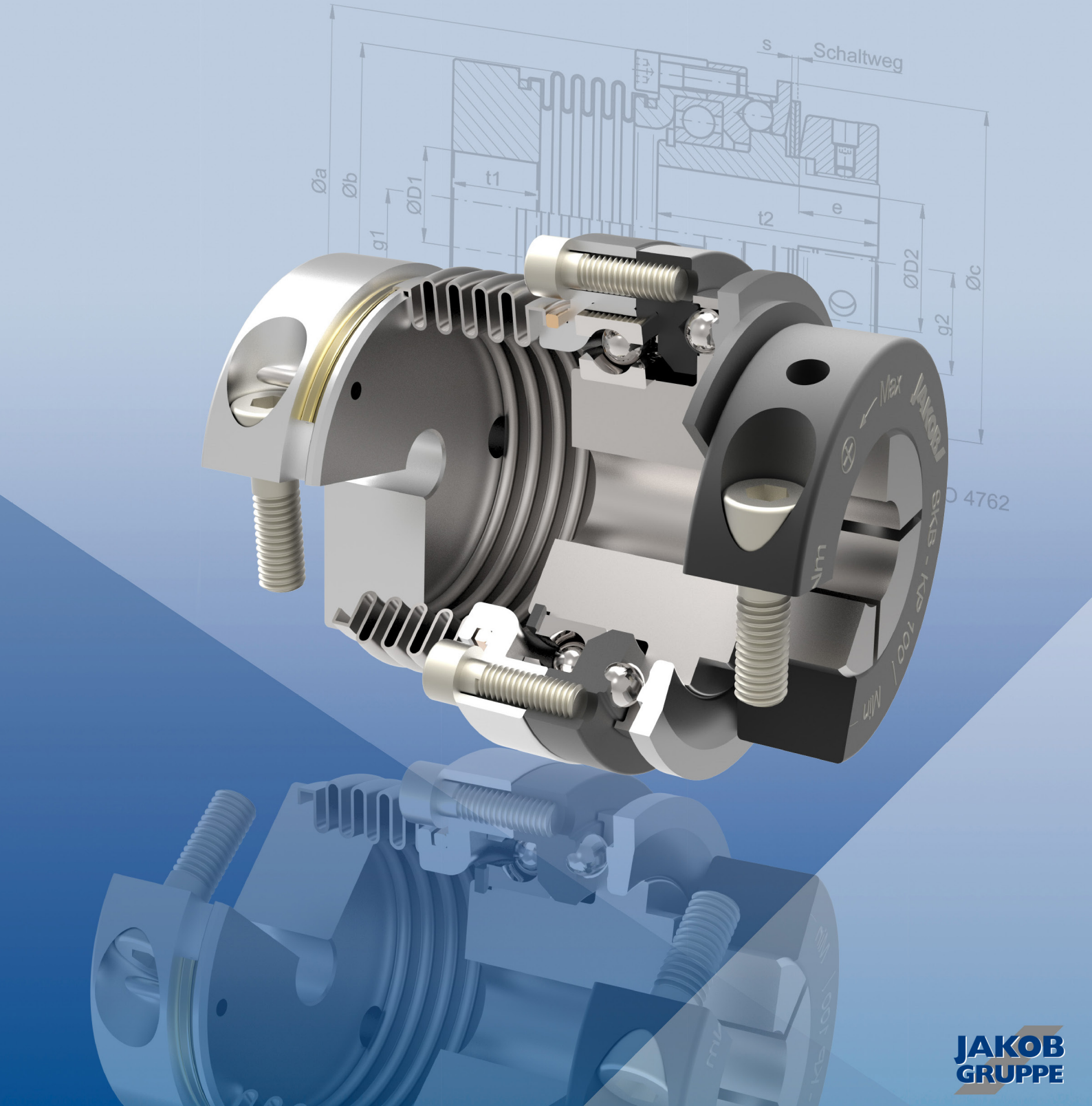
JAKOB Antriebstechnik

# Safety couplings




JAKOB GRUPPE

# The company JAKOB

**JAKOB Antriebstechnik GmbH** is an internationally leading manufacturer of servo couplings, safety couplings, and mechanical clamping elements.

For more than 50 years JAKOB has been developing and producing various types of torsionally stiff metal bellows couplings and safety couplings for the servo drive industry. Throughout our history we have earned ourselves a reputation of being a reliable and competent partner in the motion and drive industry.

JAKOB is the market leader in the area of mechanical tool and component clamping with its innovative and unique clamping technology.

The JAKOB wedge clamping technology provides the highest clamping forces with low actuation torques and, at the same time, maximum operational safety.

The goal of our servo and safety coupling catalog is to provide a general overview over our standard product range. More detailed information can be obtained at our homepage www.jakobantriebstechnik.de.

Highly trained engineers and technicians at our facility in Kleinwallstadt are always ready with a solution to best meet your requirements.

3D-models in STEP format are available for download at the corresponding site of our homepage. For special dimensions or different drawing types please contact JAKOB. Our other catalogs are also available upon request.

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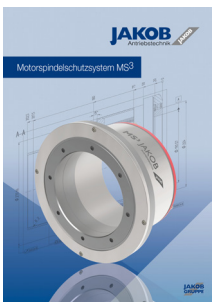
All technical details are subject to change. For the most up-to-date data sheets, please check our website.




# Safety Couplings I Contents

## Safety Couplings – indirect drives



## Safety Couplings – direct drives

# Safety Couplings I General

## Definition – Safety Couplings:

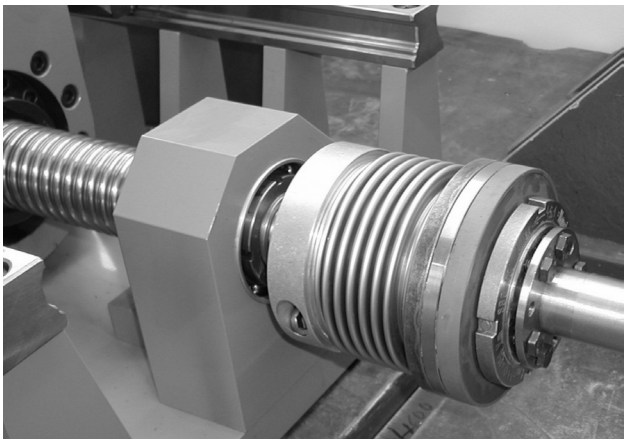
Due to the constantly increasing automation and dynamics of modern work processes, the devices which protect the complex and expensive units against damages in case of errors are becoming more important. JAKOB safety couplings reduce expensive machine damages, repairs and downtime by acting as torque limiters and overload protection absolutely reliably. JAKOB safety couplings are the life insurance for your machines, no matter whether the error occurs due to incorrect operation, programming error, material overload or tool breakage.

JAKOB safety couplings are the result of decades of continuous research and development as well as the experience gained from numerous different applications worldwide.
Unique design aspects, high-quality materials, precision machining of the individual components are some of the factors which make JAKOB couplings some of the leading couplings today. The safety couplings are used in all areas of the machine tool industry, ranging from critical servo drive applications to overload protection in conveyor systems.

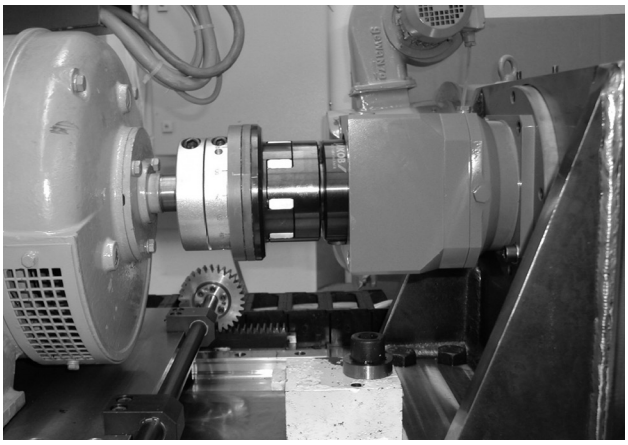
## Performance Characteristics – JAKOB Safety Couplings:

- optimal overload and collision protection to minimize damage
- backlash-free, precise torque transfer
- stepless disengagement torque adjustment
- fixed point reengagement (360° synchronised position)
- automatic reengaging (optional feature)
- degressive spring characteristic ◢ precise disengagement function
- excellent dynamic functional characteristics
- low moments of inertia ◢ high-speed
- large selection of types (modular system)
- integral fitting of pulleys or gear wheels
- stop-signal (emergency stop) by use of a proximity switch

## Application examples:



*Collision protection of a drive spindle with safety coupling series SKB-KP with bellows attachment*



*Safety coupling series SKB-EK with elastomer attachment for overload protection of a planetary gearbox*

# Couplings I Dimensioning

## Technical Information - Definitions / Details:

**Nominal torque of the coupling: $T_N$ - [Nm]**
The nominal torque of the coupling defines the max. load of the prolonged alternating-stress strength. If in normal operation, $T_N$ is not exceeded, an infinite number of operation cycles can be carried out (see d „durability“).

