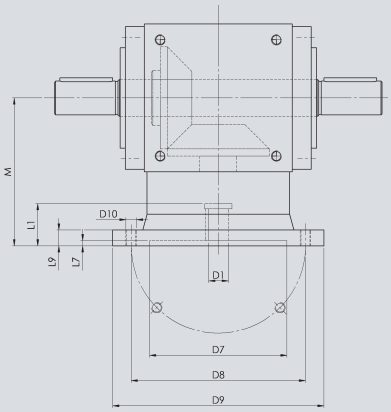
Type	Size	Ratio i = 2:1	Hollow shaft
RM	19	– 2	H

	:1	A	C	D1 J6	D2 j6	D3 h7	D4 h7	D5	D6	E	G	H	L1	L1	L2
RM 12	1	92	46	12	12	44	65	54	-	42	74	32,5	26	26	26
RM 19	1, 2, 3,	130	65	19	19	60	86	72	30	59	100	45,0	40	40	40
	4, 5			14									30	30	
RM 24	1, 2, 3,	160	80	24	24	70	105	88	35	73	115	55,0	50	50	50
	4, 5			19									40	40	
RM 32	1, 2, 3,	190	95	32	32	95	135	115	50	88	145	70,0	60	60	60
	4, 5			24									50	50	
RM 38	1, 2, 3,	220	110	38	38	120	165	145	60	103	170	85,0	70	70	70
	4, 5			28									60	60	
RM 42	1, 2, 3,	250	125	42	42	135	190	165	60	118	195	100	80	80	80
	4, 5			32									60	60	
RM 55	1, 2, 3,	300	150	55	55	170	230	205	75	143	245	120	110	110	110
	4, 5			42									80	80	

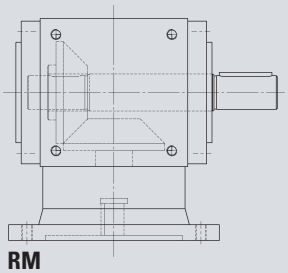
	:1	M	N	O	P	R	S1	S2	C1	C2	T	G	H	L1	L2
RM 12	1, 2, 3	100	65	45	M 6	M 6	M 4 x 8	M 4 x 8	20 x 4 x 4	20 x 4 x 4	9,5	74	32,5	26	26
RM 19	1, 2, 3,	140	90	70	M 6	M 6	M 6 x 12	M 6 x 12	35 x 6 x 6	35 x 6 x 6	14	100	45,0	40	40
	4, 5	130					M 5 x 10		25 x 5 x 5	35 x 6 x 6				30	
RM 24	1, 2, 3,	165	110	88	M 8	M 8	M 8 x 16	M 8 x 16	40 x 8 x 7	40 x 8 x 7	18	115	55,0	50	50
	4, 5	155					M 6 x 12		35 x 6 x 6					40	
RM 32	1, 2, 3,	205	140	110	M 10	M 10	M 10 x 20	M 10 x 20	50 x 10 x 8	50 x 10 x 8	18	145	70,0	60	60
	4, 5	195					M 8 x 16		40 x 8 x 7					50	
RM 38	1, 2, 3,	240	170	136	M 12	M 12	M 12 x 24	M 12 x 24	60 x 10 x 8	60 x 10 x 8	18	170	85,0	70	70
	4, 5	230					M 10 x 20		50 x 8 x 7	60 x 10 x 8				60	
RM 42	1, 2, 3,	275	200	155	M 12	M 12	M 12 x 24	M 12 x 24	70 x 12 x 8	70 x 12 x 8	18	195	100	80	80
	4, 5	255					M 10 x 20		50 x 10 x 8					60	
RM 55	1, 2, 3,	355	240	190	M 14	M 14	M 14 x 28	M 14 x 28	100 x 16 x 10	100 x 16 x 10	23	245	120	110	110
	4, 5	325					M 12 x 24		70 x 12 x 8					80	

RM, motor flange

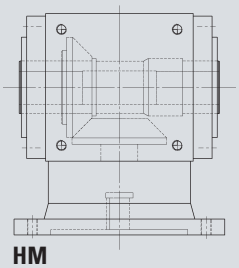




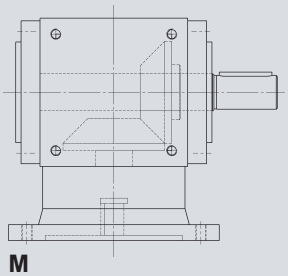
DM



RM



HM

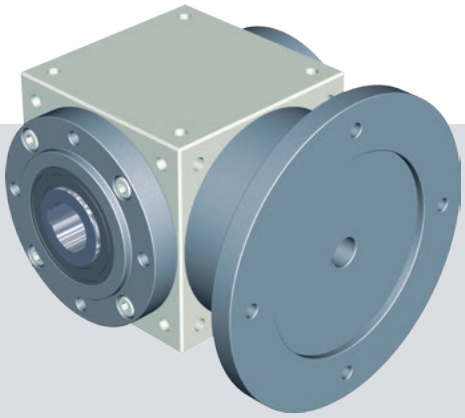


M

Ordering example

Type	Size	Ratio i = 1:1	Hollow shaft	Motor flange	IEC - Standard motor
RM	32	– 1	H	M	090

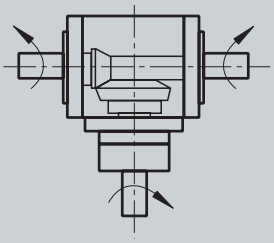
	:1	IEC-motor flange design B5	D1	D7	D8	D9	D10	L1	L7	L9	M
RM 12	1, 2, 3	63	11	95	115	140	Ø 9	26	4	10	90
	1, 2, 3	71–B14	14	70	85	105	Ø 9	35	4	10	90
RM 19	1, 2, 3,	63	11	95	115	140	M 8	23	4	12	90
	4, 5	71	14	110	130	160	M 8	30	4	12	90
RM 24	1, 2, 3	71	14	110	130	160	M 8	30	4	12	120
	1, 2, 3	80	19	130	165	200	M 10	40	5	12	120
	1, 2, 3	90	24	130	165	200	M 10	50	5	12	120
	4, 5	71	14	110	130	160	M 8	30	4	12	120
	4, 5	80	19	130	165	200	M 10	40	5	12	120
RM 32	1, 2, 3	80	19	130	165	200	M 10	40	5	15	140
	1, 2, 3	90	24	130	165	200	M 10	50	5	15	140
	1, 2, 3	112	28	180	215	250	M 12	60	5	15	140
	4, 5	80	19	130	165	200	M 10	40	5	15	140
	4, 5	90	24	130	165	200	M 10	50	5	15	140
RM 38	1, 2, 3	90	24	130	165	200	M 10	50	5	15	155
	1, 2, 3	112	28	180	215	250	M 12	60	5	15	155
	1, 2, 3	132	38	230	265	300	M 12	80	5	15	155
	4, 5	90	24	130	165	200	M 10	50	5	15	155
	4, 5	112	28	180	215	250	M 12	60	5	15	155
RM 42	1, 2	112	28	180	215	250	M 12	60	5	20	200
	1, 2	132	38	230	265	300	M 12	80	5	20	200
	1, 2	160	42	250	300	350	M 16	110	6	20	200
	3	112	28	180	215	250	M 12	60	5	20	200
	3	132	38	230	265	300	M 12	80	5	20	200
	4, 5	112	28	180	215	250	M 12	60	5	20	200
RM 55	1, 2, 3	112	28	180	215	250	M 12	60	5	20	220
	1, 2, 3	132	38	230	265	300	M 12	80	5	20	220
	1, 2, 3	160	42	250	300	350	M 16	110	6	20	220
	4, 5	112	28	180	215	250	M 12	60	5	20	220
	4, 5	132	38	230	265	300	M 12	80	5	20	220



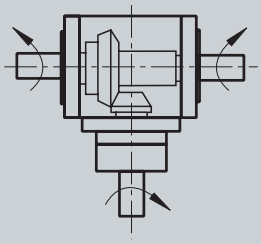
RM Special design

Gearbox setup (Geometry) modelled on the standard program

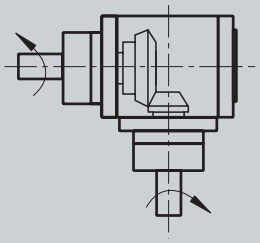
Torque:	10 ... 2077 Nm
Power:	max 125 kW
Shaft diameter:	12 ... 55 mm (types IO, DO and IC: 32 ... 55 mm) All types available with mounting flange for IEC Standard motors.



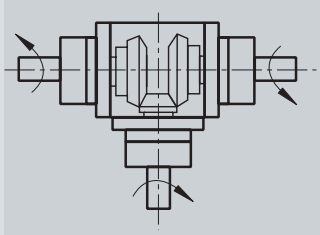
Design AX
1:1,5, 1:2



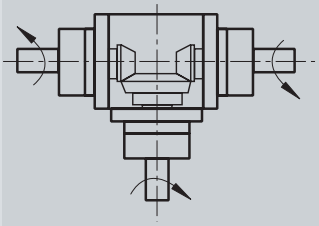
Design AP
1:1, 2:1, 3:1, 4:1, 5:1
larger shaft



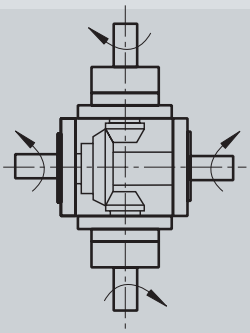
Design C
1:1, 2:1, 3:1, 4:1, 5:1



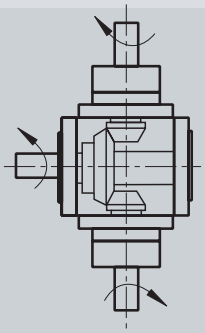
Design DR
1:1, 2:1, 3:1, 4:1, 5:1



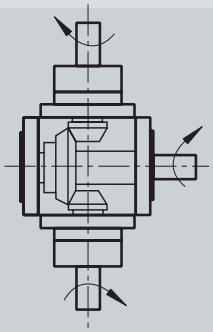
Design DX
1:1, 1:2, 1:3, 1:4, 1:5



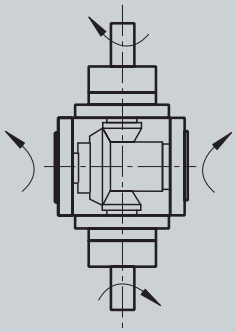
Design B
1:1, 2:1, 3:1, 4:1, 5:1



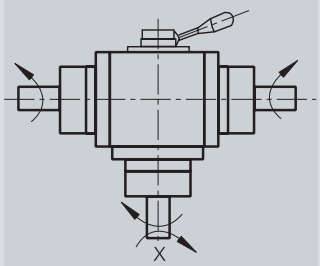
Design BD
1:1, 2:1, 3:1, 4:1, 5:1



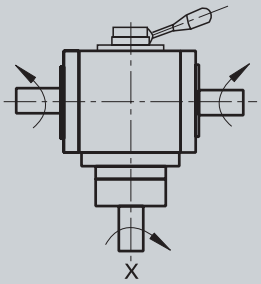
Design BS
1:1, 2:1, 3:1, 4:1, 5:1



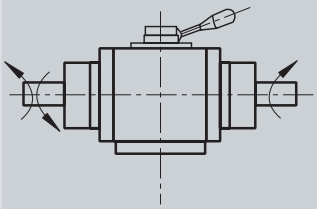
Design BH
1:1, 2:1, 3:1, 4:1, 5:1
Hollow shaft



Design IO
1:1, 2:1
Reversible, shaft «X»
changes sense of rotation



Design DO
1:1, 2:1, 3:1
Shiftable, shaft «X» can be
uncoupled



Design IC
1:1
Reversible, on request
with 90° – output shaft

5. Motor attachment

5. Motor attachment

Our screw jack kit makes it possible to install various motor sizes or types, including braking motors, matched according to the required lifting force, directly on the screw jack.

If there is not enough space for the brake on the motor side, the spring-loaded brake provides a solution. It is mounted on the free shaft end.

Properties/specifications

Rotational speeds
Three-phase motors have different rotational speeds, depending on the number of poles. Basically, we recommend that you should select our standard motor with 1400 min-1 (4-pole). Other numbers of poles can be provided for upon request.

Rotational speed (50 Hz)	Number of poles
2800	2
1400	4
900	6
700	8

Braking motor
To reduce the overrun of the system to a minimum, we recommend using a braking motor. In the case of gearboxes with a ball screw drive or 2-thread spindles, a brake is absolutely necessary. Brake motors are supplied as standard with high torque DC brake (ATDC). Supply 230VAC. Other supply voltages can be provided upon request.

Operation with frequency converter FU
Especially in the case of large gearboxes and systems, we recommend the use of a frequency converter to achieve a uniform starting and braking ramp. This minimises the acceleration load and increases the operating life of the system. When using a frequency converter, it must be remembered that with prolonged operation below 25 Hz, an external fan is necessary. This is important to ensure sufficient cooling of the motor. If you operate a braking motor with a frequency converter, provide the brake with a separate control lead through the FU. This protects the system and increases the life.

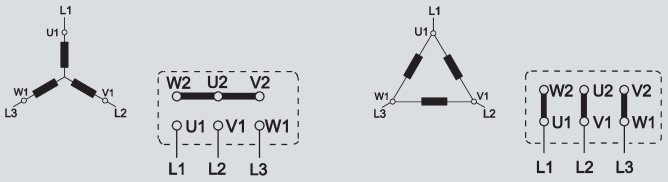
Cooling
The motors are surface-cooled (IC411).
Upon request, motors with external ventilation can be supplied.

Condensation water holes
The motors size 63 to 132 have condensation water holes. Depending on the installation position, condensation water holes are made at the deepest point of the A- or B bearing plate. These are plugged with lens-head screws. Before initial operation and during operation, the condensation water holes should be opened regularly and the condensated water drained.

Thermosensors (TF)
Other common designations: Thermistor, thermistor thermo-sensor, PTC-thermistor. The resistance of the thermo-sensor jumps up suddenly upon reaching the rated actuation temperature (NAT) to almost ten times the value, The thermistor thermo-sensor fulfils its protective function only if there is a triggering device connected. The 4-pole motors of size 80 to 132 have thermo-sensors built in factory made.

Circuit diagramm for three-phase motors
The standard version of the motors have 6 stator terminals. By using exchangeable bridges, the stator winding can be connected in star (Y) or delta (△). For direct switching on, the operating circuit of the motor can be both star (Y), as well as delta (△). The star/delta starting process is not suitable for lifting jack systems, since the full torque is required right from the start.

Star and delta connection for motors with one rotational speed



RAL/NCS
Two component acryl paint are weather-resistant and resistant to petrol and cleaners. Motors with special paint (paints according to RAL shade no. or NCS shade no. available upon request)

(TROP) tropical protection /(FEU)-moisture protection
When using motors in extreme climatic conditions (tropics), we recommend the tropical protection version (encapsulated terminal box, winding with additional impregnation).

When using motors in a humid environment, we recommend the version with humidity protection insulation.
- Terminal boxes encapsulated

Housing and bearing shields
The standard housing of the motors size 56 to 112 is of aluminium pressure casting (size 132 of cast iron).
Bearing shields and flanges of the series 56 to 80 are made of aluminium pressure castings. Bearing shields and flanges of the series 90 to 132 are made of cast iron.

Universal version (stator housing)
The motors sizes 80 to 112 have unscrewable feet. The motor feet are fastened with two Allen screws each to the motor housing. The feet can also be screwed on to the sides of the motors, so that the terminal box positioning is possible to the left or the right. The motor housings already have suitable threaded holes for this purpose.

Universal version (terminal box cable glands)
Motors size 63 to 132 have unscrewable terminal boxes, which can be rotated through 45°. Therefore, the position of the metric cable glands can be freely selected. The terminal box is designed in protection class IP 55. Metric ISO fine threads according to EN 50262 are provided.

Rotor
The rotor is encapsulated in cast aluminium. The rotor and the shaft are dynamically balanced with half keys according to DIN ISO 8821.

Fan and fan hood
The fans for the motors size 56 to 132 are of plastic. The fan hood for all motors is made of sheet steel. Caution in case of damage to the fan hood; this could cause the fan to touch it.

Operating conditions of the motor
The technical values and data in this catalogue are based on the following fundamentals:
1. Continuous operation (S1)
2. Frequency 50 Hz
3. Rated voltage in the case of 3ph motors 400V. ±10%
   1ph motors 230V. ±10%
4. Relative humidity up to 95%

Protection category
Unless otherwise specified, all motors are made with protection class IP 55 (IP…International Protection) (other protection classes can also be provided upon request).
Brake motors are delivered as safety class IP54, other safety classes on demand.

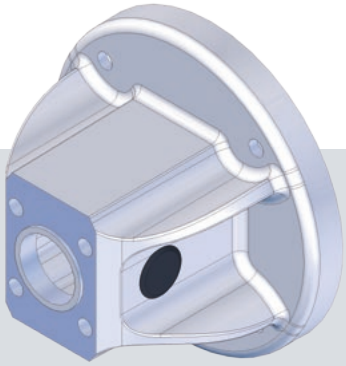
Insulation class
Unless otherwise specified, all motors are supplied with insulation class F. I.e. with an ambient temperature of 40°C, the permissible over-temperature in the winding is maximum 150°C. Insulation class H available upon request).

