

RELIABLE | COMPACT | ROBUST



INDUSTRIAL DRIVE COUPLINGS

FOR THE MOST DEMANDING POWER TRANSMISSION APPLICATIONS.

WHO WE ARE.

ABOVE ALL R+W IS: THE PERFECT COUPLING.

When R+W Antriebselemente GmbH was first established in 1990 in Klingenberg, Germany, there were three people on board. The head office is still there, but we are now more than 170 people, with subsidiaries in the USA, China, Italy, Singapore, France and Slovakia, and are partnered with over 60 well established distributors in more than 40 countries throughout the world. Many developments have led to this success, but most importantly it was brought about by our endless search for the best possible coupling solutions as well as the high esteem in which we hold all of our customers.

WE PROVIDE INSPIRED SOLUTIONS BACKED BY SOUND PLANNING AND DESIGN.

R+W stands for expertise in the development of solutions for precise torque transmission. The focus of our development is on innovative coupling systems for all sectors of precision drive technology. As a leading manufacturer of precision couplings and line shafts, we strive to maintain a permanent status of technology leadership in our field. Our central claim: R+W couplings ensure precision for process reliability and efficiency, and to that end we seek perfection.

Optimized for technology and business, our product portfolio includes:

- ▶ **Metallic couplings**
- ▶ **Elastic couplings**
- ▶ **Ball-detent safety couplings**
- ▶ **Drive shafts**
- ▶ **Industrial Drive couplings**
- ▶ **Development of customized solutions with collaboration from start to finish, including:**
 - Consultation
 - Conception
 - Engineering analysis
 - Prototyping
 - Manufacturing

DRIVE

D - DYNAMIC

Our staff is trained to always be ready and willing to provide a quick reaction to customer inquiries. Our product, the core of which is based on handling high performance, dynamic applications, is increasingly available for fast delivery.

R - RELIABLE

Many of our products are designed for infinite life with zero maintenance required. With thorough engineering processes in place, and an ISO 9001:2008 certified production facility, we continue to deliver high quality coupling products with a high level of reliability.

I - INNOVATIVE

Our business was founded on developing unique and innovative solutions to common coupling problems. Our staff in turn is constantly developing its work flows to streamline delivery and simplify the process for our customers.

V - VERSATILE

With products successfully applied and deployed in over 125 industry segments, chances are very good that we have an expert on our versatile staff that is familiar with your application requirements.

E - EXPANDING

With double digit annual growth the norm, our company is ever expanding, adding new product offerings and opening new service centers throughout the world all the time.

MORE R+W COUPLINGS

Aside from the products detailed in this catalog, we also offer high quality shaft couplings and torque limiters for servo motion control and other small to mid-size precision applications.

More information on these can be found in our **PRECISION COUPLINGS catalog**.

APPLICATIONS AND DESIGN FEATURES INDUSTRIAL DRIVE COUPLINGS

SIZING AND SELECTION

P. 7

INSTALLATION AND HANDLING

P. 25

SAFETY COUPLINGS

ST

P. 35

SIZES FROM 2,000 – 165,000 Nm

AREAS OF APPLICATION

- ▶ timber processing machinery
- ▶ bulk material handling systems
- ▶ tunnel boring machinery
- ▶ industrial shredders
- ▶ rotary test stands
- ▶ extruder drives
- ▶ wastewater scraper drives
- ▶ wherever potential for torque overload exists

FEATURES

- ▶ adjustable disengagement torque
- ▶ precise overload protection
- ▶ compact, simple design
- ▶ zero maintenance
- ▶ backlash free

TORSIONALLY STIFF BELLOWS COUPLINGS

BX

ZA

P. 53

SIZES FROM 1,500 – 100,000 Nm

AREAS OF APPLICATION

- ▶ test stands
- ▶ centrifuges
- ▶ wind energy
- ▶ machine tools
- ▶ printing machinery
- ▶ wherever precise transmission is required

FEATURES

- ▶ robust construction
- ▶ high torsional stiffness
- ▶ fatigue resistant for infinite life
- ▶ easy to mount and dismount
- ▶ precise rotational transmission
- ▶ minimal restoring loads under misalignment

BACKLASH FREE SERVOMAX® ELASTIC JAW COUPLINGS

EK

EZ

P. 61

SIZES FROM 1,950 – 25,000 Nm

AREAS OF APPLICATION

- ▶ pump systems
- ▶ conveyors
- ▶ material handling systems
- ▶ extruder drives
- ▶ crushers
- ▶ shredders
- ▶ wherever shock, vibration, and misalignment need to be absorbed

FEATURES

- ▶ vibration damping
- ▶ electrically isolating (standard version)
- ▶ misalignment compensation
- ▶ backlash free
- ▶ maintenance free

HIGH STRENGTH DISC PACK COUPLINGS

LP

P. 69

SIZES FROM **350 - 20,000 Nm**

AREAS OF APPLICATION

- ▶ API 610 pump packages
- ▶ paper machinery
- ▶ steel mill equipment
- ▶ test stands
- ▶ generators
- ▶ bulk material handling systems
- ▶ centrifuges
- ▶ cooling tower drives
- ▶ compressors
- ▶ printing machinery
- ▶ for infinite life in extreme conditions

FEATURES

- ▶ maintenance free for infinite life
- ▶ frictional clamping of disc packs
- ▶ high speeds with extended DBSE
- ▶ zero backlash
- ▶ high torsional stiffness
- ▶ low restoring forces from misalignment
- ▶ misalignment compensation

FLEXIBLE GEAR COUPLINGS

BZ

P. 77

SIZES FROM **1,300 - 348,000 Nm**

AREAS OF APPLICATION

- ▶ mixers
- ▶ rolling mills
- ▶ conveyors
- ▶ crushers
- ▶ shredders
- ▶ levelers
- ▶ wherever high torque and low cost meet

FEATURES

- ▶ very compact design
- ▶ corrosion resistant
- ▶ large misalignment compensation
- ▶ reduced wear design
- ▶ low maintenance

FOR USE IN HAZARDOUS ENVIRONMENTS – ATEX

ATEX

P. 83

AREAS OF APPLICATION

for safer operation in industries with explosive atmospheres, such as:

- ▶ oil & gas extraction
- ▶ petrochemical processing
- ▶ munitions manufacturing
- ▶ bulk and powder processing
- ▶ paint systems

FEATURES

For hazard zones 1/21 and 2/22 these couplings are authorized under directive 94/9/EG.

- ▶ Safety couplings
- ▶ Bellows couplings
- ▶ Elastic jaw couplings
- ▶ Disc pack couplings

SIZING

INSTALLATION

SAFETY COUPLINGS
ST

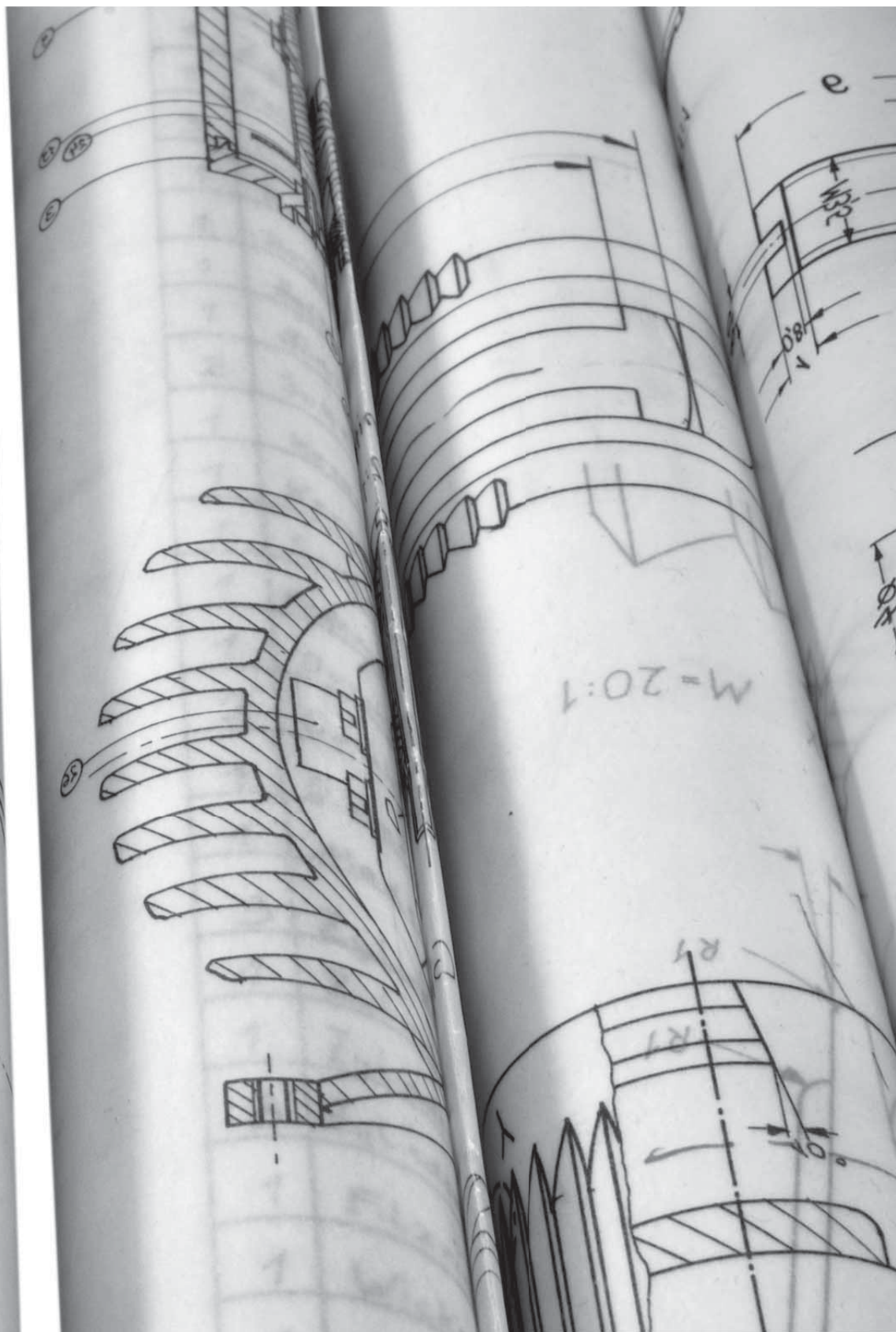
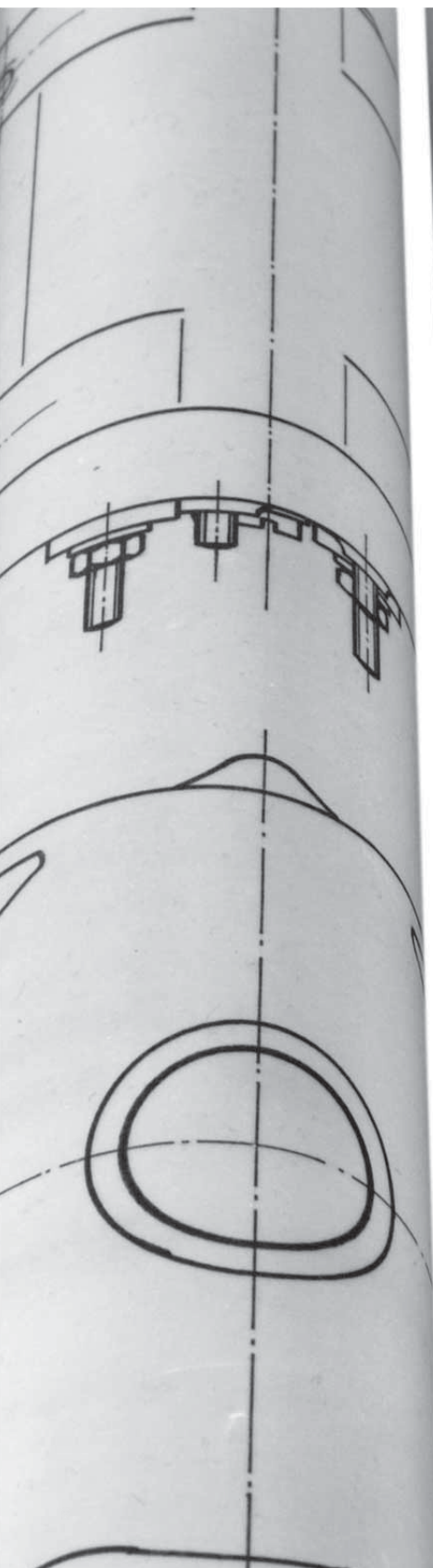
BELLOWS COUPLINGS
BX | ZA

ELASTOMER
COUPLINGS EK | EZ

DISC PACK
COUPLINGS LP

CROWNED GEAR
COUPLINGS BZ

ATEX CERTIFIED
COUPLINGS



SIZING AND SELECTION

According to
DIN 740 part 2

SAFETY COUPLINGS

SYMBOLS

T_{AR}	= Disengagement torque of the coupling (Nm)
K	= Service factor
T_{max}	= Maximum torque of the drive system (Nm)
T_{AN}	= Rated torque of the motor (Nm)
P_{Drive}	= Drive power (kW)
n	= Drive speed (min^{-1})
α	= Angular acceleration $\frac{\text{rad}}{\text{s}^2}$
t	= Acceleration time (s)
ω	= Angular velocity (rad/s)
J_L	= Moment of inertia of load (kgm^2)
J_A	= Moment of inertia of drive (kgm^2)
T_{AS}	= Peak motor torque (Nm)
S	= Number of safety elements
F	= Tangential force (kN)
r	= Radius to element (m)
s	= Spindle pitch (mm)
F_V	= Feed force (N)
η	= Spindle efficiency
d_0	= Pitch diameter (mm)
F_V	= Feed force (N)
C_T	= Torsional stiffness of coupling (Nm/rad)
$J_{Masch.}$	= Total load inertia (kgm^2) (e.g. shaft + sprocket + chain + roller + 1/2 of coupling)
$J_{Mot.}$	= Total driving inertia (kgm^2) (e.g. motor shaft + 1/2 of coupling)
f_e	= Resonant frequency of the two mass system (Hz)

Shock or Load Factor S_A

uniform load	non-uniform load	heavy shock load
1	2	3
For many crushing and shredding applications load factors are commonly $S_A = 2-3$		

ACCORDING TO DISENGAGEMENT TORQUE

Safety couplings are normally selected according to the required disengagement torque, which must be greater than the maximum torque required for start-up and operation.

Disengagement torque values are often determined from the drive data and are typically a multiple of the nominal torque at the operating drive speed (T_{AN}). In addition to a start-up torque (T_{MAX}), the following values are used as further safety factors, depending on the load conditions:

- $K = 1.3$ uniform harmonious load
- $K = 1.5$ non-uniform load
- $K = 1.8$ heavy shock load

$$T_{AR} \geq K \cdot T_{max} \text{ (Nm)}$$

or

$$T_{AN} \geq 9,550 \cdot \frac{P_{Drive}}{n} \text{ (Nm)}$$

ACCORDING TO ACCELERATION (START-UP WITH NO LOAD)

$$T_{AR} \geq \alpha \cdot J_L \geq \frac{J_L}{J_A + J_L} \cdot T_{As} \cdot S_A \text{ (Nm)}$$

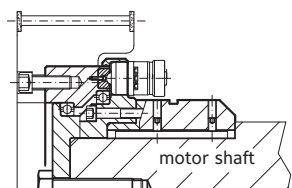
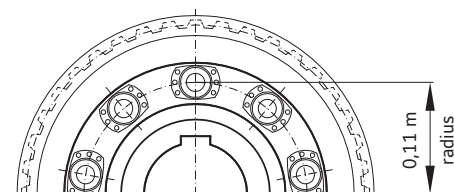
$$\alpha = \frac{\omega}{n} = \frac{\pi \cdot n}{t \cdot 30}$$

ACCORDING TO ACCELERATION (START-UP WITH LOAD)

$$T_{AR} \geq \alpha \cdot J_L + T_{AN} \geq \left[\frac{J_L}{J_A + J_L} \cdot (T_{AS} - T_{AN}) + T_{AN} \right] \cdot S_A \text{ (Nm)}$$

ACCORDING TO THE NUMBER OF SAFETY ELEMENTS

$$T_{AR} = S \cdot F \cdot r$$



ACCORDING TO LINEAR FEED FORCE

Screw drive

$$T_{AN} = \frac{s \cdot F_v}{2,000 \cdot \pi \cdot \eta} \text{ (Nm)}$$

Rack and pinion drive

$$T_{AN} = \frac{d_0 \cdot F_v}{2,000} \text{ (Nm)}$$

ACCORDING TO RESONANT FREQUENCY

The torsional natural frequency of the coupling must be significantly higher or lower than that of the equipment. For the mechanical substitution model the two mass system applies.

$$f_e = \frac{1}{2 \cdot \pi} \sqrt{C_T \cdot \frac{J_{Masch} + J_{Mot}}{J_{Masch} \cdot J_{Mot}}} \text{ (Hz)}$$

SAFETY COUPLINGS

ST

ELASTIC JAW COUPLING DESIGN ST2

Size	ST2 / 10	ST2 / 25	ST2 / 60	ST2 / 160
T _{KN} Rated Torque (Nm)	10,000	15,000	40,000	80,000
T _{Kmax} Maximum Torque (Nm)	22,000	33,000	88,000	176,000
Torsional Stiffness (10 ³ Nm/rad)	145	230	580	1000
Relative Damping	1	1	1	1

LOAD FACTORS BY MACHINE TYPE

EXCAVATORS

S bucket chain excavators
S traveling gear (caterpillar)
M traveling gear (rails)
M suction pumps
S bucket wheels
M slewing gears

CONSTRUCTION MACHINERY

M concrete mixers
M road construction machinery

CHEMICAL INDUSTRY

M mixers
G agitators (light fluids)
M dryer drums
G centrifuges

FEEDERS AND CONVEYORS

S belt conveyors
G belt conveyors (bulk materials)
M belt bucket conveyors
M screw conveyors
M circular conveyors
M hoists

BLOWERS AND FANS¹⁾

G blowers (axial/radial) P:n ≤ 0.007
M blowers (axial/radial) P:n ≤ 0.007
S blowers (axial/radial) P:n > 0.007
G cooling tower fans P:n ≤ 0.007
M cooling tower fans P:n ≤ 0.007
S cooling tower fans P:n > 0.007

GENERATORS AND TRANSFORMERS

S generators

RUBBER MACHINERY

S extruders
S calendars
M mixers
S rolling millse

WOOD PROCESSING MACHINERY

G woodworking machines

CRANES

S traveling gears
S hoisting gears
M slewing gears

PLASTICS MACHINERY

M mixers
M shredders

METALWORKING MACHINERY

M sheet metal bending machines
S plate straightening machines

S presses

M shears
S punch presses
M machine tools, main drives

FOOD PROCESSING MACHINERY

G filling machines
M kneading machines
M cane crushers
M cane cutters
S cane mills
M sugar beet cutters
M sugar beet washers

PAPER MACHINERY

S wood cutters
S calendars
S wet presses
S suction presses
S suction rollers
S drying cylinders

PUMPS

S piston pumps
G centrifugal pumps (light fluids)
S reciprocating pumps

STONE AND CLAY MACHINES

S breakers

S rotary kilns

S hammer mills
S brick presses

TEXTILE MACHINERY

M tanning vats
M willows
M looms

COMPRESSORS

S reciprocating compressors
M centrifugal compressors

METAL ROLLING MILLS

M plate tilters
S ingot handling machinery
M winding machines (strip and wire)
S descaling machines
S cold rolling mills
M chain transfers
M cross transfers
M roller straighteners
S tube welding machines
S continuous casting plants
M roller adjustment drives

LAUNDRY MACHINES

M tumblers
M washing machines

WASTEWATER TREATMENT PLANTS

M aerators
G screw pumps

¹⁾ P = power of drive in kW
n = speed of drive in rpm

DESIGN FACTORS

Shock or Load Factor S_A

Drive type	Load characteristics of driven machine		
	G	M	S
electric motors, turbines, hydraulic motors	1.25	1.6	2.0
internal combustion engines ≥ 4 cylinder degree of uniformity $\geq 1:100$	1.5	2.2	2.5

G = smooth uniform load | M = moderate load | S = heavy shock load

Temperature Factor S_v

Ambient Temperature	-40 C° +30 C°	+40 C°	+60 C°	+80 C°	> +80 C°
S_v	1.0	1.1	1.4	1.8	on request

Start Factor S_z

Starts per Hour	30	60	120	240	>240
S_z	1.0	1.1	1.2	1.3	on request

ACCORDING TO TORQUE

1. Calculate the drive torque T_{AN} .

$$T_{AN} \geq 9,550 \cdot \frac{P_{Drive}}{n} \quad (\text{Nm})$$

2. Base the coupling rated torque T_{KN} on the drive torque T_{AN} multiplied by the application factors.

$$T_{KN} \geq T_{AN} \cdot S_A \cdot S_v \cdot S_z$$

Example:

Coupling between an electric motor (P=450kW and n=980 rpm) and a gearbox driving a conveyor.

smooth uniform load

= G : $S_A = 1.25$

ambient temperature

40°C : $S_v = 1.1$

starts

30/h : $S_z = 1.0$

$$T_{AN} = 9,550 \cdot \frac{450 \text{ kW}}{980 \text{ min.}^{-1}} = 4,385.2 \text{ Nm}$$

$$T_{KN} \geq T_{AN} \cdot S_A \cdot S_v \cdot S_z$$

$$T_{KN} \geq 4,385.2 \text{ Nm} \cdot 1.25 \cdot 1.1 \cdot 1.0 = 6,029.7 \text{ Nm}$$

Selected coupling: ST2 / 10 with elastomer coupling $T_{KN} = 6,030 \text{ Nm}$

SAFETY COUPLINGS

ST

GEAR COUPLING DESIGN ST4

Size		ST4 / 10	ST4 / 25	ST4 / 60	ST4 / 160
T_{KN} Rated Torque	(Nm)	16,000	22,000	62,000	174,000
T_{Kmax} Maximum Torque	(Nm)	32,000	44,000	124,000	348,000
Volume of Grease	(dm ³)	0.52	0.8	1.51	3.29
n Ref (max speed)	(min. ⁻¹)	6,050	5,150	3,600	3,050

*only allowable at reduced torque and misalignment levels (see table on page 13)

ACCORDING TO TORQUE

1. Calculate the drive torque. T_{AN} .

$$T_{AN} \geq 9,550 \cdot \frac{P_{Drive}}{n} \quad (\text{Nm})$$

2. Base the coupling rated torque T_{KN} on the drive torque T_{AN} multiplied by the application factor. (see page 17 for shock or load factors S_A).

$$T_{KN} \geq T_{AN} \cdot S_A$$

Example:

Coupling between an electric motor (P=1000kW and n=980 rpm) and a gearbox driving a screw conveyor ($S_A = 1.6$).

$$T_{AN} = 9,550 \cdot \frac{100 \text{ kW}}{980 \text{ min.}^{-1}} = 9,744 \text{ Nm}$$

$$\begin{aligned} T_{KN} &\geq T_{AN} \cdot S_A \\ T_{KN} &\geq 9,744 \text{ Nm} \cdot 1.6 = 15,591 \text{ Nm} \end{aligned}$$

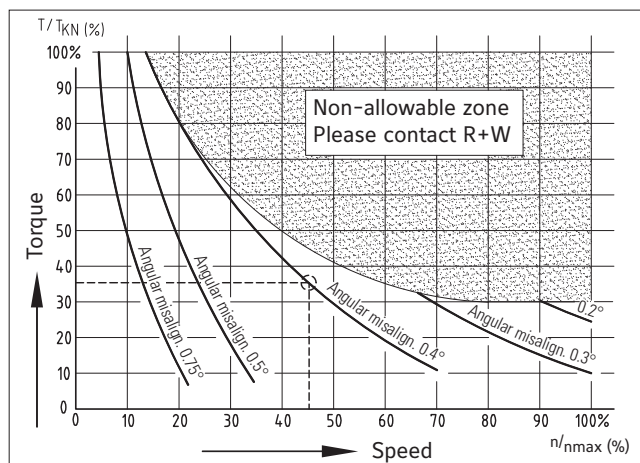
Selected coupling: ST4 / 10 with gear coupling $T_{KN} = 16,000 \text{ Nm}$

RATINGS CHART

Maximum torque, speed and misalignment are related and can not exist at the same time.