**Moment of inertia: $J_K$ - [$10^{-3}$kgm$^2$]**
The values for the moment of inertia are defined for medium hub-bores in the given diameter range Dmin/Dmax. Conversion: [kgcm$^2$] = [$10^{-4}$kgm$^2$]

**Torsional stiffness: $C_{TK}$ - [Nm/arc min]**
The values for the specific torsional stiffness of all couplings are converted from the existing values [103 Nm/rad] to “Newton meter per angular minute”. This enables the constructor to determine the torsion angle failure quite easily (see b below) under consideration of the operating torque. 60 angular minutes (resp. arc minutes) correspond to one angular degree. This defines the conversion factor 1 rad = 57,3° = 3438 arcmin.

Conversion: [103Nm/rad = 0,291 Nm/arcmin] resp. [1Nm/arcmin = 3438 Nm/rad=3,44 kNm/rad]
Example: Size KM 170: 17,5 Nm/arcmin= 60 kNm/rad

**Max. misalignment of shafts: [mm]**
The maximum misalignment of shafts is the largest allowed misalignment between drive and output shaft, which results from the calculation of the prolonged alternating-stress strength for compensating elements. If the allowed misalignment values are not exceeded, an infinite number of load alternations can be carried out. In exceptional cases (e.g. during fixing) particularly at reduced numbers of load alternations, the misalignment values may be considerably higher (please contact for further consultation).

- **axial misalignment:** usually without problems (expansion due to temperature)
- **angular misalignment:** usually without problems - allowed max. value: 1 to 2 degrees
- **lateral or parallel misalignment:** If the admissible values are considerably exceeded, permanent distortion at the bellows and higher wear of the elastomer spider can occur. Special care must be taken during fitting!

**Spring stiffness - axial / lateral: [N/mm]**
Restoring forces of metal bellows or elastomer spiders, caused by shaft misalignments.

## Dimensioning of the coupling

### a) according to torque:

Usually, the size of the coupling is chosen according to the required torque. For exact determination of the necessary drive torque, difficult calculations are neccessary. If the size of the motor is fixed, the necessary nominal torque of the coupling $T_{KN}$ can be calculated as follows:

$$T_N > 1{,}25 \cdot T_A\,max \cdot i$$

$T_A$ max = peak torque of the motor
i = transmission / reduction of the toothed belt drive or the spur-toothed wheel

### b) according to torsional stiffness:

For applications with very precise requirements (position control, transmitter), transfer errors due to high elastic deformation can be an important criterion for selection of the coupling. The torsional angle “$\alpha T$” is calculated as follows:

$$\alpha T = \frac{T_A}{C_{TK}}$$

**[arc minutes] with $T_A$= drive torque [Nm] $C_{TK}$= torsional stiffness of the coupling [Nm/arcmin]**

Very seldomly, metal bellows couplings may have resonance sounds (e.g. a whistling or a humming), when coupling types with a higher torsional stiffness or vibration reducing elastomer couplings are recommended.

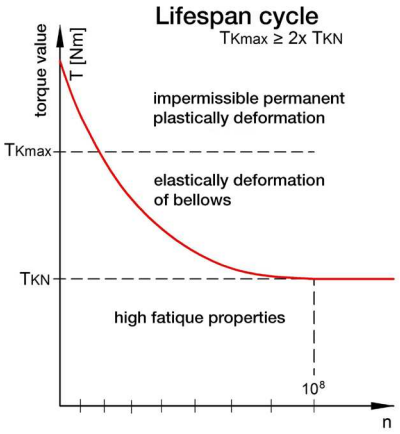
**c) according to shaft diameter:**

After selecting the coupling type, it must be checked whether the requested shaft diameter corresponds with the allowed diameter (Dmin / Dmax) of the hub bores. Another coupling type or size must be chosen, if the shaft diameter is overdimensioned in relation to the torque, which means it is larger than Dmax of the hub.

note: hub bores which are smaller than “Dmin” are possible, but an optimal transfer of the nominal torque cannot be guaranteed in this case, so a reduction of the drive torque is necessary.

**d) durability:**

The durability of JAKOB compensating couplings is basically determined by the peak torque and the existing shaft misalignment. If the admissible maximum values for the axial, lateral and angular misalignment are not exceeded and the operating torque is below the nominal torque $T_{KN}$, then the coupling is within the range of fatigue limit. An infinite number of start-stop-cycles or accelerations and decelerations can be carried out without having to expect a breakdown of the coupling during operation.

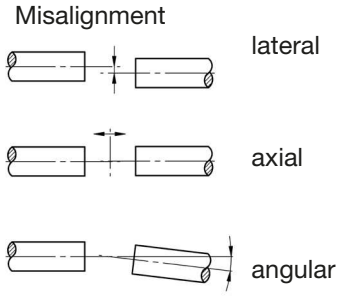



**e) max. load:**

In special cases, couplings can be overloaded for a short time with twice the nominal torque (2 x $T_{KN}$). This applies unless otherwise stated on the data sheet for the respective series. The shaft-hub-connection, however, must then be calculated seperately.

**f) bearing load:**

Due to the flexibility of the compensating couplings in all directions, considerable bearing loads are prevented, in spite of possible axial, lateral or angular misalignment from drive to output shaft. Therefore, an early breakdown or higher wear of the rolling bearing can be prevented. This means less difficult and expensive repairs.




**g) operating temperatures:**

Metal bellows couplings are, as whole metal couplings, extremely insensitive to temperature. Series with aluminum clamping hubs can be used without restriction from -40 ° C to + 150 ° C, short-term up to + 200 ° C. For models with welded steel or stainless steel hubs, the application temperature is a maximum of 350 ° C. The temperature limits of the elastomer spider are at 90°C (98 Sh-A) and 120°C (72 Sh-D).

h) speeds:

Due to precision machining, the rotation symmetry, and the additional balance pin, the compensating couplings are generally suitable for high speeds even without additional balancing. The standard balancing quality is approx. Q6.3 to Q16. Couplings with conical hubs or hubs with tapered ring can be operated with speeds of over 25,000 min-1 (please contact us for further information). The low moment of inertia also has a positive effect. The type-specific maximum speeds are specified in the data sheets. For very high operating speeds and sensitive drives, we recommend an additional balancing process (optional)

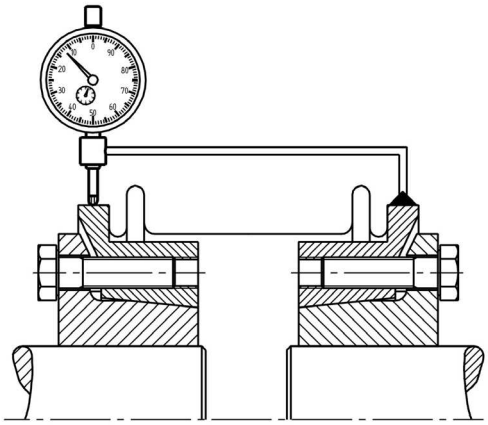
i) maintenance and wear:

Compensating couplings are maintenance and wear free under normal conditions. The polyurethane spiders of the elastomer couplings should be changed in suitable periods, if critical operation parameters are given.

# Couplings I Installation Instructions

## Alignment of shafts:

Axial and angle misalignment are usually without problems and also simple to measure. To obtain the lateral misalignment, it is recommended to proceed as follows: Fit a dial gauge with an appropriate holding device on one shaft end or on one hub of the coupling and bring the feeler onto the second shaft end or onto the second coupling half (sketch). Now the shafts are turned with the dial gauge and the deflection is read. One half of the total deflection is the lateral misalignment. The admissible value for the shaft misalignments must be taken from the technical data sheets of the appropriate series.



### Shaft-hub connection

The couplings are generally supplied with finished bores, in exceptional cases they are also supplied prebored. The seat shaft / hub is to be selected as a transitional seat (example: hub bore diameter 28 G6 - shaft diameter 28 k6). Prior to mounting, the finished bore shaft end conical sleeve should be oiled to prevent fretting corrosion. The coupling is then ready for assembly between the two shafts. An existing keyway in the shaft will not affect the frictional connection.

### a) lateral clamping hub

Admissible seat clearance shaft hub: **min. 0,01mm / max. 0,04mm**. Very simple fitting by tightening only one laterally arranged clamping screw (DIN 912). The value for the relevant tightening torques can be found in the data sheets. One hole in the housing is sufficient to tighten the clamping screw (see EASY-clamp sytem). The exception is the KG-HS series with two clamping screws arranged in mirror symmetry.

### b) conical hub / conical ring hub

Admissible seat clearance shaft-hub: **max. 0,02 mm.** Assembly of the conical bush or of the conical clamping ring with several, concentrically arranged mounting screws (as a rule 6x DIN 933). One side of the coupling is fit onto the shaft end by evenly tightening the screws crosswise (to prevent uneven draw-on). The drive or output is now turned by a few revolutions, so that the shaft pinion turns in the second hub and the hub can move on the shaft for axial release. Now the six screws of the second hub are also evenly tightened.