Options and special designs
The motors can also be built with the following options. Other special versions available upon request.

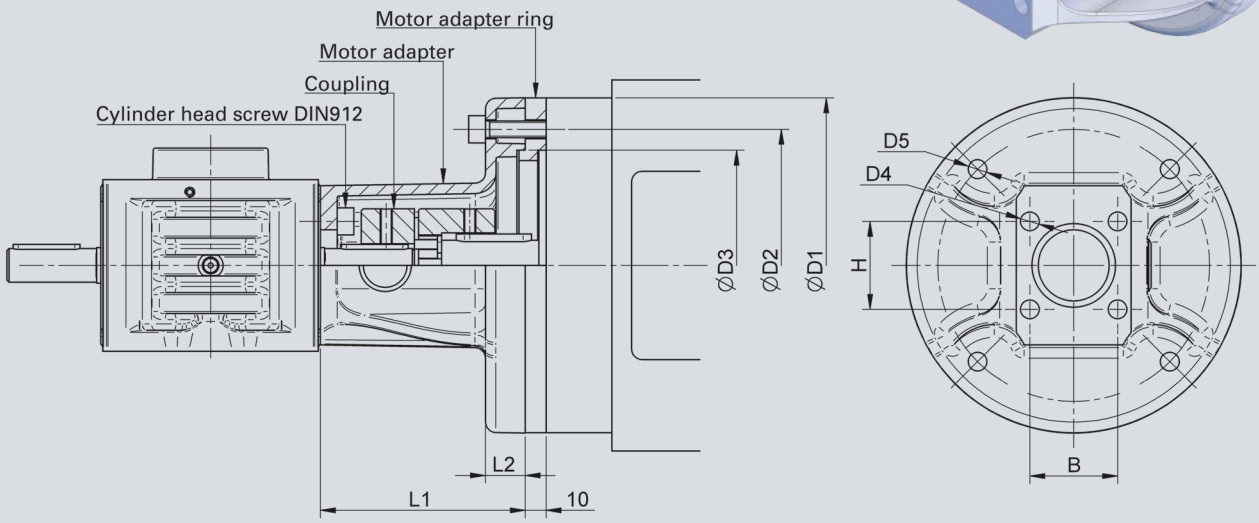
Abbre-viation	Description of the special version
2WE	2nd shaft end (shaft end according to IEC on both sides of the motor)
REDA	Rain roof (protection from foreign bodies falling into the fan)
TROP	Tropical protection version (use in extreme climatic conditions: Tropics)
FEU	Humidity protection version (terminal boxes encapsulated)
TF	Thermosensors (thermistor, thermistor thermo-sensors, PTC-thermistor)
TW	Thermo-monitor (thermo-openers, Klixon, bimetallic opener)
FREMD	External fan (in use with frequency converter, low rotational speeds)
INKR	Incremental transmitter (rotational speed feedback)
OL	Without fan (cooling to be taken care of by the user)
SPWE	Special shaft (special shafts in accordance with customer request, drawing)
BLIN	Without terminal box (stator with dummy cover)
KABE	Terminal box with cable (cable from terminal box onwards according to customer request)
STIL	Standstill heating (prevents moisture in the interior of the motor)
RAL	Motor in special paint (paint according to RAL colour shade no.)
NCS	Motor in special paint (paint according to NCS colour shade no.)
KKU	Motor terminal boxes (terminal box position universal)
KKR	Motor terminal box (terminal box position to the right of the drive side)
KKL	Motor terminal box (terminal box position to the left of the drive side)
S	Motor with special voltage (special voltage according to customer request)
MOFU	Motor with frequency converter (frequency converter placed on motor)
SCH	Motor data plate (special motor data plate according to customer request)

Ordering example

Size	Type 4-pole = 1400 min^{-1}	Power kW	Construction	Brake on request	Special design
90 –	L 4 –	1.5 –	B3 –	B –	___



Motor adapter



Apart from the requirement for a good, appealing design, simplicity and user-friendliness have played a significant role in this new development with a copyright design.
The motor adapter is made in such a way that simple fastening on the coupling used is possible.

Dimensions

	B	D1	D2	D3	D4	D5	H	L1	L2
NSE2-MOA120	28.3	120	100	80	5.5	6.6	28.3	59.0	5.5
NSE5-MOA140	32.5	140	115	95	6.6	9.0	32.5	65.0	12.0
NSE10-MOA160	35.4	160	130	110	9.0	9.0	35.4	70.5	17.0
NSE25-MOA160	42.0	160	130	110	9.0	9.0	42.0	98.0	19.0
NSE50-MOA200	50.0	200	165	130	11.0	11.0	70.0	110.5	23.5
NSE100-MOA200	46.0	200	165	130	13.0	11.0	96.0	142.0	25.0

System overview

Screw jack size	Motor				NSE			Motor adapter				Motor adapter ring	Coupling		Fixing	
	Motor size Motor flange	Power	Torque	Shaft diameter	Shaft diameter	Key width	Shaft length	Outside Ø	Inside Ø	Screw hole circle Ø	Length		Coupling	Insert*	Screw for gearbox	Screw for motor
2	56 B5	0.12	0.82	9	9	3	18	120	80	100	59.0		050	SOX	IS M5/10	IS M6/25 with 2 washer and nut
	63 B14-1	0.25	1.70	11	11	4	22	120	80	100	59.0		050	SOX	IS M5/10	IS M6/15 with washer
5	63 B5	0.25	1.70	11	11	4	22	140	95	115	65.0		050	SOX	IS M6/12	IS M8/35 with 2 washer and nut
	71 B14-1	0.55	3.75	14	11	4	22	140	95	115	65.0		070	SOX	IS M6/12	IS M8/25 with washer
10	71 B5	0.55	3.75	14	14	5	25	160	110	130	70.5		070	SOX	IS M8/14	IS M8/40 with 2 washer and nut
	80 B14-1	1.10	10.4	19	14	5	25	160	110	130	70.5	yes	070	HYTREL	IS M8/14	IS M8/30 with washer
25	71 B5	0.55	3.75	14	16	5	43	160	110	130	98.0		095	SOX	IS M8/18	IS M8/40 with 2 washer and nut
	80 B14-1	1.10	10.40	19	16	5	43	160	110	130	98.0		070	HYTREL	IS M8/18	IS M8/35 with washer
	90 B14-1	2.20	15.20	24	16	5	43	160	110	130	98.0	yes	095	HYTREL	IS M8/18	IS M8/35 with washer
50	90 B5	2.20	15.20	24	20	6	45	200	130	165	110.5		095	HYTREL	IS M10/22	IS M10/50 with 2 washer and nut
	100 B14-1	4.00	27.00	28	20	6	45	200	130	165	110.5	yes	095	HYTREL	IS M10/22	IS M10/40 with washer
	112 B14-1	5.50	37.00	28	20	6	45	200	130	165	110.5	yes	100	SOX	IS M10/22	IS M10/40 with washer
100	90 B5	2.20	15.20	24	25	8	57	200	130	165	142.0		100	SOX	IS M12/30	IS M10/50 with 2 washer and nut
	100 B14-1	4.00	27.00	28	25	8	57	200	130	165	142.0		095	HYTREL	IS M12/30	IS M10/40 with washer
	112 B14-1	5.50	37.00	28	25	8	57	200	130	165	142.0		100	SOX	IS M12/30	IS M10/40 with washer

IS = Hexagon socket screw DIN912

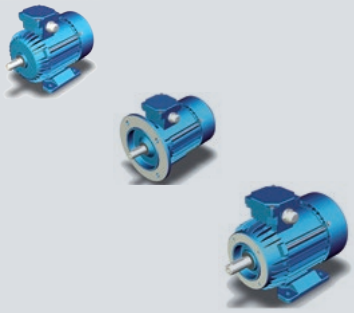
* 92 = Urethan insert 92 Shore A (with/yellow)/98 = Urethan insert 98 Shore A (red)

Flexible couplings on Chapter 4

Motor output

motor output and revolutions (r.p.m) for IEC sizes

Motor by IEC	Type	1400 min^{-1} kW	IE Norm	900 min^{-1} kW	IE Norm	700 min^{-1} kW	IE Norm
56	A	0.06	1				
56	B	0.09	1				
56	XC	0.12	1				
63	A	0.12	1	0.09	1		
63	B	0.18	1	0.12	1		
63	XC	0.25	1	0.15	1		
71	A	0.25	1	0.18	1	0.09	1
71	B	0.37	1	0.25	1	0.12	1
71	XC	0.55	1	0.37	1		
80	A	0.55	1	0.37	1	0.18	1
80	B	0.75	2	0.55	1	0.25	1
80	XC	1.10	2	0.75	2		
90	S	1.10	2	0.75	2	0.37	1
90	L	1.50	2	1.10	2	0.55	1
100	LA	2.20	2			0.75	1
100	LB	3.00	2	1.50	2	1.10	1
112	M	4.00	2	2.20	2	1.50	1
112	MA	5.50	2	3.00	2		
132	S	5.50	2	3.00	2	2.20	1
132	M	7.50	3	4.00	2	3.00	1
132	MA	9.20	2	5.50	2		

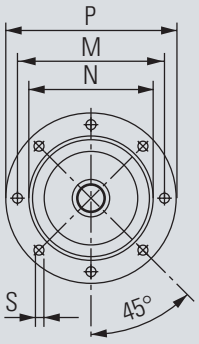


Motor flange

Dimensions of flange models

IEC	B5					B14 -1					B14 -2			
Motor	P	M	N	Sø	Z	P	M	N	S	Z	P	M	N	S
56	120	100	80	6.6	4	105	85	70	M6	4	80	65	50	M5
63	140	115	95	9.0	8	120	100	80	M6	8	90	75	60	M5
71	160	130	110	9.0	8	140	115	95	M8	8	105	85	70	M6
80	200	165	130	11	8	160	130	110	M8	8	120	100	80	M6
90	200	165	130	11	8	160	130	110	M8	8	140	115	95	M8
100	250	215	180	14	8	200	165	130	M10	8	160	130	110	M8
112	250	215	180	14	8	200	165	130	M10	8	160	130	110	M8
132	300	265	230	14	8	250	215	180	M12	8	200	165	130	M10

Flange 63-132

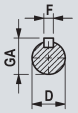


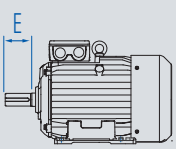
Motor shaft

Dimensions of shaft model

IEC Motor	Poles	D ømm	E mm	GA mm	F mm
56	2-6	9	20	10.2	3
63	2-8	11	23	12.5	4
71	2-8	14	30	16.0	5
80	2-8	19	40	21.5	6
90	2-8	24	50	27.0	8
100	2-8	28	60	31.0	8
112	2-8	28	60	31.0	8
132	2-8	38	80	41.0	10

Shaft 56-132





Motors

IEC	Type	Poles	Power rating (KW)	Model	Brake	Options
56	**A**	**2** 2800 min^{-1}	0.06	**B3** Foot	B	**2WE** 2nd shaft end
63	**B**	**4** 1400 min^{-1}	11.00	**B5** Flange	–	**REDA** rain roof
71	**X**	**6** 900 min^{-1}		**B14-1** Flange		**TROP** Tropical protection (IP54)
80	**B**	**8** 750 min^{-1}		**B14-2** Flange		**FEU** Humidity protection
90	**L**					**TF** Thermosensor
100	**LB**					**TW** Thermomonitor
112	**M**					**FREMD** External fan
132	**S**					**INKR** Incremental transmitter
	M					**OL** without fan
	MA					**SPWE** Special shaft
						BLIN without terminal box
						KABE Terminal box with cable
						STIL Standstill heating
						RAL motor with special paint
						NCS motor with special paint
						KKU Motor terminal box universal
						KKR Motor terminal box right
						KKL Motor terminal box left
						S Motor with special voltage
						MOFU Motor with frequency converter
						SCH motor data plate

Three-phase motors 1400 min^{-1}

3Ph motor IEC 60034.30 400 Volt +/- 10 % IP55 Isol.Cl. F Serv. S1

IEC	Type	kW	min^{-1}	Nm	V	Ina	W	kg	ø WE	L We	K.K	IE Norm
56	A 4	0.06	1400	0.41	230/400	0.25	55.0	2.6	9	20	o	1
56	B 4	0.09	1400	0.61	230/400	0.40	61.0	2.8	9	20	o	1
56	XC 4	0.12	1400	0.82	230/400	0.50	59.0	4.0	9	20	o	1
63	A 4	0.12	1380	0.83	230/400	0.45	60.0	3.5	11	23	o	1
63	B 4	0.18	1380	1.25	230/400	0.65	65.0	4.2	11	23	o	1
63	XC 4	0.25	1400	1.70	230/400	0.77	69.0	5.0	11	23	o	1
71	A 4	0.25	1380	1.73	230/400	0.85	66.0	4.8	14	30	o	1
71	B 4	0.37	1370	2.59	230/400	1.30	68.0	5.9	14	30	o	1
71	XC 4	0.55	1400	3.86	230/400	1.54	70.0	7.2	14	30	o	1
80	A 4	0.55	1400	3.75	230/400	1.70	72.0	7.5	19	40	u	1
80	B 4	0.75	1400	5.12	230/400	2.20	80.0	9.6	19	40	u	2
80	XC 4	1.10	1380	7.61	230/400	3.00	81.4	11.5	19	40	u	2
90	S 4	1.10	1425	7.62	230/400	2.60	81.4	16.3	24	50	u	2
90	L 4	1.50	1425	10.10	230/400	3.40	82.8	18.0	24	50	u	2
100	LA 4	2.20	1440	14.60	230/400	4.50	84.7	25.5	28	60	u	2
100	LB 4	3.00	1445	19.80	400/690	6.80	85.5	27.5	28	60	u	2
112	M 4	4.00	1550	26.30	400/690	8.40	87.0	35.5	28	60	u	2
112	MA 4	5.50	1440	36.50	400/690	11.50	87.7	39.0	28	60	u	2
132	S 4	5.50	1460	36.00	400/690	11.30	88.0	69.0	38	80	o	2
132	M 4	7.50	1460	49.10	400/690	15.30	88.7	73.5	38	80	o	3

Approximate values, exact data sheets on request.

Three-phase motors 900 min^{-1}

3Ph motor IEC 60034.30 400 Volt +/- 10 % IP55 Isol.Cl. F Serv. S1

IEC	Type	kW	min^{-1}	Nm	V	Ina	W	kg	ø WE	L We	K.K	IE Norm
63	B 6	0.12	880	1.30	230/400	0.65	50.0	4.2	11	23	o	1
63	XC 6	0.15	870	1.65	230/400	1.00	45.0	5.1	11	23	o	1
71	A 6	0.18	890	1.93	230/400	0.75	57.0	4.8	14	30	o	1
71	B 6	0.25	860	2.78	230/400	1.00	55.0	5.8	14	30	o	1
71	XC 6	0.37	880	4.02	230/400	1.35	60.0	7.3	14	30	o	1
80	A 6	0.37	910	3.88	230/400	1.40	64.0	7.4	19	40	u	1
80	B 6	0.55	900	5.84	230/400	1.80	67.0	8.6	19	40	u	1
80	XC 6	0.75	920	7.80	230/400	2.25	75.9	7.3	19	40	u	2
90	S 6	0.75	925	7.70	230/400	2.00	75.9	16.5	24	50	u	2
90	L 6	1.10	910	11.50	230/400	2.90	78.1	18.2	24	50	u	2
100	L 6	1.50	950	15.10	230/400	3.70	80.3	22.0	28	60	u	2
112	M 6	2.20	955	22.00	230/400	5.10	82.3	32.0	28	60	u	2
132	S 6	3.00	945	30.30	400/690	6.60	83.3	50.0	38	80	o	2
132	MA 6	4.00	950	40.20	400/690	8.40	84.6	62.0	38	80	o	2
132	MB 6	5.50	950	55.30	400/690	11.70	86.0	72.0	38	80	o	2

Approximate values, exact data sheets on request.