Evaluation of T/T_{KN} and n/n_{max}

► Compare plotted values for combined limits



Example: **Coupling ST4 / 10**

$$T = 5,600 \text{ Nm} \quad T/T_{KN} = \frac{5,600}{16,000} \cdot 100 = 35\%$$

$$n = 2,700 \text{ min.}^{-1} \quad n/n_{max} = \frac{2,700}{6,050} \cdot 100 = 45\%$$

Angular misalignment: 0.4°

► Coupling is within operable range - ST4 / 10 can be used.

BELLOWS COUPLINGS

SYMBOLS

- T_{KN} = Rated torque of coupling (Nm)
- T_{AS} = Peak torque (Nm)
e.g. maximum acceleration peak torque or maximum braking torque from the load
- J_L = Moment of inertia of the load (load + drive line components + half of coupling) (kgm²)
- J_A = Drive inertia (rotor of motor + drive line components + half of coupling) (kgm²)
- C_T = Torsional stiffness of coupling (Nm/rad)
- f_e = Resonant frequency of the two mass system (Hz)
- f_{er} = Excitation frequency of the drive (Hz)
- φ = Angle of twist (degree)

Shock or Load Factor S_A		
uniform load	non-uniform load	heavy shock load
1	2	3-4
For many crushing and shredding applications load factors are commonly $S_A = 2-3$		

ACCORDING TO TORQUE

Couplings are normally sized for the highest torque to be regularly transmitted. The peak torque of the application should not exceed the rated torque of the coupling. The following calculation provides an approximation of the minimum required coupling size, and allows for the maximum rated speed and misalignment to exist in the application.

$$T_{KN} \geq 1.5 \cdot T_{AS} \text{ (Nm)}$$

ACCORDING TO ACCELERATION TORQUE

A more detailed calculation takes acceleration and the driving and driven moments of inertia into account. A strong inertia ratio diminishes the effect of the load factor in the sizing calculation.

$$T_{KN} \geq T_{AS} \cdot S_A \cdot \frac{J_L}{J_A + J_L} \text{ (Nm)}$$

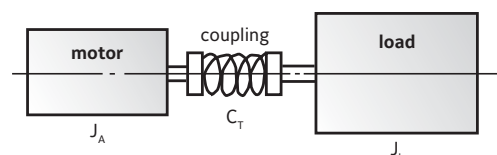
ACCORDING TO RESONANT FREQUENCY

The torsional natural frequency of the coupling must be significantly higher or lower than that of the equipment. For the mechanical substitution model the two mass system applies.

In practice the following applies: $f_e \geq 2 \cdot f_{er}$

$$f_e = \frac{1}{2 \cdot \pi} \sqrt{C_T \cdot \frac{J_A + J_L}{J_A \cdot J_L}} \text{ (Hz)}$$

Two Mass System



ACCORDING TO TORSIONAL DEFLECTION

To calculate transmission error as a result of torsional stress:

$$\varphi = \frac{180}{\pi} \cdot \frac{T_{AS}}{C_T} \text{ (degree)}$$

ELASTIC JAW COUPLINGS

SYMBOLS

T_{KN}	= Rated torque of the coupling (Nm)
T_{Kmax}	= Maximum torque rating of coupling (Nm)
T_S	= Peak torque applied to the coupling (Nm)
T_{AS}	= Peak torque of the drive system (Nm)
T_{AN}	= Nominal torque of the drive system (Nm)
T_{LN}	= Nominal torque of the load (Nm)
P	= Drive power (kW)
n	= Rotational speed (min. ⁻¹)
J_A	= Total driving inertia (kgm ²) (motor [including gear ratio] + 1/2 of coupling)
J_L	= Total load inertia (kgm ²) (load + drive line components + half of coupling)
J_1	= Moment of inertia of driving coupling half (kgm ²)
J_2	= Moment of inertia of driving coupling half (kgm ²)
m	= Ratio of the moment of inertia of the drive to the load
ϑ	= Temperature at the coupling (also consider radiant heat)
S_v	= Temperature factor
S_A	= Load factor
S_z	= Start factor (factor for the number of starts per hour)
Z_h	= Number of starts per hour (1/h)

Temperature factor S_v	A	B	E
Temperature (°C)	Sh 98 A	Sh 64 D	Sh 64 D
> -30°C to -10°C	1.5	1.3	1.2
> -10°C to +30°C	1.0	1.0	1.0
> +30°C to +40°C	1.2	1.1	1.0
> +40°C to +60°C	1.4	1.3	1.2
> +60°C to +80°C	1.7	1.5	1.3
> +80°C to +100°C	2.0	1.8	1.6
> +100°C to +120°C	-	2.4	2.0
> +120°C to +150°C	-	-	2.8

Start factor S_z			
Z_h	up to 120	120 to 240	over 240
S_z	1.0	1.3	on request

Shock / load factor S_A			
	uniform load	non-uniform load	heavy shock load
	1	1.8	2.5

COUPLING SELECTION FOR OPERATION WITHOUT SHOCK OR REVERSAL

The rated torque of the coupling (T_{KN}) must be greater than the rated torque of the load (T_{LN}), taking into account the temperature at the coupling (Temperature factor S_v). Should T_{LN} be unknown, T_{AN} can be used as a substitute in the formula.

Calculation

$$T_{KN} > T_{AN} \cdot S_v$$

Supplemental Calculation

$$T_{AN} = \frac{9,550 \cdot P}{n}$$

Sample calculation: (without shock loads)

Coupling conditions

$t_v = 70^\circ \text{C}$

$S_v = 1.7$ (for 70° Elastomer Type A)

Drive for centrifugal pump

$T_{AN} = 85 \text{ Nm}$

Calculation: $T_{KN} > T_{AN} \cdot S_v$

$T_{KN} > 85 \text{ Nm} \cdot 1.7$

$T_{KN} > 144.5 \text{ Nm} \longrightarrow$ **Result:** Coupling model EK2/150/A ($T_{KN} = 160 \text{ Nm}$) is selected.

COUPLING SELECTION FOR OPERATION WITH SHOCK LOADS

Same basic conditions as above. In addition, the maximum torque rating of the coupling (T_{Kmax}) is dictated by peak torque (T_s) due to shock loads.

Calculation

$$T_{KN} > T_{AN} \cdot S_v$$

Supplemental Calculation

$$T_{AN} = \frac{9,550 \cdot P}{n}$$

Calculation

$$T_{Kmax} > T_s \cdot S_z \cdot S_v$$

Supplemental Calculation

$$T_s = \frac{T_{AS} \cdot S_A}{m + 1}$$

$$m = \frac{J_A \cdot J_1}{J_L \cdot J_2}$$

SIZING AND SELECTION

DRIVE SHAFT COUPLINGS

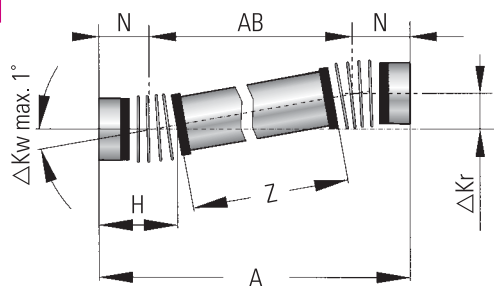
ZA

EZ

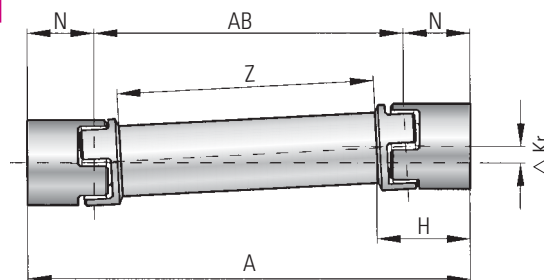
SYMBOLS

- A = Overall length (mm)
- AB = Distance between flextures (mm)
 $AB = (A - 2xN)$
- Z = Tube length (mm)
 $Z = (A - 2xH)$
- H = Length of coupling ends (mm)
- N = Length to flexure (mm)
- T_{AS} = Peak torque of the drive (Nm)
- φ = Torsional deflection (degree)
- C_T^B = Torsional stiffness of both flexible elements (Nm/rad)
- C_T^{ZWR} = Torsional stiffness per 1m of tubing (Nm/rad)
- C_T^{ZA} = Total torsional stiffness (Nm/rad)
- n_k = Critical speed (1/min.)
- C_{Tdyn}^E = Dynamic torsional stiffness of both elastomer inserts (Nm/rad)
- C_{Tdyn}^{EZ} = Total torsional stiffness (Nm/rad)

ZA



EZ



MODEL ZA

Size	Torsional stiffness of both bellows bodies C_T^B (Nm/rad)	Torsional stiffness per 1m of standard tubing C_T^{ZWR} (Nm/rad)	Length of coupling ends ZA H (mm)	Length to flexure N (mm)	Maximum axial misalignment ΔKa (mm)
1500	1,400,000	775,000	92	56	4
4000	4,850,000	1,160,000	102	61	4

Table 1

MODEL EZ

Size	Torsional stiffness of both flexible elements		Torsional stiffness per 1m of tubing	Length of coupling ends EZ	Length to flexure	Max. axial misalignment
	Elastomer insert A C_T^B (Nm/rad)	Elastomer insert B C_T^B (Nm/rad)	C_T^{ZWR} (Nm/rad)	H (mm)	N (mm)	ΔKa (mm)
2500	87,500	108,000	950,000	142	108	5
4500	168,500	371,500	2,200,000	181	137	5
9500	590,000	670,000	5,500,000	229	171	6

Table 2

MAXIMUM TRANSMITTABLE TORQUE BY BORE DIAMETER (Nm)

Size	Ø 35	Ø 45	Ø 50	Ø 55	Ø 60	Ø 65	Ø 70	Ø 75	Ø 80	Ø 90	Ø 120	Ø 140
2500	1900	2600	2900	3200	3500	3800	4000	4300	4600	5200		
4500		5300	5800	6300	7000	7600	8200	8800	9400	10600	14100	
9500			9200	10100	11100	11900	12800	13800	14800	16700	22000	25600

TEMPERATURE FACTOR S

Temperature (°C)	A	B
	Sh 98 A	Sh 64 D
> -30° to -10°	1.5	1.7
> -10° to +30°	1.0	1.0
> +30° to +40°	1.2	1.1
> +40° to +60°	1.4	1.3
> +60° to +80°	1.7	1.5
> +80° to +100°	2.0	1.8
> +100° to +120°	-	2.4

ACCORDING TO TORSIONAL STIFFNESS

Condition: Line shaft ZA, Size 1,500 $T_{AS} = 1,500$ Nm

Wanted: Total torsional stiffness C_T^{ZA}

$$(C_T^{ZA}) = \frac{1,400,000 \text{ Nm/rad} \times (728,800 \text{ Nm/rad} / 1.344 \text{ m})}{1,400,000 \text{ Nm/rad} + (728,800 \text{ Nm/rad} / 1.344 \text{ m})} = 390,867 \text{ [Nm/rad]}$$

$$(C_T^{ZA}) = \frac{C_T^B \cdot (C_T^{ZWR}/Z)}{C_T^B + (C_T^{ZWR}/Z)} \text{ (Nm/rad)}$$

ACCORDING TO TORSIONAL DEFLECTION

Condition: Line shaft ZA, size 1,500 $T_{AS} = 1,500$ Nm

Wanted: Torsional deflection at maximum acceleration torque T_{AS}

Measurement (A) of line shaft = 1.5m

Length (Z) of tubing = A-(2xH) = 1.344m

$$\varphi = \frac{180 \times 1,500 \text{ Nm}}{\pi \times 390,867 \text{ Nm/rad}} = 0.21^\circ$$

With a maximum torque of 1,500 Nm the torsional deflection is 0.21°

$$\varphi = \frac{180 \cdot T_{AS}}{\pi \cdot C_T^{ZA}} \text{ (degree)}$$

DRIVE SHAFT COUPLINGS

ZA

EZ

ACCORDING TO MAXIMUM MISALIGNMENT

ZA

EZ

Lateral misalignment ΔKr

Angular misalignment ΔKw

Axial misalignment ΔKa

$$\Delta Kr_{max} = \tan \Delta \frac{Kw}{2} \cdot AB$$
$$AB = A - 2xN$$

$$\Delta Kw_{max} = 2^\circ$$

See table 1+2
Pages 16+17

R+W CALCULATION PROGRAM

Using proprietary software, R+W will calculate the specific mechanical details of exactly the model you plan to use. Overall length, tube materials (e.g. steel, aluminum, CFK), and other factors are used to determine a number of performance values unique to your line shaft coupling.

- Critical speed
Torsional stiffness of tubing
Overall stiffness
Torsional deflection
Total Weight
Moment of inertia
Maximum misalignment
- $n_k = 1/\text{min.}$
 $C_T^{ZWR} = \text{Nm/rad}$
 $C_T^{ZA} = \text{Nm/rad}$
 $\varphi = \text{degree-min-sec}$
 $m = \text{kg}$
 $J = \text{kgm}^2$
 $\Delta Kr = \text{mm}$

DISC PACK COUPLINGS

LP

SYMBOLS

- T_{KN} = Rated torque of the coupling (Nm)
 T_{AS} = Peak torque of the drive system
 e.g. max. acceleration torque of drive (Nm)
 or max. braking torque of load (Nm)
 J_L = Total load inertia (e.g. shaft + sprocket + chain +
 roller + 1/2 of coupling) (kgm²)
 J_A = Total driving inertia (motor [including gear ratio] +
 1/2 of coupling) (kgm²)
 C_T = Torsional stiffness of the coupling (Nm/rad)
 f_e = Natural frequency of the two mass system (Hz)
 f_{er} = Excitation frequency of the drive (Hz)
 φ = Torsional deflection (degree)

Shock or Load Factor S_A		
uniform load	non-uniform load	highly dynamic load
1	2	3-4
Common factor for servo drives in machine tools: $S_A = 2-3$		

ACCORDING TO TORQUE

Couplings are normally sized for the highest torque to be regularly transmitted. The peak torque of the application should not exceed the rated torque of the coupling. The following calculation provides an approximation of the minimum required coupling size, and allows for the maximum rated speed and misalignment to exist in the application.

$$T_{KN} \geq 1.5 \cdot T_{AS} \text{ (Nm)}$$

ACCORDING TO ACCELERATION TORQUE

A more detailed calculation takes acceleration and the driving and driven moments of inertia into account. A strong inertia ratio diminishes the effect of the load factor in the sizing calculation.

$$T_{KN} \geq T_{AS} \cdot S_A \cdot \frac{J_L}{J_A + J_L} \text{ (Nm)}$$

GEAR COUPLINGS

SYMBOLS

T_{KN}	= Rated torque of the coupling (Nm)
T_{AN}	= Rated torque of the drive (Nm)
S_A	= Shock or load factor
P	= Drive power (kW)
n	= Rotational speed (rpm)

DESIGN FACTORS

Shock or Load Factor S_A

Drive type	Load characteristics of driven machine		
	G	M	S
electric motors, turbines, hydraulic motors	1.25	1.6	2.0
internal combustion engines ≥ 4 cylinder degree of uniformity $\geq 1:100$	1.5	2.2	2.5

G = smooth uniform load | M = moderate load | S = heavy shock load

LOAD FACTORS BY MACHINE TYPE

EXCAVATORS

S bucket chain excavators
S traveling gear (caterpillar)
M traveling gear (rails)
M suction pumps
S bucket wheels
M slewing gears

CONSTRUCTION MACHINERY

M concrete mixers
M road construction machinery

CHEMICAL INDUSTRY

M mixers
G agitators (light fluids)
M dryer drums
G centrifuges

FEEDERS AND CONVEYORS

S belt conveyors
G belt conveyors (bulk materials)
M belt bucket conveyors
M screw conveyors
M circular conveyors
M hoists

BLOWERS AND FANS¹⁾

G blowers (axial/radial) $P:n \leq 0.007$
M blowers (axial/radial) $P:n \leq 0.007$
S blowers (axial/radial) $P:n > 0.007$
G cooling tower fans $P:n \leq 0.007$
M cooling tower fans $P:n \leq 0.007$
S cooling tower fans $P:n > 0.007$

GENERATORS AND TRANSFORMERS

S generators

RUBBER MACHINERY

S extruders
S calendars
M mixers
S rolling millse

WOOD PROCESSING MACHINERY

G woodworking machines

CRANES

S traveling gears
S hoisting gears
M slewing gears

PLASTICS MACHINERY

M mixers
M shredders

METALWORKING MACHINERY

M sheet metal bending machines
S plate straightening machines

S presses

M shears
S punch presses
M machine tools, main drives

FOOD PROCESSING MACHINERY

G filling machines
M kneading machines
M cane crushers
M cane cutters
S cane mills
M sugar beet cutters
M sugar beet washers

PAPER MACHINERY

S wood cutters
S calendars
S wet presses
S suction presses
S suction rollers
S drying cylinders

PUMPS

S piston pumps
G centrifugal pumps (light fluids)
S reciprocating pumps

STONE AND CLAY MACHINES

S breakers

S rotary kilns

S hammer mills
S brick presses

TEXTILE MACHINERY

M tanning vats
M willows
M looms

COMPRESSORS

S reciprocating compressors
M centrifugal compressors

METAL ROLLING MILLS

M plate tilters
S ingot handling machinery
M winding machines (strip and wire)
S descaling machines
S cold rolling mills
M chain transfers
M cross transfers
M roller straighteners
S tube welding machines
S continuous casting plants
M roller adjustment drives

LAUNDRY MACHINES

M tumblers
M washing machines

WASTEWATER TREATMENT PLANTS

M aerators
G screw pumps

¹⁾ P = power of drive in kW
n = speed of drive in rpm

ACCORDING TO TORQUE

1. Calculate the drive torque at speed T_{AN} .

$$T_{AN} \geq 9,550 \cdot \frac{P_{Drive}}{n} \text{ (Nm)}$$

2. Determine the required torque rating of the coupling T_{KN} based on the drive torque T_{AN} multiplied by the shock or load factor S_A (see page 17)

$$T_{KN} \geq T_{AN} \cdot S_A$$

Sample calculation:

Coupling between an electric motor (P=1000 kW at n=980 rpm) and a transmission, driving a screw conveyor ($S_A=1.6$).

$$T_{AN} = 9,550 \cdot \frac{1,000 \text{ kW}}{980 \text{ min}^{-1}} = 9,744 \text{ Nm}$$

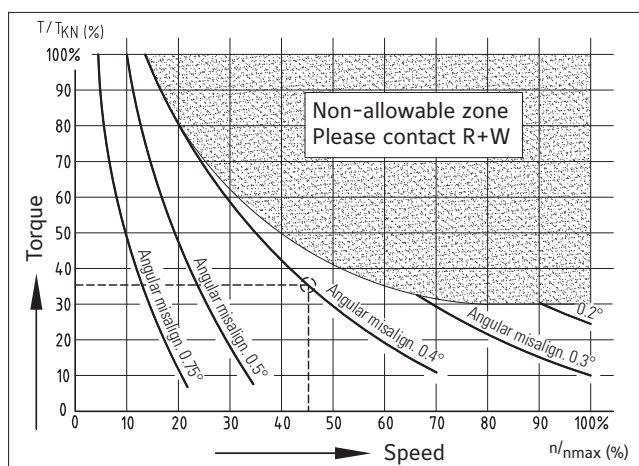
$$\begin{aligned} T_{KN} &\geq T_{AN} \cdot S_A \\ T_{KN} &\geq 9,744 \text{ Nm} \cdot 1.6 = 15,591 \text{ Nm} \end{aligned}$$

RATINGS CHART

Maximum torque, speed and misalignment are related and can not exist at the same time.