### c) split-hub

Admissible seat clearance shaft-hub: **min. 0,01mm / max. 0,04mm**. Two lateral clamping screws (DIN 912) are arranged oppositely. The hubs or couplings are split and consist of two loose halves. One of the split-hubs can be put onto the aligned shaft. Tighten clamping screws evenly, alternating between both sides (note specified tightening torques). A larger opening must be provided in the housing for easy installation.

### d) disassembly

After releasing the six retaining screws, the hubs are released with three push-off threads each. In axially tight space conditions, it is advisable to screw in and secure the push-off-screws before fitting. For disassembly an opening in the housing should be provided. Disassembly of lateral clamping hub: see EASY-clamp System page 7!

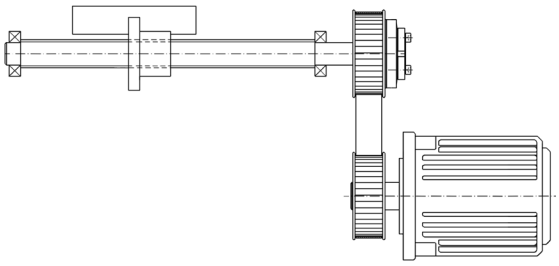
### e) special notes

- As the metal bellows consist of thin stainless steel sheeting, special care during fitting and disassembly is necessary. Damages to the bellows can render the coupling useless
- **hub bores which are smaller than “Dmin”** are possible, but an optimal transfer of the nominal torque cannot be guaranteed in this case
- at smaller shaft diameters, the conical hub (larger section thickness) is slotted additionally
- you will find further type specific technical details and characteristics in the data sheets

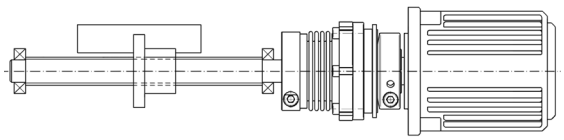
# Safety Couplings I Modular System

The safety coupling modular system, consisting of three standard assemblies and several special variants, enables a solution for almost every application. Depending on the application, various add-on elements can be attached to the release mechanism to be attached. For indirect drives, belt pulleys, gear wheels or corresponding connecting parts are flanged on. In the case of direct drives, the release mechanism is supplemented with metal bellows or an elastomer coupling part to compensate for any shaft misalignments. The main selection and design criteria are the torque to be transmitted, the required torsional rigidity, the existing shaft diameter, the installation conditions and other operating parameters such as temperature, shaft offset and operating speed.

indirect drives



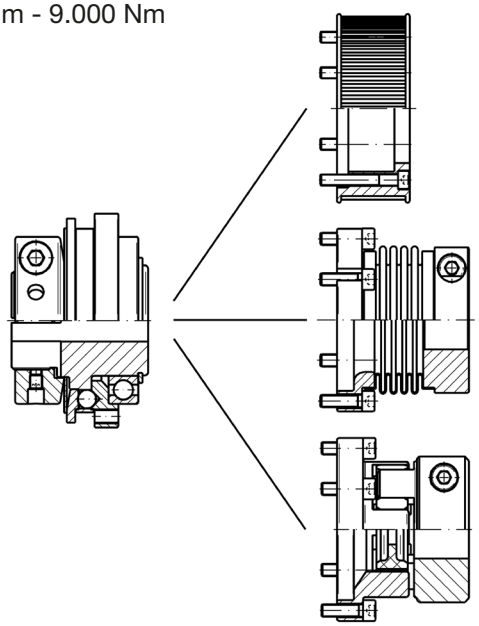
direct drives



## Overview:

**safety mechanism**
1 Nm - 9.000 Nm

**attachments**

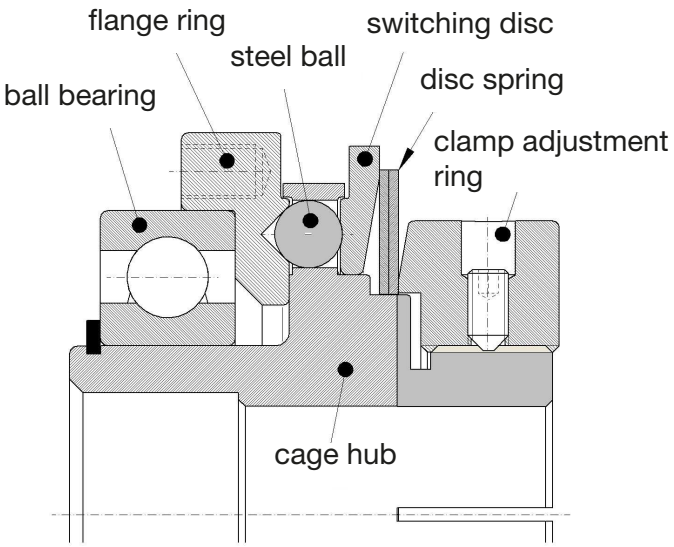


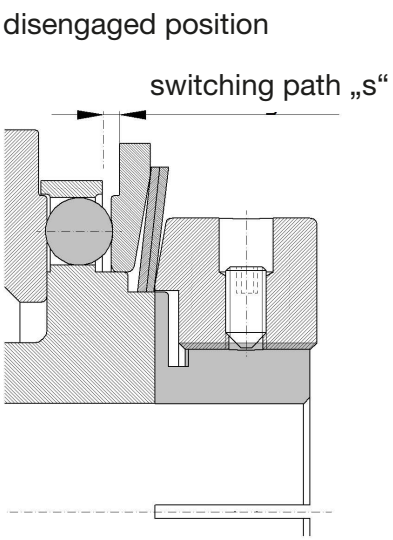
| | series |
|---|---|
| ◢ pulleys<br>◢ gears<br>◢ flanges | SK<br>SKW<br>SKR |
| ◢ metal bellows<br>• torsionally stiff<br>• all-steel-version<br>• high operating temperatures<br>• variable length | <br><br><br>SKB-KP<br><br>SKW-KP |
| ◢ elastomer spider<br>• oscillation dampening<br>• plug-in, electrically insulating<br>• Tmax ≤ 120°C | <br>SKB-EK<br><br>SKW-EK |

## Note:

- To reduce wear on the safety coupling mechanism the drive should be stopped as soon as possible after disengagement. The signal of the limit switch can be used for this purpose (emergency-OFF signal)
- In vertical drive axes, the slide or the table can drop upon disengagement of the safety coupling due to its own weight and the low residual torque of the safety coupling. To counter this effect, it is suggested that either a compensating weight or an additional brake be provided.
- During the coupling selection, the linear measuring system (positioning) must also be considered. When fitting an encoder to the drive motor, a torsionally stiff coupling should be used to get the best results.
- For high speed applications, please select types SKY or SKY-ES because of their rotational symmetry. Nominal speed up to 4,000 $min^{-1}$ as well as safety couplings with release mechanism are possible on request.
- The safety coupling is maintenance free under normal operating conditions.
- For mounting instructions and explanations about the shaft - hub - connection, please see separate datasheets.

# Safety Couplings I Technical Information




*The axial stroke of the switching disk is immediately stopped by means of a non-contact or mechanical limit switch (emergency stop) of the drive.*

JAKOB safety couplings are designed as predetermined separation points, collision protection or overload limitation in a direct or indirect drive train. The heart of the safety clutch is a high-precision, robust release mechanism with steel balls as a spring-loaded form-fit body. The torque is introduced into the centrally located hub via a non-positive and backlash-free clamp or cone connection. The hub is designed as a ball cage and is used to hold the flange ring, the switching disc with disc spring and the adjusting nut. Special disc springs press the balls into hardened countersinks via a pressure or switching disc. bores (calottes) of the flange ring. In normal operation, this means that the drive torque is transmitted backlash-free to the flange ring. A compensating element (metal bellows, elastomer star), a toothed wheel or belt wheel or another connecting part is optionally attached to the flange ring. If the set release torque is exceeded, the flange ring twists relative to the cage hub and the balls are suddenly pushed out of the calottes, interrupting the drive train. The residual torque is a maximum of 10% of the set release torque.

## The play-free ball detent mechanism

A backlash-free torque transmission with high torsional rigidity is guaranteed by a specially designed tensioning of the hardened and polished steel balls between the ball cage of the hub and the spherical caps of the flange ring. In reversing operation, the mechanics work equally for both directions of rotation.

## The dynamic release behavior

JAKOB safety clutches are characterized by excellent dynamic release behavior. The reason for this is the degressive spring characteristic as well as the minimized masses (ball and switching disk), which have to be accelerated axially when disengaging. This guarantees that the drive train is interrupted within a few milliseconds in the event of a collision. This results in a very low mass force that has to be added to the spring force. With many other safety clutch types, the dynamic release torque and the switching time can increase significantly due to the large switching masses and linear standard springs. The maximum operating speed should not exceed 4000 rpm (from size 1000Nm - 3000 rpm).