- Nm — Nominal torque in Nm
- V — Voltage
- Ina — Nominal current in A
- W — Efficiency in %
- kg — Weight on bases B3 (foot version)
- Ø WE — IEC-Shaft diameter
- L WE — IEC-Shaft length
- K.K — Terminal box o > above
  Terminal box u > universal (above, right, left)

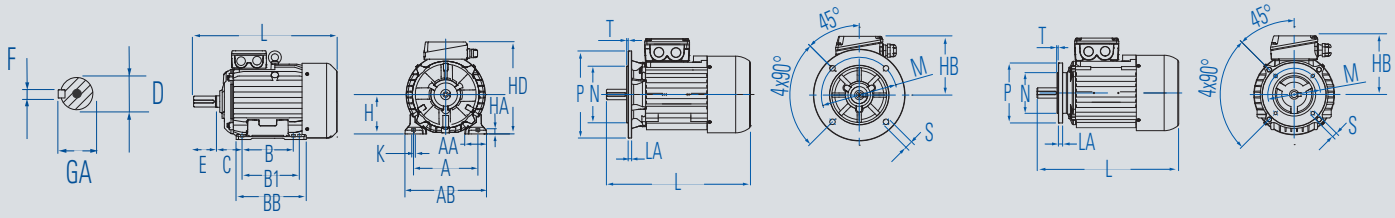
Three-phase motors 700 min^{-1}

3Ph motor IEC 60034.30 400 Volt +/- 10 % IP55 Isol.Cl. F Serv. S1

IEC	Type	kW	min^{-1}	Nm	V	Ina	W	kg	ø WE	L We	K.K	IE Norm
63	B 8	0.06	670	0.85	230/400	0.45	38.0	4.2	11	23	o	1
71	A 8	0.09	680	1.26	230/400	0.75	35.0	4.9	14	30	o	1
71	B 8	0.12	670	1.71	230/400	0.70	47.0	5.8	14	30	o	1
71	XC 8	0.18	680	2.53	230/400	1.40	45.0	7.3	14	30	o	1
80	A 8	0.18	680	2.53	230/400	0.90	53.0	7.5	19	40	u	1
80	B 8	0.25	680	3.51	230/400	1.20	57.0	8.9	19	40	u	1
80	XC 8	0.37	680	5.20	230/400	1.70	58.0	11.0	19	40	u	1
90	S 8	0.37	695	5.10	230/400	1.40	63.4	13.4	24	50	u	1
90	L 8	0.55	675	7.80	230/400	1.90	65.0	15.3	24	50	u	1
100	LA 8	0.75	710	10.10	230/400	2.30	71.1	23.6	28	60	u	1
100	LB 8	1.10	705	14.90	230/400	3.40	72.2	26.3	28	60	u	1
112	M 8	1.50	720	19.90	230/400	4.00	76.8	31.0	28	60	u	1
132	S 8	2.20	710	29.60	230/400	5.50	78.0	53.0	38	80	o	1
132	M 8	3.00	710	40.40	230/400	7.30	80.0	65.0	38	80	o	1

Approximate values, exact data sheets on request.

Dimensions of 3-phase motor from sizes 56 -132



IEC	Type	Pols	Base*								Housing*			Shaft					Flange B5					Flange B14-1					Flange B14-2				
			H	B	A	HA	BB	AB	K	AA	L	HD	C	D	E	GA	F	LA	P	N	M	T	S	P	N	M	T	S	P	N	M	T	S
56	A	2-4	56	71	90	7	92	110	8	30	188	154	36	9	20	10.2	3	8	120	80	100	3.0	7	105	70	85	2.5	M6	80	65	50	2.5	M5
56	B	2-4	56	71	90	7	92	110	8	30	196	154	36	9	20	10.2	3	8	120	80	100	3.0	7	105	70	85	2.5	M6	80	65	50	2.5	M5
63	A	2-8	63	80	100	8	106	124	7	36	201	165	40	11	23	12.5	4	9	140	95	115	3.0	10	120	80	100	3.0	M6	90	60	75	2.5	M5
63	B	2-8	63	80	100	8	106	124	7	36	213	165	40	11	23	12.5	4	9	140	95	115	3.0	10	120	80	100	3.0	M6	90	60	75	2.5	M5
63	XC	2-8	63	80	100	8	106	124	7	36	228	165	40	11	23	12.5	4	9	140	95	115	3.0	10	120	80	100	3.0	M6	90	60	75	2.5	M5
71	A	2-8	71	90	112	8	116	142	7	45	223	182	45	14	30	16.0	5	9	160	110	130	3.5	10	140	95	115	3.5	M8	105	70	85	3.0	M6
71	B	2-8	71	90	112	8	116	142	7	45	245	182	45	14	30	16.0	5	9	160	110	130	3.5	10	140	95	115	3.5	M8	105	70	85	3.0	M6
71	XC	2-8	71	90	112	8	116	142	7	45	266	200	45	14	30	16.0	5	9	160	110	130	3.5	10	140	95	115	3.5	M8	105	70	85	3.0	M6
80	A	2-8	80	100	125	9	130	160	10	55	266	200	50	19	40	21.5	6	10	200	130	165	3.5	12	160	110	130	3.5	M8	120	80	100	3.0	M6
80	B	2-8	80	100	125	9	130	160	10	55	278	200	50	19	40	21.5	6	10	200	130	165	3.5	12	160	110	130	3.5	M8	120	80	100	3.0	M6
80	XC	2-6	80	100	125	9	130	160	10	55	306	200	50	19	40	21.5	6	10	200	130	165	3.5	12	160	110	130	3.5	M8	120	80	100	3.0	M6
90	S	2-8	90	100	140	12	153	170	10	41	331	228	56	24	50	27.0	8	10	200	130	165	3.5	12	160	110	130	3.5	M8	140	95	115	3.0	M8
90	L	2-8	90	125	140	12	153	170	10	41	356	228	56	24	50	27.0	8	10	200	130	165	3.5	12	160	110	130	3.5	M8	140	95	115	3.0	M8
100	LA	2-8	100	140	160	14	174	197	12	44	440	240	63	28	60	31.0	8	11	250	180	215	4.0	15	200	130	165	3.5	M10	160	110	130	3.5	M8
100	LB	2-8	100	140	160	14	174	197	12	44	440	240	63	28	60	31.0	8	11	250	180	215	4.0	15	200	130	165	3.5	M10	160	110	130	3.5	M8
112	M	2-8	112	140	190	14	174	230	12	49	416	276	70	28	60	31.0	8	12	250	180	215	4.0	15	200	130	165	3.5	M10	160	110	130	3.5	M8
112	MA	2-6	112	140	190	14	174	230	12	49	466	276	70	28	60	31.0	8	12	250	180	215	4.0	15	200	130	165	3.5	M10	160	110	130	3.5	M8
132	S	2-8	132	140	216	16	220	274	12	62	499	310	89	38	80	41.0	10	12	300	230	265	4.0	15	250	180	215	4.0	M12	200	130	165	3.5	M10
132	M	2-8	132	178	216	16	220	274	12	62	531	310	89	38	80	41.0	10	12	300	230	265	4.0	15	250	180	215	4.0	M12	200	130	165	3.5	M10
132	MA	2-4	132	178	216	16	220	274	12	62	531	310	89	38	80	41.0	10	12	300	230	265	4.0	15	250	180	215	4.0	M12	200	130	165	3.5	M10

* Subject to change without notice, exact dimension sheets on request.

Three-phase motors 1400 min^{-1}

3Ph Brake motor IEC 60034.30 400 Volt +/- 10 % IP54 Isol.Cl. F Serv. S1

IEC	Type	kW	min^{-1}	Nm	V	Ina	W	kg	ø WE	L We	DC brake Nm
63	A 4	0.12	1355	0.92	230/400	0.40	64.7	8.5	11	23	4.5
63	B 4	0.18	1393	1.23	230/400	0.56	68.2	8.7	11	23	4.5
63	C 4	0.25	1380	1.73	230/400	0.72	71.0	9.7	11	23	4.5
71	A 4	0.25	1400	1.71	230/400	0.69	72.7	11.0	14	30	8.0
71	B 4	0.37	1366	2.59	230/400	1.04	71.5	11.3	14	30	8.0
71	C 4	0.55	1400	3.75	230/400	1.47	74.9	12.3	14	30	8.0
80	A 4	0.55	1391	3.78	230/400	1.49	75.0	15.5	19	40	12.5
80	B 4	0.75	1394	5.14	230/400	1.99	79.6	16.5	19	40	12.5
80	C 4	1.10	1390	7.56	230/400	2.85	81.5	18.0	19	40	12.5
90	S 4	1.10	1378	7.62	230/400	2.50	81.4	19.0	24	50	20.0
90	L 4	1.50	1413	10.10	230/400	3.54	82.9	20.0	24	50	20.0
90	LB 4	1.90	1415	12.80	230/400	4.47	84.3	22.0	24	50	20.0
100	LA 4	2.20	1435	14.60	230/400	4.80	84.4	30.0	28	60	38.0
100	LB 4	3.00	1407	20.30	400/690	6.39	85.5	32.0	28	60	38.0
112	M 4	4.00	1415	27.00	400/690	7.75	86.6	38.5	28	60	55.0
112	MB 4	5.00	1445	33.00	400/690	10.20	87.7	45.0	28	60	55.0
132	S 4	5.50	1446	36.30	400/690	10.70	87.8	57.0	38	80	90.0
132	M 4	7.50	1450	49.40	400/690	14.30	88.8	59.0	38	80	90.0

Approximate values, exact data sheets on request.

Three-phase motors 900 min^{-1}

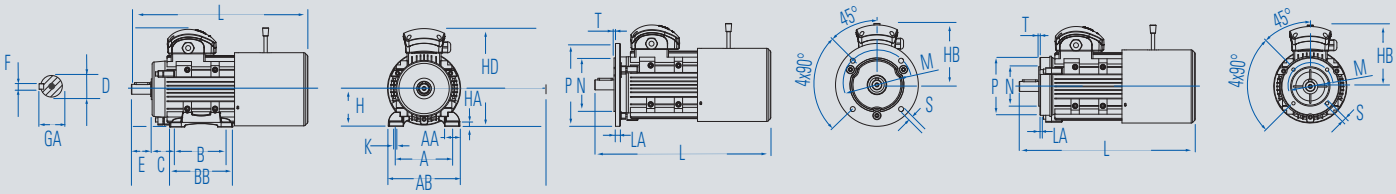
3Ph Brake motor IEC 60034.30 400 Volt +/- 10 % IP54 Isol.Cl. F Serv. S1

IEC	Type	kW	min^{-1}	Nm	V	Ina	W	kg	ø WE	L We	DC brake Nm
71	A 6	0.18	921	1.87	230/400	0.66	62.7	11.0	14	30	8.0
71	B 6	0.25	910	2.62	230/400	0.87	64.0	11.3	14	30	8.0
80	A 6	0.37	928	3.81	230/400	1.20	67.3	15.5	19	40	12.5
80	B 6	0.55	917	5.73	230/400	1.71	70.5	16.5	19	40	12.5
90	S 6	0.75	915	7.83	230/400	2.01	76.0	19.0	24	50	20.0
90	L 6	1.10	915	11.48	230/400	2.74	78.3	20.0	24	50	20.0
100	LA 6	1.50	944	15.17	230/400	3.91	79.9	30.0	28	60	38.0
112	M 6	2.20	951	22.09	230/400	5.45	81.9	35.0	28	60	55.0
132	S 6	3.00	969	29.57	230/400	6.95	84.5	40.0	38	80	90.0
132	M 6	4.00	969	39.42	400/690	8.85	84.7	57.0	38	80	90.0
132	MB 6	5.50	969	54.37	400/690	12.38	87.0	67.0	38	80	90.0

Approximate values, exact data sheets on request.

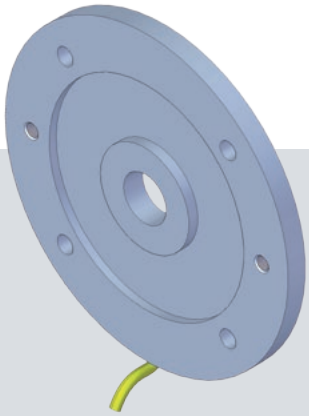
- Nm Nominal torque in Nm
- V Voltage
- Ina Nominal current in A
- W Efficiency in %
- kg Weight on bases B3 (foot version)
- Ø WE IEC-Shaft diameter
- L WE IEC-Shaft length

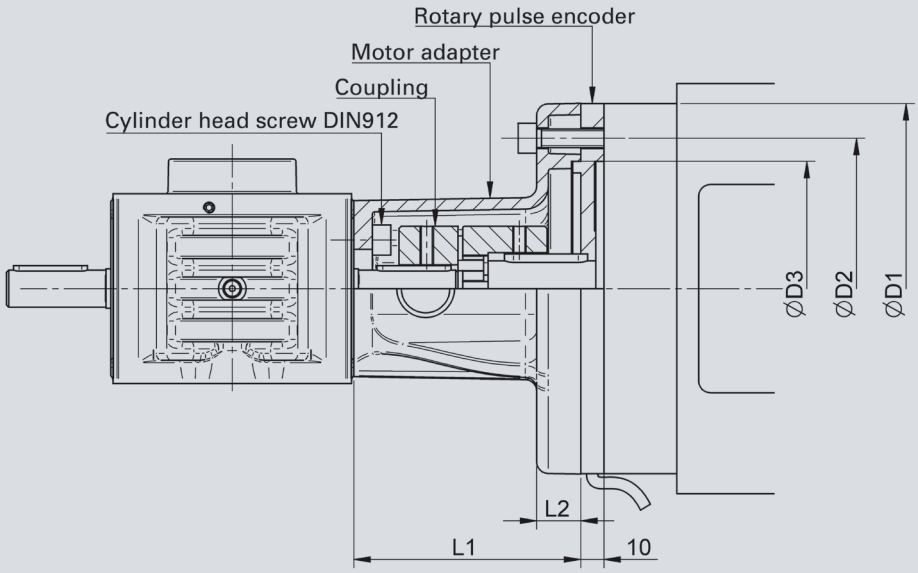
Dimensions of 3-phase motor from sizes 63-132



IEC Type		Pols	Base*					Housing*			Shaft					Flange B5					Flange B14-1					Flange B14-2				
			H	B	A	AB	K	L	HD	C	D	E	GA	F	LA	P	N	M	T	S	P	N	M	T	S	P	N	M	T	S
63	A	2-6	63	80	100	123	7	261	179	40	11	23	12.5	4	9	140	95	115	3.0	10	120	80	100	3.0	M6	90	60	75	2.5	M5
63	B	2-6	63	80	100	123	7	261	179	40	11	23	12.5	4	9	140	95	115	3.0	10	120	80	100	3.0	M6	90	60	75	2.5	M5
71	A	2-6	71	90	112	138	7	295	195	45	14	30	16.0	5	9	160	110	130	3.5	10	140	95	115	3.5	M8	105	70	85	3.0	M6
71	B	2-6	71	90	112	138	7	295	195	45	14	30	16.0	5	9	160	110	130	3.5	10	140	95	115	3.5	M8	105	70	85	3.0	M6
71	C	2-6	71	90	112	138	7	295	195	45	14	30	16.0	5	9	160	110	130	3.5	10	140	95	115	3.5	M8	105	70	85	3.0	M6
80	A	2-6	80	100	125	157	10	340	219	50	19	40	21.5	6	10	200	130	165	3.5	10	160	110	130	3.5	M8	120	80	100	3.0	M6
80	B	2-6	80	100	125	157	10	340	219	50	19	40	21.5	6	10	200	130	165	3.5	10	160	110	130	3.5	M8	120	80	100	3.0	M6
80	C	2-6	80	100	125	157	10	340	219	50	19	40	21.5	6	10	200	130	165	3.5	10	160	110	130	3.5	M8	120	80	100	3.0	M6
90	S	2-6	90	100	140	173	10	385	236	56	24	50	27.0	8	10	200	130	165	3.5	12	160	110	130	3.5	M8	140	95	115	3.0	M8
90	L	2-6	90	125	140	173	10	410	236	56	24	50	27.0	8	10	200	130	165	3.5	12	160	110	130	3.5	M8	140	95	115	3.0	M8
90	LB	2-6	90	125	140	173	10	410	236	56	24	50	27.0	8	10	200	130	165	3.5	12	160	110	130	3.5	M8	140	95	115	3.0	M8
100	LA	2-6	100	140	160	196	12	450	261	63	28	60	31.0	8	11	250	180	215	4.0	15	200	130	165	3.5	M10	160	110	130	3.5	M8
100	LB	2-6	100	140	160	196	12	450	261	63	28	60	31.0	8	11	250	180	215	4.0	15	200	130	165	3.5	M10	160	110	130	3.5	M8
112	M	2-6	100	140	190	227	12	475	289	70	28	60	31.0	8	12	250	180	215	4.0	15	200	130	165	3.5	M10	160	110	130	3.5	M8
112	MB	2-6	112	140	190	227	12	475	289	70	28	60	31.0	8	12	250	180	215	4.0	15	200	130	165	3.5	M10	160	110	130	3.5	M8
132	S	2-6	132	140	216	262	12	550	327	89	38	80	41.0	10	12	300	230	265	4.0	15	250	180	215	4.0	M12	200	130	165	3.5	M10
132	M	2-6	132	178	216	262	12	550	327	89	38	80	41.0	10	12	300	230	265	4.0	15	250	180	215	4.0	M12	200	130	165	3.5	M10
132	MB	2-6	132	178	216	262	12	590	327	89	38	80	41.0	10	12	300	230	265	4.0	15	250	180	215	4.0	M12	200	130	165	3.5	M10

* Subject to change without notice, exact dimension sheets on request.





Dimensions

	D1	D2	D3	L1	L2
NSE2-DIG-...	120	100	80	59.0	5.5
NSE5-DIG-...	140	115	95	65.0	12.0
NSE10-DIG-...	160	130	110	70.5	17.0
NSE25-DIG-...	160	130	110	98.0	19.0
NSE50-DIG-...	200	165	130	110.5	23.5
NSE100-DIG-...	200	165	130	142.0	25.0

Rotary pulse encoder DIG

An intelligent intermediate flange was developed, which significantly simplifies the recording of the rotational speed and direction of rotation and the linkage with super-ordinate control systems. This magnetic pulse transmitter is designed as an intermediate flange, which is simply installed between the motor and the motor adapter. This considerably simplifies the integration of incremental position transmitters in drive systems, regardless of whether they are used for rotational speed adjustment, as positioning controllers (e.g. for dosage control) or for synchronous run control.

