LOW COST AND RELIABLE.

ECONOMY CLASS

BELLOWS COUPLINGS

SERIES BKC + BKL | 2 – 500 Nm

R+W®
COUPLING TECHNOLOGY

THE ULTIMATE COUPLING FROM 2 – 500 Nm

www.rwcouplings.com

optional EDELSTAHL Rost frei

MODEL **BKC + BKL**

Areas of application:

for high dynamic servo drives of:

- Machine tools
- CNC milling / grinding machinery
- Woodworking machinery
- Assembly machinery
- Automated plants
- Textile machinery
- Industrial robots
- Processing machinery
- Printing machinery
- Packaging machinery

Properties:

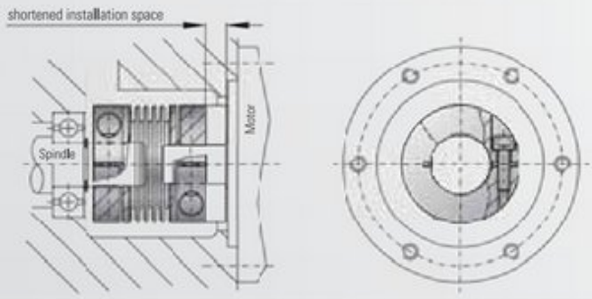
- high degree of torsional stiffness
- compensates for axial, lateral and angular misalignment, also causing quiet, smooth operation
- exact angular transmission of motion and torque
- infinite life and maintenance free

MODEL	PROPERTIES	APPLICATION EXAMPLES

BKC

Economy Class with clamping hub from 15-500 Nm

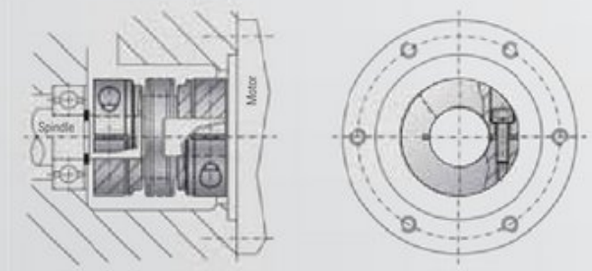
- compact design
- low cost version
- self opening clamping system optional



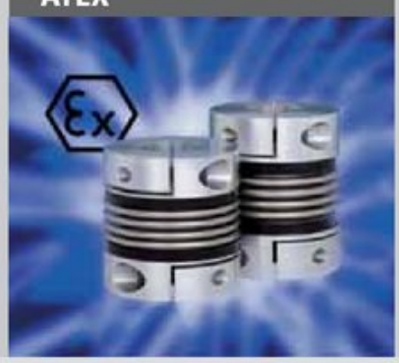
BKL

Economy Class with clamping hub from 2-500 Nm

- low cost version
- self opening clamp system optional



ATEX



for the use in explosive environments

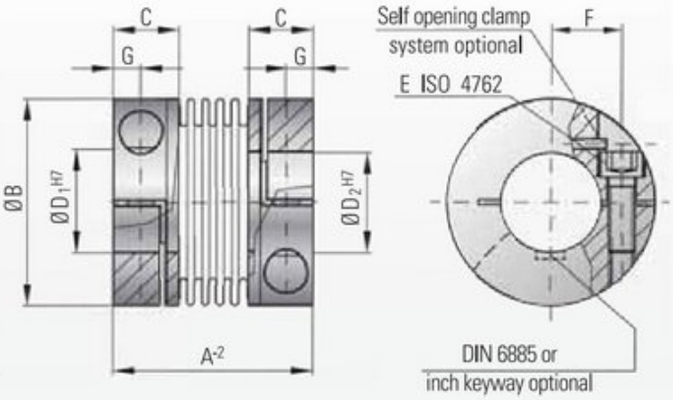
- available for the full product range
- for hazardous areas 1/21 and 2/22 bellows couplings are registered according to the directive ATEX 95/137

optional stainless steel

MODEL **BKC**

TECHNICAL SPECIFICATIONS

compact version



Properties:
- compact design
- easy to mount
- suited for space restricted installations
- low moment of inertia
- economically priced

Material: Bellows made of highly flexible high-grade stainless steel

Design: With a single ISO 4762 radial clamping screw per hub.
Self opening clamp system optional: Loosening the clamping screw applies force to the pin, which will force the clamp into the open position for easy mounting and dismounting.