## The re-entry – fixed-point switching

The balls or the cage bores and calottes are distributed asymmetrically around the circumference, so that only one angle-synchronous detent position is possible per 360°. The balls ratchet over once per revolution with little residual torque until they come to a standstill. The repetition accuracy of the set release torque is max. ± 5%. Special versions of the locking mechanism (6x60° or 8x45° locking) are available on request. After the cause of the failure has been rectified, the clutch automatically re-engages in the synchronous position when operated at low speed (< 30 rpm) and is ready for operation.

## Sicherheitskupplungen - Drehzahlinformation

In general, when using safety clutches, the operating speed should be a maximum of 4000 rpm - for sizes from 1000 Nm a maximum of 3000 rpm. Rotationally symmetrical hub variants, as well as types with an elastomer coupling attachment, are for high speeds most suitable. Balancing is optionally possible.

### The degressive spring characteristic

The function of the JAKOB safety couplings is significantly influenced by the disk springs specially developed for this application. Due to the design in the degressive characteristic curve area, the spring force decreases with increasing spring deflection (switching travel), which means that the torque drops immediately when it responds. With usual Spring-loaded overload clutches, on the other hand, increase the spring force and the release torque, e.g. T. significantly. This results in an undefined functional behavior between response and disengagement, as well as a significantly higher residual torque.

### Mechanics with backstop

An additional freewheel, which serves as a backstop, prevents disengagement in the opposite direction. Irrespective of the set release torque, this ensures permanent forced driving with the nominal torque. (Upon request)

### The unlock mechanic

In applications with high operating speeds (test benches) or long run-on times (immediate stop not possible), it may be necessary to supplement the locking mechanism with a release mechanism. For this purpose, JAKOB has several proven functional variants available, which prevent it from re-engaging until it comes to a standstill.

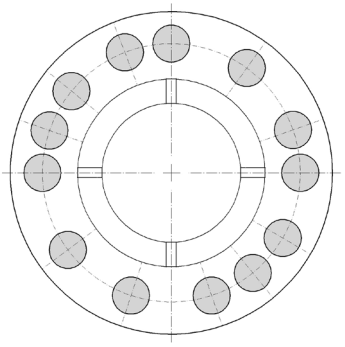
### The Labyrinth Seal

In the SKB and SKW series, the locking mechanism is protected by a labyrinth seal against the ingress of coarse dirt particles or heavy leaching of the lubricant. If required, a complete encapsulation of the release mechanism is also possible (on request).

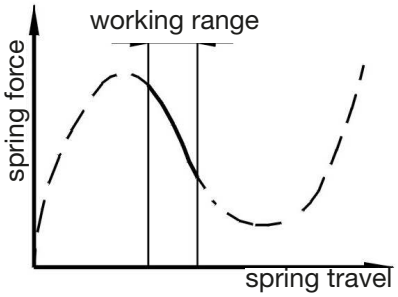
### corrosion protection

Most of the series are optionally available in a corrosion-protected material version. A special surface coating of the steel components ensures excellent rust resistance - ball bearings, locking balls, etc. are made of stainless steel and the disc springs are nickel-plated. Safety couplings made entirely of stainless steel, e.g. for the food industry, can also be offered on request.

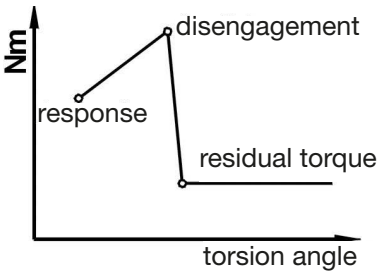
**Fixed point switching - asymmetric ball position**



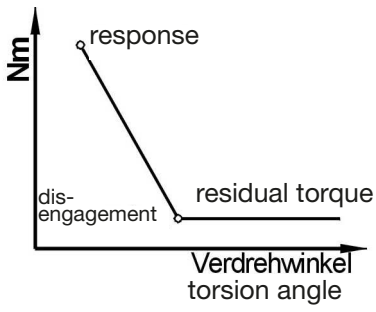
**Spring characteristics**




**Regular form-fit coupling**




**JAKOB Safety coupling**



# Safety Couplings I Adjusting the Disengagement Torque

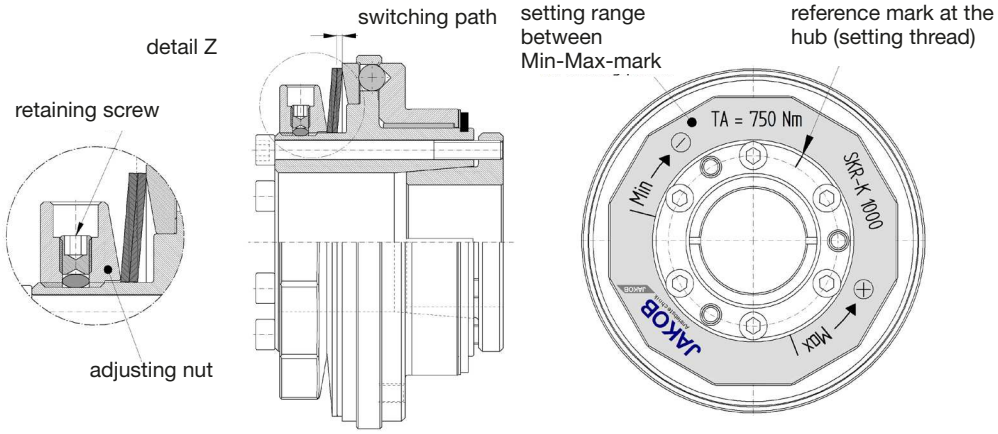
The disengagement torque is generally steplessly adjustable between about 40% and 100% of the nominal clutch torque. If no setting is specified by the customer, the maximum torque (nominal torque) is set. The set, static disengagement torque can easily be readjusted by turning the adjusting nut or the adjusting ring on the machine using a hook wrench. For this purpose, the setting rings of all series are provided with a user-friendly label and the set release torque as well as a marking for the minimum and maximum release torque (Tmin, Tmax) are engraved. Additional scaling is possible on request. Higher disengaging torques greater than Tmax are generally possible, but this results in greater wear on the locking mechanism.

## Caution:

**Due to the degressive spring characteristics, turning back (counter-clockwise) the adjusting nut means an increase, or a turning in clockwise direction means a reduction of the disengagement torque (see direction arrow at clamping nut)!**

## Reihe SKW/SKR/SKY

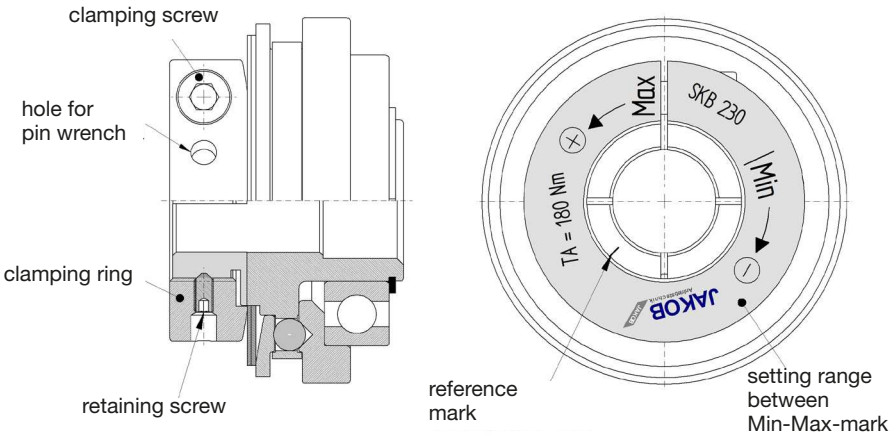
**Einstellvorgang für das Ausrückmoment:**




*Setting procedure for the release torque:*
*Completely loosen the locking screws (see Detail Z). Turn the adjusting nut in the minus or plus direction with a hook wrench! Observe the reference mark and min-max mark. After the adjustment, secure the adjustment ring by screwing in the locking screws. Factory setting of the release torque, see ring engraving.*

## Series SKB

**Setting of disengagement torque:**




*Setting procedure for the release torque:*
*Loosen the locking screw. When installed, the clamping screw of the clamping ring hub must also be loosened. Then turn the clamping ring in the minus or plus direction - note the reference line and the MIN and MAX markings. The drive shaft should be locked here. Finally, tighten the clamping screw with the specified TS value and screw in the locking screw. Factory setting of TA see ring engraving.*

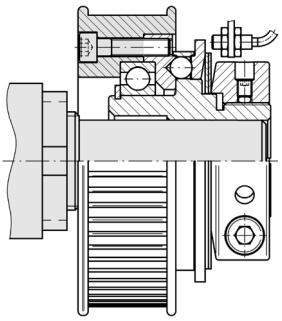
# Safety Couplings I *for indirect drives*

- for the attachment of toothed belt pulleys, gear wheels, chain wheels, flanges, and so on
- with integrated ball bearing or sliding bearing - for optimal constructional adjustment
- frictional shaft-hub-connection with conical clamping bush or conical clamping ring or keyway

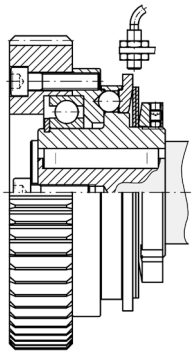
For overload limitation or as collision protection for indirect drives, JAKOB offers the SKB, SKW and SKR series with integrated ball bearings or with integrated slide bearings in the standard range. Toothed belt pulleys, gears or other attachments with a concentricity or axial runout accuracy of a few hundredths of a millimeter can be attached to the respective coupling flange rings. In normal operation, the bearings have the task of absorbing the lateral and axial forces and passing them on to the input or output shaft. By means of a conical clamping ring (SKR-K) or a clamping ring hub (SKB), the set torque is transmitted from the shaft to the clutch hub absolutely backlash-free and friction-locked. If a feather key connection between shaft and hub is sufficient, the inexpensive type SKW can be used. While the SKB and SKW couplings are suitable for normal and large discs and pinions due to the pitch circle diameter of the fastening threads, the SKR series is designed for add-on elements with a large width or small diameter. With the SKR series, extremely compact design solutions are possible thanks to the integrated plain bearing, and the forces are introduced almost centrically to the bearing. Since the clamping ring clamping was also arranged on the inside towards the shaft, the SKR coupling is ideal even in very tight spaces with minimized bearing loads on the motor or transmission. Drive shaft.