Advantages

- Compact construction. Depending on the size, only 7 to 12 mm flange thickness are required in the installation space.
- Simple and fast assembly. The flange with the sensors is fixed directly on the motor; the magnetic ring is engaged on the motor shaft.
- Suitable for all IEC flange motors.
- A cost-effective solution, which is also suitable for economical retrofitting of existing drives.
- No mechanical changes necessary at the time of assembly.
- Proven, exact principle of measurement. Two Hall sensors pick up the signals for rotational speed and direction of rotation. As a result, the measurements are wear-free and maintenance-free.
- Universal HTL- and TTL signals for all the usual evaluations (PNP, NPN, RS 422).
- Short-circuit resistant, reverse polarity-protected and surge-protected transmitter electronics, in SMD-technology, completely integrated in the flange.

Mechanical values

max. rotational speed	6000 min^{-1}
Temperature range, electronics	-40° C to 100° C at load ≤ 20 mA (120 °C at load ≤ 15 mA)
Temperature range, cable	-40° C to 80° C
Flange-/collar material	aluminium/steel
Connecting cable	PUR-jacket/4 x 0.25/ Ø 5 mm (TTL 6 x 0.14)
Cable length	Standard 2 m or upon request
Design with plug-in socket connection	plug 4-pole/cable length 5 m or 10 m (not for TTL -version)
Protection class	depends on the sealing between the motor flange and machine flange (max. IP 67 e.g. in case of sealing with silicon)
permissible vibration	100 m/s^2
permissible shock	1000 m/s^2

						Number of pulses						
Flange	Shaft	Motor size	dxlength	ta	Da	1	2	4	5	10	25	50
Ø120	Ø9	56	Ø9x20	2	63	x	x	x	x	x		
	Ø11	63	Ø11x23	2	63	x	x	x	x	x		
	Ø19	80	Ø19x40	2	63	x	x	x	x	x		
Ø140	Ø11	63	Ø11x23	2	85	x	x	x	x	x	x	x
	Ø14	71	Ø14x30	2	85	x	x	x	x	x	x	x
	Ø24	90	Ø24x50	3	85	x	x	x	x	x	x	x
Ø160	Ø14	71	Ø14x30	2	90	x	x	x	x	x	x	x
	Ø19	80	Ø19x40	2	90	x	x	x	x	x	x	x
	Ø24	90	Ø24x50	3	90	x	x	x	x		x	x
	Ø28	100	Ø28x60	3	90	x	x	x	x		x	x
Ø200	Ø19	90	Ø24x50	3	90	x	x	x	x		x	x
	Ø24	100	Ø28x60	3	90	x	x	x	x		x	x
	Ø28	112	Ø28x60	3	90	x	x	x	x		x	x

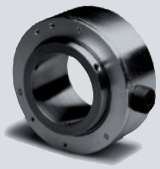
Other number of pulses on demand.

Example for ordering

Type	Flange diameter	Shaft diameter	Number of pulses
DIG	– 160	– 19	– 25

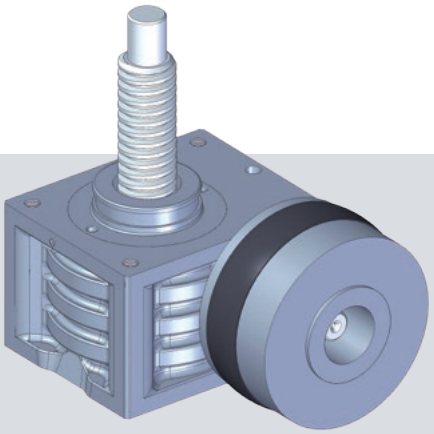
Electrical values	**Standard**	**TTL-version**
Voltage supply UB	10 to 24 VDC/+ 20%	5 VDC/± 5%
Max. pulse frequency	20 kHz	20 kHz
Output signals	rectangular pulse (2-channel) A + B	rectangular pulse (2-channel) A + B and A +B inv.
Pulse sequence	A 90° B Tolerance ± 40° el	A 90° B Tolerance ± 40° el A 90° B inv. Tolerance ± 40° el
Pulse/Pause ratio	180° : 180° Tolerance ± 20° el	180° : 180° Tolerance ± 20° el
Signal level	Uhigh ≥ UB - 4 V at LLast ≤ 10 mA	Uhigh ≥ 3,5 V Ulow ≤ 1 V Ulow ≤ 0,3 V
Loading capacity	≤ 30 mA at UB = 10 V resp. ≤ 20 mA at UB = 24 V	max. 30 mA of the outputs
Insulation resistance	100 MΩ	100 MΩ
Insulation test	4 kV	4 kV
Short-circuit resistant	yes	no
Secured against reverse polarity	yes	no

INKR Incremental rotary pulse transmitter

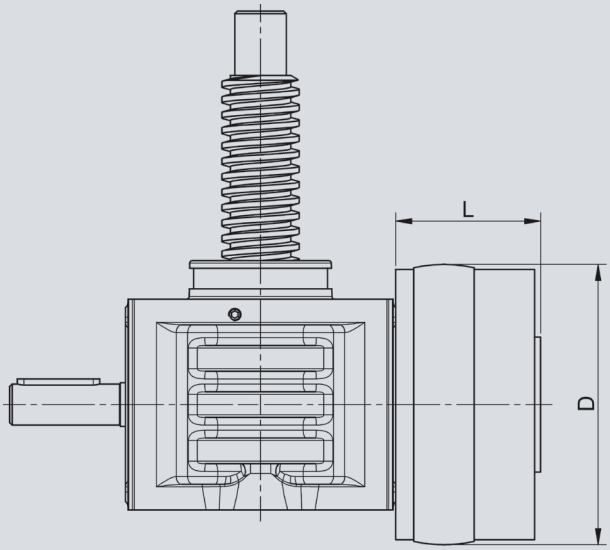


Mechanical properties, materials	
Dimensions	see drawing
Hollow shaft	ø 10 mm
Shaft load (axial and radial)	20 N max.
Flange	Aluminium
Housing	Anticorodal
Shaft	Stainless steel, non-magnetic
Ball bearing	ABEC 5

Electrical properties	
Pulses	512,1024,2048
Operating voltage	+10V +30V, +5V +30V
Outputs	Push-Pull, Line Driver, PP/LD
Loading per channel	40 mA max.
Counter frequency	100 kHz max.
Current drawn	70 mA max.
Optoelectric. Lifetime	100.000 h min.



Functional description



General

The spring-loaded brakes type FDB described here are dual-surface brakes for dry running. The braking torque is generated by compression springs in a current-less state. Venting takes place electronically by applying a DC voltage. Thanks to the guard rings that are used as a standard feature, the friction surfaces are mostly protected from external influences.

Under no circumstances may the friction surfaces come into contact with oil or grease or other lubricants.

Minor fouling of this kind can greatly reduce the braking torque. The protection class in the standard version is IP 54. The maximum permissible temperature is 145 °C; Duty cycle 100% ED.

Method of functioning

The existing compression springs press the brake rotor, which is positively locked with the gearbox shaft, against the flange via the axially movable armature disc. The braking torque is generated, applying a DC voltage to the exciter winding in the solenoid body results in a magnetic force, which pulls the armature disk towards the magnetic body. The brake rotor is released and the brake is vented.

Before working on an installed spring-loaded brake, the voltage supply source must always be disconnected or turned off. The brake should be rendered free of load if required, in order to avoid uncontrolled rotary motion of the shaft.

Manual venting

By providing a manual venting device (lever), the brake can be vented mechanically, e.g. in case of a power failure. For reasons of safety, nothing should be changed in the settings of the manual venting system.

Spring-loaded brake FDB

	Design	Brakes-Type	T_B (Nm)	P (W)	Centres Ø	L	D
NSE5	SL/RL	FDB 08	5.0	22	11	46	89
	SN/RN	FDB 08	5.0	22	11	46	89
NSE10	SL/RL	FDB 08	5.0	22	14	46	89
	SN/RN	FDB 10	10.0	28	14	54	109
NSE25	SL/RL	FDB 10	10.0	28	16	54	109
	SN/RN	FDB 13	20.0	34	16	62	135
NSE50	SL/RL	FDB 13	20.0	34	20	62	135
	SN/RN	FDB 15	40.0	42	20	69	155
NSE100	SL/RL	FDB 15	40.0	42	25	69	155
	SN/RN	FDB 17	60.0	50	25	81	175

T_B = braking torque

with direct current: $P = U \times I \longrightarrow I = \frac{P}{U}$

FDB60 at 205 V DC coil voltage

$I = \frac{50W}{205V} = 0.24\ A$

Electrical Connection

There are half-wave and bridge rectifiers available for providing a power supply to the brakes from the AC supply. Both types are available for DC-side or AC-side connection. Owing to the inductance of the magnetic coil, the release of the armature disc after switching off takes place in a delayed manner. This switch-off delay is relatively long when connecting before the DC rectifier on the AC side. The switch-off delay can be reduced when the connections present at the rectifier are used for the DC-side switching (6x faster). If connections are to be made on the AC side, a bridge should be connected to the contacts. The electrical connections should only be made in a voltage-less state. The operating voltage (DC) of the brake is given on the magnet housing.

Maintenance

The load should be secured with a suitable support. The spring-loaded brakes are almost maintenance-free. The air gap «a» and hence the rotor wear must be checked at certain intervals of time and if required, reset, or the rotor must be replaced.

Re-adjusting the brake air gap

Loosen the 3 fastening screws of the brake through half a revolution. Now, the sleeve bolts, which surround the fastening screws, can be screwed into the magnet body by turning them counter-clockwise. With the 3 fastening screws, the magnet body is moved to such an extent in the direction of the armature disc, till the nominal air gap, see the table, is reached. Now, the 3 sleeve bolts are unscrewed out of the magnet body by rotating them clockwise till fixed contact is made. Next, the fastening screws are re-tightened and the air gap is once again checked with a feeler gauge.

Supply voltage	Operating voltage of the brake	Transformer rectifier / type
24V DC	24V DC	without
230V AC	105V DC	Half wave rectifier/KSE 500/1-S
230V AC	205V DC	Jumper rectifier/PMB 400-S
400V AC	180V DC	Half wave rectifier/KSE 500/1-S
500V AC	220V DC	Half wave rectifier/KSE 500/1-S

Brake size	FDB5	FDB10	FDB20	FDB40	FDB60
Air gap $a_{nominal}$	0.2	0.2	0.3	0.3	0.3
Air gap a_{max}	0.8	0.8	0.8	0.9	1.0
min. rotor thickness	4.5	5.5	7.5	9.5	11.5

Example for ordering

Size	Spring-loaded brake	Nominal torque (TB)	Operational voltage	Direct current	Rectifier package (if required)	Manual venting (if required)
NSE10	**FDB10**	**10Nm**	**205V**	**DC**	**GL**	**HL**

6. Maintenance

6. Maintenance

To ensure trouble-free operation across the entire operational life right from the beginning, please always follow our operating manual.

Safety

Safety and availability
Safety and availability are just as important in the case of industrial systems as they are for theatre stages or other systems.

Construction and layout
At the time of design and construction, pay attention to the loading capacity of the drives and system components depending on the installation situation. Design the fastening, movement and transmission elements with a factor of safety that is suitable for your system. Follow the design instructions. In safety-relevant systems, use a safety trap nut SIFA.

Assembly
Correct and careful assembly is required for smooth and safe operation of the system. Therefore, always follow our operating instructions, which accompany every delivery. You can also find them on the Internet at www.nozag.ch

Inspection and maintenance
Regular inspection and maintenance is necessary to ensure availability. The following should be checked at the time of regular inspection: visual appearance, fastenings and joints, wear of the trapezoid thread and the lubrication state. Follow our lubrication instructions and use only the lubricants recommended by us. Also consider our automatic lubricant dispensers.

Spare Parts
For protection from production downtime in case of a long switching on time or a high load, we recommend stocking a gearbox set (incl. threaded spindles etc. and assembly drawings) either with you or your customer. Repair work on the jack is usually most economically achieved with a complete replacement.

Temperature

The ambient temperature is very important for the design of the components. Please always specify the ambient temperature and ambient conditions, especially if they are different from the normal 20°C to 25°C.

Normal temperature (-20°C to +60°C):
A normal temperature range is up to approx. 60°C gearbox operating temperature. The greatest heating takes place at the shaft sealing ring and at the trapezoid thread.

Low temperature (-20°C to -40°C):
Basically, the seals and most of our greases can be used up to a temperature of -40°C. But experience has shown that use below -20°C is critical. The greases become very viscous and difficult to move; especially the breakaway torque is affected. At minus temperatures, in general, all the components must be sufficiently dimensioned.

High temperature (+60°C to +160°C):
At ambient and operating temperatures (gearbox housing) above 60 °C, we recommend gearboxes with high-temperature grease and FPM seals. In general, the operating temperature can then be up to 160°C. For high-temperature applications, we supply the corresponding heat-resistant components.

For lower and higher temperatures, please inquire about the components, ideally, with the checklist.

Foodstuffs industry

The foodstuffs industry works with a high degree of automation. On the one hand, this helps to achieve a higher standard of hygiene, and on the other, with intelligent and efficient systems, rational production becomes possible. For the foodstuffs industry, we have already manufactured various bevel gearboxes and screw jacks including accessories in stainless steel with the corresponding grease filling. In case of any requirement, please do inquire with us.

Lubrication

Screw jacks
The screw jack is sealed and filled with a synthetic lubricant. In normal operation, the gearbox is lubricated for life.

Trapezoid thread spindle
The trapezoid thread spindle must be inspected regularly and re-lubricated according to the operating cycle.

Long-life systems
In the case of long-life systems (for example, working platforms or theatre stages) the grease loses its lubrication properties after approx. 5 years. Dust and dirt enhance this effect. We recommend a complete cleaning and re-greasing after 5 years.

KGT lubrication
Lubricate the ball screw KGT every 500 hours of effective running period.
Guide value for grease quantity approx. 1 ml per cm spindle diameter.

Other greases, fouling
The use of multi-purpose grease and other greases can significantly reduce the working and the life. In case of fouling of the spindle, it should be cleaned and regreased.

Lubrication dispensers

Nozag lubricant dispensers
The lubricant dispenser serves for providing a continuous supply of grease. The lubricant dispenser is bolted on directly at the lubrication point. It works independently and is activated upon setting the running period. The lubricant level is visible at all times in the transparent housing.

Advantages
- Time-saving and cost-saving owing to automatic lubrication
- Longer life and operational safety through continuous lubrication
- One dispenser covers running periods of 1 to 12 months

Technical Data

Drive system:	Hydrogen-gas generation cell (dry element)
Setting:	continuously variable 1 to 12 months
Volume/Weight:	60 ml/approx.115 g + 125 ml/approx.190 g, other volumes available upon request
Operating pressure:	max. 5 bar
Application temperature:	- 20°C to + 55° C ambient temperature
Application:	the dispensers can be mounted in any position.
Caution:	do not subject to direct heat
Usage time:	within 2 years of production date
Storage temperature:	recommended at 20°C +/- 5°C

Completely filled grease channels are important for reliable working. It has to be ensured that the grease channels are not blocked. Therefore, they must be completely lubricated by means of a grease gun before every commissioning of the dispensers. The lubricant dispenser can be readjusted or shut off during the dispensing period. The values on the adjusting scale disc are based on laboratory conditions. Depending on the setting and the temperature, after starting, it can take hours, and in the case of long-term settings, some days, before the first discharge of lubricant. The user must regularly inspect the working of the lubricant dispenser. Connecting pipes may not be longer than 0.5 m. Recommended hole diameter: 6 – 8 mm. Pipe resistances must be minimised, bottlenecks and angular bends are not permitted. The lubricant dispenser may only be used for supplying one lubrication point. No branches should be made.

6.2.1 Using the Manual

This assembly manual must categorically be followed for the integration of the screw jack in a system, so that first, the functions can be fulfilled in keeping with the specifications, and second, personnel and equipment protection is guaranteed.
Only by strictly following this installation manual, can the safety of process and personnel be achieved.

Not complying with this manual can result in dangerous situations. If the screw jack is transferred to a third party, this manual must also be passed on.

Please contact Nozag in case of doubts or questions.

6.2.2 Supplementary Documentation

- Data sheets
- Dimension diagrams
- Catalog

This documentation can be obtained at www.nozag.ch or directly from Nozag.

6.2.3 Reference to Machinery Directives and Compliance

The screw jacks conform to the present state-of-the-art and the applicable regulations. They fulfill the preconditions so that they can be integrated in systems without problems, both functionally and from a safety standpoint.

As long as the integration of a screw jack is performed in accordance with this assembly manual, then basic system requirements enacted in the following Directives shall be deemed as having been complied with:

2006/42EG Annex II	(Machinery Directive)
2004/108/EC	(EMC Directive)

The engineering connections must be carried out in keeping with the governing requirements and with the EMC Directives!

6.2.4 Qualified Personnel

The layout, assembly, commissioning and maintenance of the screw jacks may only be carried out by personnel specially authorised, trained and instructed in the field of electrontechnical machinery.

6.2.5 General Safety Instructions

The operator must ensure that persons entrusted with the assembly and maintenance have read and understood the Assembly and Maintenance Manual and follow it in every respect, in order to:

- avoid dangers to life and limb of users or third parties or to property
- ensure the operational safety of the screw jack
- exclude the possibility of usage failure through incorrect handling

Work on screw jacks may only be carried out at standstill and with sufficient safeguarding against unintentional switching on.
Replaced lubricants should be disposed of in a technically correct manner and keeping within the applicable regulations.