Evaluation of T/T_{KN} and n/n_{max}

► Compare plotted values for combined limits.





INSTALLATION AND HANDLING

SHAFT / AXIS MISALIGNMENT

Exact alignment of the shaft axes extends the service life of the coupling and adjacent components by minimizing reaction loads from misalignment.

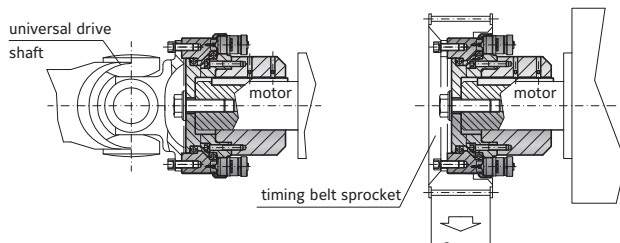
INSTALLATION AND HANDLING INDUSTRIAL DRIVE COUPLINGS

INDIRECT DRIVES

SAFETY COUPLINGS

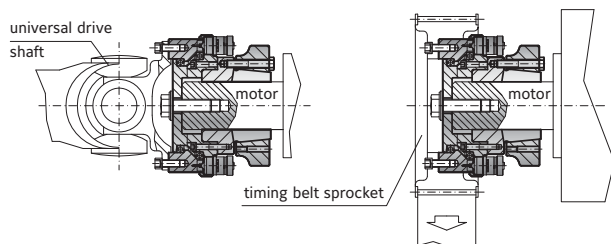
Drive attachments such as sprockets and universal joint shafts need to be centered on one of the precision locating features in the output flange of the coupling. In the case of sprockets, gears, sheaves, etc, the radial load should be centered between the two rows of ball bearings, integral to the coupling. In case this is not possible the overhung load can be supported by additional outboard bearings on the shaft. Make sure to observe the allowable size and radial load ratings for the safety couplings.

ST1



WITH KEYWAY MOUNTING

STN



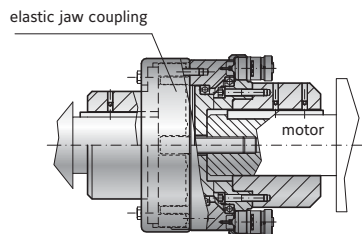
WITH CONICAL CLAMPING RINGS

DIRECT DRIVES

SAFETY COUPLINGS

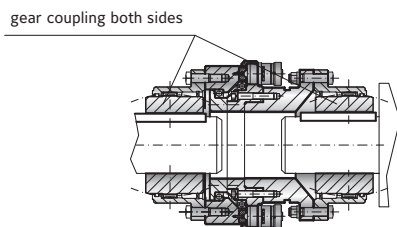
Model ST safety couplings are designed for high torque. This is accomplished by means of the robust spring plunger safety elements, which are uniformly distributed around the face of the coupling body. These safety elements provide a spring loaded form fit connection between the input and output of the coupling system. Transmittable torque is determined by the quantity and force settings of the safety elements. At a predetermined maximum torque level, the balls of the safety elements exit the conical detents in the output flange of the coupling, and retract inside the housings of the safety elements. This creates a complete disconnection of the input and output of the coupling system. Re-engagement is performed by applying pressure to the back side of the safety elements, causing the balls to be released back into their detents. The coupling system is sealed to prevent dirt and debris from entering, and to prevent grease from escaping.

ST2



WITH KEYWAY MOUNTING
AND ELASTIC JAW COUPLING

ST4



WITH KEYWAY MOUNTING
AND GEAR COUPLING

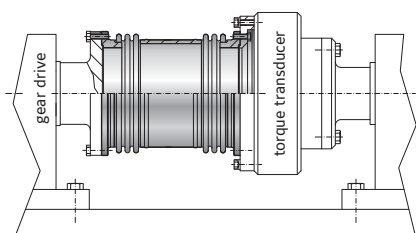
INSTALLATION AND HANDLING INDUSTRIAL DRIVE COUPLINGS

DIRECT DRIVES

METAL BELLOWS COUPLINGS

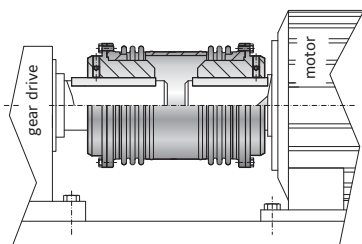
R+W bellows couplings are flexible shaft couplings. The stainless steel bellows compensates for lateral, axial and angular shaft misalignment while transmitting torque with zero backlash and high torsional stiffness.

BX1



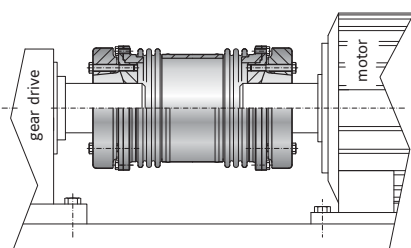
WITH FLANGE MOUNTING

BX4



WITH KEYWAY MOUNTING

BX6

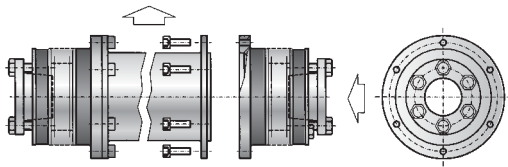


WITH CONICAL CLAMPING RINGS

DIRECT DRIVES

BELLOWS DRIVE SHAFTING

R+W line shafts are flexible and torsionally rigid. The stainless steel bellows compensate for lateral, axial and angular shaft misalignment while transmitting torque with high precision. A special support system in the flanges of the drive shaft tubing allows for the weight of the tubing to be supported by the adjacent bearings rather than the flexible bellows itself. This allows for drive shaft lengths of up to 6 m without intermediate supports.

ZA

WITH CONICAL CLAMPING HUB

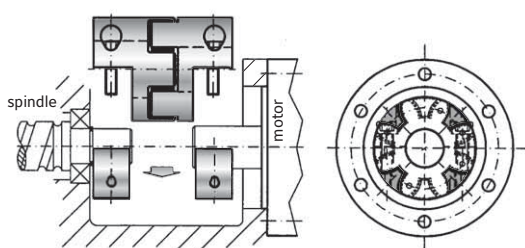
INSTALLATION AND HANDLING INDUSTRIAL DRIVE COUPLINGS

DIRECT DRIVES

ELASTIC JAW COUPLINGS

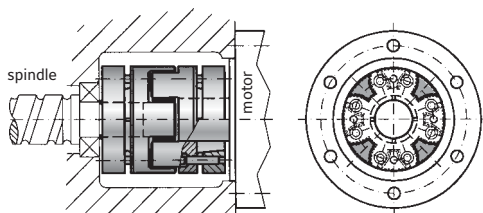
R+W elastic jaw couplings are three piece flexible shaft couplings. The elastomer inserts are preloaded into the jaws, transmitting torque with zero backlash. The coupling system also compensates for lateral, axial, and angular shaft misalignment. The elastomer inserts are available in different hardness levels in order to allow for different characteristics in terms of damping, flexibility, and torsional stiffness.

EKH



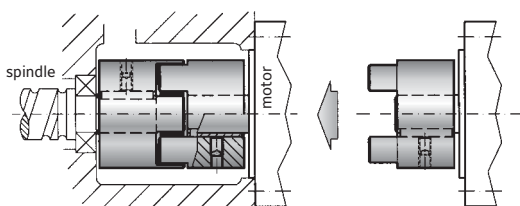
WITH FULLY SPLIT CLAMPING HUBS

EK6



WITH CONICAL CLAMPING RINGS

EK1

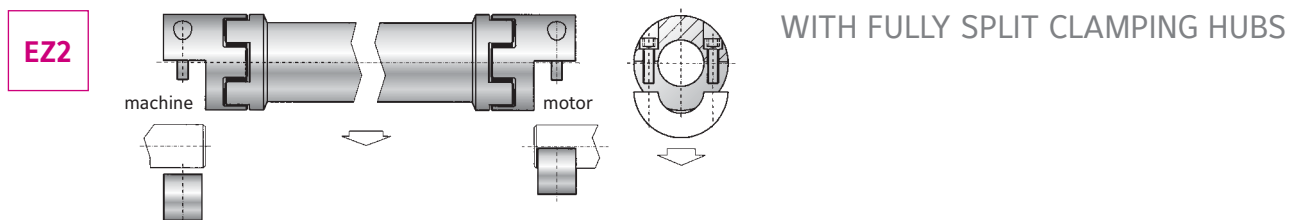


WITH SIMPLE KEYWAY MOUNTING

DIRECT DRIVES

ELASTIC DRIVE SHAFT SYSTEM

R+W drive shaft systems are flexible couplings for spanning larger distances between shaft ends. The elastomer inserts compensate for lateral, axial, and angular shaft misalignment. The preloaded elastic coupling system also absorbs vibration while transmitting torque with zero backlash.



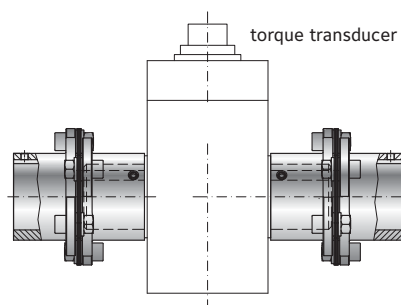
INSTALLATION AND HANDLING INDUSTRIAL DRIVE COUPLINGS

DIRECT DRIVES

DISC PACK COUPLINGS

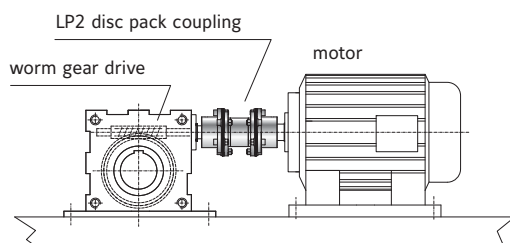
R+W LP series couplings come with the disc packs fully assembled. They need only to be mounted to the hubs and spacers during installation. Once assembled the disc pack couplings compensate for axial, lateral, and angular shaft misalignment. Torque is transmitted across the disc packs purely by the frictional flanged connection created by the grade 12.9 bolts. This helps to avoid problems associated with backlash, stress concentration, and micro movements, while also making the coupling assembly more torsionally stiff.

LP1



WITH SIMPLE KEYWAY MOUNTING

LP2

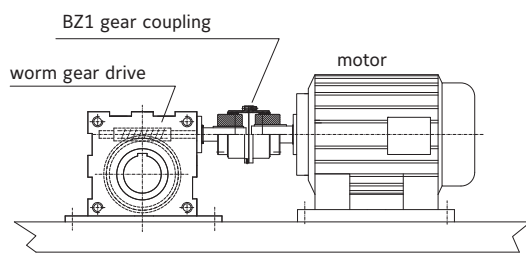


DOUBLE FLEX

DIRECT DRIVES

CROWNED GEAR COUPLINGS

The precise integration of the coupling hub and intermediate flange allow for low backlash and highly rigid torque transmission, while compensating for lateral, axial, and angular shaft misalignment. The crowned geometry of the gearing allows for a long life, even without the presence of misalignment.

BZ1

WITH SIMPLE KEYWAY MOUNTING





SIZES FROM 2,000 - 165,000 Nm

SAFETY COUPLINGS

GENERAL INFORMATION ABOUT R+W SAFETY COUPLINGS:



SERVICE LIFE

When properly installed and handled these couplings are completely wear and maintenance free.

FIT CLEARANCE

Overall shaft / hub clearance of 0.02 - 0.07 mm

TEMPERATURE RANGE

-30 to +120° C

SPECIAL SOLUTIONS

Automatic re-engagement, special materials, special flanges, bore profiles, etc. are available on request.

ATEX (Optional)

For use in hazardous areas available upon request.

DISENGAGEMENT BEHAVIOR

Full disengagement / manual reset is standard.

TORSIONALLY STIFF SAFETY COUPLINGS

SIZES FROM 2 – 165 KNm

MODEL	FEATURES	
ST1 	with simple keyway mounting for indirect drives from 2 - 165 KNm ▶ compact, simple design ▶ precise overload protection ▶ torsionally stiff ▶ integral bearing for overhung load support	Page 40
STN 	with conical clamping ring for indirect drives from 2 - 165 KNm ▶ high shaft clamping pressure ▶ compact, simple design ▶ precise overload protection ▶ torsionally stiff ▶ integral bearing for overhung load support	Page 41
ST2 	with simple keyway mounting and elastic coupling from 2 - 165 KNm ▶ vibration damping ▶ compensation for misalignment ▶ precise overload protection ▶ elastomer segments resistant to oil and dirt ▶ press fit design	Page 42
ST4 	with simple keyway mounting and crowned gear coupling from 2 - 165 KNm ▶ high power density ▶ compensation for misalignment ▶ precise overload protection ▶ low reaction loads on shaft bearings ▶ torsionally stiff	Page 44

GENERAL INFORMATION

SAFETY COUPLINGS

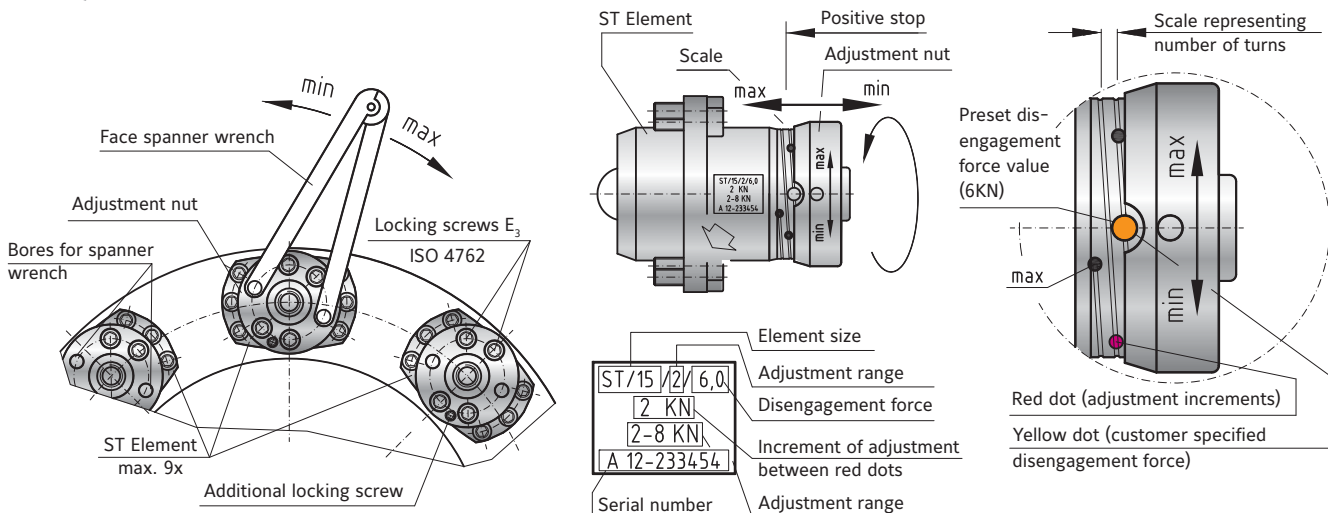
ST1

STN

ST2

ST4

TORQUE ADJUSTMENT



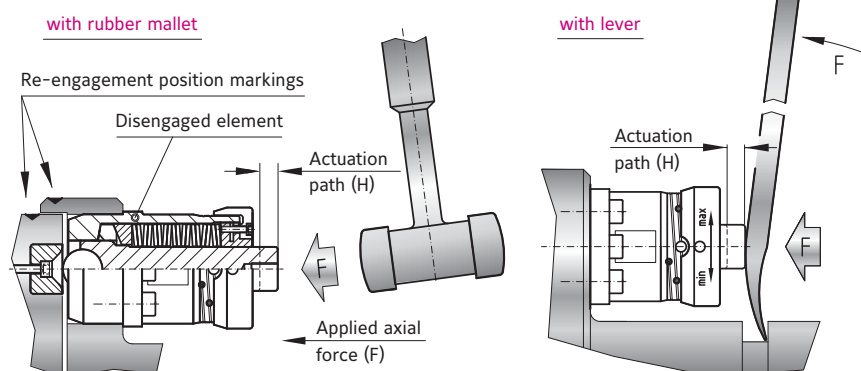
After loosening (approx. 1 rotation) the locking screws (E₃), the adjustment nut can be turned to adjust the disengagement setting. Incremental values are marked on the adjustment scale. After adjustment, the torque setting is secured by tightening the locking screws (E₃).

► Note

All safety elements must be set to the same value.

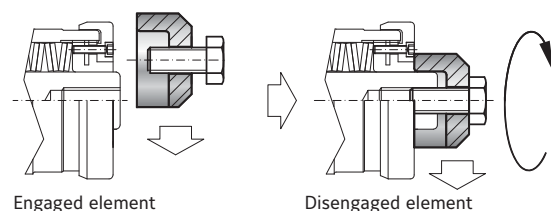
RE-ENGAGEMENT OF THE SAFETY ELEMENTS

After the overload has been cleared, the drive or driven side must be rotated until the re-engagement position markings are lined up. The elements can only be re-engaged in this position. The element is re-engaged through applying an axial force to the plunger. Re-engagement is audible. Once this is complete, the torque limiter is ready for operation.



MANUAL DISENGAGEMENT OF ELEMENTS

Prior to machine start-up, the individual elements can be manually disengaged. A manual disengagement tool is available from R+W (see page 13).



GENERAL INFORMATION

SAFETY COUPLINGS

RELIABLE TORQUE OVERLOAD PROTECTION

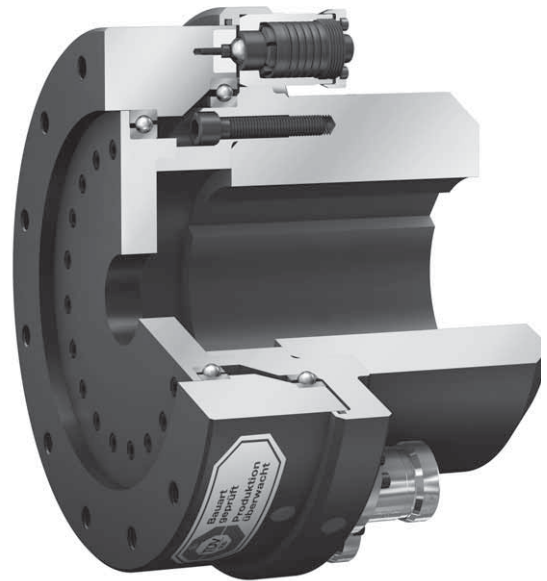
ST series safety couplings are designed to decouple machine drives in the event of torque overload, preventing damage and downtime.

A series of ball bearings are spring loaded into detents on an otherwise freely spinning output plate. In the case of the ST series, these ball bearings are mounted onto plungers which are individually loaded in order to generate high clutching forces while maintaining a relatively small profile.

The transmittable torque is determined by the number and force setting of the safety elements and their distance from the center of the rotational axis. In the event of an overload, the force applied by the detents causes the plungers to overcome the spring loading and retract into the housings, resulting in a complete separation of the driving and driven hubs.

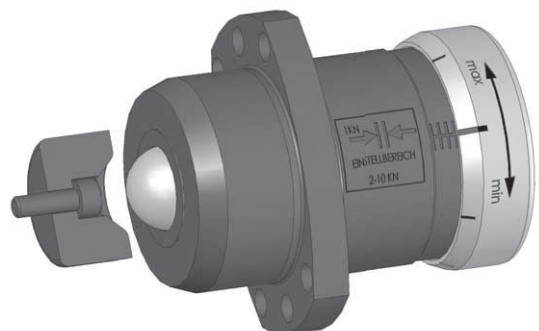
They will not re-engage automatically. After the overload condition has passed, an axial force must be applied in order to re-engage the safety elements into the detents of the output plate.

This is normally accomplished without any special tools, simply requiring a mallet or pry bar.



The safety elements consist of two components: the detent receptacle and the adjustable plunger mechanism.

The force setting is clearly marked on an adjusting scale.