Other types of safety couplings for indirect drives, e.g. with a release mechanism, are available on request.

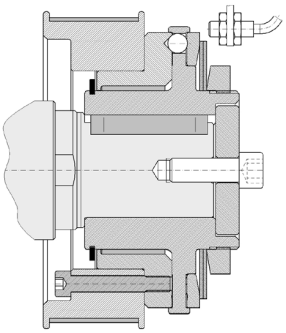
## Series SKB



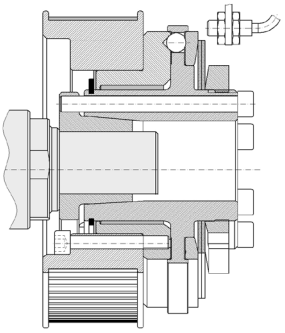
## Series SKW



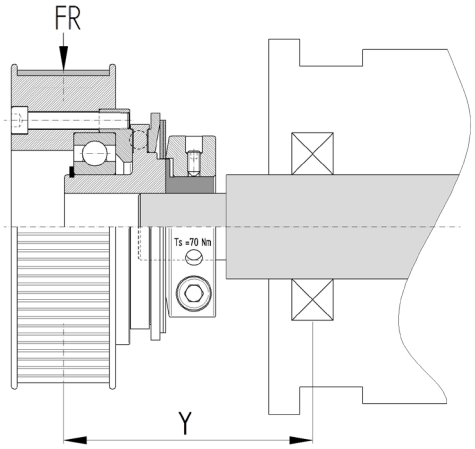
## Series SKR-N



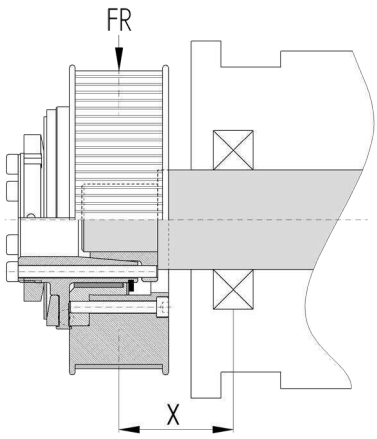
## Series SKR-K



## Bearing load Baureihe SKB




## Bearing load Baureihe SKR



# Safety Coupling I Series SKB *for indirect drives*

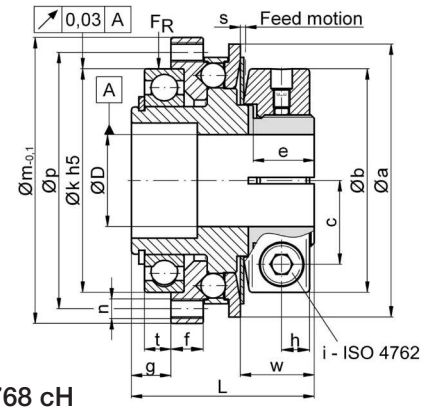
- simple installation with clamping ring hub
- with integral ball bearing
- for high axial and lateral loads
- excellent run-out accuracy

## technical data:

| SKB size | setting range disengagement torque $T_{KA}$[Nm] | moment of inertia [$10^{-3}$kgm²] | mass approx. [kg] | tightening torque of screws i [Nm] | max. lateral load $F_R$ [N] | bore diameters øD min | bore diameters øD max | bore diameters øD max. bore- Ø keyway DIN 6885 |
|---|---|---|---|---|---|---|---|---|
| 1,5 | 0,3 - 1,5 | 0,009 | 0,07 | M3 - [2] | 750 | 6 | 12,7 | 10 |
| 3 | 1 - 3 | | | | | 6 | 12,7 | |
| 6 | 2 - 6 | 0,09 | 0,36 | M5 - [8] | 5000 | 6 | 16 | 12 |
| 12 | 6 - 12 | | | | | 8 | 16 | |
| 15 | 8 - 15 | 0,36 | 0,8 | M6 - [16] | 8000 | 10 | 25,4 | 20 |
| 30 | 13 - 30 | | | | | 12 | 25,4 | |
| 45 | 22 - 45 | | | | | 14 | 25,4 | |
| 60 | 25 - 60 | 1,1 | 1,5 | M8 - [35] | 9500 | 18 | 35 | 30 |
| 100 | 40 - 100 | | | | | 18 | 35 | |
| 150 | 60 - 150 | | | | | 24 | 35 | |
| 230 | 80 - 230 | 4,2 | 3,3 | M10 - [70] | 23000 | 24 | 44 | 38 |
| 330 | 130 - 330 | | | | | 32 | 44 | |
| 500 | 200 - 500 | 12,2 | 6,2 | M14 - [200] | 30000 | 28 | 58 | 50 |
| 800 | 350 - 800 | | | | | 40 | 58 | |
| 1000 | 500 - 1000 | 76 | 20 | 2xM16 - [250] | 50000 | 42 | 100 | 90 |
| 2000 | 800 - 2000 | | | | | 48 | 100 | |
| 3000 | 1500 - 3000 | 240 | 34 | 10xM10 - [60] | 65000 | 50 | 120 | Optional |
| 6000 | 3000 - 6000 | | | | | 60 | 120 | |
| 9000 | 3000 - 9000 | | | | | 80 | 120 | |

*temperature range: -30°C up to +150°C*

***material:***
*heat-treated steel*
*optional in stainless version*


## Dimensions [mm]: length dimensions according to DIN ISO 2768 cH

| SKB | Øa | (Øa*) | Øb | c | e | f | g | h | Øk$^{h5}$ | Øm | Øp | L | n | s | t | w |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,5/3 | 32 | - | 28,5 | 10,1 | 8 | 4 | 5 | 4 | 24 | 32 | 28,5 | 26,5 | 4xM2,5 | 0,5 | 2,5 | 12,4 |
| 6/12 | 48 | (42)* | 38,5 | 13,5 | 13 | 8 | 9,8 | 6 | 42 | 52 | 47 | 41 | 6xM3 | 0,9 | 7 | 15,8 |
| 15/30/45 | 66 | (60)* | 53 | 19,5 | 15 | 9 | 11,5 | 7,5 | 55 | 69 | 62 | 48 | 6xM4 | 1,2 | 8 | 18,5 |
| 60/100/150 | 83 | (76)* | 68 | 25,5 | 18,5 | 9 | 12 | 8,5 | 68 | 87 | 78 | 55,5 | 6xM6 | 1,6 | 8 | 22,4 |
| 230/330 | 109 | (104)* | 87 | 32 | 21 | 14 | 16,5 | 10,5 | 90 | 113 | 102 | 71,5 | 6xM8 | 1,8 | 12 | 25,6 |
| 500/800 | 132 | - | 115 | 42 | 30 | 15 | 17 | 13,5 | 110 | 136 | 124 | 87,5 | 8xM8 | 2,5 | 12 | 37 |
| 1000/2000 | 185 | - | 172 | 69 | 76 | 16 | 28 | 17/30 | 140 | 181 | 165 | 142±2 | 12xM10 | 3,7 | 21,5 | 77 |
| 3000/9000 | 236 | - | 215 | Ø160 | 82 | 18/14 | 22 | - | 180 | 243 | 200/225 | 166 | 12xM10 | 3,0 | 14 | 87 |

*For size 3000 - 9000 shrink disk clamping instead of clamping ring design*

*note: smaller outer diameters of the thrust plate are possible (see values in brackets)

order example: SKB 30 - D = 24 $^{H7}$ - $T_{KA}$ = 25 Nm

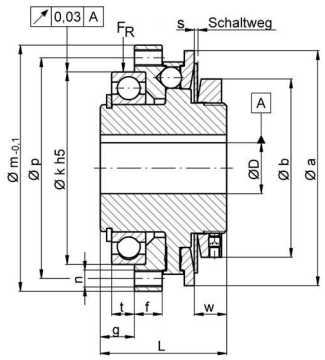
# Safety Coupling I Series SKW *for indirect drives*