For the integration of the screw jacks in equipment, machines or systems, it is the responsibility of the manufacturer of the equipment, machines or systems to include the specifications, instructions and descriptions as given by Nozag of the screw jacks, in his operating manual.

6.2.6 Warning and Symbols used

The following symbols are used in this text to provide warnings of possible danger and useful additional information:

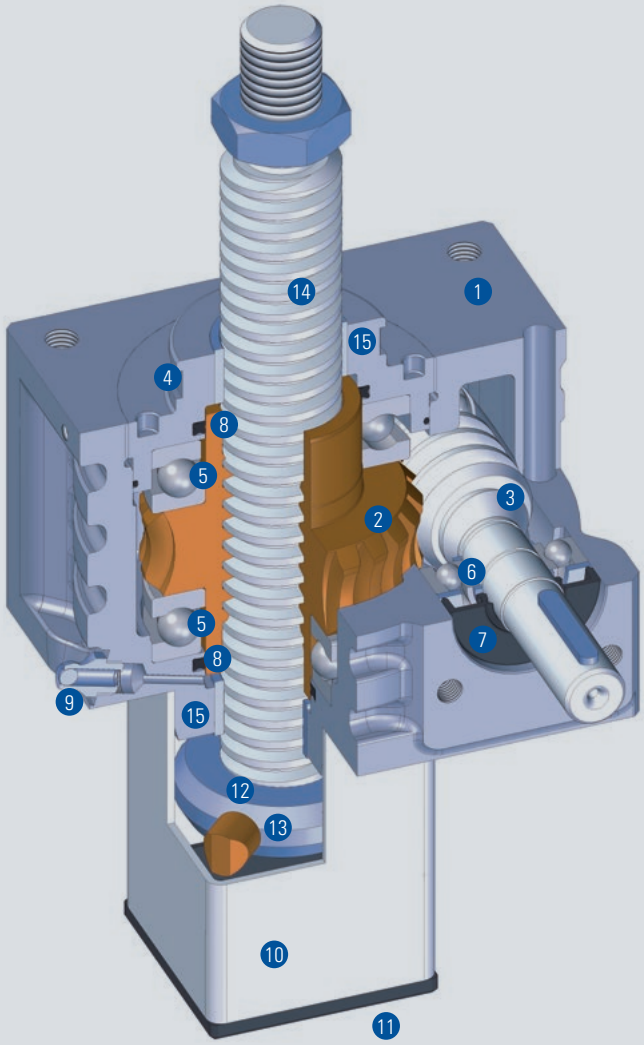
Danger to humans
This symbol indicates that non-compliance with the safety instructions can result in serious bodily injury or death.

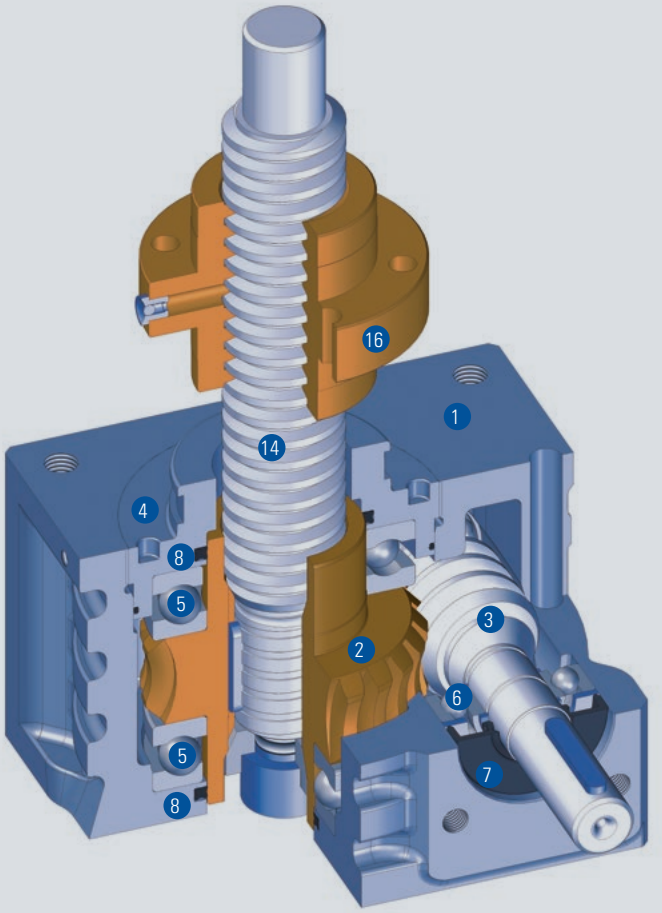
Danger to property (material)
This symbol indicates that non-compliance with the safety instructions can result in property damage (destruction of materials).

Notice
This symbol indicates that there is additional useful information provided here.

Non-rotating spindle NSE...-S...
The worm wheel is provided with a female thread and converts the rotational movement into an axial movement of the spindle, when the latter is prevented from rotating (through its design or by means of an anti-rotation protection in the protection tube).

Rotating spindle NSE...-R...
The spindle has a fixed connection to the worm wheel and rotates with it. The nut therefore screws itself up and down.





1 Housing
2 Worm wheel
3 Worm
4 Bearing cover
5 Axial grooved ball bearing
6 Grooved ball bearing
7 Oilseal
8 X-ring/O-ring
9 Lubrication nipple for spindle
10 Protection tube
11 End cover
12 Unscrewing protection
13 Anti-rotation lock
14 Spindle
15 Spindle guide
16 Duplex nut

This manual is applicable to all screw jacks of the NSE series in the standard versions manufactured by Nozag in the sizes 2, 5, 10, 25, 50 and 100, as well as for special types, in consultation with Nozag.

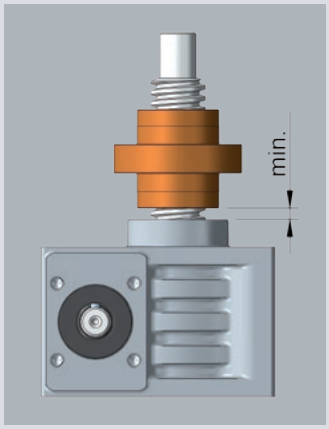
6.4.1 General Design Measures

The load bearing capacity of the drives and system components varies widely according to the installation situation and the operating duration. The limits specified in the data sheets must not be exceeded under any circumstances.

Screw jacks are basically not suitable for continuous operation under load. The maximum operating duration depends on the load being moved and must not exceed the limit values according to the ED-diagram on the relevant data sheets.

The duration of operation can be significantly increased by using a ball screw spindle instead of the trapezoid thread spindle. Particular attention must be paid to the evenness, as well as the parallelity and angularity of the mounting face of the gearbox, nut and guides with respect to one another.

Lateral forces must be absorbed by additional guides.
The play between the spindle and the integrated guide bushings is between 0.2 and 0.6 mm depending on the size. This is only a secondary support and does not replace a guiding system.



As a minimum distance of the movable parts to the fixed parts in the direction of lifting, we recommend in the case of trapezoid spindles, the thread pitch times one, and in the case of ball threaded spindles, the thread pitch times two. This distance must not fall below this limit.

A screw jack must never hit a mechanical stop, since the forces that then occur could reach a multiple of the rated load. All warranties as well all liabilities of Nozag shall be rendered null and void in such a case.

There are various moving parts freely accessible on a screw jack, such as the nut, spindle and shaft ends, which can mean great personal danger while in operation. The systems integrator is responsible for ensuring protection against accidental contact in the course of operation.

The protective cap SK from Nozag can be used for the free end of the driving shaft as protection from accidental contact.

In general, the construction instructions and design procedures listed in our catalogue should be followed.

6.4.2 Operating Temperatures

The temperature behaviour is dependent on the ambient temperature and on self-heating during operation under load. The self-heating can be reduced through favourable construction measures for fast dissipation of heat.

The jack can quickly become hot during operation under load. Therefore, in such a case, sufficient contact protection should be provided. Please note the following temperature ranges and the corresponding notes:

-40°C to -20°C	**low temperature** The standard seals and greases can all be used up to -40°C. However, the breakaway torque and the wear both increase significantly. In general, at low temperatures, all the components should be dimensioned for greater safety. Please contact our technical department.
-20°C to +60°C	**normal temperature** The highest heating is normally to be observed at the worm shaft and at the trapezoid threaded nut and it should never go out of this temperature range. The range limits may not be used as the normal operating points.
+60°C to +160°C	**high temperature** In case of ambient or operating temperatures in this range, only jacks equipped with high-temperature grease and FPM seals may be used. Please contact our technical department.

6.4.3 Measures to be Taken in Case of Increased Risk

The trapezoid threaded nut is subject to continuous wear owing to the existing friction. The wear of the trapezoid thread in the worm wheel or in the nut must be checked at suitable intervals depending on the duty cycle.

As soon as the axial distance between the trapezoid thread nut and the spindle is more than 20% of the thread pitch, the gearbox or the worm wheel (S-Version) or the nut (R-Version) must be replaced.

The wear can be checked with a safety trap nut and by monitoring it.

Essentially, a screw jack in the R-Version should not be subjected to tensile loads, since the trapezoid thread spindle is subject to a cyclical bending stress and can break without any warning. If this type of installation cannot be avoided, then, under increased safety requirements (such as in stage construction, suspended loads, …) the load must without fail be secured by an external trapping device.

Upon request Nozag shall provide suitable solutions for this.

The screw jacks of the NSE serve to convert a rotational movement into a linear one, in order to then carry out controlled and regulated pushing and pulling movements. In addition, they can be used in all installation positions in general mechanical engineering, under normal ambient conditions, in compliance with the operating limits and always in consideration of all the technical data, in accordance with the applicable data sheets.

In case of use with suspended loads, special additional measures must be taken in order to ensure sufficient protection for persons and property at all times.

Other uses, or any use over and above those described a proper usage, shall be considered as improper and can result in dangerous situations.

Adjustments may be necessary in case of special requirements, such as those existing, for example in the food industry, or where extreme ambient conditions prevail. In such cases, it is necessary to clarify all specific details with Nozag.

A screw jack may only be brought into operation when it is ensured that the machine or plant, in which it has been installed, conforms to the EU Machinery Directive's regulations and to corresponding national standards and specifications.

Screw jacks in ATEX design are special versions and should be discussed with Nozag.

6.6.1 Guide Values for Screw Tightening Torques

Information based on VDI 2230, edition 2003: Maximum permissible tightening torques for hexagon socket screws ISO4762 and screws with similar head strength and head bearing surface, of the strength class 8.8 at 90% exploitation of the elastic limit R_{el}. / 0.2%-yield point $R_{p0.2}$. The table shows the permissible maximum values and does not contain any further safety factors. It assumes a knowledge of the relevant directives and design criteria.

Maximum tightening torques (Nm) for strength class 8.8 and a total coefficient of friction of $\mu_{ges} = 0.12$:

Thread size	Tightening torque M_A
M4	3
M5	6
M6	10
M8	25
M10	48
M12	84
M16	206

Dealing with the guide values

Friction μ_{ges}

The friction coefficient shows scatter, since it is depending upon many factors, such as the material pairing, the surface quality (roughness depth) and the surface treatment. If the total friction is less, a smaller tightening torque should be selected. The main cause of fractures is an overestimation of total friction factors.

Strength class

The strength class refers only to the screw and is determined according to ISO 898/1.

Tightening torque M_A

These are guide values and do not substitute a recalculation according to VDI2230. In case of additional tensile forces acting centrally or eccentrically, as well as statically or dynamically on the screws, the tightening torques and/or loading forces should be reduced to such an extent that the maximum permissible load on the screws is not exceeded.

Screw-in depth

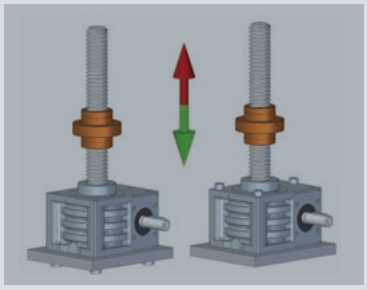
These guide values assume a screw-in depth of 1.4 x nominal diameter (of the screws) in the aluminium housing.

6.6.2 Housing

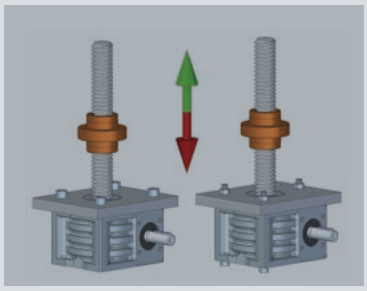
Should the specified screw-in depths not be exploited for fastening the housing or the prescribed tightening torques not be complied with, the certainty of the screws getting pulled out under tractional stress is reduced. If the screws are stressed to more than 50% of the rated tensile load, the screw connection must be recalculated according to VDI2230. A decision can thus be made whether the existing safety is adequate in the relevant application.

In order to avoid a tensile load of the screws, the bearing surface must be arranged as follows, depending on the load:

Main load: Pressure from top > support below



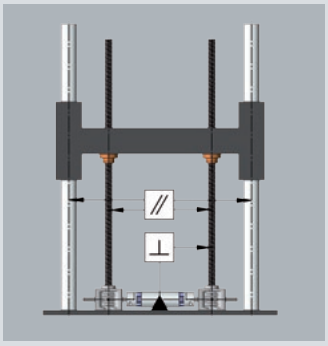
main load: tension upwards > support above



The 4 threaded holes or the 3 through holes in the housing can be used for fastening.

6.6.3 Spindle

While assembling the spindle and fastening the spindle end, care must always be taken, first, that the spindle is in alignment with the nut, second, that the housing is at right angles to the resting surface of the housing and third, that it is parallel to any guideway that may be present. This must be ensured during the entire operation, so that the jack does not have to absorb lateral forces in any situation.



In the R-version, the spindle can be installed in the housing from both sides. Thus, depending on the loading direction, the load can be ideally transmitted into the housing and not into the bearing cover.

In the R-version, the central screw or nut for spindle fastening must be installed with a suitable thread adhesive (e.g. Loctite 243) and the correct torque. Otherwise, in case of tensile loading, there is a danger that the spindle might be pulled out of the housing!

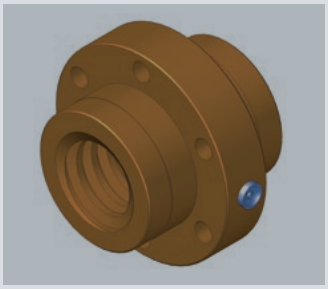
In this context, the instructions of the thread adhesive manufacturer must be followed without fail.

Tightening torques (Nm) for spindle central screw or nut in the R-version:

NSE2	NSE5	NSE10	NSE25	NSE50	NSE100
2	5	10	15	50	100
nut	screw	screw	screw	screw	screw
M6	M8×20	M10×30	M14×40	M20×50	M42×3
4-6	9-14	19-30	55-90	150-240	550-990

6.6.4 Nut

The nut must be mounted concentrically with the spindle, and the bearing surface must be at right angles to the spindle axis, so that uniform resting in all thred turns is ensured. The calotte disks NSE...-KS can be used for compensating angle errors up to ±3°.

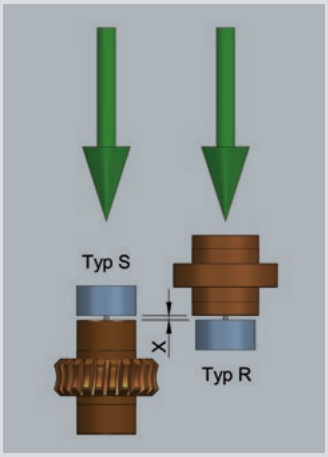


Lateral loads and alignment errors should be avoided, since they can have a very negative effect on the life of the support nut.

In order not to subject the screws to tensile loads as far as possible, the load must always be supported against the nut flange. Should this not be possible, the threaded joint must be designed in accordance with VDI2230 and constructed accordingly.

6.6.5 Safety trap nut

The gap X between the nut and the safety trap nut corresponds to half the trapezoid thread pitch (= tooth thickness) in the new state. The wear of the nut causes a corresponding reduction of the gap, which can be monitored.



The safety trap nut works in one direction only and therefore, attention must be paid to the correct arrangement!
R-Version: viewed in the direction of the load after the nut
S-Version: viewed in the direction of the load, before the nut

6.6.6 Ball Screw KGT

The same points as described in 6.6.3 and 6.6.4 have to be followed.

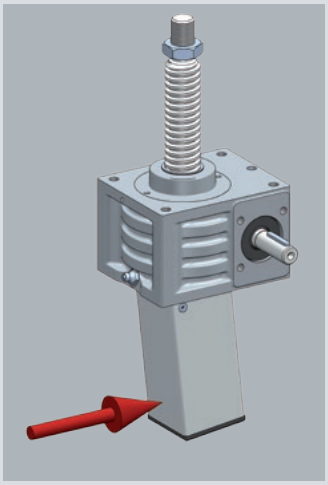
The delivery is always in the form of an assembled spindle/nut unit and it must not be taken apart under any circumstance, otherwise the balls will fall out.

If dismantling is necessary, in the R-version, the nut can be removed by using a mounting sleeve. The sleeve is used like an extension of the spindle and prevents the balls from falling out.