GENERAL INFORMATION

SAFETY COUPLINGS

OPTION: HYDRAULIC ACTUATED RE-ENGAGEMENT

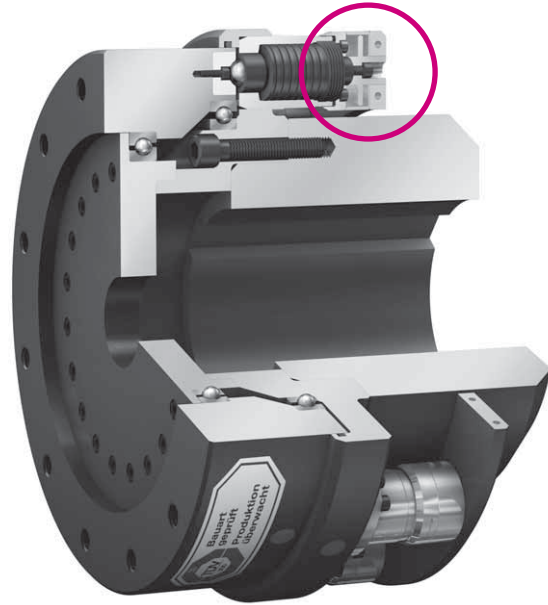
With a new combination of hydraulic and mechanical components, the special SH version is available for automatic re-engagement.

The SH system is available to be incorporated into all of the standard ST series safety couplings, from 2,000 - 165,000 Nm.

After an overload the coupling can be slowly rotated in reverse to cause the safety elements to automatically engage upon reaching the next set of detent receptacles.

This reduces downtime in heavy equipment by allowing for remote re-engagement of the safety coupling.

Incorporation of the SH system into any standard ST model has no impact on the overall space envelope requirements.



ST1

WITH SIMPLE KEYWAY MOUNTING

2 - 165 KNm



ABOUT

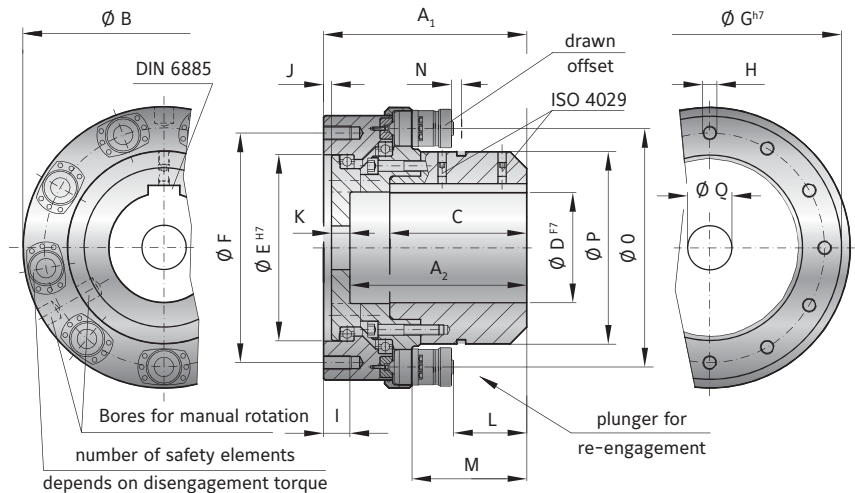
MATERIAL
Hardened steel (nitrocarburized surface)

► Driven side: output flange with 12x fastening threads and integral bearings

DESIGN

► Drive side: coupling hub with keyway connection (spline profile on request)

► Safety elements: evenly spaced around the circumference; externally adjustable



MODEL ST1

SIZE			10			25			60			160		
Adjustment range available from - to (KNm)			2-6	4-12	6-18	3-8	5-16	10-25	11-20	22-40	35-60	25-55	50-110	80-165
			3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 30	6 x ST 30	9 x ST 30	3 x ST 70	6 x ST 70	9 x ST 70
Overall length	(mm)	A ₁	183			230			320			410		
Bore depth	(mm)	A ₂	158			200			275			360		
Flange outside diameter	(mm)	B	270			318			459			648		
Fit length	(mm)	C	120			155			220			290		
Bore diameter possible Ø to Ø F7	(mm)	D	40-110			60-140			80-200			100-290		
Flange centering diameter H7	(mm)	E	170			210			300			450		
Bolt circle diameter ±0.3	(mm)	F	220			260			360			570		
Outside diameter h7	(mm)	G	259			298			418			618		
Fastening threads		H	12 x M16			12 x M16			12 x M20			12 x M24		
Thread depth	(mm)	I	25			30			35			40		
Fit length	(mm)	J	6			8			8			10		
Wall thickness	(mm)	K	17			20			30			38		
Distance	(mm)	L	45			83			96			136		
Distance	(mm)	M	95			130			165			225		
Actuation path	(mm)	N	4			4			7,5			10		
Mounting diameter - elements	(mm)	O	220			270			376			532		
Hub outside diameter	(mm)	P	170			218			295			418		
Bore for fastening screw	(mm)	Q	max. Ø 110			max. Ø 140			max. Ø 200			max. Ø 290		
Moment of inertia (approx.) D max.(10 ⁻³ kgm ²)			370			780			4600			24600		
Speed max.	(rpm)		4200			3800			2500			2000		
Allowable max. radial force standard*	(kN)		40			60			100			200		
Approx. weight at D max.	(kg)		40			63			179			463		

* larger radial loads possible with special bearings

ORDERING EXAMPLE	ST1	025	5-16	12	117.48	25.4	XX
Model	●						Special designation only (e.g. custom output flange)
Size		●					
Adjustment range (KNm)			●				
Disengagement torque (KNm)				●			
Bore diameter D F7					●		
Bore for fastening screw in shaft end (Q)						●	
For custom features place an XX at the end of the part number and describe the special requirements (e.g. ST1 / 025 / 5-16 / 12 / 117.48 / 25.4 / XX)							



ABOUT

MATERIAL

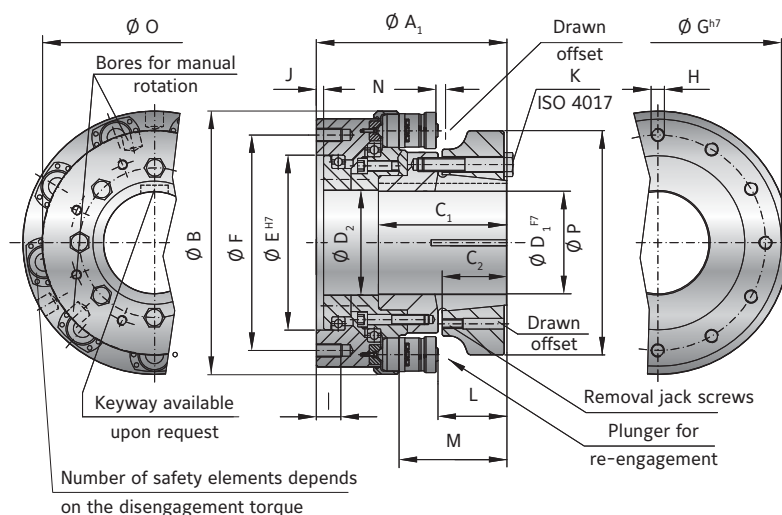
Hardened steel (nitrocarburized surface)

► Driven side: output flange with 12x fastening threads and integral bearings

DESIGN

► Drive side: coupling hub with conical clamping ring connection (spline profile on request)

► Safety elements: evenly spaced around the circumference; externally adjustable



MODEL STN

SIZE		10			25			60			160		
Adjustment range available from - to (KNm)		2-6	4-12	6-18	3-8	5-16	10-25	11-20	22-40	35-60	25-55	50-110	80-165
		3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 30	6 x ST 30	9 x ST 30	3 x ST 70	6 x ST 70	9 x ST 70
Overall length	(mm)	A ₁	210			227			318			425	
Flange outside diameter	(mm)	B	270			318			459			648	
Fit length / keyway length	(mm)	C ₁	147			152			218			305	
Effective clamping length	(mm)	C ₂	62			67			93			125	
Bore diameter possible Ø to Ø F7	(mm)	D ₁	65 - 110			70 - 150			80 - 200			140 - 290	
Bore diameter max. Ø F7 with keyway	(mm)	D ₁	100			140			180			270	
Inside diameter	(mm)	D ₂	110,2			140,2			200,2			290,2	
Flange centering diameter H7	(mm)	E	170			210			300			450	
Bolt circle diameter ±0.3	(mm)	F	220			260			360			570	
Outside diameter h7	(mm)	G	259			298			418			618	
Fastening threads		H	12 x M16			12 x M16			12 x M20			12 x M24	
Thread depth	(mm)	I	25			30			35			40	
Fit length	(mm)	J	6			8			8			10	
Tightening screw ISO 4017		K	8 x M16			9 x M16			8 x M20			8 x M24	
Tightening torque	(Nm)	L	180			180			570			710	
Distance	(mm)	M	72			80			94			151	
Distance	(mm)	N	122			127			163			240	
Actuation path	(mm)	O	4			4			7,5			10	
Mounting diameter - elements	(mm)	P	220			270			376			532	
Hub outside diameter	(mm)	P	218			278			378			535	
Moment of inertia (approx.) D max.(10 ⁻³ kgm ²)			446			789			5700			30700	
Speed max.	(rpm)		4200			3800			2500			2000	
Allowable max. radial force standard*	(kN)		40			60			100			200	
Approx. weight at D max.	(kg)		50			65			200			550	

* larger radial loads possible with special bearings

ORDERING EXAMPLE	STN	025	5-16	12	117.48	25	XX
Model	●						Special designation only (e.g. custom output flange)
Size		●					
Adjustment range (KNm)			●				
Disengagement torque (KNm)				●			
Bore diameter D F7					●		
Bore for fastening screw in shaft end (Q)						●	
For custom features place an XX at the end of the part number and describe the special requirements (e.g. STN / 025 / 5-16 / 12 / 117.48 / 25 / XX)							

ST2

WITH SIMPLE KEYWAY MOUNTING

2 – 165 KNm



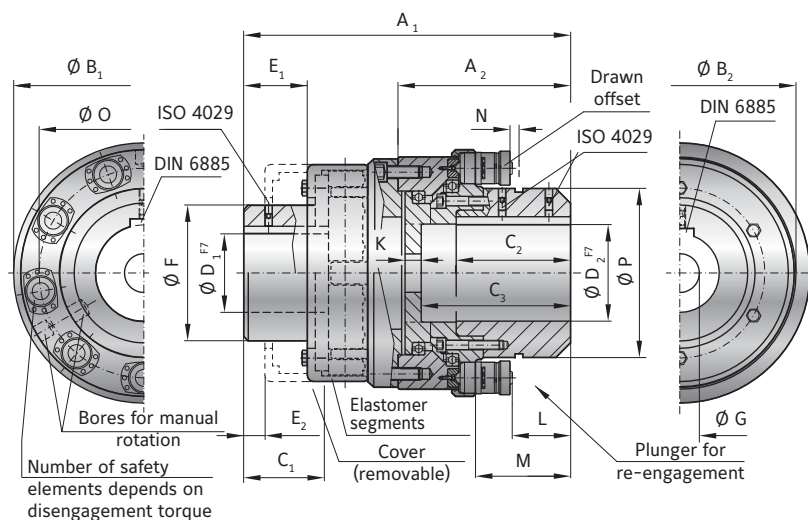
ABOUT

MATERIAL

- **Safety coupling portion:** hardened steel (nitrocarburized surface)
- **Elastomer segments:** precision molded, wear resistant rubber compound (75-80 Shore A)
- **Elastomer coupling:** hubs made from coated high strength cast steel

DESIGN

With keyway connection (spline profile on request). Elastomer segments compensate for misalignment and absorb vibration. Safety elements evenly spaced around the circumference. Field adjustable within the specified range.



MODEL ST2

SIZE		10			25			60			160		
Adjustment range available from - to (KNm)		2-6	4-12	6-18	3-8	5-16	10-25	11-20	22-40	35-60	25-55	50-110	80-165
		3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 30	6 x ST 30	9 x ST 30	3 x ST 70	6 x ST 70	9 x ST 70
Overall length ±2 (mm)	A ₁	360			437			580			730		
Length of torque limiting portion (mm)	A ₂	183			230			320			410		
Flange outside diameter (ST portion) (mm)	B ₁	270			318			459			648		
Flange outside diameter (elastomer portion) (mm)	B ₂	290			330			432			553		
Fit length/keyway length D1 (mm)	C ₁	97			116			160			230		
Fit length/keyway length D2 (mm)	C ₂	120			155			220			290		
Bore depth (torque limiting portion) (mm)	C ₃	158			200			275			360		
Bore diameter (elastomer portion) Ø - Ø F7 (mm)	D ₁	40-105*			60-130*			80-160*			100-200*		
Bore diameter (torque limiting portion) Ø - Ø F7 (mm)	D ₂	40-110*			60-140*			80-200*			100-290*		
Length to cover (mm)	E ₁	70			87			112			152		
Length to (cover removed) (mm)	E ₂	22			26			40			65		
Hub diameter (mm)	F	160			200			255			300		
Bore for fastening screw (mm)	G	max. 110			max. 140			max. 200			max. 290		
Distance (mm)	L	45			83			96			136		
Distance (mm)	M	95			130			165			225		
Actuation path (mm)	N	4			4			7.5			10		
Mounting diameter - elements (mm)	O	220			270			376			532		
Hub outside diameter (mm)	P	170			218			295			418		
Moment of inertia (approx.) D max. (10 ⁻³ kgm ²)		854			1850			8960			36858		
Speed max. (rpm)		2700			2300			1800			1500		
Approx. weight at D max. (kg)		80			115			287			729		
Axial (mm)		1.5			1.5			2			2.5		
Lateral (mm)		0.4			0.5			0.6			0.7		
Angular (Grad)		1			1			1			1		
Dynamic torsional stiffness at T _{KN} (Standard A Insert) (10 ³ Nm/rad)		145			230			580			1000		

* larger bore diameters upon request.

THE ELASTOMER SEGMENT

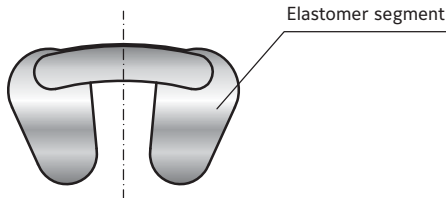
The compensating elements of the ST2 safety couplings are the elastomer segments. They transmit torque while damping vibration and compensating for lateral, axial

and angular misalignment. Three different versions are available with version A being supplied unless otherwise specified.

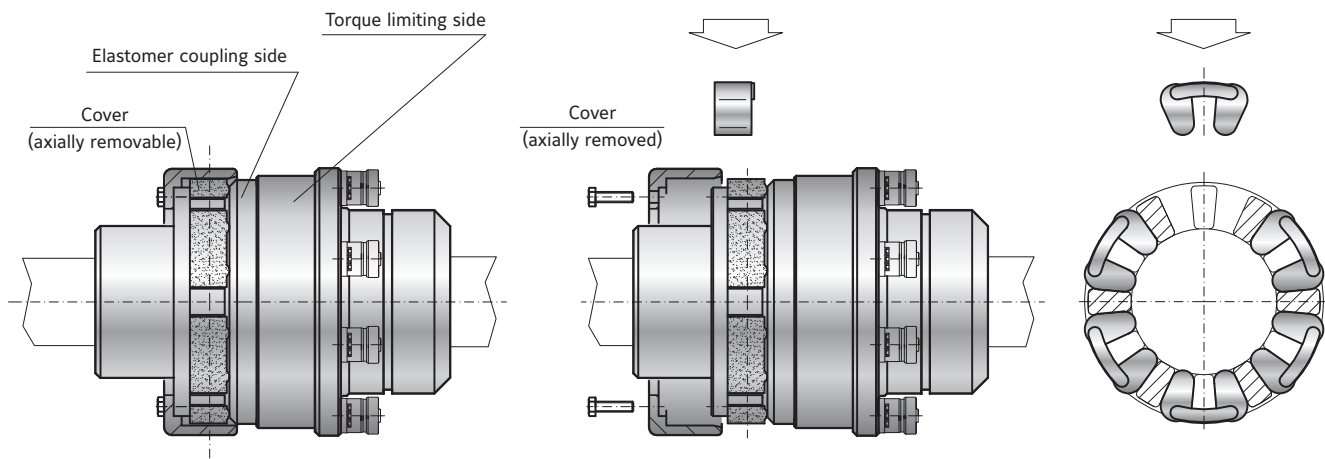
Type	Relative damping (ψ)	Temperature range constant peak	Material	Shore hardness	Features
A (Standard)	1.0	-40°C to +80°C +90°C	Natural and synthetic rubber	75-80 Shore A	Very high wear resistance
B	1.0	-40°C to +100°C +120°C	Synthetic rubber	73-78 Shore A	Resistant to many oils and fuels
C	1.0	-70°C to +120°C +140°C	Silicone rubber	70-75 Shore A	High temperature range

► **Note**

Elastomer segments can be easily changed after installation. Every coupling utilizes 6x elastomer segments. The elastomer segments do not need to be installed prior to coupling mounting.



CHANGING THE ELASTOMER SEGMENTS



For easier handling, the coupling will be shipped unassembled.

ORDERING EXAMPLE	ST2	025	10-25	15	127	117.48	XX
Model	●						Special designation only (e.g. custom output flange)
Size		●					
Adjustment range (KNm)			●				
Disengagement torque (KNm)				●			
Bore Ø D1 F7					●		
Bore Ø D2 F7						●	
For custom features place an XX at the end of the part number and describe the special requirements (e.g. ST2 / 025 / 10-25 / 15 / 127 / 117.48 / XX)							

ST4

WITH SIMPLE KEYWAY MOUNTING

2 - 165 KNm



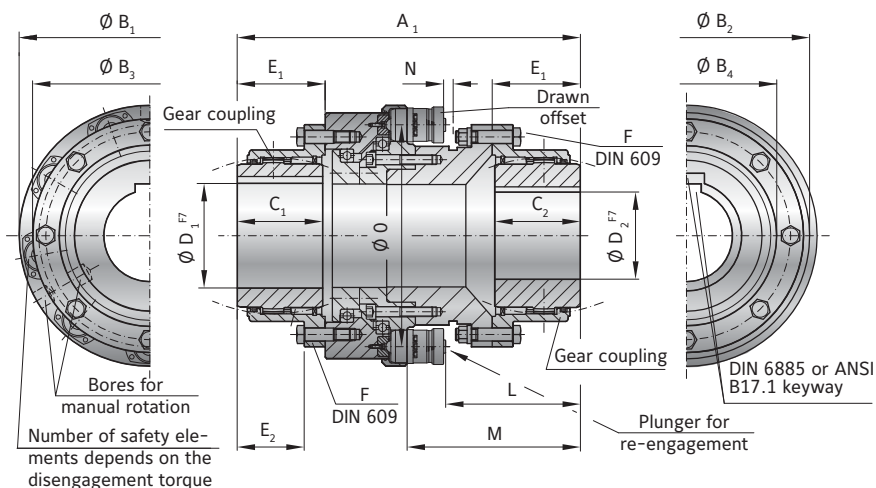
ABOUT

MATERIAL

- **Safety coupling portion:** hardened steel (nitrocarburized surface)
- **Gear coupling portion:** wear resistant high strength alloy steel (nitrocarburized surface)

DESIGN

With keyway connection (spline profile on request). Gear coupling for misalignment compensation. Safety elements evenly spaced around the circumference. Field adjustable within the specified range.



MODEL ST4

SIZE		10			25			60			160		
Adjustment range available from - to (KNm)		2-6	4-12	6-18	3-8	5-16	10-25	11-20	22-40	35-60	25-55	50-110	80-165
		3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 30	6 x ST 30	9 x ST 30	3 x ST 70	6 x ST 70	9 x ST 70
Overall length (mm)	A ₁	377			430			615			850		
Flange outside diameter (ST portion) (mm)	B ₁	270			318			459			648		
Mounting flange outside diameter (ST portion) (mm)	B ₂	259			298			418			618		
Flange outside diameter (gear coupling) (mm)	B ₃	234			274			380			506		
Hub diameter (gear coupling) (mm)	B ₄	181			209			307			426		
Fit length/keyway length (mm)	C _{1/2}	90			105			150			220		
Bore diameter Ø bis Ø F7 (mm)	D _{1/2}	40-112*			55-132*			90-198*			150-275*		
Length (mm)	E ₁	92.5			108			154			225		
Length (mm)	E ₂	70			79			116			196		
Screw DIN 609 12.9 (mm)	F	8 x M16			8 x M20			10 x M20			16 x M24		
Tightening torque (mm)		280			650			650			1100		
Distance (mm)	L	146			172			237			320		
Distance (mm)	M	196			222			306			412		
Actuation path (mm)	N	4			4			7.5			10		
Mounting diameter - elements (mm)	O	220			270			376			532		
Moment of inertia (approx.) D max. (10 ⁻³ kgm ²)		545			1298			7547			39742		
Speed max. (rpm)		2700			2300			1800			1500		
Approx. weight at D max. (kg)		69			115			325			870		
Axial (mm)		4			5			6			8		
Lateral (mm)		6			7			8			10		
Angular (Degrees)		1.2			1.2			1.2			1.2		

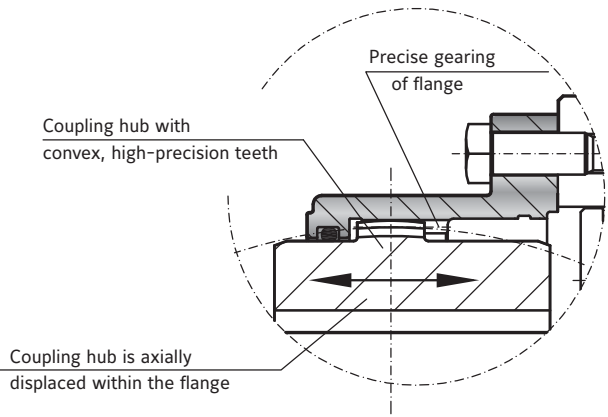
* larger bore diameters upon request.