- cost-effective type
- easy keyway connection
- with integrated ball bearing for high axial and lateral load

technical data:

| SKW<br>Size | setting range disengagement torque $T_{KA}$[Nm] | moment of inertia [$10^{-3}$kgm$^2$] | mass approx. [kg] | max. lateral-load $F_R$ [N] | n | bore diameters øD min - max |
|---|---|---|---|---|---|---|
| **1,5** | 0,3 - 1,5 | 0,008 | 0,07 | 750 | 4 x M 2,5 | 6 - 10 |
| **3** | 1 - 3 | | | | | |
| **6** | 2 - 6 | 0,08 | 0,28 | 5.000 | 6 x M3 | 6 - 12 |
| **12** | 6 - 12 | | | | | |
| **15** | 8 - 15 | 0,3 | 0,63 | 8.000 | 6 x M4 | 8 - 22 |
| **30** | 13 - 30 | | | | | 10 - 22 |
| **45** | 22 - 45 | | | | | |
| **60** | 25 - 60 | 0,91 | 1,25 | 9.500 | 6 x M6 | 11 - 32 |
| **100** | 40 - 100 | | | | | 13 - 32 |
| **150** | 60 - 150 | | | | | 16 - 32 |
| **230** | 80 - 230 | 3,70 | 2,80 | 23.000 | 6 x M8 | 18 - 38 |
| **330** | 130 - 330 | | | | | 21 - 38 |
| **500** | 200 - 500 | 9,25 | 4,80 | 30.000 | 8 x M8 | 26 - 55 |
| **800** | 350 - 800 | | | | | 30 - 55 |
| **1000** | 500 - 1000 | 52 | 15,5 | 50.000 | 12 x M10 | 40 - 90 |
| **2000** | 800 - 2000 | | | | | |
| **3000** | 1500 - 3000 | 160 | 25 | 65.000 | 12 x M10 | 50 - 110 |
| **6000** | 3000 - 6000 | | | | | |
| **9000** | 6000 - 9000 | | | | | |

*material:*
*heat-treated steel*
*temperature range:*
*-30°C up to +200°C*




Dimensions [mm]: length dimensions according to DIN ISO 2768 cH

| SKW | Øa | (Øa*) | Øb | f | g | Øk$^{h5}$ | Øm | Øp | L | s | t | w |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1,5/3** | 32 | - | 27,5 | 4 | 5 | 24 | 32 | 28,5 | 18,5 | 0,6 | 2,5 | 4,4 |
| **6/12** | 48 | (42)* | 33 | 8 | 9,8 | 42 | 52 | 47 | 31 | 0,9 | 7 | 5,8 |
| **15/30/45** | 66 | (60)* | 45 | 9 | 11,5 | 55 | 69 | 62 | 38 | 1,2 | 8 | 8,6 |
| **60/100/150** | 83 | (76)* | 63 | 9 | 12 | 68 | 87 | 78 | 44,5 | 1,6 | 8 | 11,4 |
| **230/330** | 109 | (104)* | 84 | 14 | 16,5 | 90 | 113 | 102 | 59,5 | 1,8 | 12 | 13,7 |
| **500/800** | 132 | - | 105 | 15 | 17 | 110 | 136 | 124 | 68,5 | 2,5 | 12 | 18,1 |
| **1000/2000** | 185 | - | 168 | 19 | 28 | 140 | 181 | 165 | 106 | 3,7 | 22,5 | 40,4 |
| **3000-9000** | 236 | - | 197 | 18/14 | 22 | 180 | 243 | 200/225 | 128 | 3,0 | 14 | 60,6 |

*note: smaller outer diameters of the shift disc are possible (see values in brackets)
with zero clearance conical-hub-connection (Dmax = Ø120) see series SKY

order example: SKW 500 - D = $44^{G6}$ - PFN 12 P9 x 3,3 - $T_{KA}$ = 450 Nm

# Safety Coupling I Series SKR *for indirect drives*

- Series SKR-K with cone clamping bush
- Series SKR-N with keyway connection
- robust slide bearing for high bearing forces and best concentricity
- compact attachment and optimum pane integration

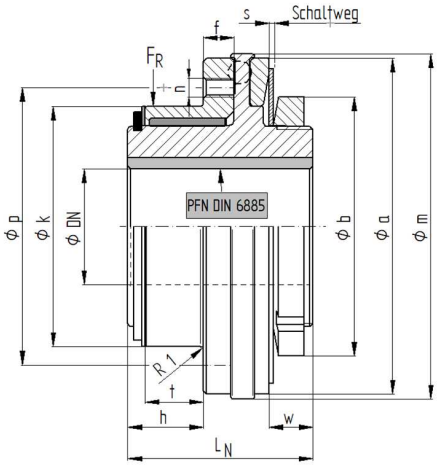
technical data:

| SKR Size | setting range disengagement torque $T_{KA}$[Nm] | moment of inertia [$10^{-3}$kgm²] | mass. approx. [kg] | tightening torque of screws 6x i - ISO 4762 [Nm] | max. lateral load $F_R$[N] | bore diameters øD DK from-to | bore diameters øD DN from-to |
|---|---|---|---|---|---|---|---|
| 25 | 10 - 25 | | | | | 8 - 22 | 8 - 30 |
| 40 | 16 - 40 | 0,5 | 0,8 | M4 - (3) | 40 | 10 - 22 | 10 - 30 |
| 80 | 30 - 80 | | | | | 14 - 22 | 12 - 30 |
| 105 | 50 - 105 | | | | | 12 - 38 | 12 - 50 |
| 180 | 80 - 180 | 3 | 2,5 | M6 - (12) | 90 | 14 - 38 | 16 - 50 |
| 380 | 160 - 380 | | | | | 22 - 38 | 20 - 50 |
| 650 | 300 - 650 | 11 | 5,5 | M8 - (30) | 150 | 22 - 48 | 22 - 65 |
| 950 | 350 - 950 | | | | | 22 - 48 | 30 - 65 |
| 1100 | 500 - 1100 | | | | | 28 - 70 | 30 - 95 |
| 2200 | 1000 - 2200 | 55 | 14 | M10 - (60) | 250 | 42 - 70 | 45 - 95 |
| 3200 | 1500 - 3200 | | | | | 55 - 70 | 52 - 95 |

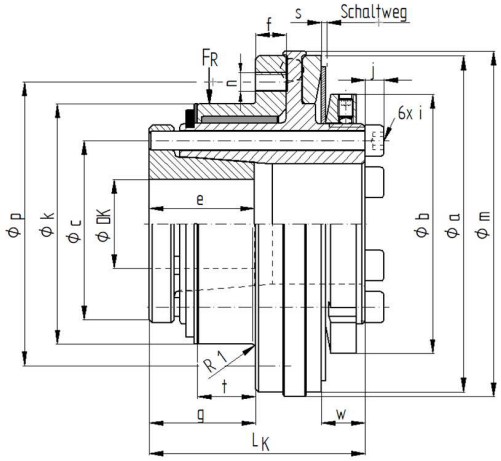
***material:***
*heat-treated steel. temperature range: -30°C up to + 150°C*

*SKR-N*

*SKR-K*




*SKR-N*




*SKR-K*

Dimensions [mm]: length dimensions according to DIN ISO 2768 cH

| SKR | Øa | Øb | Øc | e | f | g | h | j | Øk$^{h7}$ | Øm | Øp | $L_K$ | $L_N$ | n | s | t | w |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25/40/80 | 73,5 | 52 | 33 | 23 | 7 | 24 | 17,2 | 4 | 50 | 77 | 59 | 50 | 43 | 8xM4 | 1,2 | 12,5 | 10,3 |
| 105/180/380 | 109 | 84 | 54 | 34 | 10 | 34,5 | 24,5 | 6 | 78 | 112 | 90 | 70x | 60 | 8xM6 | 1,6 | 19 | 14,2 |
| 650/950 | 139 | 105 | 66 | 37 | 14 | 42,5 | 30 | 8 | 100 | 145 | 115 | 90,5 | 78 | 8xM8 | 1,9 | 24 | 20 |
| 1100/2200/3200 | 188 | 170 | 97 | 51 | 14 | 51,5 | 36 | 10 | 140 | 196 | 160 | 120,5 | 105 | 12xM10 | 3,0 | 28 | 35,6 |

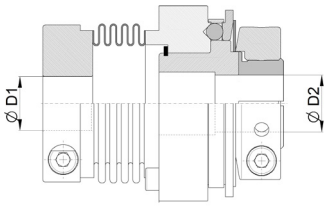
order example: SKR-K 105 - D = 22$^{G6}$ - release torque - TKA = 75 Nm

# Safety Couplings I *for direct drives*

## Large selection of safety coupling types with coupling attachment for shaft-shaft connection

The JAKOB safety couplings for direct drives are a combination of the release mechanism that has been tried and tested and optimized for decades with a coupling element to compensate for misalignments between the input and output shaft. Various versions from an extensive modular system of metal bellows or elastomer couplings can be selected. While the main specific feature of the Metal bellows is the very high torsional rigidity with low restoring forces, the elastomer couplings are characterized by their robustness, excellent damping properties and the possibility of plug-in assembly. Due to the screw connection between the coupling element and the safety part, in the event of damage or Changing the technical operating parameters means replacing the coupling attachment or the safety part anytime possible.