Ball screws are not self-locking, which is why a braking motor or a spring-loaded brake FDB is necessary. A ball screw in the S-version is generally assembled with an unscrewing protection AS by default.

6.6.7 Protection Tube

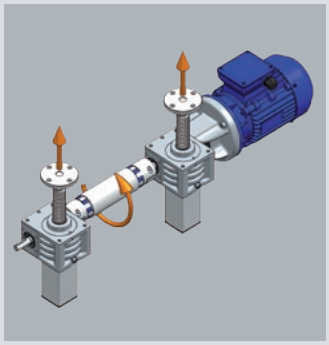
The protection tube cannot absorb any lateral force in the standard version. The same applies during transportation: the jack must not be supported at the protection tube end.



6.6.8 Lubrication

Screw jacks are supplied in an operationally ready state and are lubricated for life under standard conditions.

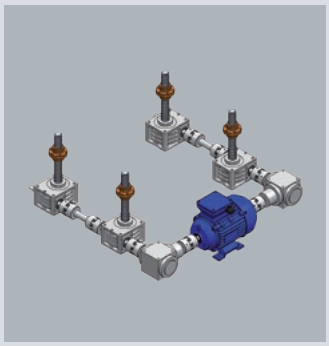
Nozag provides the spindles in the S-version pre-greased ready for use, with a protection tube. Without a protection tube, or in the case of the R-version, the spindles are delivered without grease owing to the danger of soiling.



Before the first trial run, the ungreased spindles must be cleaned and generously lubricated over theire entire length with a grease that adheres well.For a long life, use the greases that are suggested by Nozag.

6.6.9 Direction of Rotation and Movement

Before a motor trial run, a check should first be carried out as to whether all the coupled screw jacks have the same direction of movement. When using bevel gearboxes, the direction of movement of the screw jacks can be changed, simply by turning the bevel gear (however, this only applies to the D-version with 3 shafts).



6.6.10 Levelling and Trial Run

In the case of coupled screw jacks, the individual gearboxes can be levelled with the help of couplings or connecting shafts. The levelling is done under load by loosening and turning the coupling or the shaft through 120°. For continuous (stepless) variable height settings, a clamping hub coupling KNK or a connecting shaft VW can be used.

Screw jacks equipped with ball screws or multi-start trapezoid thread spindles are not self-locking and must therefore be secured during assembly.

During the trial run, the assembly quality can be indirectly checked by a continuous measurement of the motor current drawn. If an increased drawn current is determined, the fastening screws should be loosened and a new trial run initiated. Non-uniform force requirements and wear tracks on the spindle indicate the presence of alignment errors.

Before and after the trial run, all the screwed joints must be checked and tightened correctly.

6.7.1 Screw Jack

The jack must never hit against a mechanical stop (such as an unscrewing protection, end stop, …), since the forces hereby generated could reach a multiple of the rated load. Any damage caused by the violation of the latter rule shall not be covered by warranty obligations or render the manufacturer to be liable in any way whatsoever.

We recommend the following safety distances between the movable and the fixed parts:

Trapezoid thread spindle:	Safety distance = 1 x spindle pitch
Ball screw:	Safety distance = 2 x spindle pitch

During operation, the named safety distance must be ensured through customer-side measures or by using our limit switches ESM / ESI.

For uniform starting and braking ramps, we recommend the use of a frequency transformer. This prolongs the life of the system and minimises the starting noises.

The positioning accuracy mainly depends on the type of drive used. In case of more stringent requirements, a three-phase servomotor with frequency transformer and rotary pulse transmitter or a servomotor with resolver etc. can be used.

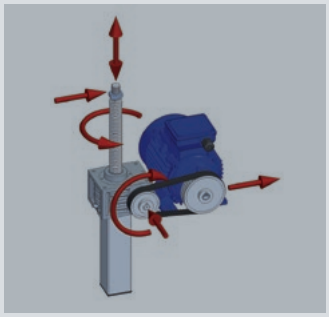
6.7.2 Rotational Speeds

The maximum rotational speed advised in the data sheet may not be exceeded.When R-gearboxes (with rotating spindles) are used, the bending-critical rotational speed of the spindle must be taken into consideration.

Long, thin spindles can squeak despite complying with the bending-critical rotational speed. Therefore, your calculations should include a sufficient safety factor.

6.7.3 Maximum Forces / Torques

The power usage of the machine in operation must not exceed the limit data specified in the catalogue (not even temporarily). Permanent damage may result, even if the limits are exceeded just once.



Regarding the maximum drive torque, it should be remembered that the starting torque is approx. 50% above the operating torque.

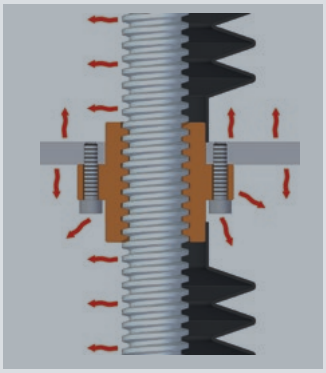
Depending on the motor type, the short-circuit torque can be a multiple of the rated torque!

Where several gearboxes are coupled to one another, if one gearbox is blocked, the full energy of the motor can act on that gearbox!

6.7.4 Measures for Minimimising Noise

The motor is usually the biggest source of noise. With a uniform acceleration ramp, starting and braking noises can be minimised.
The gearbox and motor should not be mounted on resonant bodies.

6.7.5 Heat balance



In the case of screw jacks with trapezoidal thread spindles, only a small part of the drive power is converted into lifting force. There are losses in the worm drive and at the trapezoidal thread, which have to be dissipated as heat. In the case of the version with the non-rotating spindle, the gearbox power loss and the spindle power loss occur in the gearbox and are dissipated outwards through the gearbox housing.

In the case of the rotating spindle, the gearbox power loss originates in the gearbox and is dissipated through the gearbox housing; the spindle power loss originates between the spindle and the nut and must be dissipated via the surface of the nut, the spindle and the support plate. When bellows are used with rotating spindles, particular attention must be paid to the heat balance. Experience has shown that the heat can only dissipate about 50% due to the bellows. Therefore, the possible duty cycle is reduced by 50 % as compared to an identical design without bellows. In the case of gearboxes with non-rotating spindles, the bellows are not a problem, since the heat is mostly dissipated via the housing. If the ambient temperature is higher than 20°C, the load must be reduced, since the higher heat level cannot be dissipated. For every 10 °C increase in ambient temperature above 20 °C, the load must be reduced by approx. 15–20 %.

Air holes must be made by the customer, depending on the speed.

6.7.6 Electrical Connection

Regarding the electrical connections of the drive motor, attention must be paid to the following specifications and directives:

2004/108/EG	EMC Directive
2006/95/EG	Low-voltage Directive

The electrical installation work must only be carried out by a technician who is qualified according to the situational requirements. Attention must be paid to the local laws and to the specialists recommendations.

The electrical connections must be done in accordance with the specifications on the rating plate with regard to the frequency, voltage, current and connections. Connections must be made in such a way that a continuous, safe electrical contact is maintained. A secure protective conductor connection should be set up.

Before electrical commissioning, any possible impact against any hard mechanical stop must be ruled out.
Very high forces and torques can be generated by impacting against hard mechanical stops, which could result in enormous damage and have a very adverse impact on safety.

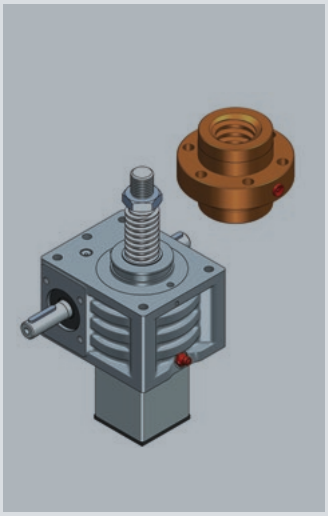
The drive motor must be protected from overload through suitable measures.

At the time of electrical initiation, the first thing to be checked is the direction of rotation.

There must not be any foreign bodies, dirt or moisture in the connection box. Cable ducts that are not required should be closed tightly.

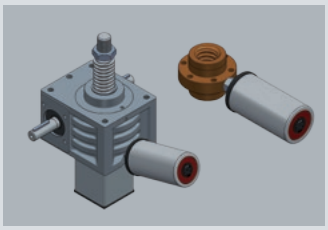
6.8.1 Lubrication

The worm gearboxes are lubricated for life under standard conditions. The lubrication consumption is concentrated above all, on the trapezoidal screw. It should be re-lubricated regularly, depending on the duty cycle. Since the lubrication requirement of a trapezoidal screw depends on very many factors, no general guidevalues can be specified for the required lubrication intervals. We recommend that the user starts with a weekly interval; a weekly inspection of the spindle should then be carried out. The lubrication intervals can thus be individually matched to the prevailing conditions.



During dry running, the nut is subjected to intense wear and can, in addition, become extremely hot very quickly.

Ball screws KGT should be re-lubricated after every 300 hours of effective operating time. A guideline value of 1 ml per cm spindle diameter can be taken for the grease quantity.



After about 5 years, the grease loses its lubricating properties. Dust and dirt increases this effect. Therefore in the case of long-life systems, a complete cleaning and re-greasing is necessary after 5 years. If the spindle is dirty, it must be cleaned and regreased to avoid excessive wear and damage.

Recomended grease Blasolube 306
(other lubricants on request)

Grease amount per gearbox

NSE2	20 cm^3	NSE25	100 cm^3
NSE5	25 cm^3	NSE50	420 cm^3
NSE10	40 cm^3	NSE100	800 cm^3

Our lubricant dispenser SSG can be used for automatic lubrication. The lubricant dispenser is screwed on in place of the grease nipple and continuously supplies grease to the lubrication point. The dispensing duration can be set continuously variable from 1 to 12 months and the grease quantity varies according to the SSG-size between 0.08 – 8.3 ml/day.

6.8.2 Checking Wear

The trapezoid thread in the worm wheel or in the nut is subject to continuous wear owing to the existing friction, which depends on many factors and cannot be predicted. We recommend that at the beginning, the axial play should be checked after just a few hours of effective deployment. Thereafter, the inspection interval can be gradually adjusted depending on the results.

As soon as the axial play in the trapezoid thread nut corresponds to more than 20 % of the thread pitch, the gearbox respectivly the worm wheel (S-Version) or the nut (R-Version) must be replaced.

The wear can be checked with a safety trap nut and by monitoring it. For simplified monitoring, Nozag offers, upon request, mechanical (manual buttons) and electrical (inductive sensor) aids.

Except for standard machine elements that are commonly available commercially, Nozag original spare parts must be used. Warranty entitlements as well as liability commitments shall be rendered null and void if third-party, imitation or non-approved components are used instead.

In order to prevent unwanted production downtimes, during long duty cycles or high loads, it is recommended to keep a complete gearbox (incl. threaded spindle, nut, …) on standby. New seals must always be used for repair.

Repair work is usually most economically achieved by completely replacing of the jack.

6.10.1 Bellows

The ZD-dimension must not be underrun and the AZ-dimension must not be exceeded. These dimensions can be viewed in our main catalogue.

It must be remembered that the bellows may not touch the spindle, otherwise, there is a danger of the bellows getting destroyed.

Air holes must be made by the customer, depending on the speed.

Our support rings STR can be used to prevent contact between the spindle and bellows in case of longer strokes or horizontal installation.

The maximum duty cycle of a jack with rotating spindle (R-Version) is reduced by about 50% owing to the heat-insulating action of a bellows.

6.10.2 Spiral Spring

The spiral spring is subject to a great deal of tension and is tied up with a securing wire. This securing wire may only be opened with extreme care, once the spiral spring has been pushed onto the spindle and the movable part of the machine has been compressed to such an extent, that both ends of the spiral spring are almost in contact.

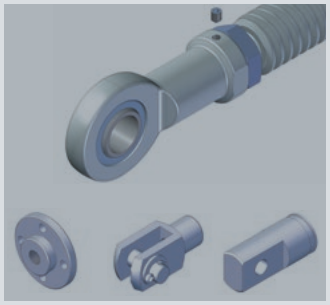
Centring flanges should be provided for positioning the two ends of the spiral spring, which permit the rotational movements of the springs. The spring must be able to move freely and must not be fastened under any circumstances.
In case of vertical deployment of the spiral spring, the large diameter should be at the top, so that, as far as possible, no foreign bodies (e.g. chips) can enter the coil openings.

In case of a horizontal installation of the spiral spring, for the same reason, the large diameter should be in the area where the chips are most prevalent.
Regular maintenance is necessary. Depending upon the degree of contamination, the spiral spring should be cleaned daily or weekly and then coated with a light film of oil. We recommend the Longlife Spray Oil W44T, which you can also obtain from us.

Spiral springs must preferably be used in oil-containing environments. If fine particles or dust are generated (especially in case of grinding dust), spiral springs are not suitable. For these cases, the use of bellows is recommended.

6.10.3 Spindle End Attachments: BF, GK, KGK and SLK

Fastening flanges, fork heads, ball joints and pivot bearing heads for the S-gearbox are screwed onto the spindle ends. After setting the position, these attachments should be fixed by means of a lock nut, stud screw and a suitable thread adhesive (e.g. Loctite 243). The securing must be done carefully and checked.



The fixations are not tightened at the time of delivery.
This gives the user the possibility for exact positioning.

When tightening the lock nut and the stud screw, the following maximum tightening torques in Nm should be maintained:

	NSE2	NSE5	NSE10	NSE25	NSE50	NSE100
Locking nut	6 Nm (M8)	20 Nm (M12)	45 Nm (M14)	140 Nm (M20)	440 Nm (M30)	700 Nm (M42x2)
Stud screw	1 Nm (M3)	2.5 Nm (M4)	5 Nm (M5)	5 Nm (M5)	8 Nm (M6)	20 Nm (M8)

Owing to the low efficiency of a trapezoidal spindle and the ratio of the gearboxes, the twisting torque reaches a multiple of the motor torque.
With enhanced safety requirements, a positive anti-rotation lock is recommended as being indispensable.

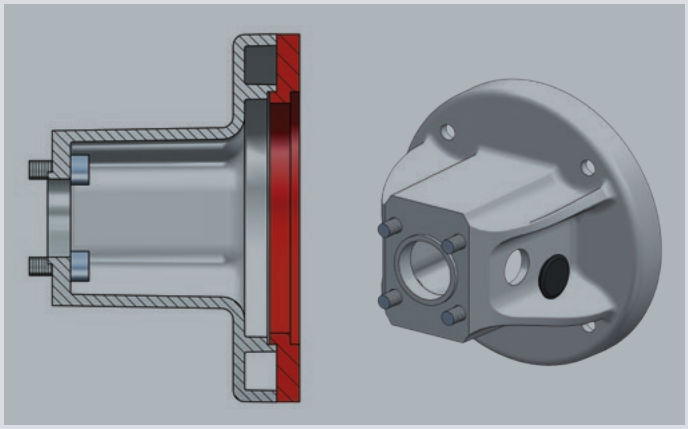
6.10.4 Flange Bearing FL

When assembling the flange bearing at the spindle end, care must be taken that it aligns with the gearbox/spindle/nut, otherwise, the spindle is subject to a cyclical bending stress and can break without previous warning.

The flange bearing is not suitable for absorbing radial forces.
At the time of assembly, it must be ensured that there is enough axial play, so that the spindle can expand freely when it heats up.

6.10.5 Motor Adapter MOA

Check the length of the fastening screws for the motor. The motor can get damaged if excessively long screws are used!
The coupling can be checked through the viewing hole and fixed.

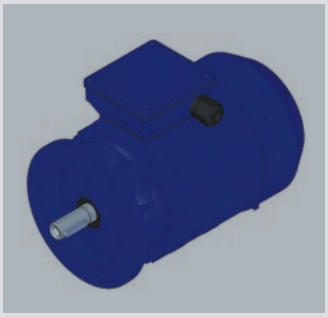


In the following motor-gearbox combinations, with Nozag standard couplings, an additional motor adaptor ring MOAR is necessary:

NSE10 - IEC80
NSE25 - IEC90
NSE50 - IEC100 - IEC112

The motor adapter ring can be dispensed with when using a rotary encoder DIG.

6.10.6 Three-phase Motor



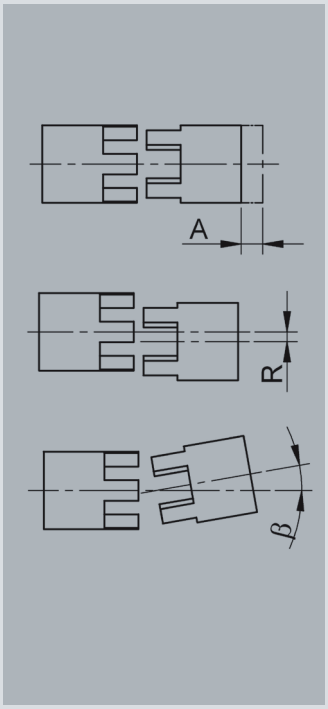
The motors normally have a terminal board with 6 terminals and an earth lead terminal in the terminal box. By shifting the connecting link, the stator winding can be connected in star or delta formation.
The star/delta starting process is not suitable for lifting jack systems, since the full torque is required right from the start.

Basically, we recommend the use of 4-pole motors with a maximum rotational speed of 1400 rpm. Higher rotational speeds are only possible with the expressed permission of Nozag.