FUNCTION OF THE GEAR COUPLING

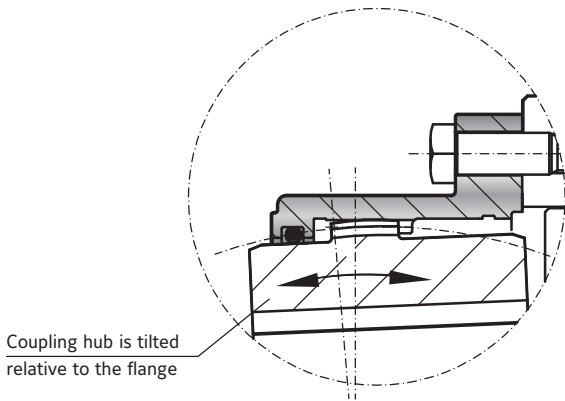
The high precision gearing of the coupling compensates for lateral, angular, and axial misalignment. The gearing transmits torque with minimal backlash and a high degree

of torsional rigidity. The precise geometry of the gearing ensures the performance of the coupling.

Axial misalignment



Angular and lateral misalignment



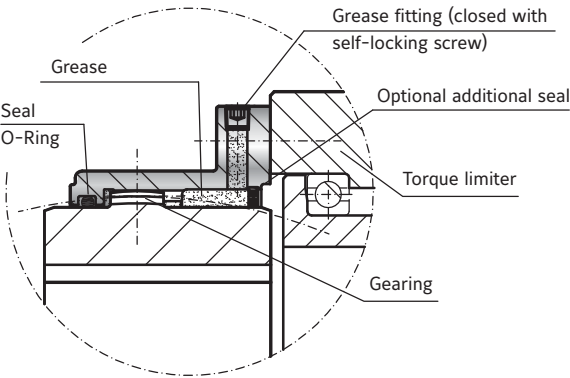
MAINTENANCE AND LUBRICATION

► **Note:** Lubrication of the gearing is very important to the service life of the coupling. An additional seal (optional) ensures the lubrication of the gearing over a long period of time.

Use only high performance grease

RECOMMENDED LUBRICANTS

Normal speed		High speed	
Castrol	Impervia MDX	Caltex	Coupling Grease
Esso	Fibrax 370	Klüber	Klüberplex GE 11-680
Klüber	Klüberplex GE 11-680	Mobil	Mobilgrease XTC
Mobil	Mobilux EPO	Shell	Albida GC1
Shell	Alvania grease EP R-O or ER 1	Texaco	Coupling Grease
Total	Specis EPG		



For easier handling, the coupling will be shipped unassembled.

ORDERING EXAMPLE	ST4	025	10-25	15	100	120	XX
Model	●						Special designation only (e.g. custom output flange)
Size		●					
Adjustment range (KNm)			●				
Disengagement torque (KNm)				●			
Bore Ø D1 F7					●		
Bore Ø D2 F7						●	
For custom features place an XX at the end of the part number and describe the special requirements (e.g. ST4 / 025 / 10-25 / 15 / 100 / 120 / XX)							



SAFETY COUPLING ACCESSORIES



ABOUT

MATERIAL

Hardened steel (nitrocarburized surface)

DESIGN

Two part assembly for installation into prefabricated coupling components.

Part 1: detent receptacle

Part 2: self-contained, spring loaded plunger module.

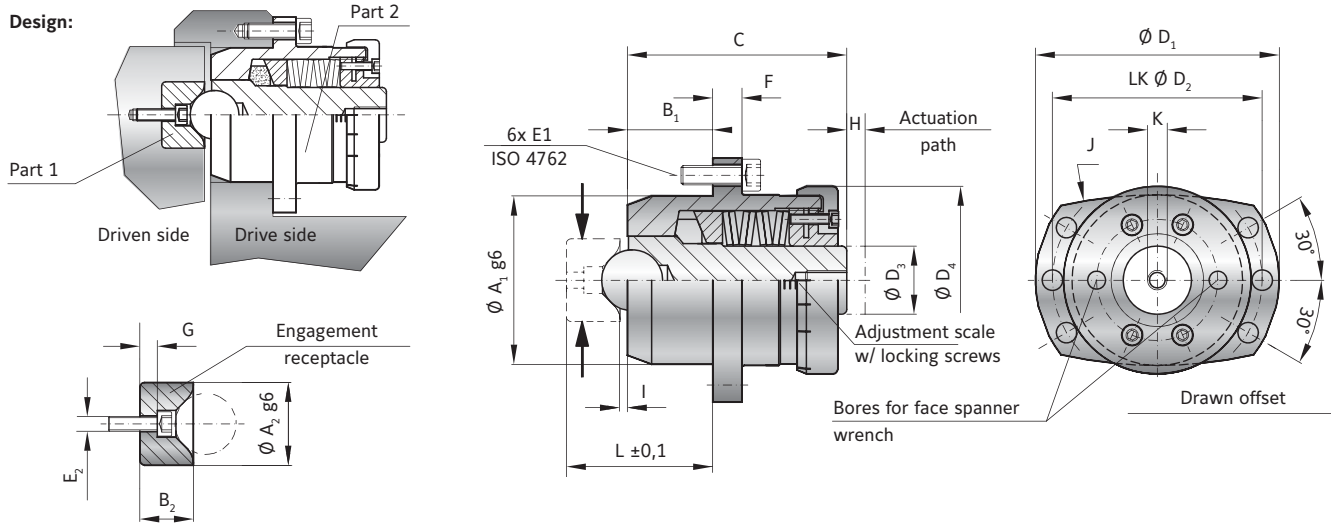
The spring force setting is adjustable in the field, with the settings clearly marked on an adjustment scale.

FIT TOLERANCE

For insertion of the safety elements H7 precision holes should be used for all centered components.

RE-ENGAGEMENT

When properly located over the detent receptacle the safety element can be re-engaged through the application of pressure to the back side of the plunger core.



MODEL ST

SIZE		15	30	70
Tangential force (KN) Adjustment range available from - to (ranges)	1	1-4	5-10	8-20
	2	2-8	10-20	15-40
	3	6-20	20-35	30-70
Centering diameter of safety element g6 (mm)	A ₁	40	70	90
Centering diameter engagement receptacle g6 (mm)	A ₂	24	34	44
Centering length of safety element (mm)	B ₁	20	35	45
Centering length engagement receptacle (mm)	B ₂	14	22	30
Overall length (mm)	C	70	103	135
Outside diameter (mm)	D ₁	59	100	129
Bolt circle diameter (mm)	D ₂	50	86	110
Diameter plunger (mm)	D ₃	16	28	35
Diameter adjustment nut (mm)	D ₄	44	75	92
Screw / Tightening torque ISO 4762 (mm)	E ₁	6 x M5 x 16 / 10 Nm	6 x M8 x 25 / 40 Nm	6 x M12 x 35 / 120 Nm
Screw / Tightening torque ISO 4762 (mm)	E ₂	M4 x 14 4.5 Nm	M6 x 20 15.5 Nm	M8 x 25 38 Nm
Flange thickness (mm)	F	7	12	16
Distance (mm)	G	5	8	10
Actuation path (mm)	H	4	7.5	10
Distance (mm)	I	2	3	4
Radius (mm)	J	110	200	250
Inner thread (mm)	K	M8 x 15	M10 x 25	M16 x 30
Distance ± 0,1 (mm)	L	36	60	79
Weight (kg)		0.65	2.7	6

axial spring force = tangential force/1.4

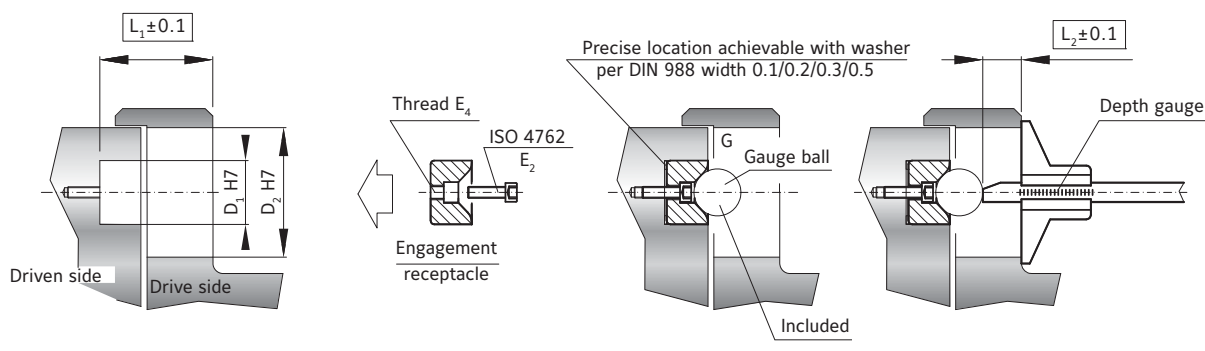
MAINTENANCE

The ST elements are lubricated and sealed for life. Routine maintenance is not required. While the safety elements have an extreme service life, they should be periodically checked to ensure proper functionality.

MOUNTING INSTRUCTIONS ST

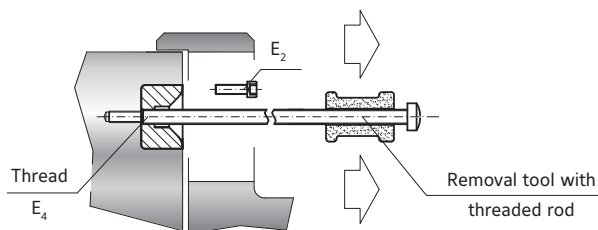
MOUNTING ENGAGEMENT RECEPTACLE

Note: Measurements L1 and L2 must be checked prior to installing the safety elements.



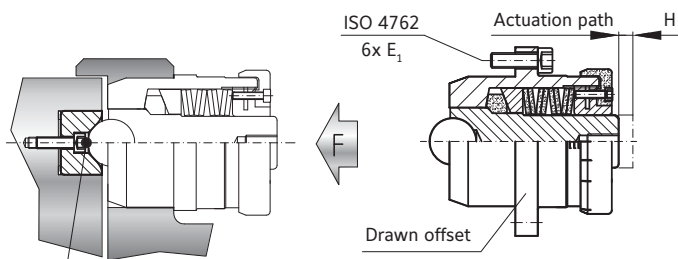
DISMOUNTING OF ENGAGEMENT RECEPTACLE

After loosening the mounting screw E2, the engagement receptacle can be dismantled with a removal tool.



MOUNTING OF SAFETY ELEMENT

SIZE	15	30	70
Screws E ₁	6 x M5 x 16 (12.9)	6 x M8 x 25 (12.9)	6 x M12 x 35 (12.9)
Tightening torque	10 Nm	40 Nm	120 Nm
Screws E ₂	1 x M4 x 12	1 x M6 x 20	1 x M8 x 25
Tightening torque	4.5 Nm	15.5 Nm	38 Nm
Screws E ₃	4 x M4 x 14	4 x M4 x 16	4 x M5 x 20
Tightening torque	4.5 Nm	4.5 Nm	10 Nm
Thread E ₄	M5	M8	M10
Actuation path H	4 mm	7.5 mm	10 mm
Restoring force F	max. 2 KN	max. 4 KN	max. 6 KN
Fit length L ₁ ± 0,1	36	60	79
Depth measurement L ₂ ± 0,1	10	20.5	29
Gauge ball Ø G	16	25	30



Note: Prior to mounting the safety element, the ball seat must be lubricated (e.g. Klüber Isoflex Topas NB 52).

ORDERING EXAMPLE	ST	30	2	12	XX
Model	●				
Size		●			
Adjustment range 1/2/3			●		
Tangential force (KN)				●	
For custom features place an XX at the end of the part number and describe the special requirements (e.g. ST / 30 / 2 / 12 / XX)					

ST ACCESSORIES

SAFETY COUPLINGS

ENGAGEMENT AND DISENGAGEMENT



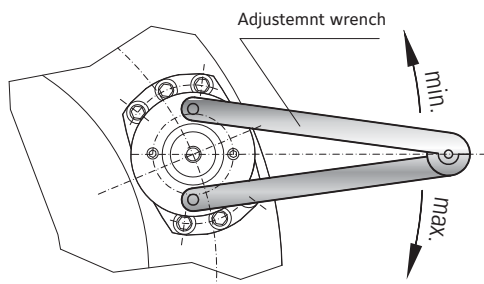
engaged element

disengaged element

ORDER NUMBER

SIZE	ENGAGEMENT / DISENGAGEMENT TOOL
15	Order number AV/0015
30	Order number AV/0030
70	Order number AV/0070

ADJUSTMENT WRENCH



ORDER NUMBER

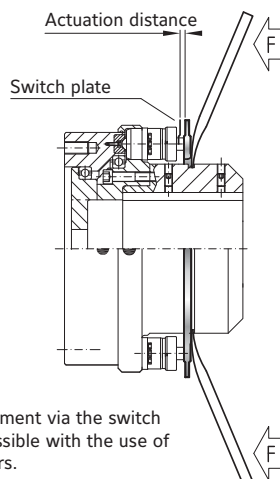
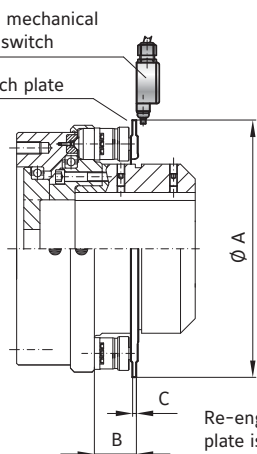
SIZE	ADJUSTMENT WRENCH
15	Order number SLS/0015
30	Order number SLS/0030
70	Order number SLS/0070

SWITCH PLATE



R+W mechanical limit switch

Switch plate



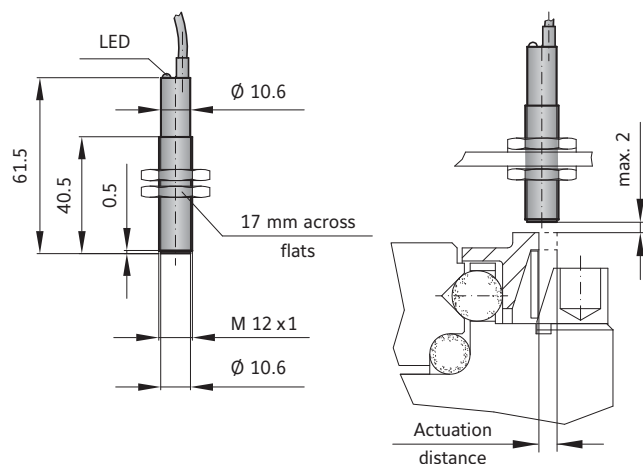
Re-engagement via the switch plate is possible with the use of two pry bars.

SIZE		10	25	60	160
Outside diameter	A	278	328	on request	on request
Distance	B	57	57	on request	on request
Thickness	C	4.5	4.5	on request	on request

It is important the switches be
100% tested for proper functioning
after mounting with safety coupling.

PROXIMITY SWITCH (E-STOP FUNCTION)

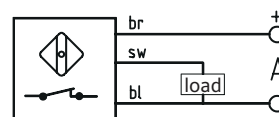
ST



ORDER NUMBER 650.2703.001

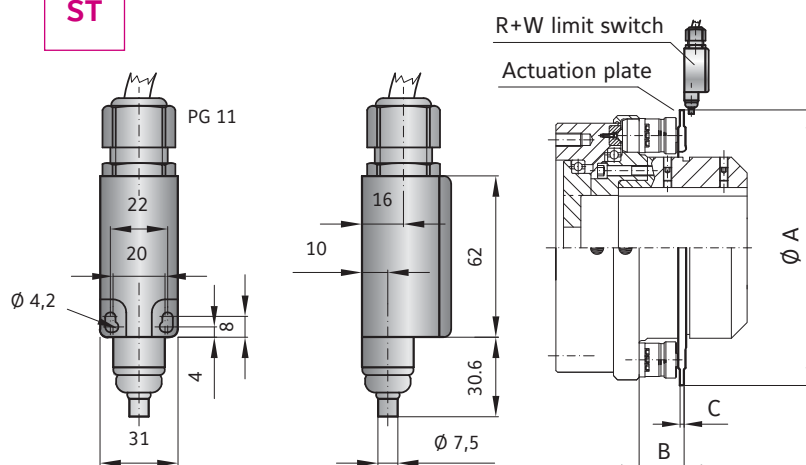
TECHNICAL DATA	ST
Voltage	10 to 30 V DC
Max. output current	200 mA
Max. switch frequency	800 KHz
Temperature range	-25° to +70° C
Protective system	IP 67
Switch type	normally open
Max. detection gap	max. 2 mm

SWITCH DIAGRAM SK, ES2



MECHANICAL LIMIT SWITCH (E-STOP FUNCTION)

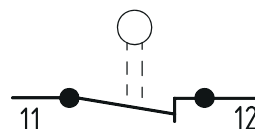
ST



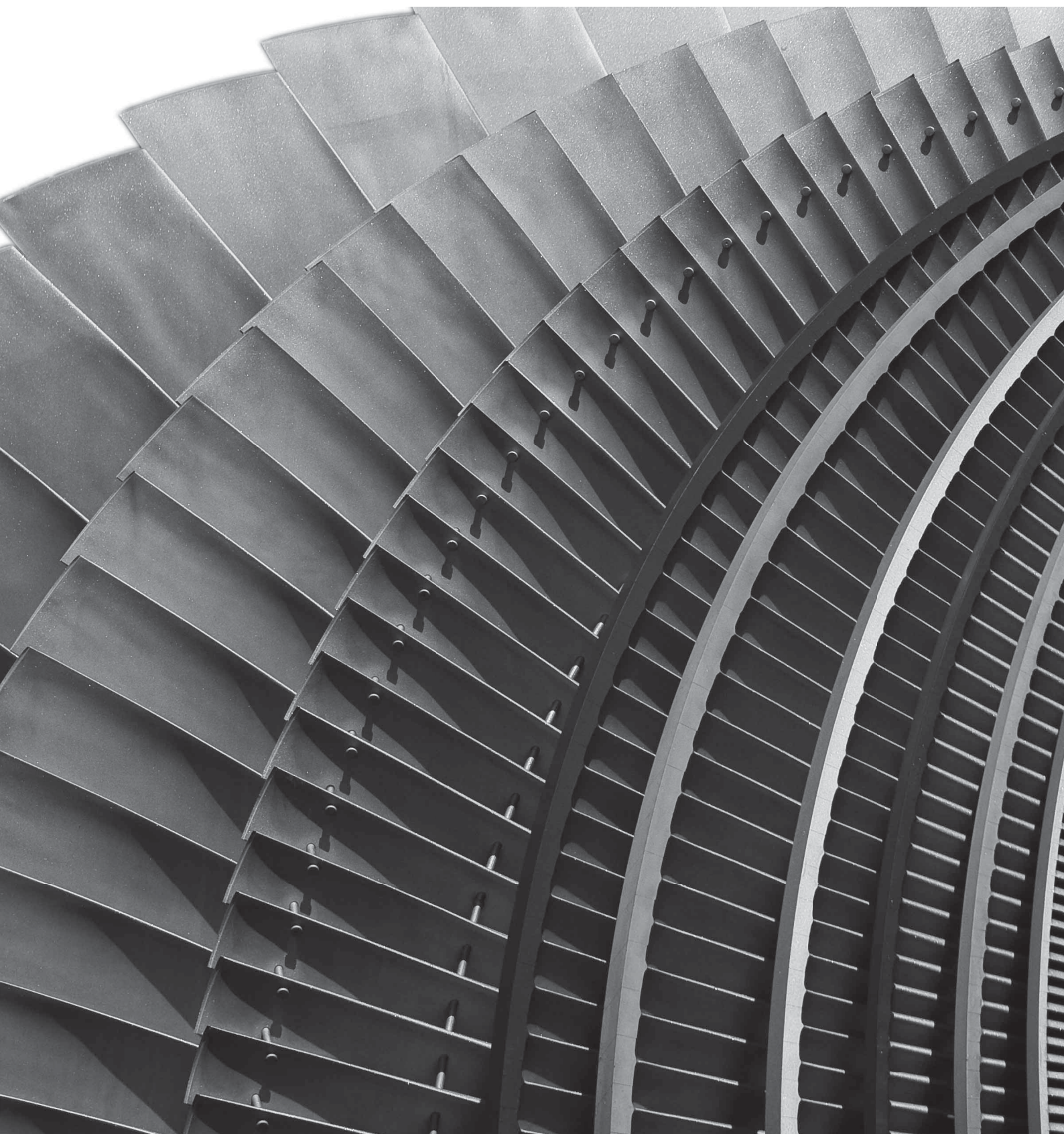
ORDER NUMBER 618.6740.644

TECHNICAL DATA	ST
Max. voltage	250 V AC
MAX. CONSTANT CURRENT:	2.5h A
Protective system	IP 65
Contact system	Opener (forced separating)
Temperature range	-30° to +80° C
Actuation	Plunger (metal)

SWITCH DIAGRAM ST



The switch plunger (pictured above and right) should be located as close to the actuation ring / limit switch plate as possible (approximately 0.1-0.2mm).





SIZES FROM 1,500 - 100,000 Nm

BACKLASH FREE, TORSIONALLY STIFF

METALLIC BELLOWS COUPLINGS

GENERAL INFORMATION ABOUT R+W BELLOWS COUPLINGS:



SERVICE LIFE

R+W bellows couplings are fatigue resistant and wear free for an infinite life, as long as the technical limits are not exceeded.