## The following series are available as standard:




| | | |
|---|---|---|
| Series SKB | -> | with clamping ring hub Ø D2 |
| Series SKY | -> | with cone clamping bush Ø D2 |
| Series SKW | -> | with feather key connection Ø D2 |

### Series SKB - KP
**with metal bellows 4W + clamping hub**

### Series SKB - EK
**with elastomer star + clamping hub**

### Series SKY - KS
**with metal bellows 4W + conical clamping bush**

### Series SKY - ES
**with elastomer spider + cone clamping ring hub**

### Series SKW - KP
**with metal bellows 4W + clamping hub**
**(optionally with keyway)**

### Series SKW - EK
**with elastomer spider + clamping hub**
**(optionally with keyway)**

Further attachment combinations or hub variants with metal bellows or elastomer star, as well as customer-specific designs are possible on request.

# Safety Coupling I Series SKB-KP *for direct drives*

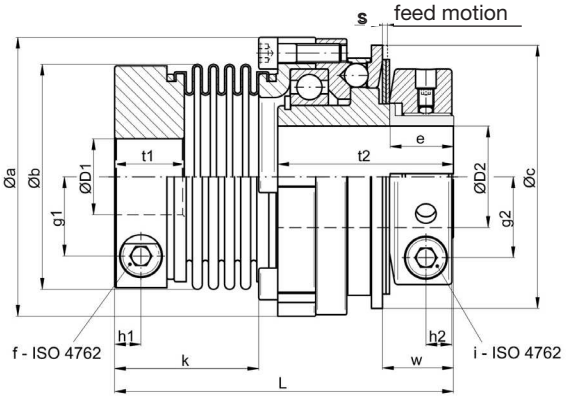
✓ with bellows attachment ✓ with lateral clamping hub on both sides
✓ EASY-clamping hub on bellows side ✓ compensation of misalignments ✓ low restoring forces

## technical data:

| SKB -KP size | setting range disengagement torque $T_{KA}$ [Nm] | moment of inertia [$10^{-3}$kgm$^2$] | mass approx. [kg] | torsional stiffness [Nm/arcmin] | max. shaft misalignment [mm] axial± | lateral | tightening torque of screws f [Nm] | i [Nm] | ø D1 min | ø D1 max | ø D2 min | ø D2 max | ø D2 max. bore-ø keyway DIN 6885 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,5 | 0,3 - 1,5 | 0,015 | 0,14 | 0,9 | 0,3 | 0,1 | M3-[2] | M3-[2] | 5 | 11 | 6 | 12,7 | 10 |
| 3 | 1 - 2 | | | | | | | | 5 | 11 | 6 | 12,7 | |
| 6 | 2 - 6 | 0,13 | 0,45 | 2,1 | 0,5 | 0,15 | M5-[8] | M5-[8] | 6 | 24 | 6 | 16 | 12 |
| 12 | 6 - 12 | | | | | | | | 8 | 24 | 8 | 16 | |
| 15 | 8 - 15 | | | | | | | | 8 | 32 | 10 | 25,4 | |
| 30 | 13 - 30 | 0,5 | 1,0 | 9 | 0,5 | 0,2 | M6-[14] | M6-[16] | 10 | 32 | 12 | 25,4 | 20 |
| 45 | 22 - 45 | | | | | | | | 12 | 32 | 14 | 25,4 | |
| 60 | 25 - 60 | | | | | | | | 13 | 38 | 18 | 35 | |
| 100 | 40 - 100 | 1,5 | 1,9 | 20 | 0,6 | 0,2 | M8-[30] | M8-[35] | 14 | 38 | 18 | 35 | 32 |
| 150 | 60 - 150 | | | | | | | | 21 | 38 | 24 | 35 | |
| 230 | 80 - 230 | 5,5 | 3,8 | 28 | 0,8 | 0,2 | M10-[50] | M10-[70] | 24 | 43 | 24 | 44 | 38 |
| 330 | 130 - 330 | | | | | | | | 32 | 43 | 32 | 44 | |
| 500 | 200 - 500 | 14,0 | 6,8 | 52 | 0,8 | 0,2 | M12-[90] | M14-[200] | 35 | 55 | 28 | 58 | 50 |
| 800 | 350 - 800 | 17,2 | 8,3 | 106 | 0,7 | 0,2 | M14-[140] | M14-[200] | 42 | 68 | 40 | 58 | |
| 1000 | 500 - 1000 | 80 | 20 | 150 | 0,8 | 0,2 | M14-[140] | 2xM16-[250] | 45 | 75 | 42 | 100 | 90 |
| 2000 | 800 - 2000 | 95 | 23 | 250 | 1,5 | 0,3 | M20-[450] | 2xM16-[250] | 45 | 90 | 45 | 100 | |
| 3000 | 1500 - 3000 | | | 600 | | 1,2 | | | 50 | 130 | 50 | 120 | |
| 6000 | 3000 - 6000 | 380 | 50 | 1000 | 3 | 1,4 | 10xM12[70] | 10xM10[50] | 60 | 130 | 60 | 120 | Opt. |
| 9000 | 6000 - 9000 | | | 1000 | | 1,4 | | | 80 | 130 | 80 | 120 | |

*temperature range: -30°C up to +150°C*

***material:***
*safety part:*
*heat-treated steel*
*clamping hub:*
*high-tensile aluminum*
*hub 2000-9000: steel*
*bellows: stainless steel*
*screws: ISO 4762 / 12.9*




## Dimensions [mm]: length dimensions according to DIN ISO 2768 cH

| SKB-KP | Øa | Øb | Øc | e | g1 | g2 | h1 | h2 | k | L±1 | s | t1 | t2 | w |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1,5/3** | 33 | 24 | 32 | 8 | 7,3 | 10,1 | 4,5 | 4 | 20,5 | 48,5 | 0,5 | 9,5 | 26,5 | 12,4 |
| **6/12** | 52,5 | 40(45) | 48 | 14 | 13 | 13,5 | 6 | 6 | 36,6 | 81 | 0,9 | 16,5 | 41 | 16 |
| **15/30/45** | 69 | 56 | 66 | 16 | 19 | 19,5 | 8 | 7,5 | 43 | 94,5 | 1,2 | 20 | 48 | 18,5 |
| **60/100/150** | 88 | 71 | 83 | 20 | 25 | 25,5 | 9 | 8,5 | 45,5 | 107 | 1,6 | 22 | 55,5 | 22 |
| **230/330** | 115 | 82 | 109 | 23 | 28,5 | 32 | 11,5 | 10,5 | 52 | 132 | 1,8 | 26 | 72 | 26 |
| **500** | 137 | 101 | 132 | 32 | 35 | 42 | 13 | 13,5 | 60 | 156 | 2,5 | 29 | 87,5 | 37 |
| **800** | 137 | 122 | 132 | 32 | 42 | 42 | 16 | 13,5 | 74,5 | 170 | 2,5 | 34 | 87,5 | 37 |
| **1000** | 181 | 133 | 185 | 74 | 47 | 69 | 18,5 | 17/30 | 87,5 | 220±2 | 3,7 | 45 | 89 | 74 |
| **2000** | 181 | 157 | 185 | 74 | 58 | 69 | 22 | 17/30 | 112 | 241 | 3,7 | 45 | 89 | 74 |
| **3000-9000** | 243 | 236 | 236 | 54 | 175 | 160 | - | - | - | 336 | 3,0 | 74 | 81 | 87 |

**note:** alternative lengths of bellows are possible on request
For size 3000 - 9000 shrink disk clamping on both sides

**order example: SKB-KP 30 - D1 = 28 $^{G6}$ - D1 = 24 $^{H7}$ - $T_{KA}$ = 25 Nm**

# Safety Coupling I Series SKB-EK *for direct drives*

with elastomer attachment · with lateral clamping hub on both sides
plug-in · flexible · backlash-free · oscillation dampening