The maximum motor torque can reach a multiple of the rated torque for a short time. If required, this must be limited using a frequency converter.

When operating with a frequency converter, it must be remembered that for prolonged operation below 25 Hz, an external fan is required for sufficient cooling of the motor. The separate documentation for the motor must be followed without fail.

6.10.7 Coupling / Connecting Shaft

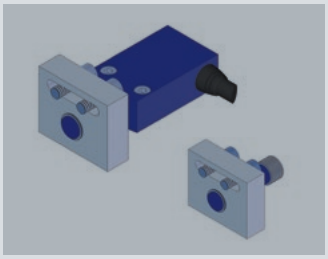


Beware of the axial alignment of the shafts being connected. Despite a certain elasticity of the coupling or the connecting shaft, the deviations should to be kept to a minimum. The maximum errors allowed can be seen in our catalogue. The standard couplings 035 to 190, as well as the connecting shafts LJ and GX must be pushed onto a shaft end with feather keys and thereafter, secured against axial displacement by tightening the threaded pin over the feather key.
The clamping hub coupling KNK and the connecting shaft VW can be radially mounted through the partitioned clamping hubs and the feather key can be omitted. The clamping screws are not allowed to be replaced by a different quality, and for securing torque transmission, must be tightened according to the following table:

Tightening torques (Nm) for clamping bolts:

	KNK02	KNK06	KNK15	KNK30	KNK45	KNK80
VW28	VW35	VW50	VW60	VW76	VW90	VW120
4	8	15	35	70	120	290

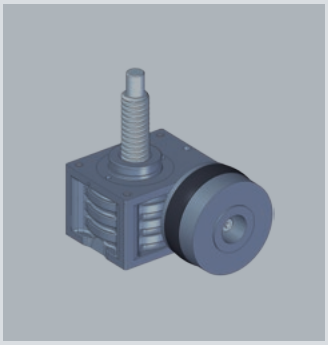
6.10.8 Limit Switch: ESM, ESI



The working of the controller in conjunction with the limit switches must be so designed that a mechanical stop is completely avoided. Test the limit switch function before the motor trial run. If the after-running of the motor does not ensure a complete stillstand, a braking motor should be used. This can especially take place in the case of multi-start threaded spindles and ball screws.

The protection tube has a wall thickness of only 2 mm,depending on the gearbox size. Therefore, the M5-fastening screws may be tightened with a maximum of 2Nm, so that the thread in the tube is not destroyed. In no case should screws longer than those supplied be used, since screws reaching too far into the protection tube could collide with the unscrewing protection.

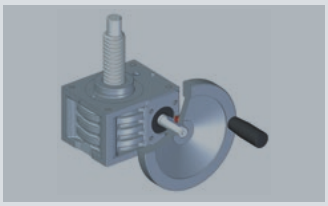
6.10.9 Spring-loaded Brake FDB



When re-lubricating the spindle, the friction surface of the spring-loaded brake must be protected from dirt without fail. Under no circumstances may oil or grease reach the friction pad. Small amounts of dirt can adversely affect the working of the brake.

The maximum permissible limiting temperature of the spring-loaded brake is 145°C. When using a spring-loaded brake or a braking motor in combination with a frequency converter, activate the brake separately. The separate documentation for the spring-loaded brake must be followed without fail.

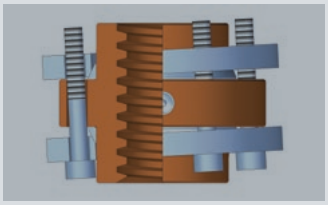
6.10.10 Handwheel HR



The handwheel is pushed onto the shaft with a feather key, at least to the extent that it is flush with the shaft end, and must be secured with a stud screw over the feather key or with a cross-hole and pin.

If a handwheel is combined with a motor, no handle must be screwed in because of the imbalance. During motor operation, the handwheel must under no circumstances be accessible.

6.10.11 Calotte disks KS for Duplex Nuts DMN

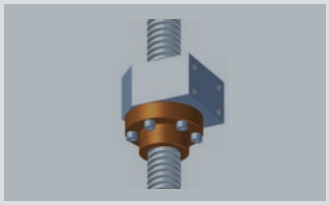


If the joint surface for the nuts is not at right angles to the spindle axis, the calotte disks KS can be used to compensate an error of up to ±3° on the fastening surface.

When tightening the screws, care must be taken that the two large disks are parallel to one another, in order to avoid excessive tilting torque of the screw heads.

The calotte disks are not suitable if the angle can change during operation.Parallelism errors of spindles to one another and to guides cannot be compensated.

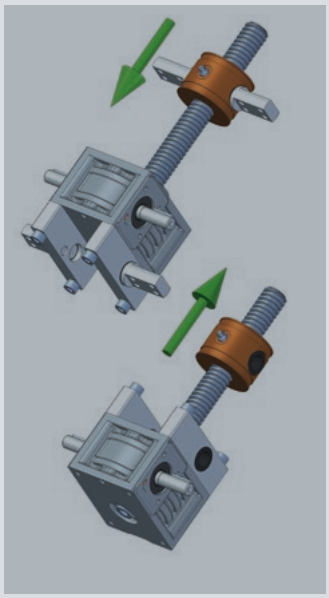
6.10.12 Carrier Flange TRMFL



The carrier flange serves for an eccentric fastening of a load, where by this load must have its own stable linear guide, so that solely an axial force acts on the nut and the carrier flange.

The torques that occur must be absolutely absorbed by an external guide, since the fastening screws could get overloaded with an additional tilting torque and the nut would be subject to significant wear.

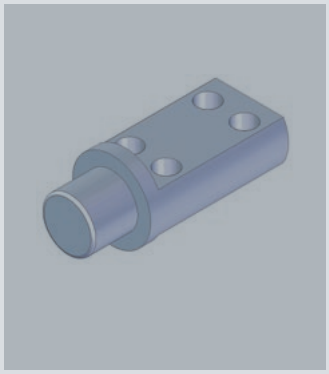
6.10.13 Cardan Adapter for Gearbox KAL, KAK and cardan Nut KM



The swivelling axis should preferably be arranged parallel to the drive axis, so that no additional torque acts on the spindles owing to the motor weight. Particular attention must be given in case of non-horizontally placed spindle axis, long strokes and large motors, otherwise, increased wear at the nut and the spindle will have to be expected. The pivot bearing bushings are maintenance-free and need not be lubricated. However, a one-off lubrication at the time of assembly improves the running-in characteristics as well as the friction coefficient. For the shaft, a tolerance zone h9 and a surface roughness of Ra=0.8 is recommended.

The cardan adapter must always be mounted in such a way that the fastening screws are not stressed in the main load direction. If this is not possible, the load that occurs may not exceed 50% of the rated load. Otherwise, calculations for the screwed joint will have to be carried out again with the conditions applicable in the respective application, in accordance with VDI2230.

6.10.14 Cardan Pin KB



The interface for the cardan pin must be made as rigid as possible, so that the pin cannot give way under load and the pins, always to be used in pairs, must be arranged coaxially, otherwise, a uniform positioning in the bearing bushes is not ensured, which results in excessive wear.The pins should be fastened in such a way that there is only a minimal play to the bearing bushes on the face side.

Above all, in combination of cardan pins with cardan adapter plates at the gearbox, a rigid positioning construction for the cardan pins is important. The pins must also remain coaxial (± 0.3°) under load, since otherwise, the fastening screws of the cardan adapter plates do no longer provide the same safety under the additional forces that occur.

The screw joint of the cardan pins must be designed with particular care and recalculated according to VDI2230. The resting contact surfaces should be so designed that shearing forces are avoided as far as possible.

6.10.15 Support Tube STR

With a support tube, large additional forces can act on the gearbox and the spindle, and therefore, for a swivel bearing solution, whenever possible, the cardan adapter should be preferred!

A horizontal arrangement is the least favourable, since almost the entire dead weight has to be absorbed by the short spindle guide in the gearbox. Therefore, the following maximum stroke lengths in mm apply:

NSE2	NSE5	NSE10	NSE25	NSE50	NSE100
100	200	250	400	500	600

The kink length calculation must be carried out without fail despite the already restricted stroke lengths. If the load is a pressure load, the maximum stroke length can be even shorter.

6.11.1 Modifications

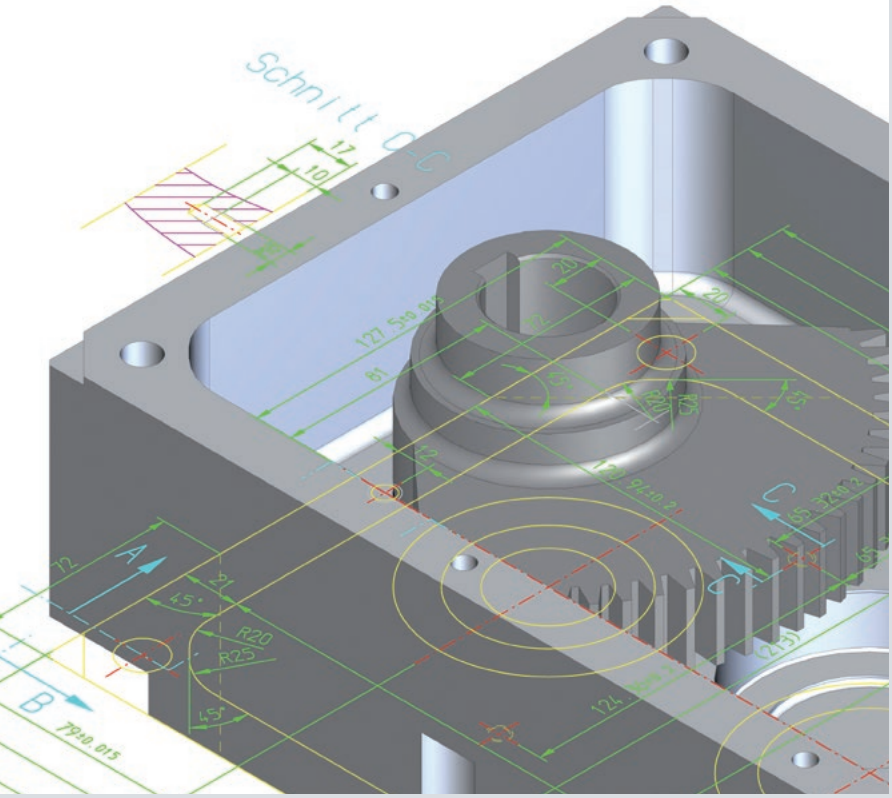
The screw jack and the accessories may not be modified without Nozag's agreement, neither from a technical safety standpoint, nor a constructive standpoint. Any violation of the latter rule shall free Nozag from all warranty or liability obligations whatsoever.

6.11.2 Dismantling and Disposal

At the time of dismantling, before loosening any screws, please ensure that all the loads have been secured. The local community waste disposal regulations must be observed.

6.11.3 Document Index

Product data sheets and catalogues are downloadable in PDF format from our website www.nozag.ch or can be obtained free of charge from Nozag.



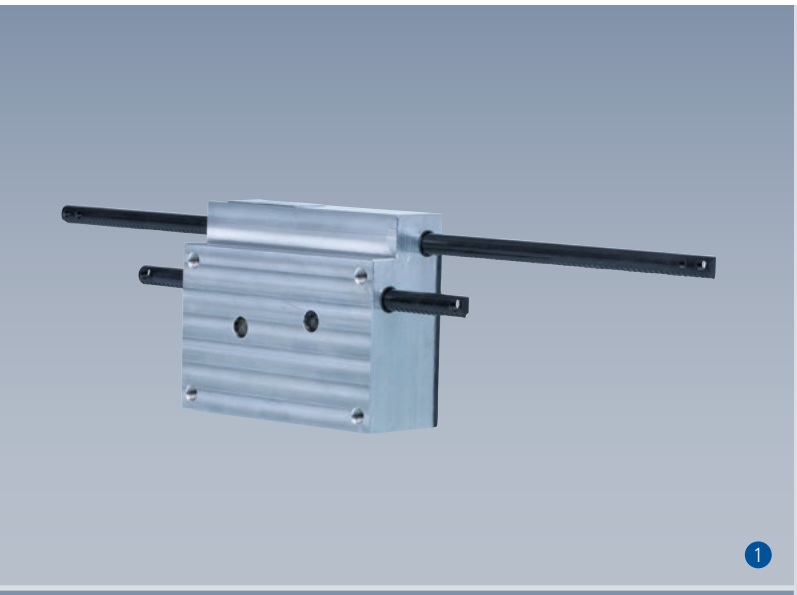
From your idea to the finished assembly – everything from one source

Years of experience
> over 40 years of producing gear components
> 35 years of experience in the development and construction in gearbox manufacturing

Theory in honor
> on our performance testing station for gearboxes, your prototype can be tested to your load cycle specifications

High series safety, thanks to performance tests
> many factors can be simulated, like different and changing torques, axial forces, radial forces, speeds and much more.

Complete logistic chain for your series product
> sourcing, manufacturing of individual components
> reliable, flexible assembling
> quality control
> on schedule delivery to your guidelines
> for yearly agreements, temporary storage possible
> delivery in swap containers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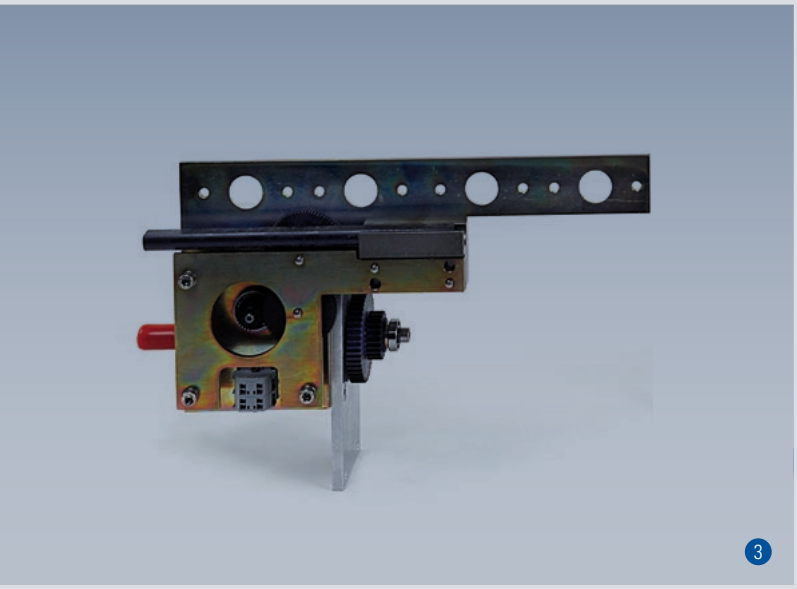
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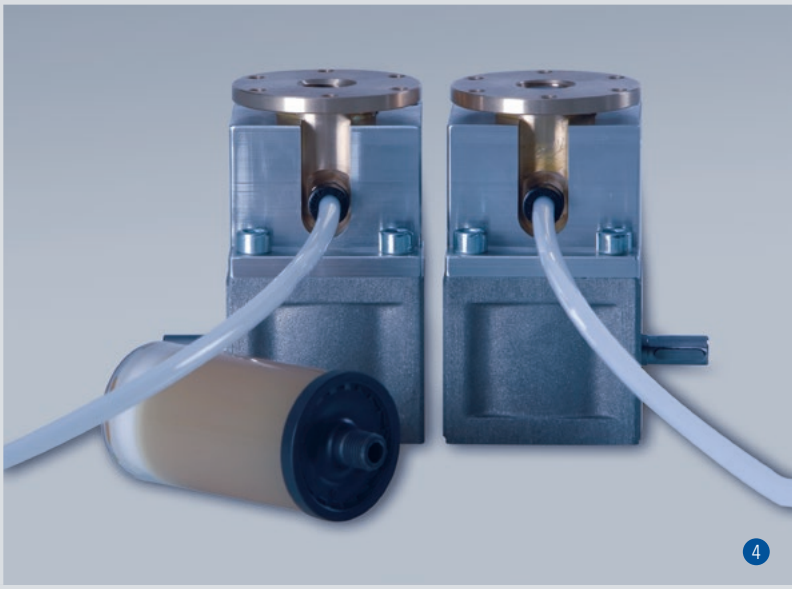
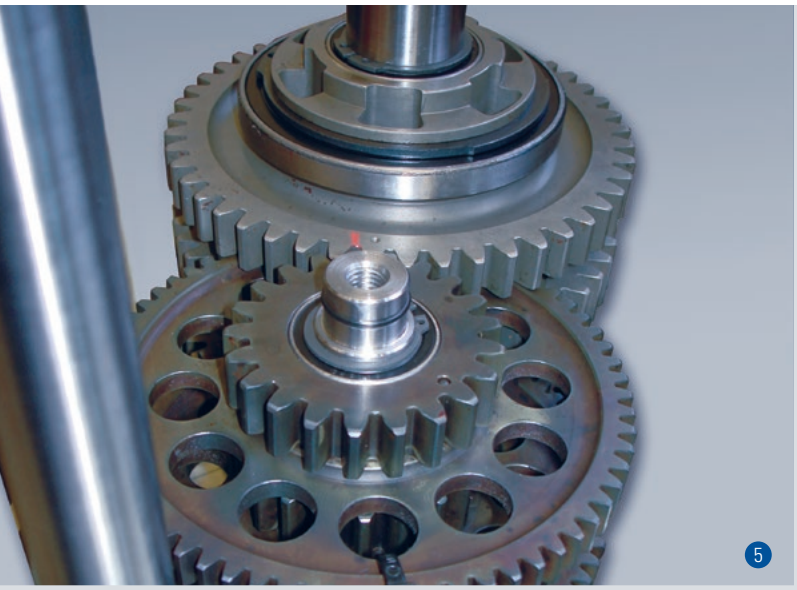