FIT CLEARANCE

Overall shaft / hub clearance of 0.03 - 0.08 mm

TEMPERATURE RANGE

-40 to +300° C

SPECIAL SOLUTIONS

Various materials, tolerances, dimensions and performance ratings available for custom applications on request.

ATEX (Optional)

For use in hazardous areas available upon request.

BX**ZA**

TORSIONALLY STIFF METALLIC BELLOWS COUPLINGS

SIZES FROM 1,500 - 100,000 Nm

MODEL

FEATURES

BX1

**with flange mounting
from 10 - 100 KNm**

- ▶ for customer specific applications

Page 55

BX4

**with simple keyway mounting
from 10 - 100 KNm**

- ▶ low backlash keyway connection
- ▶ compact, simple design

Page 56

BX6

**with conical clamping ring
from 10 - 100 KNm**

- ▶ backlash free conical clamping
- ▶ high shaft clamping pressure

Page 57

ZA

**with conical clamping bushing
from 1,500 - 4,000 Nm**

- ▶ mounting and dismounting without disturbing adjacent equipment
- ▶ standard lengths of up to 6 meters
- ▶ no intermediate support necessary

Page 58

BX1

WITH FLANGE MOUNTING

10 – 100 KNm

ABOUT

FEATURES

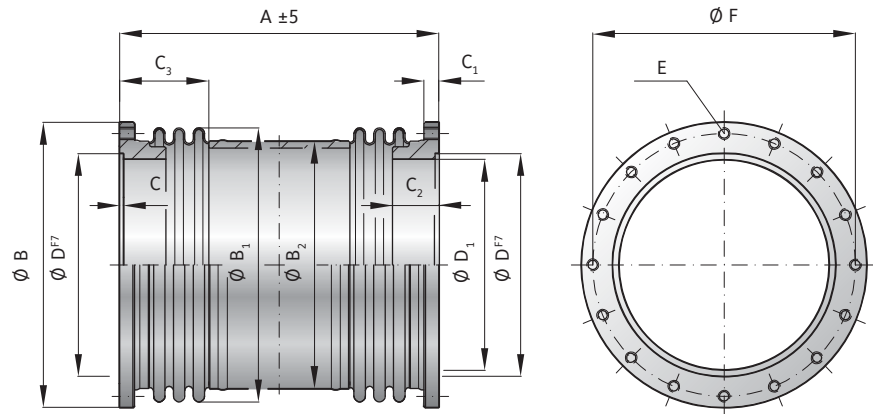
- compact, simple design
- high misalignment compensation
- integral support system (size 25 and up)

MATERIAL

- **Hubs:** steel
- **Bellows:** highly flexible high grade stainless steel

DESIGN

Both ends with flanged hubs
 Spacer between bellows
 (optional variable length)
 (size 10 without spacer)
 welded bellows-hub connection



MODEL BX1

SIZE			10	25	50	75	100
Rated torque (KNm)	T _{KN}		10	25	50	75	100
Maximum torque (KNm)	T _{Kmax}		15	38	75	113	150
Overall length (mm)	A ±5		125	380	450	580	640
Outside diameter of flange (mm)	B		310	336	398	449	545
Outside diameter of bellows ±2 (mm)	B ₁		300	323	370	412	520
Outside diameter of tube (mm)	B ₂		–	273	324	360	460
Fit length +0,5 (mm)	C ±0,5		4	5	6	10	15
Thread depth (mm)	C ₁		15	25	30	36	36
Hub length (mm)	C ₂		24	81	80	103	120
Bellows body length +3 (mm)	C ₃		–	121	133	165	165
Centering diameter F 7 (mm)	D		265	260	310	350	440
Hub diameter +0,3 (mm)	D ₁		250	240	290	320	390
Fastening threads*	E		20x M12	24x M16	24x M20	20x M24	24x M24
Tightening torque of the fastening screws (screw grade 10.9) (Nm)			120	300	580	1000	1000
Bolt circle diameter ±0.4 (mm)		F	290	304	361	404	500
Moment of inertia (10 ⁻³ kgm ²)	J _{ges.}		101	548	1185	2725	7900
Approximate weight (kg)			8.3	27.8	43.7	80	151
Axial ± (mm)	Max. value		3	5	6	7	8
Lateral ± (mm)			0.4	2.2	2.5	3	3.5
Angular ± (degree)			1.5	1	1	1	1
Torsional stiffness coupling (10 ³ Nm/rad)			20,000	9,000	15,500	23,000	35,000
Axial spring stiffness bellows (N/mm)			985	3000	4300	3900	2800
Lateral spring stiffness bellows (KN/mm)			21	133	207	175	219

*drilling pattern between hub 1 and hub 2 not aligned as standard

ORDERING EXAMPLE	BX1	50	XX
Model	●		Special designation only (e.g. stainless steel hubs)
Size / torque rating (KNm)		●	
For custom features place an XX at the end of the part number and describe the special requirements (e.g. BX1 / 50 / XX; XX = 700 mm overall length)			

BX4

WITH SIMPLE KEYWAY MOUNTING

10 – 100 KNm



ABOUT

FEATURES

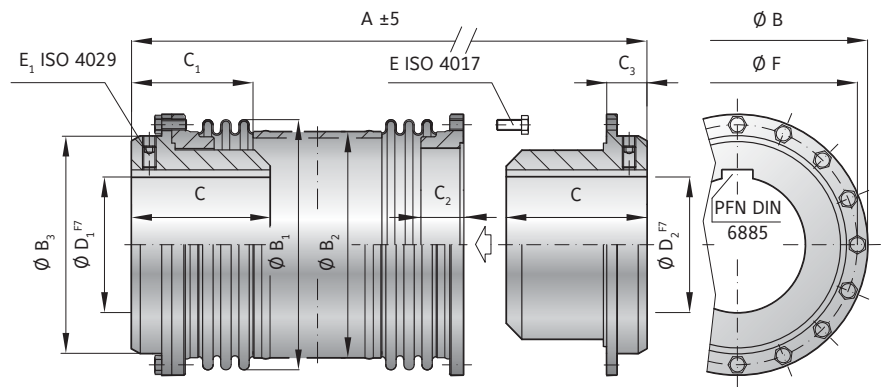
- compact, simple design
- high misalignment compensation
- integral support system (size 25 and up)

MATERIAL

- **Hubs:** steel
- **Bellows:** highly flexible high grade stainless steel

DESIGN

Both sides with removable coupling hubs, including keyway (splines optional)
 Spacer between bellows (optional variable length)
 (size 10 without spacer)
 welded bellows-hub connection



MODEL BX4

SIZE			10	25	50	75	100
Rated torque	(KNm)	T _{KN}	10	25	50	75	100
Maximum torque	(KNm)	T _{Kmax}	15	38	75	113	150
Overall length	(mm)	A _{±5}	210	480	590	760	840
Outside diameter of flange	(mm)	B	310	336	398	449	545
Outside diameter of bellows ±2	(mm)	B ₁	300	323	370	412	520
Outside diameter of tube	(mm)	B ₂	–	273	324	360	460
Hub diameter	(mm)	B ₃	255	260	310	350	440
Fit length	(mm)	C	95	130	200	240	280
Length ±3	(mm)	C ₁	–	170	200	257	260
Hub length	(mm)	C ₂	24	81	80	103	120
Distance	(mm)	C ₃	42	50	70	90	97
Inside diameter possible from Ø to Ø F7	(mm)	D ₁ /D ₂	50 – 180	60 – 170	80 – 200	100 – 230	120 – 280
Fastening screw ISO 4017 / Tightening torque	(Nm)	E	20xM12 / 120	24xM16 / 300	24xM20 / 580	20xM24 / 1000	24xM24 / 1000
Fastening screw ISO 4029 / Tightening torque	(Nm)	E ₁	M12 / 100	M16 / 220	M20 / 450	M24 / 800	M24 / 800
Bolt circle diameter ±0.4	(mm)	F	290	304	361	404	500
Moment of inertia	(10 ⁻³ kgm ²)	J _{ges.}	492	1272	3270	6754	19350
Approximate weight	(kg)		44.7	85	164	260	477
Axial	± (mm)	Max. value	3	5	6	7	8
Lateral	± (mm)		0.4	2.2	2.5	3	3.5
Angular	± (degree)		1.5	1	1	1	1
Torsional stiffness coupling	(10 ³ Nm/rad)		20,000	9,000	15,500	23,000	35,000

MAXIMUM TRANSMITTABLE TORQUE OF KEYWAY CONNECTION

Data is in KNm. These values relate to metric DIN 6885 keyway dimensions with 100% contact through the hub.

SIZE	Ø 60	Ø 80	Ø 100	Ø 120	Ø 140	Ø 160	Ø 170	Ø 180	Ø 200	Ø 220	Ø 230	Ø 240	Ø 260	Ø 280
10	x	x	x	x	x	x	x	x	x	x	x	x	x	x
25	7	12	18	26	34	44	46	x	x	x	x	x	x	x
50	x	19	28	40	52	67	71	84	94	x	x	x	x	x
75	x	x	34	47	62	81	85	101	112	136	142	x	x	x
100	x	x	x	55	74	94	100	118	131	159	166	189	205	220

BX6

WITH REMOVABLE CONICAL CLAMPING RING HUB 10 - 100 KNm

ABOUT

FEATURES

- compact, simple design
- high misalignment compensation
- integral support (size 25 and up)

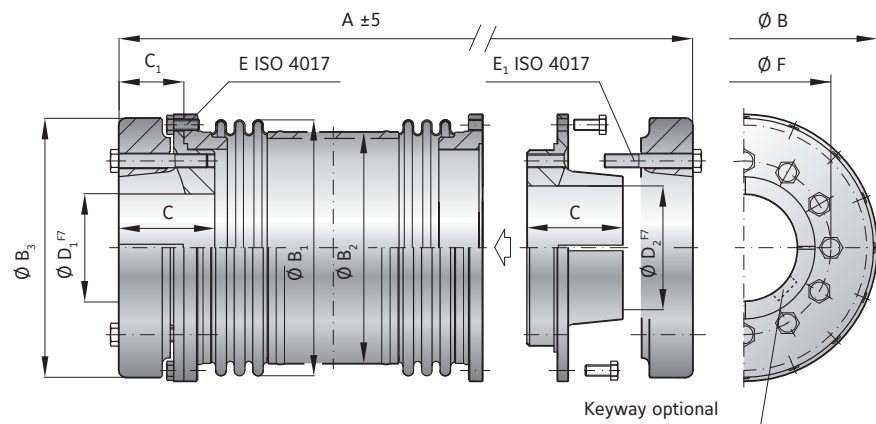
MATERIAL

- **Hubs:** steel
- **Bellows:** highly flexible high grade stainless steel

DESIGN

Both sides with removable clamping hubs including conical clamping ring system.

Spacer between bellows (optional variable length)
(size 10 without spacer)
welded bellows-hub connection



MODEL BX6

SIZE			10	25	50	75	100
Rated torque	(KNm)	T _{KN}	10	25	50	75	100
Maximum torque	(KNm)	T _{Kmax}	15	38	75	113	150
Overall length	(mm)	A ±5	235	530	650	840	940
Outside diameter of flange	(mm)	B	310	336	398	449	545
Outside diameter of bellows ±2	(mm)	B ₁	300	323	370	412	520
Outside diameter of tube	(mm)	B ₂	-	273	324	360	460
Diameter of clamping ring	(mm)	B ₃	300	310	380	420	530
Fit length	(mm)	C	90	110	140	170	200
Length	(mm)	C ₁	55	74	99	130	150
Inside diameter possible from Ø to Ø F7	(mm)	D ₁ /D ₂	70 - 170	80 - 180	100 - 200	130 - 230	150 - 280
Fastening screw ISO 4017 for mounting flange	(mm)	E	20 x M12	24 x M16	24 x M20	20 x M24	24 x M24
Tightening torque	(Nm)		120	300	580	1000	1000
Fastening screw ISO 4017 for conical clamping ring	(mm)	E ₁	8 x M16	12 x M16	12 x M20	16 x M20	12 x M24
Tightening torque	(Nm)		200	250	300	350	600
Bolt circle diameter ±0.4	(mm)	F	210	220	250	290	360
Moment of inertia (10 ⁻³ kgm ²)		J _{res.}	828	1535	3799	8277	24876
Approximate weight	(kg)		60	93	168	280	550
Axial ±	(mm)	Max. value	3	5	6	7	8
Lateral ±	(mm)		0,4	2,2	2,5	3	3,5
Angular ±	(degree)		1,5	1	1	1	1
Torsional stiffness coupling (10 ³ Nm/rad)			20.000	9.000	15.500	23.000	35.000

ORDERING EXAMPLE	BX4 BX6	50	120	200	XX
Model	●				
Size / torque rating (KNm)		●			
Bore D1 F7			●		
Bore D2 F7				●	
For custom features place an XX at the end of the part number and describe the special requirements (e.g. BX4 / 50 / 117.48 / 127 / XX; XX = 700 mm overall length)					

ZA

WITH CONICAL CLAMPING SYSTEM

1,500 – 4,000 Nm



ABOUT

FEATURES

- Compensation for misalignment
- Standard lengths of up to 6 meters
- No intermediate support bearing necessary
- Full assembly can be mounted laterally without disturbing adjacent equipment

MATERIAL

- **Bellows:** highly flexible high grade stainless steel
- **Intermediate tube:** steel, optional CFK
- **Hubs:** steel

DESIGN

With tapered compression bushings and removal screws. Intermediate tube is held by special gimbal supports, extending from the hubs inside the bellows.

TEMPERATURE RANGE

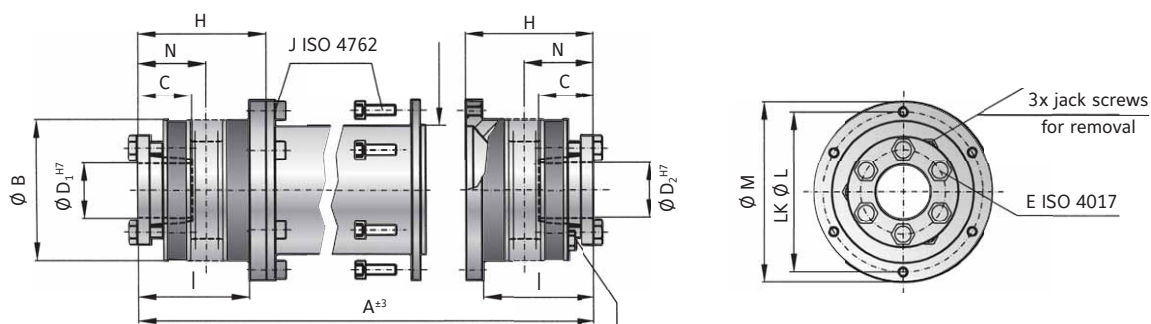
-30 to +100° C

HUB / SHAFT CLEARANCE

Overall shaft / hub clearance of 0.01 – 0.05 mm

ROTATIONAL SPEED

After selecting overall length A, contact R+W for maximum speed.



MODEL ZA

SIZE			1500	4000
Rated torque (Nm)	T_{KN}		1500	4000
Overall length min. to max. (mm)	$A^{±3}$		280 – 6000	280 – 6000
Outside diameter (mm)	B		157	200
Fit length (mm)	C		61	80.5
Inside diameter from $\emptyset$ to $\emptyset$ H7 (mm)	$D_{1/2}$		35 – 70	40 – 100
ISO 4017 clamping screws 6x	E		6 x M12	6 x M16
Tightening torque (Nm)			70	120
Length bellows body (mm)	H		98	103,5
Distance (mm)	I		82	84
ISO 4762 clamping screws	J		10x M10	12x M12
Tightening torque of the assembly screws (Nm)			70	120
Outside diameter tube section (mm)	K		150	160
Bolt hole circle $\emptyset$ (mm)	L		168	193
Outside diameter flange (mm)	M		184	213
Shaft average value (mm)	N		56	61

ORDERING EXAMPLE	ZA	1500	2551	50.8	70	XX
Model	●					Special designation only (e.g. special bore tolerance).
Size		●				
Overall length mm			●			
Bore Ø D1 H7				●		
Bore Ø D2 H7					●	
For custom features place an XX at the end of the part number and describe the special requirements (e.g. ZA / 1500 / 2551 / 50.8 / 70 / XX; XX = all stainless steel)						



SPECIAL SOLUTIONS

1,500 – 100,000 Nm

CUSTOMER SPECIFIC SOLUTIONS

Such as:

- ▶ special materials
- ▶ special lengths
- ▶ other special dimensions
- ▶ torque up to 1,000,000 Nm

...all available on request. Phone +49 9372 9864-0





SIZES FROM 1,950 - 25,000 Nm

BACKLASH FREE ELASTIC JAW COUPLINGS

GENERAL INFORMATION ABOUT R+W ELASTOMER COUPLINGS:



SERVICE LIFE

When properly selected, handled, and installed, these couplings are maintenance free with infinite service life.

ATEX (Optional)

For use in hazardous areas available upon request.

SPECIAL SOLUTIONS

Various materials, tolerances, dimensions and performance ratings available for custom applications on request.

FIT CLEARANCE

Overall shaft / hub clearance of 0.01 - 0.05 mm

EK**EZ**

BACKLASH FREE ELASTIC JAW COUPLINGS®

SIZES FROM 1,950 - 25,000 Nm

MODELE

FEATURES

EKH

**with fully split clamping hubs
from 1,950 - 25,000 Nm**

- ▶ easy installation and removal
- ▶ allows for lateral mounting

Page 64

EZ2

**with fully split clamping hubs
from 1,950 - 25,000 Nm**

- ▶ standard lengths of up to 4 meters
- ▶ no intermediate support bearing necessary
- ▶ lateral installation and removal without disturbing adjacent equipment

Page 65

EK1

**with simple keyway mounting
from 1,950 - 25,000 Nm**

- ▶ economically priced version
- ▶ modifiable to customer specific dimensions and features
- ▶ available as solid stock hub for custom machining

Page 66

EK6

**with conical clamping ring
from 1,950 - 25,000 Nm**

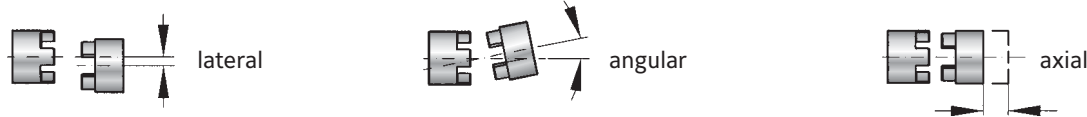
- ▶ highly concentric design
- ▶ high clamping pressure on shafts
- ▶ hubs mount axially
- ▶ in case a housing will be used, no access holes are necessary

Page 67

GENERAL INFORMATION

R+W ELASTIC JAW COUPLINGS

SHAFT MISALIGNMENT



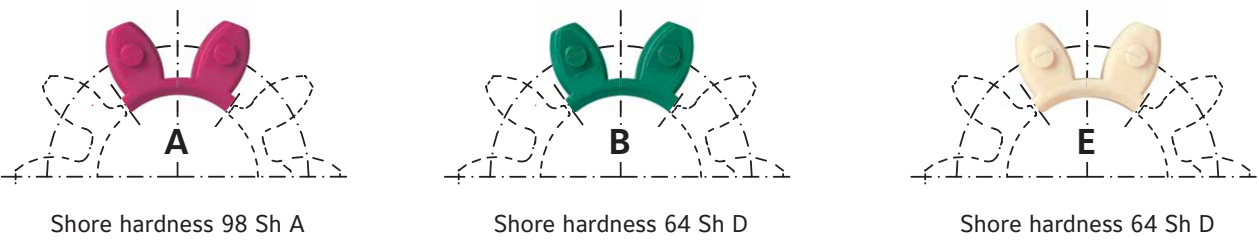
FUNCTION

The equalizing element of the EK coupling is the elastomer insert. It transmits torque without backlash or vibration. The elastomer insert defines the characteristics of the entire drive system.

Backlash is eliminated by the press fit of the elastomer into the hubs. Through variation of the Shore hardness of the elastomer insert, the coupling system can be optimized for the ideal torsional characteristics.

SIZE 2500 - 9500

THE COUPLING INCLUDES 5X ELASTOMER SEGMENTS



DESCRIPTION OF THE ELASTOMER TYPES

Type	Shore hardness	Color	Material	Relative damping (μ)	Temperature range	Features
A	98 Sh A	red	TPU	0.4 - 0.5	-30°C to +100°C	high damping
B	64 Sh D	green	TPU	0.3 - 0.45	-30°C to +120°C	high torsional stiffness
E	64 Sh D	beige	Hytrel	0.3 - 0.45	-50°C to +150°C	temperature resistant

The values of relative damping were determined at 10 Hz and +20° C.