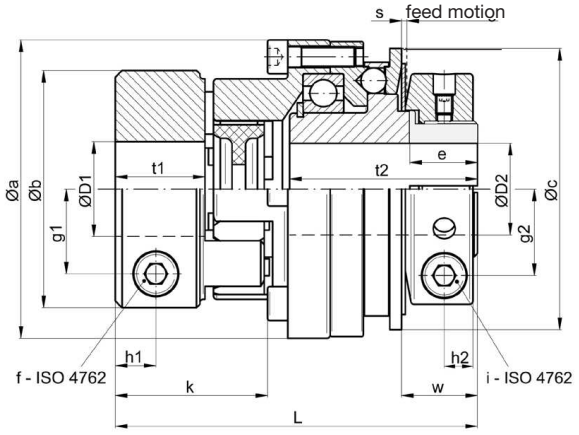
## technical data:

| SKB -EK size | setting range disengagement torque $T_{KA}$[Nm] | moment of inertia [$10^{-3}$kgm$^2$] | mass approx. [kg] | torsional stiffness [Nm/arcmin] | max. shaft mis-alignment [mm] axial± | lateral | tightening torque of screws f [Nm] | i [Nm] | ø D1 min | max | ø D2 min | max | ø D2 max. bore-ø keyway DIN 6885 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,5 | 0,3 - 1,5 | 0,015 | 0,15 | 0,016 | 0,8 | 0,1 | M2,5-[1] | M3-[2] | 5 | 10 | 6 | 12,7 | 10 |
| 3 | 1 - 3 | | | | | | | | 5 | 10 | 6 | 12,7 | |
| 6 | 2 - 6 | 0,13 | 0,44 | 0,25 | 0,5 | 0,1 | M5-[8] | M5-[8] | 7 | 20 | 6 | 16 | 12 |
| 12 | 6 - 12 | | | | | | | | 7 | 20 | 8 | 16 | |
| 15 | 8 - 15 | 0,5 | 1 | 1 | 0,5 | 0,1 | M6-[14] | M6-[14] | 13 | 32 | 10 | 25,4 | 20 |
| 30 | 13 - 30 | | | | | | | | 13 | 32 | 12 | 25,4 | |
| 45 | 22 - 45 | | | | | | | | 13 | 32 | 14 | 25,4 | |
| 60 | 25 - 60 | 1,5 | 2 | 1,2 | 1 | 0,1 | M8-[35] | M8-[35] | 16 | 38 | 18 | 35 | 32 |
| 100 | 40 - 100 | | | | | | | | 19 | 38 | 18 | 35 | |
| 150 | 60 - 150 | | | | | | | | 22 | 38 | 24 | 35 | |
| 230 | 80 - 230 | 5,6 | 4,2 | 3,6 | 1 | 0,12 | M12-[90] | M10-[70] | 20 | 42 | 24 | 42 | 38 |
| 330 | 130 - 330 | | | | | | | | 20 | 42 | 32 | 42 | |
| 500 | 200 - 500 | 17 | 8,6 | 8 | 1 | 0,15 | M14-[140] | M14-[200] | 25 | 70 | 28 | 58 | 50 |
| 800 | 350 - 800 | | | | | | | | 32 | 70 | 40 | 58 | |
| 1000 | 500 - 1000 | 79 | 19,5 | 12 | 1 | 0,10 | M14-[140] | M16-[250] | 40 | 70 | 42 | 100 | 90 |
| 2000 | 800 - 2000 | 116 | 27,9 | 21 | 1 | 0,15 | M16-[290] | M16-[250] | 48 | 90 | 42 | 100 | 90 |

*temperature range: -30°C up to +90°C*

***material:***
*safety part: heat treated steel*
*clamping hub: high-tensile aluminum*
*(size 2000: tempered steel)*

*elastomer spider: polyurethane – 98 Shore A*
*screws: ISO 4762 / 12.9*




## Dimensions [mm]: length dimensions according to DIN ISO 2768 cH

| SKB-EK | Øa | Øb | Øc | e | g1 | g2 | h1 | h2 | k | L±1 | s | t1 | t2 | w |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,5/3 | 33 | 21,5 | 32 | 8 | 6,5 | 10,1 | 5 | 4 | 30,5 | 58,5 | 0,5 | 10 | 26,5 | 12,4 |
| 6/12 | 52,5 | 40 | 48 | 14 | 13 | 13,5 | 8 | 6 | 33 | 77 | 0,9 | 17 | 41 | 16 |
| 15/30/45 | 69 | 55 | 66 | 16 | 20 | 19,5 | 10 | 7,5 | 39 | 91,5 | 1,2 | 21 | 48 | 18,5 |
| 60/100/150 | 88 | 70 | 83 | 20 | 25 | 25,5 | 12 | 8,5 | 45 | 107 | 1,6 | 26,5 | 55,5 | 22 |
| 230/330 | 115 | 85 | 109 | 23 | 29 | 32 | 14 | 10,5 | 54 | 134 | 1,8 | 31 | 72 | 26,5 |
| 500/800 | 137 | 120 | 132 | 32 | 44 | 42 | 18 | 13,5 | 71 | 167,5 | 2,5 | 38 | 87,5 | 37 |
| 1000 | 181 | 120 | 185 | 74 | 44 | 69 | 18 | 17/30 | 72 | 204 | 3,7 | 38 | 89 | 74 |
| 2000 | 181 | 160 | 185 | 76 | 55,5 | 69 | 21 | 17/30 | 84 | 219 | 3,7 | 42 | 89 | 77 |

*note: other shore hardnesses of elastomer spider are possible on request
coupling side with conical hub: see series SKB-ES

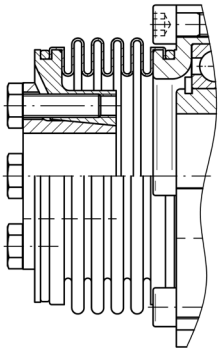
order example: SKB-EK 45 - D1 = 28 $^{G7}$ - D2 = 24 $^{H7}$ - $T_{KA}$ = 35 Nm

# Safety Couplings I Additional Series

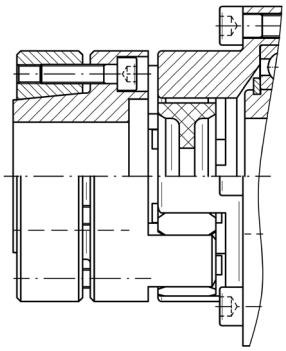
## Series

- high clamping forces
- for smaller shaft diameters
- however: more difficult assembly
- with ES-hub: blind fitting possible
- dimensions on request
  or see homepage:
  www.jakobantriebstechnik.de

## SKB-KS with conical clamping hub

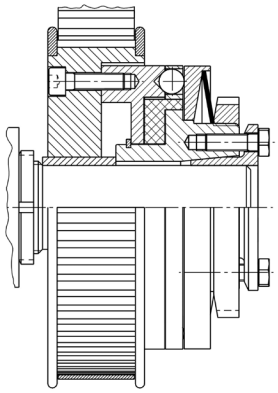


## SKB-ES with conical clamping hub



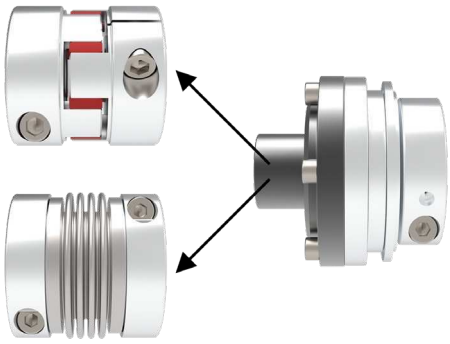
## Series SKD/SBE/SK-F with special mechanism

- for long run-out times
- minimal residual torque
- re-engaging only by reverse rotation



## Series SKB-WA

- Standard SKB type with adapter shaft
- for the universal attachment of metal bellows, Elastomer and spacer couplings



## Special series

- customized hub versions and dimensions
- operating speeds up to 8.000 rpm
- special or stainless steel design
- special re-engaging functions (e.g. for vertical drive axis)

-> please feel free to contact us

# Product Overview I JAKOB Clamping Technology

## Power Clamping Nut Series MCA

- 4 sizes up to 200 kN
- blind hole thread up to M64
- thread protected
- centered operation
- compact design

## Power Clamping Nut Series MDA

- 2 sizes up to 180 kN
- through hole thread up to M48
- for variable clamping edges
- unlimited clamping stroke

## Spring Clamping Cylinder Series ZSF / ZDF

- numerous sizes up to 350 kN
- mechanical clamping
- hydraulic relasing
- high operational safety
- leak-proof, robust, economical
- temperature range: -30°C to +100°C
- fitting position in any direction

*spring clamping cylinder Series ZSF (pulling)*

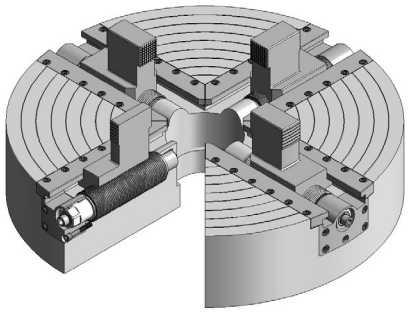
*spring clamping cylinder Series ZDF (pushing)*

## Power Clamping Screw Series SC

- 5 sizes up to 250 kN
- wedge clamping mechanism
- high clamping forces
- low tightening torques
- maximum operational safety

## Power Clamping Screws mechanical type: Series MSP/MSPD hydraulical type: Series HSP

- nominal clamping forces up to 1,200 kN
- maximum operational safety
- large power clamping stroke
- simple operation and fitting
- very large clamping forces at low tightening torques



**please ask for our clamping elements catalog**

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date: 08/2023