4

1 spur gear drive with rack as a positioning indicator

2 Nozdrive® as an elevating drive

3 worm drive for switch activation (energy transfer)

4 Screw jacks with transverse guidance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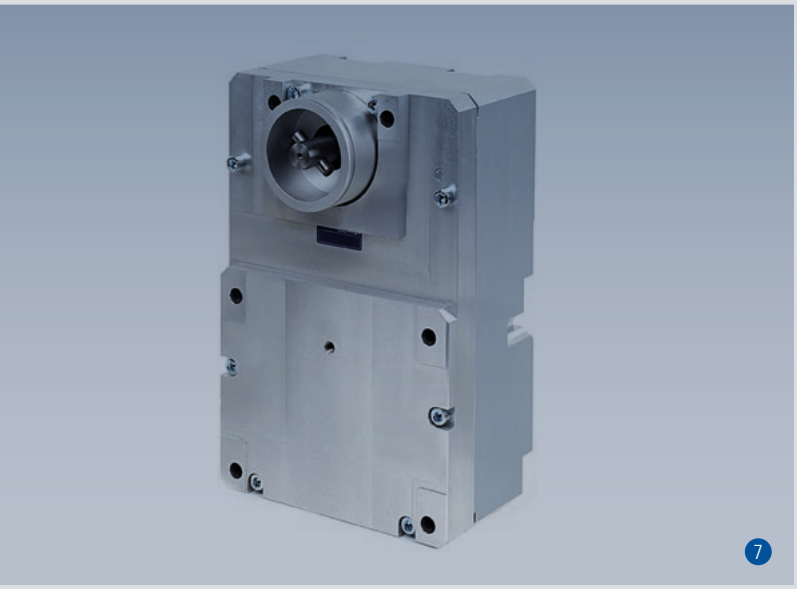
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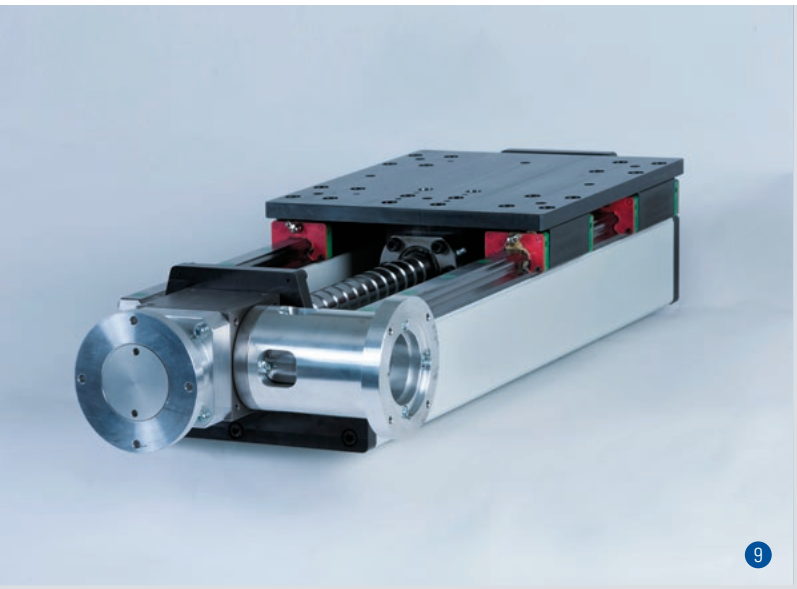
8

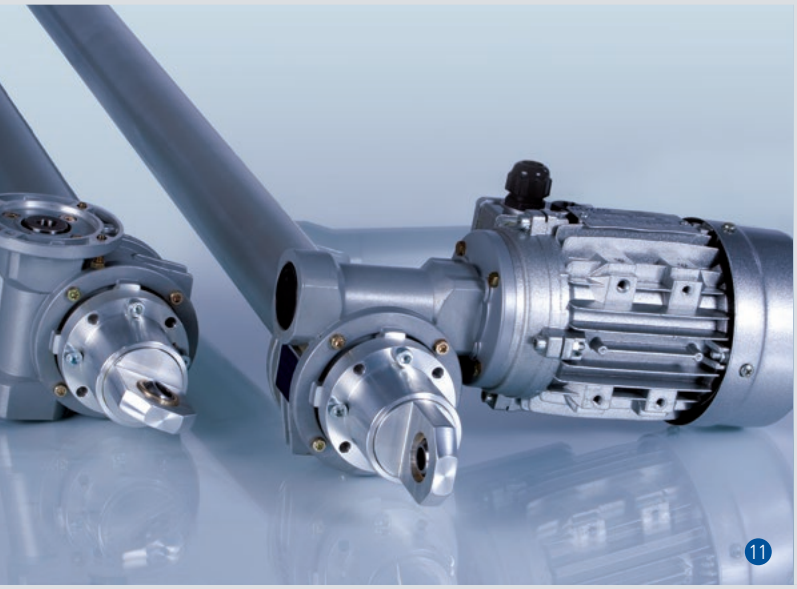
5 Customer-specific spur gear boxes

6 bevel gearbox with combined spur gear drive for wheelchair drive mechanism

7 spur gearbox with a dimension of: 390 x 255 x 120 mm

8 spur gearbox for drainpipe robot



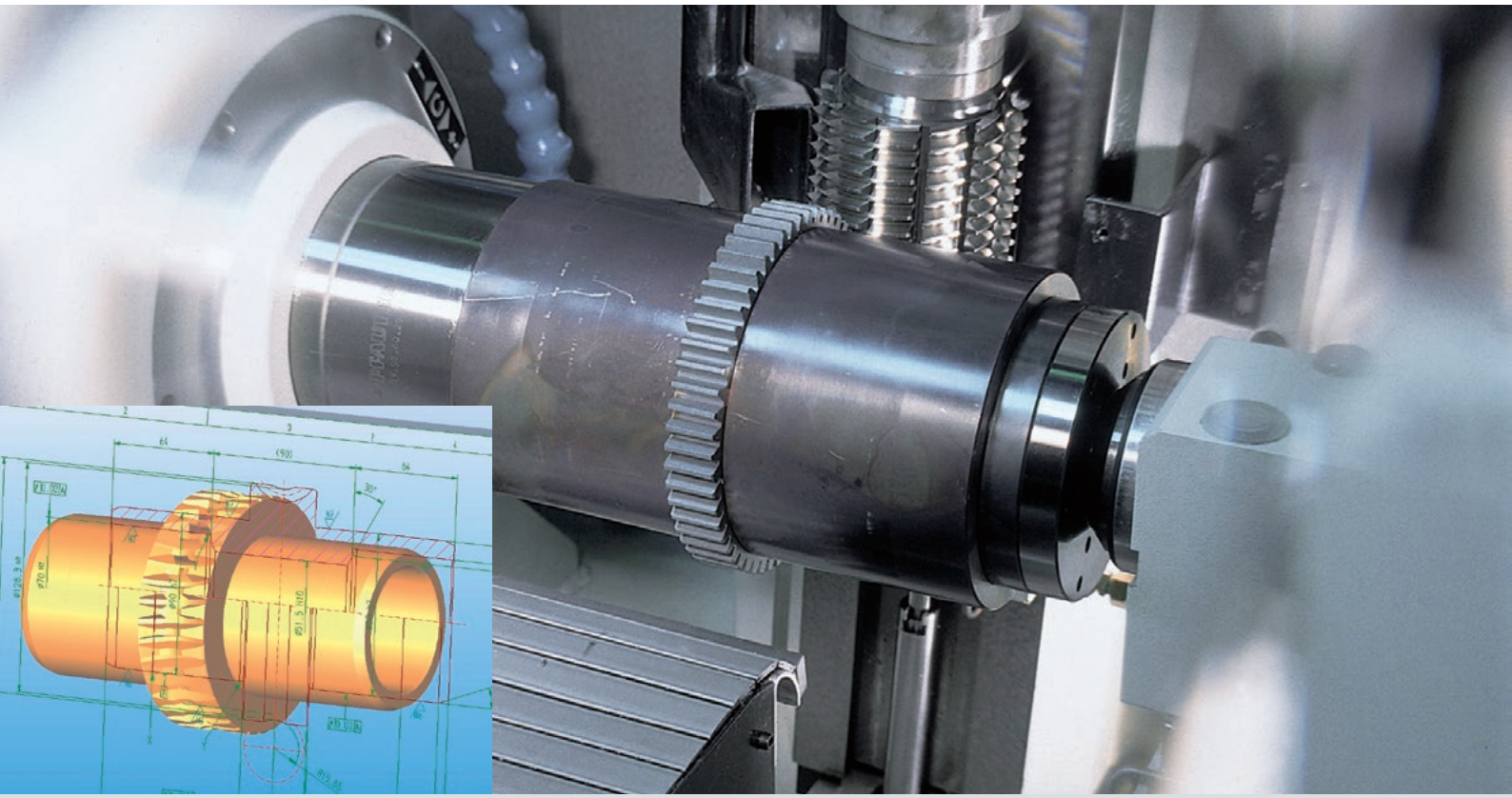


9 «ALL-IN» Ball Screw for Common Lifting Situations

10 Nozdrive® for trapezoidal screw technique – configure your applications mass

11 SHC – reliable in any weather

12 spur gearbox CHC



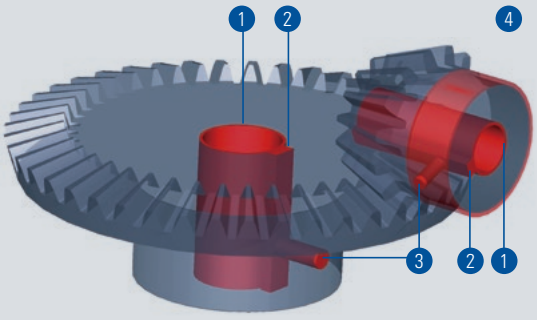
Components made from your drawing

Take advantage of our strengths and skills
- our own production in CH-8330 Pfäffikon
- high flexibility
- Swiss quality
- short delivery times
- one partner for the sourcing of finished components
- even small batch series
- thermal or galvanic treatment

Gears from our own production
- module from 0.3 to 8mm
- up to Ø 500 mm
- material: steel, stainless steel, bronze, brass, plastic, plastic with steel-core, laminated fabric, etc.
- even helical toothed, hardened and ground

Upon request we take over the logistics for you
- call orders with duration of up to 12 months
- delivery in swap containers

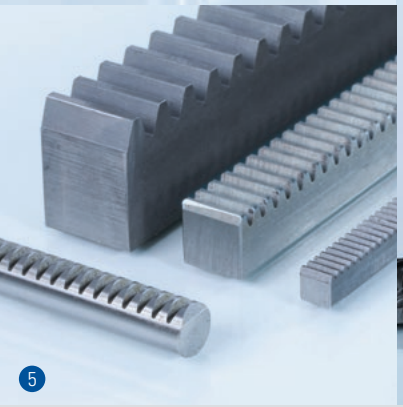
You benefit of
- reasonable price due to larger series
- short delivery time for each call-off
- smaller warehouse costs
- no material price fluctuations



1 bore bigger? **2** keyway? **3** threaded bore? **4** lathe off hub?

Your advantages at one glance

> 3D CAD data download from www.nozag.ch
> support for layout and dimensioning
> drive systems and components from our own production
> ready to install processing of standard components according to your needs
> special execution to your specifications out of our own production
> most standard components available from stock
> flexibility and quality thanks to our own production
> various materials such as steel, stainless steel, bronze, brass, plastic, laminated fabric



1 Spur gears Module 0.3 to 8
- straight toothed, helical toothed
- upon request, hardened and ground

2 Bevel gears up to Module 6
- straight toothed, helical toothed
- upon request, hardened and ground

3 Trapezoidal screws and nuts
- for longer life, also available with surface treatment

4 Worms and worm wheels

5 Standard racks

6 Chains and sprockets
- standard chains
- special chains even for difficult applications or requirements

7 Connecting shafts
- torques up to 1060Nm
- speeds up to 4000min^{-1}
- lengths up to 3000mm
- radial assembly

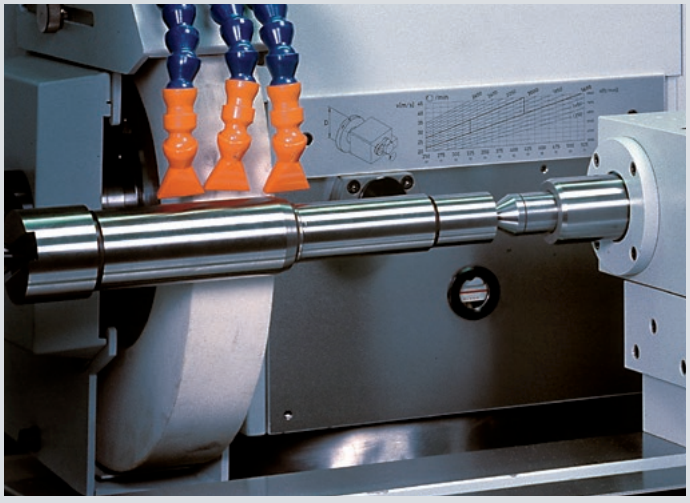
8 Internal ring gear Module 1 to 2

Hardened precision steel shafts from stock or machined ready for installation

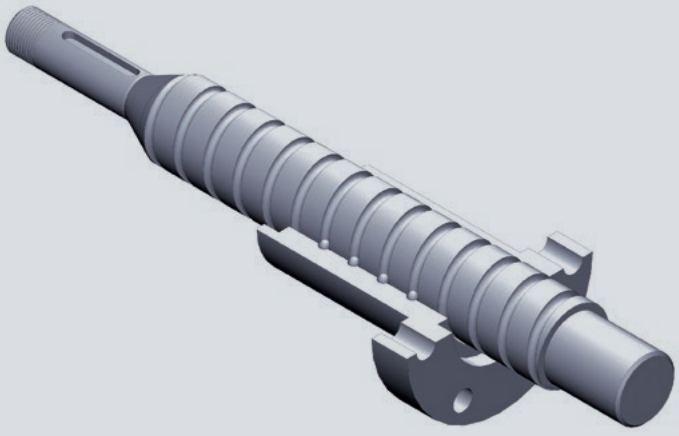
Our high quality shafts are used in most areas of industry, such as for textile, printing, packaging industry, machine tools, machinery for the food industry, measuring and control systems, linear systems, optical and medical equipment, etc.

Flexible
- precision shafts at short call from stock
- thanks to our own production, fast processing to your drawings

Quality under our own control
- long time production specialists in high precision mechanics



Further processing of a precision shaft on grinding machine



End machining on ball screw

Overview of Types and diameters

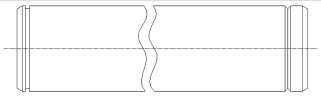
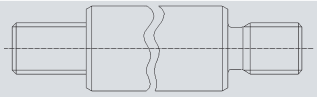
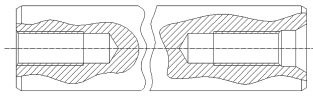
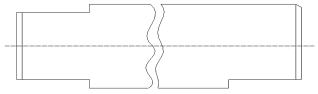
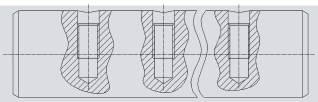
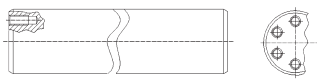
All precision steel shafts and tubes are available, in production lengths or cut to length, from stock. Further diameters and tolerances available on request.

	Description	External-Ø in mm, tolerance h6, ground, polished Ra <= 0.30															
		5	6	8	10	12	14	15	16	18	20	25	30	35	40	45	50
WE	standard precision steel shaft material No. 1.1213 inductively hardened HRC 60-66	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
CWE	chrome plated precision steel shaft material No. 1.1213 inductively hardened HRC 60-66 chrome plated to size 10 ± 5 microns		■	■	■	■			■		■	■	■		■		
XWE	precision stainless steel shaft material No. 1.4112 inductively hardened HRC 53-59		■	■	■	■		■	■		■	■	■		■		
HWE	precision steel tube material No. 1.0601 inductively hardened HRC 60-66					■			■		■	■	■		■		
	internal-Ø					4.0			7.0		14.0	15.4	18.0		26.0		

Applications / operational areas

WE suitable for upper grade applications within the field of linear guides, guide pillars, roller levelling and holms
CWE suitable for upper grade applications within the field of linear guides, guide pillars, roller levelling and holms
XWE suitable for upper grade applications within the field of linear guides, shafts and guide pillars with demand for resistance to corrosion
HWE suitable for upper grade applications within the field of linear guides, guide pillars and holms

The following processing can also be done to hardened precision shafts

Here are some examples		
plunge cut for retaining ring DIN 471		**90° plunge cut**
threaded pin with thread runout		**threaded pin with undercut**
face side tapped hole		**face side tapped hole with protective centre**
keyway		**90° counter bore**
spanner flats		**clamping surface**
radial tapped hole		
tapped hole on a pitch circle		
pin		**pin with threaded pin**

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