SIZES EK

SIZE		2500		4500		9500	
Type (elastomer insert)		A	B	A	B	A	B
Static torsional stiffness (Nm/rad)	C_T	87600	109000	167000	372000	590000	670000
Dynamic torsional stiffness (Nm/rad)	C_{Tdyn}	175000	216000	337000	743000	1180000	1340000
lateral misalignment (mm)		0.5	0.3	0.5	0.3	0.6	0.4
angular misalignment (Degree)	Max. values	1.5	1	1.5	1	1.5	1
axial misalignment (mm)		± 3		± 4		± 5	

Static torsional stiffness at 50% T_{KN}

Dynamic torsional stiffness at T_{KN}

WITH FULLY SPLIT CLAMPING HUB 1,950 – 25,000 Nm



ABOUT

FEATURES

- ▶ lateral mounting
- ▶ easy installation and removal
- ▶ allows for pre-alignment of shafts

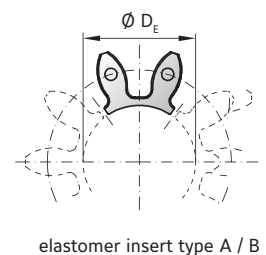
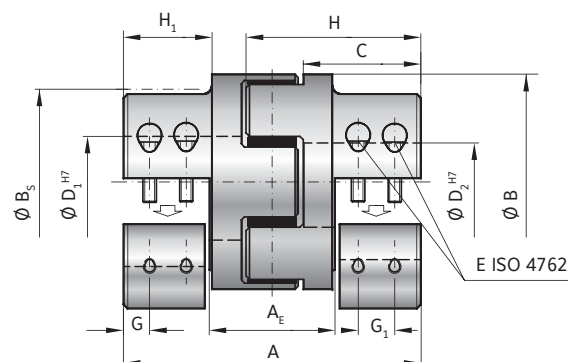
MATERIAL

- ▶ **Hubs:** GGG40
- ▶ **Elastomer:** wear resistant thermally stable TPU

DESIGN

Two concentrically machined, fully split hubs with curved jaws and clamping screws. 5x elastomer segments press fit for zero backlash; standard versions are electrically isolating.

ORDERING EXAMPLE
see page 67



MODEL EKH

SIZE		2500		4500		9500	
Type (Elastomer insert)		A	B	A	B	A	B
Rated torque (Nm)	T_{KN}	1950	2450	5000	6200	10000	12500
Max. torque* (Nm)	T_{Kmax}	3900	4900	10000	12400	20000	25000
Overall length (mm)	A	213		272		341	
Length of center section (mm)	A_E	78		104		131	
Outside diameter (mm)	B	160		225		290	
Outside diameter with screw head (mm)	B_S	156		190		243	
Mounting length (mm)	C	85		110		140	
Inside diameter range H7 (mm)	$D_{1/2}$	35 - 90		40 - 120		50 - 140	
Inside diameter of elastomer (mm)	D_E	80		111		145	
Clamping screw (ISO 4762)	E	8 x M16		8 x M20		8 x M24	
Tightening torque of the clamping screw (Nm)		300		600		1100	
Distance between centers (mm)	F	57		72.5		90	
Distance (mm)	G/G_1	36		24 / 34		30 / 48	
Hub length (mm)	H/H_1	120 / 69		154 / 80		193 / 110	
Moment of inertia per hub (10^{-3} kgm^2)	J_1/J_2	40		147		480	
Approx. weight (kg)		12.5		25		53	
Speed standard (min^{-1})		3,000		3,500		2,000	
Speed balanced (10^3 min^{-1})		10	10	8	8	6.5	6.5

For information on shaft misalignment, torsional stiffness, and other details about the elastomer inserts see page 63.

* Maximum transmittable torque of the clamping hub depends on the bore diameter

Size	Ø 35	Ø 45	Ø 50	Ø 55	Ø 60	Ø 65	Ø 70	Ø 75	Ø 80	Ø 90	Ø 120	Ø 140
2500	1400	1800	2000	2250	2500	2700	2900	3100	3300	3700		
4500		2400	2600	2900	3100	3400	3600	3900	4100	4700	6200	
9500			5000	5500	6000	6500	7000	7500	8000	9000	12000	14000

Higher torques possible with keyway.

EZ2

WITH FULLY SPLIT CLAMPING HUB

1,950 – 25,000 Nm



ABOUT

FEATURES

- easy installation and removal
- standard lengths up to 4 meters
- no intermediate support bearings required

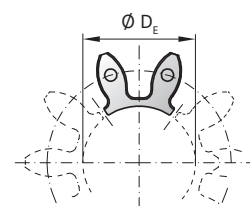
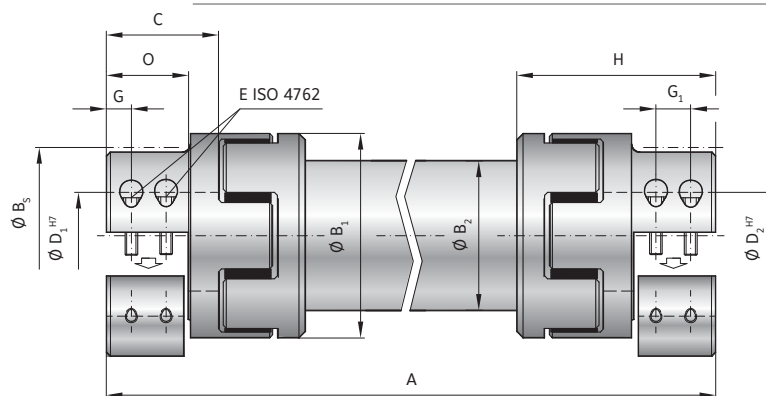
MATERIAL

- **Hubs:** GGG40
- **Intermediate tube:** steel, optional CFK tube on request

- **Elastomer insert:** wear resistant, thermally stable TPU

DESIGN

Two fully split clamping hubs, with four clamping screws in each, and concave driving jaws. Backlash free, vibration damping, electrically isolating elastomer inserts press fit into the hubs. Precision intermediate tube with a high level of straightness and lateral stiffness.



elastomer insert type A / B

MODEL EZ2

SIZE			2500		4500		9500	
Type (Elastomer insert)			A	B	A	B	A	B
Rated torque	(Nm)	T_{KN}	1,950	2,450	5,000	6,200	10,000	12,500
Maximum torque*	(Nm)	T_{Kmax}	3,900	4,900	10,000	12,400	20,000	25,000
Overall length	(mm)	A	460 - 4000		580 - 4,000		710 - 4,000	
Outer diameter hub	(mm)	B_1	160		225		290	
Outer diameter tube	(mm)	B_2	150		175		220	
Outer diameter with screwhead	(mm)	B_5	155		190		243	
Fit length	(mm)	C	85		110		140	
Inside diameter range from $\emptyset$ to $\emptyset$ H7	(mm)	$D_{1/2}$	35 - 90		40 - 120		50 - 140	
Max. inside diameter (Elastomer insert)	(mm)	D_E	80		111		145	
Mounting screw ISO 4762		E	4 x M16		8 x M16		8 x M24	
Tightening torque	(Nm)		300		300		980	
Distance between centers	(mm)	F	57		72,5		90	
Distance	(mm)	G/G ₁	36		24 / 34		30 / 48	
Hub length	(mm)	H	142		181		229	
Moment of inertia per hub	(10 ⁻³ kgm ²)	J_1/J_2	30		140		450	
Inertia of tube per meter	(10 ⁻³ kgm ²)	J_3	360		750		1,800	
Combined dynamic torsional stiffness of the inserts	(Nm/rad)	C_{Tdyn}^E	87,500	108,000	168,500	371,500	590,000	670,000
Torsional stiffness of tube per meter	(Nm/rad)	C_T^{ZWR}	1,000,000		2,500,000		5,000,000	
Shaft average value	(mm)	N	108		137		171	
Length	(mm)	O	67		85		105	

* Maximum transmittable torque of the clamping hub depends on the bore diameter - see page 64.

ORDERING EXAMPLE	EZ2	2500	1200	A	50.8	80	XX
Model	●						Special designation only (e.g. special bore tolerance).
Size		●					
Overall length			●				
Elastomer insert type				●			
Bore $\emptyset$ D1 H7					●		
Bore $\emptyset$ D2 H7						●	
For custom features place an XX at the end of the part number and describe the special requirements (e.g. EZ2 / 2500 / 1200 / A / 50.8 / 80 / XX; XX = stainless steel)							

EK1

WITH KEYWAY MOUNTING

1,950 – 25,000 Nm



ABOUT

FEATURES

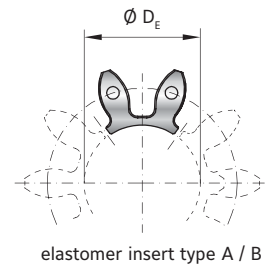
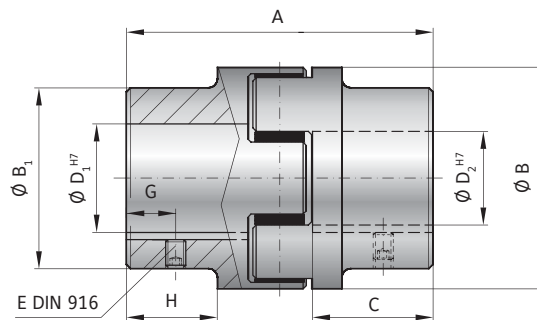
- ▶ press fit design
- ▶ readily modified for custom dimensions
- ▶ low backlash (keyway)

MATERIAL

- ▶ **Hubs:** GGG40
- ▶ **Elastomer:** wear resistant thermally stable TPU

DESIGN

Two concentrically machined hubs with curved jaws, keyways, and set screws. 5x elastomer segments press fit for zero backlash; standard versions are electrically isolating.



MODEL EK1

SIZE			2500		4500		9500	
Type (Elastomer insert)			A	B	A	B	A	B
Rated torque	(Nm)	T _{KN}	1950	2450	5000	6200	10000	12500
Max. torque	(Nm)	T _{Kmax}	3900	4900	10000	12400	20000	25000
Overall length	(mm)	A	213		272		341	
Outside diameter	(mm)	B/B ₁	160 / 154		225 / 190		290 / 240	
Mounting length	(mm)	C	88		113		142	
Inside diameter (pilot bored)	(mm)	D _V	30		40		50	
Inside diameter range H7	(mm)	D _{1/2}	30 - 95		40 - 130		50 - 170	
Inside diameter of elastomer	(mm)	D _E	80		111		145	
Set screws (DIN 916)		E	see table (depending on bore Ø)**					
Distance	(mm)	G	25		30		40	
Possible shortening length	(mm)	H	69		89		110	
Moment of inertia per hub	(10 ⁻³ kgm ²)	J ₁ /J ₂	40		147		480	
Approx. weight	(kg)		12.5		25		53	
Speed standard	(min ⁻¹)		3,500		3,000		2,000	
Speed balanced	(10 ³ min ⁻¹)		10	10	8	8	6.5	6.5

For information on shaft misalignment, torsional stiffness, and other details about the elastomer inserts see page 63.

** Set screw		ORDERING EXAMPLE	EK1	2500	A	50.8	80	XX
Ø 12.1 – 30	M5	Model	●					Special designation only (e.g. special bore tolerance).
Ø 30.1 – 58	M8	Size		●				
Ø 58.1 – 95	M10	Elastomer insert type			●			
Ø 95.1 – 130	M12	Bore D1 H7				●		
Ø 130.1 – 170	M16	Bore D2 H7					●	
For custom features place an XX at the end of the part number and describe the special requirements (e.g. EK1 / 2500 / A / 50.8 / 80 / XX; XX = stainless steel)								

1,950 – 25,000 Nm





SIZES FROM 350 – 20,000 Nm

TORSIONALLY STIFF DISC PACK COUPLINGS

GENERAL INFORMATION ABOUT R+W DISC PACK COUPLINGS:



SERVICE LIFE

R+W disc pack couplings are fatigue resistant and wear free for an infinite service life, as long as the technical limits are not exceeded.

FIT CLEARANCE

Overall shaft / hub clearance of 0.01 – 0.05 mm

TEMPERATURE RANGE

-30 to +280° C

ROTATIONAL SPEED

see table

DELIVERY

LP couplings are delivered with the disc packs pre-assembled. They need only to be mounted to the hubs.

ATEX (Optional)

For use in hazardous areas available upon request.

TORSIONALLY STIFF DISC PACK COUPLINGS

SIZES FROM 350 – 20,000 Nm

MODEL	FEATURES	
LP1 	with keyway mounting from 350 – 20,000 Nm ▶ very high torsional stiffness ▶ single flex design ▶ compact layout ▶ compensates for axial and angular misalignment	Page 72
LP2 	with keyway mounting from 350 – 20,000 Nm ▶ high torsional stiffness ▶ double flex design ▶ customer specified length available ▶ compensates for axial, angular, and lateral misalignment	Page 73
LP3 	with conical clamping ring from 350 – 20,000 Nm ▶ high torsional stiffness ▶ high clamping pressure ▶ backlash free torque transmission ▶ good for high speed, reversing and intermittent loading	Page 74
LPA 	with keyway mounting for API 610 pump systems from 350 – 20,000 Nm ▶ customizable for individual project requirements ▶ intermediate tube removable without disturbing adjacent equipment ▶ integral safety catch in case of disc pack rupture ▶ customer specified DBSE available	Page 75

DESIGN

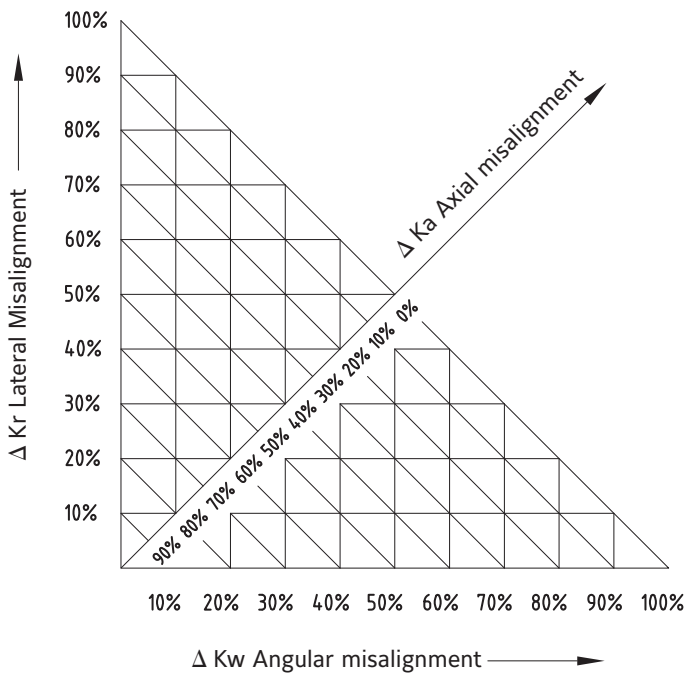
DISC PACK COUPLINGS

R+W disc pack couplings transmit torque across the disc pack assemblies purely by friction, thus avoiding stress concentration, backlash, and micro-movements resulting from transmitting torque across shoulder bolts. This aids in approaching infinite life in addition to making the complete coupling assembly more torsionally stiff.

R+W disc pack couplings are shipped as individual components. Assembly is required.



MISALIGNMENT COMPENSATION



$$\Delta K_{total} = \Delta K_r + \Delta K_w + \Delta K_a \leq 100\%$$

These couplings compensate for varying combinations of shaft misalignment types as percentages of the total allowable misalignment values listed in the data tables. The total sum of the three misalignment percentages must not exceed 100%.

Example: pump skid

- axial misalignment: 20%
- lateral misalignment: 40%
- angular misalignment: 40%

$$\Delta K_{total} = 20\% + 40\% + 40\% \leq 100\%$$

➡ coupling is fatigue resistant

LP1

WITH KEYWAY MOUNTING

350 - 20,000 Nm



ABOUT

FEATURES

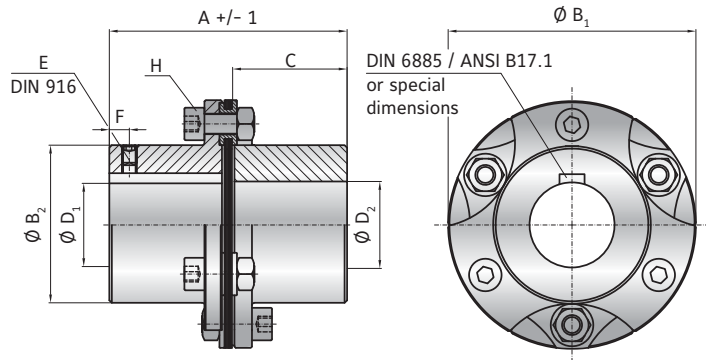
- ▶ very high torsional stiffness
- ▶ single flex design
- ▶ wear and maintenance free

MATERIAL

- ▶ **Disc pack:** highly elastic spring steel
- ▶ **Hubs:** high strength steel

DESIGN

Two precision machined coupling hubs mounted to the disc pack by means of high strength screws and bushings for alignment and frictional clamping of the assembly. Axial retention with DIN 916 set screws.



MODEL LP1

SIZE			300	700	2000	4000	7000	10000
Rated torque	(Nm)	T_{KN}	350	700	2000	4500	7600	10000
Maximum torque	(Nm)	T_{Kmax}	700	1400	4000	9000	15200	20000
Overall length	(mm)	A	95	116	158	193	216	268
Outside diameter	(mm)	B_1	99	128	150	198	238	298
Hub diameter	(mm)	B_2	63	78	86	120	140	194
Hub fit length	(mm)	C	45	55	75	90	100	125
Bore diameter available from Ø to Ø H7	(mm)	$D_{1/2}$	18 - 48	25 - 58	28 - 64	38 - 90	50 - 102	70 - 140
Set screw (DIN 916)	E	see table (depends on bore diameter)*						
Distance to screw	(mm)	F	15	15	20	20	25	30
Assembly screw (ISO 4762) Nut (DIN 934)	H		M8	M10	M16	M20	M24	M24
Tightening torque	(Nm)		38	75	320	650	1000	1100
Moment of inertia	(10^{-3}kgm^2)	$J_{ges.}$	1.8	5.6	13.9	52.2	127	412
Material			steel	steel	steel	steel	steel	steel
Approximate weight	(kg)		2	3.8	6.7	13.3	20.9	41.4
Torsional stiffness	(10^3Nm/rad)	C_T	470	1200	1500	3600	6000	13300
Axial ±	(mm)		0.5	0.75	1	1.25	1.25	1.5
Angular ±	(degree)		0.7°	0.7°	0.7°	0.7°	0.7°	0.7°
Maximum speed	(1/min.)		10000	8000	6000	5000	4500	4000

Bore range Ø	(mm)	Ø 18 - 30	Ø 30.1 - 44	Ø 44.1 - 65	Ø 65.1 - 85	Ø 85.1 - 110	Ø 110.1 - 140
Set screw size*		M5	M8	M10	M12	M16	M20

ORDERING EXAMPLE	LP1	700	42	38.1	XX
Model	●				Special designation only (e.g. special bore tolerance).
Size		●			
Bore D1 H7			●		
Bore D2 H7				●	

For custom features place an XX at the end of the part number and describe the special requirements (e.g. LP1 / 700 / 42 / 38.1 / XX; XX = stainless steel)

LP2

WITH KEYWAY MOUNTING

350 - 20,000 Nm

ABOUT

FEATURES

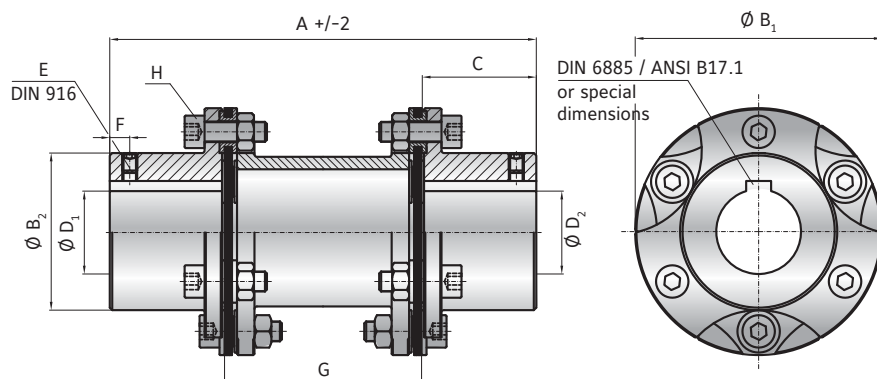
- high torsional stiffness
- double flex design
- customer specified length available

MATERIAL

- **Disc packs:** highly elastic spring steel
- **Hubs and spacer:** high strength steel

DESIGN

Two precision machined coupling hubs and precision spacer tube mounted to the disc packs by means of high strength screws and bushings for alignment and frictional clamping of the assembly. Axial retention with DIN 916 set screws.



MODEL LP2

SIZE			300		700		2000		4000		7000		10000	
Rated torque	(Nm)	T _{KN}	350		700		2000		4500		7600		10000	
Maximum torque	(Nm)	T _{Kmax}	700		1400		4000		9000		15200		20000	
Overall length	(mm)	A	170	186	206	226	286	292	320	340	370	394	470	482
Outside diameter	(mm)	B ₁	99		128		150		198		238		298	
Hub diameter	(mm)	B ₂	63		78		86		120		140		194	
Hub fit length	(mm)	C	45		55		75		90		100		125	
Bore diameter available from Ø to Ø H7	(mm)	D _{1/2}	18 - 48		25 - 58		28 - 64		38 - 90		50 - 102		70 - 140	
Set screw (DIN 916)		E	see table (depends on bore diameter)*											
Distance to screw	(mm)	F	15		15		20		20		25		30	
Distance	(mm)	G	80	96	96	116	136	142	140	160	170	194	220	232
Assembly screw (ISO 4762) Nut (DIN 934)		H	M8		M10		M16		M20		M24		M24	
Tightening torque	(Nm)		38		75		320		650		1000		1100	
Moment of inertia	(10 ⁻³ kgm ²)	J _{ges.}	3	3.1	7.4	7.7	25	25.2	89.3	90.4	230	236	721	726
Material			steel		steel		steel		steel		steel		steel	
Approximate weight	(kg)		3		4.7		11		20.7		35		68.8	
Torsional stiffness	(10 ³ Nm/rad)	C _T	220		550		700		1700		2800		6200	
Axial ±	(mm)		1		1.5		2		2.5		2.5		3	
Lateral ±	(mm)		0.8	1	1	1.3	1.4	1.5	1.4	1.6	1.6	1.9	2.2	2.4
Angular ±	(degree)		1°		1°		1°		1°		1°		1°	
Maximum speed	(1/min.)		10000		8000		6000		5000		4500		4000	
Bore range Ø	(mm)		Ø 18 - 30		Ø 30.1 - 44		Ø 44.1 - 65		Ø 65.1 - 85		Ø 85.1 - 110		Ø 110.1 - 140	
Set screw size*			M5		M8		M10		M12		M16		M20	

ORDERING EXAMPLE	LP2	700	206	38.1	42	XX
Model	●					Special designation only (e.g. special bore tolerance).
Size		●				
Overall length mm			●			
Bore D1 H7				●		
Bore D2 H7					●	
For custom features place an XX at the end of the part number and describe the special requirements (e.g. LP2 / 700 / 206 / 38.1 / 42 / XX; XX = stainless steel)						

LP3

WITH CONICAL CLAMPING RING

350 - 20,000 Nm



ABOUT

FEATURES

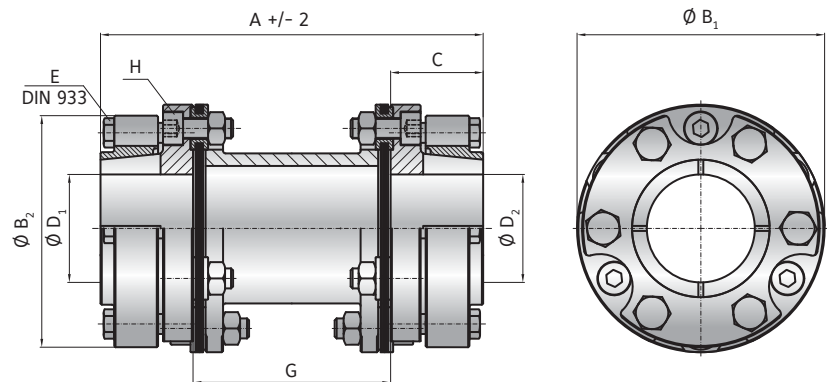
- ▶ high torsional stiffness
- ▶ high clamping pressure
- ▶ backlash free torque transmission
- ▶ good for high speed, reversing and intermittent loading

DESIGN

Two precision machined conical clamping ring hubs and precision spacer tube mounted to the disc packs by means of high strength screws and bushings for alignment and frictional clamping of the assembly.

MATERIAL

- ▶ **Disc packs:** highly elastic spring steel
- ▶ **Hubs and spacer:** high strength steel



MODEL LP3

SERIE			300	700	2000	4000	7000	10000
Rated torque (Nm)	T_{KN}		350	700	2000	4500	7600	10000
Maximum torque (Nm)	T_{Kmax}		700	1400	4000	9000	15200	20000
Overall length (mm)	A		153	198	303	321	410	490
Outside diameter (mm)	B_1		99	128	150	198	238	298
Hub diameter (mm)	B_2		95	125	146	194	234	294
Hub fit length (mm)	C		37	51	71	92	120	135
Bore diameter* available from $\emptyset$ to $\emptyset$ H7 (mm)	$D_{1/2}$		24 - 50	30 - 65	35 - 70	50 - 100	60 - 115	70 - 170
Clamping screws (ISO 4017)	E		6x M8	6x M10	6x M12	6x M16	6x M20	6x M20
Tightening torque (Nm)			25	50	100	250	470	500
Distance (mm)	G		79	96	161	137	170	220
Assembly screw (ISO 4762) Nut (DIN 934)	H		M8	M10	M16	M20	M24	M24
Tightening torque (Nm)			38	75	320	650	1000	1100
Moment of inertia (10^{-3}kgm^2)	$J_{ges.}$		4.2	16.2	44.5	167	468	1280
Material			steel	steel	steel	steel	steel	steel
Approximate weight (kg)			3.2	7.3	14.8	31.4	59.3	98.4
Torsional stiffness (10^3Nm/rad)	C_T		220	550	700	1700	2800	6200
Axial $\pm$ (mm)			1	1.5	2	2.5	2.5	3
Lateral $\pm$ (mm)			0.8	1	1.5	1.4	1.6	2.2
Angular $\pm$ (degree)			1°	1°	1°	1°	1°	1°
Maximum speed (1/min.)			10000	8000	6000	5000	4500	4000

* transmittable torque can depend on the bore diameter (contact supplier for details)

ORDERING EXAMPLE	LP3	700	198	42	38.1	XX
Model	●					Special designation only (e.g. special bore tolerance).
Size		●				
Overall length			●			
Bore D1 H7				●		
Bore D2 H7					●	
For custom features place an XX at the end of the part number and describe the special requirements (e.g. LP3 / 700 / 198 / 42 / 38.1 / XX; XX = stainless steel)						

ABOUT

FEATURES

- meets all requirements of API 610
- intermediate tube removable without disturbing adjacent equipment
- integral safety catch in case of disc pack rupture
- ISO G6.3 / AGMA class 9 minimum balance quality
- highly customizable

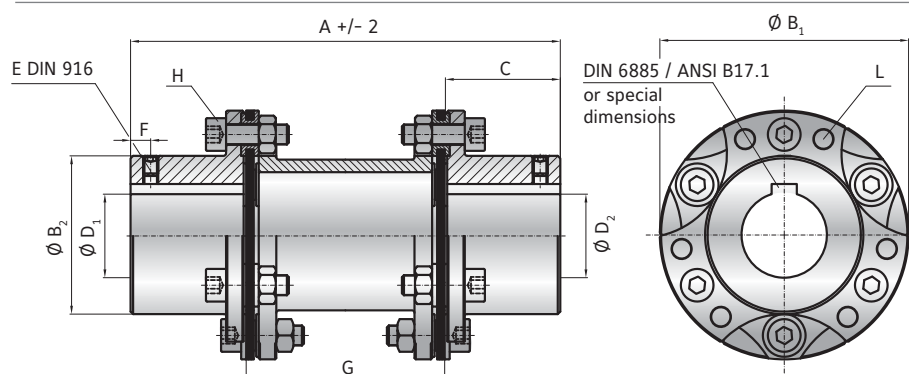
- **Hubs and spacer:** high strength steel

DESIGN

Two precision machined coupling hubs and precision spacer tube mounted to the disc packs by means of high strength screws and bushings for alignment and frictional clamping of the assembly. Axial retention with DIN 916 set screws.

MATERIAL

- **Disc packs:** highly elastic, corrosion resistant spring steel



MODEL LPA

SIZE			300		700		2000		4000		7000		10000	
Rated torque	(Nm)	T _{KN}	350		700		2000		4500		7600		10000	
Maximum torque	(Nm)	T _{Kmax}	700		1400		4000		9000		15200		20000	
Overall length	(mm)	A	190	230	250	290	330	400	360	430	380	450	500	550
Outside diameter	(mm)	B ₁	104		130		160		202		248		312	
Hub diameter	(mm)	B ₂	63		78		86		120		140		194	
Hub fit length	(mm)	C	45		55		75		90		100		125	
Bore diameter available from Ø to Ø H7	(mm)	D _{1/2}	18 - 48		25 - 58		28 - 64		38 - 90		50 - 102		70 - 140	
Set screw (DIN 916)		E	see table (depends on bore diameter)*											
Distance to screw	(mm)	F	15		15		20		20		25		30	
Distance	(mm)	G	100	140	140	180	180	250	180	250	180	250	250	300
Assembly screw (ISO 4762) Nut (DIN 934)		H	M8		M10		M16		M20		M24		M24	
Tightening torque	(Nm)		38		75		320		650		1000		1100	
Safety catch screws (DIN 916)		L	M6		M8		M10		M12		M16		M20	
Moment of inertia (10 ⁻³ Nm/kgm ²)			3	3.1	7.4	7.7	25	25.2	89.3	90.4	230	236	721	726
Material			steel		steel		steel		steel		steel		steel	
Approximate weight	(kg)		3		4.7		11		20.7		35		68.8	
Torsional stiffness (10 ³ Nm/rad)		C _T	220		550		700		1700		2800		6200	
Axial ±	(mm)		1		1.5		2		2.5		2.5		3	
Lateral ±	(mm)		0.8	1	1	1.3	1.4	1.5	1.4	1.6	1.6	1.9	2.2	2.4
Angular ±	(degree)		1°		1°		1°		1°		1°		1°	
Maximum speed (1/min.)			10000		8000		6000		5000		4500		4000	

Bore range $\emptyset$		$\emptyset$ 18 - 30	$\emptyset$ 30.1 - 44	$\emptyset$ 44.1 - 65	$\emptyset$ 65.1 - 85	$\emptyset$ 85.1 - 110	$\emptyset$ 110.1 - 140
Set screw size*		M5	M8	M10	M12	M16	M20

ORDERING EXAMPLE	LPA	700	250	42	38.1	XX
Model	●					
Size		●				
Overall length mm			●			
Bore D1 H7				●		
Bore D2 H7					●	
For custom features place an XX at the end of the part number and describe the special requirements (e.g. LPA / 700 / 250 / 42 / 38.1 / XX; XX = stainless steel)						





SIZES FROM 1,300 - 348,000 NM

CROWNED GEAR COUPLINGS

GENERAL INFORMATION ABOUT R+W CROWNED GEAR COUPLINGS:

FIT CLEARANCE

Overall shaft / hub clearance of 0.01 - 0.05 mm

TEMPERATURE RANGE

-30 to +100° C; higher temperatures on request

CROWNED GEAR COUPLINGS

SIZES FROM 1,300 - 348,000 Nm

MODEL

FEATURES

BZ1



with keyway mounting

- ▶ high power density
- ▶ very low backlash
- ▶ economically priced
- ▶ low maintenance due to special crowned tooth design

Pages 80-81

GENERAL INFORMATION

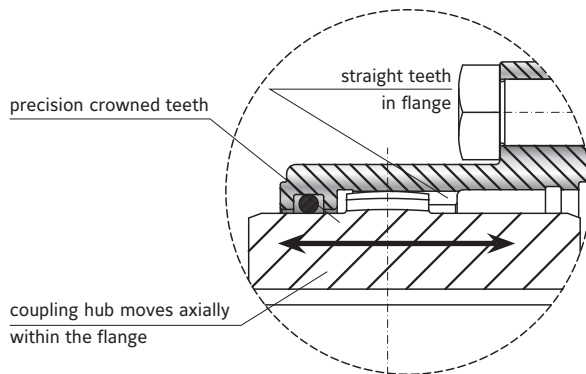
CROWNED GEAR COUPLINGS

FUNCTION OF THE GEAR COUPLING

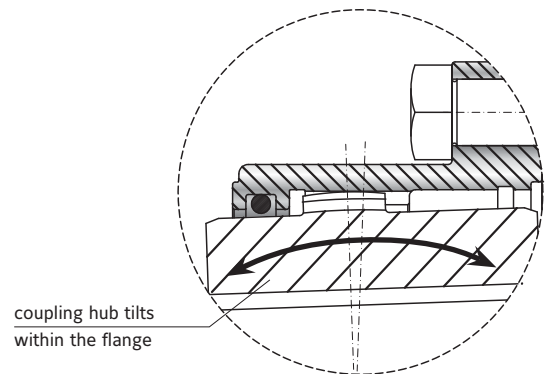
The precise integration of the coupling hub and intermediate flange allow for low backlash and highly rigid torque transmission, while compensating for lateral, axial, and

angular shaft misalignment. The crowned geometry of the gearing allows for a long life, even without the presence of misalignment.

Axial misalignment



Angular and lateral misalignment



BZ1

WITH KEYWAY MOUNTING

1,300 – 348,000 Nm



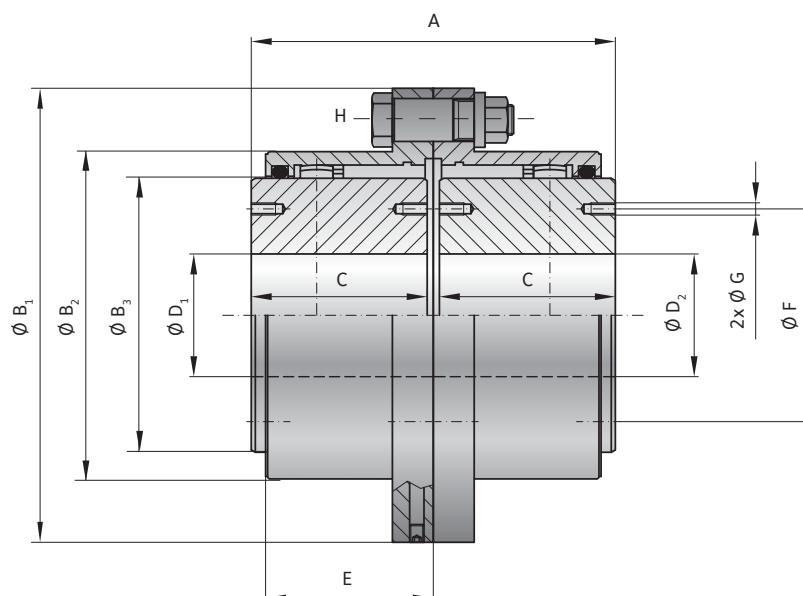
ABOUT

MATERIAL

Coupling made of burnished high strength steel

DESIGN

Hubs with keyway mounting or high precision cylindrical bore for interference fitting. Optional DIN 916 set screw for locking down onto shaft key.



MODEL BZ1

SIZE		10	25	50	100	150	200	300	450	600	800	1100	1700
Rated torque (Nm)	T_{KN}	1,300	2,800	5,000	10,000	16,000	22,000	32,000	45,000	62,000	84,000	115,000	174,000
Maximum torque (Nm)	T_{Kmax}	2,600	5,600	10,000	20,000	32,000	44,000	64,000	90,000	124,000	168,000	230,000	348,000
Overall length (mm)	A	89	103	127	157	185	216	246	278	308	358	388	450
Flange outside diameter (mm)	B_1	111	141	171	210	234	274	312	337	380	405	444	506
Flange hub outside diameter (mm)	B_2	80	103.5	129.5	156	181	209	247	273	307	338	368	426
Shaft hub outside diameter (mm)	B_3	67	87	106	130	151	178	213	235	263	286	316	372
Shaft fit length (mm)	C	43	50	62	76	90	105	120	135	150	175	190	220
Available bore diameters (from-to) H7 (mm)	D_1/D_2	10-45	15-60	25-75	30-95	35-110	50-130	60-155	75-175	85-195	95-215	115-240	145-275
Hub length (mm)	E	41	47	58.5	68.5	82	98	108.5	121	132	151.5	165	183.5
Diameter for handling screws (mm)	F	-	-	-	-	130	155	185	205	226	250	276	330
Handling screw size	G	-	-	-	-	2 x M8	2 x M8	2 x M10	2 x M12	2 x M16	2 x M16	2 x M16	2 x M20
Hex head screw (10.9)	H	6 x M8	8 x M10	6 x M12	6 x M16	8 x M16	8 x M20	8 x M20	10 x M20	10 x M20	14 x M20	14 x M24	16 x M24
Tightening torque (Nm)		33.5	66	112	277	277	537	537	537	537	537	795	795
Moment of inertia (kgm ²)		0.005	0.015	0.04	0.105	0.191	0.43	0.842	1.32	2.448	3.716	5.384	10.872
Approximate weight (kg)		4	7	14	25	37	60	90	118	169	224	277	414
Grease volume (dm ³)		0.05	0.07	0.13	0.21	0.36	0.52	0.8	0.98	1.51	2.02	2.43	3.29
Hub material		Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel
Axial misalignment (mm)		3	3	3	5	5	6	6	8	8	8	10	10
Angular misalignment (degrees)		2x0.75	2x0.75	2x0.75	2x0.75	2x0.75	2x0.75	2x0.75	2x0.75	2x0.75	2x0.75	2x0.75	2x0.75
Max. speed (rpm)		7000	6200	5650	5100	4700	4350	4000	3800	3600	3450	3300	3050

ORDERING EXAMPLE	BZ1	50	60.33	50	XX
Model	●				Special designation only (e.g. special bore tolerance).
Size		●			
Bore Ø D1 F7			●		
Bore Ø D2 F7				●	
For custom features place an XX at the end of the part number and describe the special requirements (e.g. BZ1 / 50 / 60.33 / 50 / XX)					

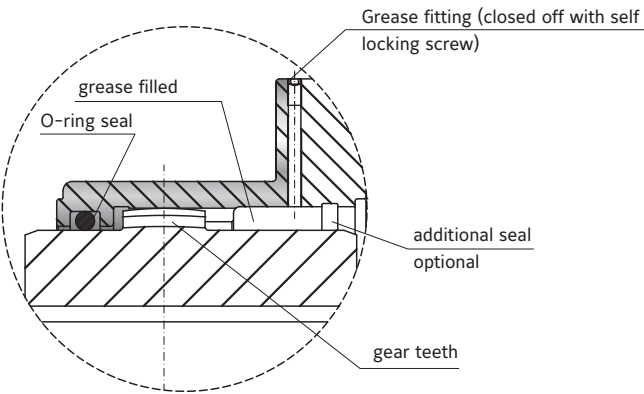
APPROVED LUBRICANTS

► **Note:** Proper lubrication is very important to the service life of the coupling. An optional seal may be included in order to extend lubrication periods.

High performance grease is recommended.

Normal speed and loads		High speed and loads	
Castrol	Impervia MDX	Caltex	Coupling Grease
Esso	Fibrax 370	Klüber	Klüberplex GE 11-680
Klüber	Klüberplex GE 11-680	Mobil	Mobilgrease XTC
Mobil	Mobilux EPO	Shell	Albida GC1
Shell	Alvania grease EP R-O or ER 1	Texaco	Coupling Grease
Total	Specis EPG		

MAINTENANCE AND LUBRICATION







FOR USE IN HAZARDOUS AREAS



FOR USE IN HAZARDOUS AREAS INDUSTRIAL DRIVE COUPLINGS

MARKING EXAMPLE

Based on the ATEX markings the product can be certified for suitability under certain conditions.

	II	2G	c	IIA T6	X
	II	2D	c	85°C	X
Equipment group		Category	Protection type	Explosion group / temperature class / maximum surface temperature	Additional features

Equipment group	Approval type
I	approved for underground operation
II	approved for all other applications

Category	Approved for zone	Zone description
1G	0	Area in which an explosive atmosphere consisting of a mixture of air and flammable gases, vapors, or mists, is present continuously, frequently, or for long periods of time.
2G	1	Area in which the potential exists for an explosive mixture of air and flammable gases, vapors, or mists to occur.
3G	2	Area in which the potential for an explosive mixture of air and flammable gases, vapors, or mists to occur is unlikely and only for a brief duration.
1D	20	Area with the same conditions as zone 0, with powder or dust.
2D	21	Area with the same conditions as zone 1, with powder or dust.
3D	22	Area with the same conditions as zone 2, with powder or dust.

Protection type	Definition
c	Design safety level: ignition hazard is avoided by the product design.

Example classification by occurring gases, mists and vapors according to temperature class and explosion group

Explosion group / temperature class / maximum surface temperature	IIA	IIB (includes IIA)	IIC (includes IIA + IIB)
T1 / 450°C	acetone, ammonia, methane...	natural gas	hydrogen
T2 / 300°C	ethyl alcohol, butane, cyclohexane...	ethylene, ethylene oxide	ethyne (acetylene)
T3 / 200°C	gasoline, diesel fuel, fuel oil...	ethylene glycol, hydrogen sulfide	
T4 / 135°C	acetaldehyde	ethyl ether	
T5 / 100°C			
T6 / 85°C			carbon disulphide

Additional labeling	Definition
X	Special operating conditions
U	Product is only a component in a machine. Conformity therefore shall only be declared after installation.

GENERAL INFORMATION

The use of devices and components in explosive areas is governed by the European directives 94/9/EC (for manufacturers) and 1992/92/EC (for operators). The presented products are non-electrical equipment of category 2.

According to Directive 94/9/EC, delivery of an ATEX coupling requires the inclusion of special installation and operating instructions along with the EC declaration of conformity issued by the manufacturer. All necessary values for installation, operation and removal are included.

All models of BX, LP, EK, and ST are available with ATEX certification on request. The BZ coupling is not intended for use in hazardous areas.

R+W Couplings are ATEX approved for use in general industry (Group II). Operation in hazardous zones 1 and 2 (Category 2G) and 21 and 22 (category 2D) are allowed. For the device group I, as well as for zones 0 and 20 the couplings are not registered.

Product specific information about ATEX certified couplings, such as temperature class, are available on request.

All statements made about ATEX conforming products are based on our present knowledge and experience. R+W reserves the right to change technical specifications.

PERFECT CONNECTIONS WORLDWIDE.

QUALITY "MADE IN GERMANY."



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A POPPE + POTTHOFF COMPANY

Version: 01/2013

QUALITY MANAGEMENT

We are certified

according to ISO 9001:2008

D-ZM-16029-01-01 Registration No. 40503432/3



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