Temperature-range: -30 to +100° C (3,6 F to 237 F)

Speeds: Up to 10,000 rpm, in excess of 10,000 with a finely balanced version.

Backlash: Absolutely backlash-free due to frictional clamped connection.

Service life: These couplings have an infinite life and are maintenance-free if the technical ratings are not exceeded.

Tolerance: On the hub/shaft connection 0.01 to 0.05 mm.

Non standard: Custom designs with varied tolerances, keyways, non-standard material and bellows are available upon request.

Ordering example

BKC / 60 / 26 / 25.4 / XX

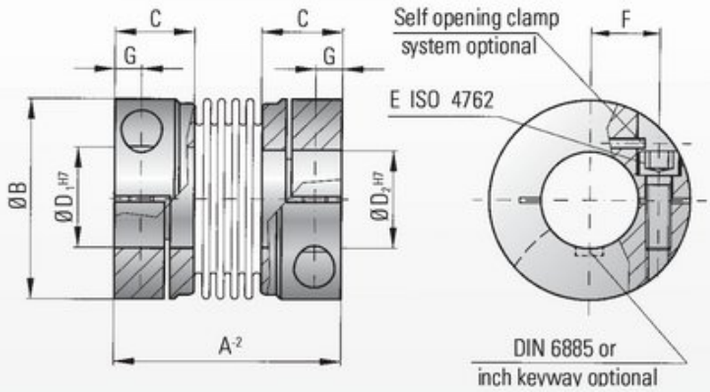
- Model
- Series Nm
- Ø D1 H7
- Ø D2 H7
- non standard

Model BKC			Series					
			15	30	60	150	300	500
Rated torque	(Nm)	T_{KN}	15	30	60	150	300	500
Overall length	(mm)	A	48	58	67	78	94	100
Outer diameter	(mm)	B	49	56	66	82	110	123
Fit length	(mm)	C	16.5	21	23	27.5	34	34
Inner diameter possible from Ø to Ø H7	(mm)	$D_{1/2}$	8-28	12-32	14-35	19-42	24-60	32-75
ISO 4762 fastening screw		E	M5	M6	M8	M10	M12	M12
Tightening torque of the fastening screw	(Nm)		8	15	40	75	120	125
Distance between centers	(mm)	F	17	20	23	27	39	45
Distance	(mm)	G	6.5	7.5	9.5	11	13	13
Moment of inertia	(10^{-3} kgm²)	J_{total}	0.05	0.1	0.26	0.65	6.3	9
Hub material (standard) (steel on request)			AL	AL	AL	AL	Steel	Steel
Approx. weight	(kg)		0.13	0.21	0.37	0.72	3.26	3.52
Torsional stiffness	(10^3 Nm/rad)	C_T	23	31	72	141	157	290
axial	(mm)	max. Werte	1	1	1.5	2	2	2.5
lateral	(mm)		0.15	0.15	0.15	0.15	0.15	0.20
axial spring stiffness	(N/mm)	C_a	30	50	67	77	112	72
lateral spring stiffness	(N/mm)	C_r	315	366	679	960	2940	2200

max. angular misalignment 1 degree (1 Nm = 8.85 in lbs)

optional stainless steel

MODEL **BKL**



Properties:
- easy to mount
- suited for space restricted installations
- low moment of inertia
- economically priced

Material: Bellows made of highly flexible high-grade stainless steel. Hub material see table

Design: With a single ISO 4762 radial clamping screw per hub.
Self opening clamp system optional: Loosening the clamping screw applies force to the pin, which will force the clamp into the open position for easy mounting and dismounting.

Temperature range: -30 to +100° C (3,6 F to 237 F)

Speeds: Up to 10,000 rpm, in excess of 10,000 with a finely balanced version.

Backlash: Absolutely backlash-free due to frictional clamped connection.

Service life: These couplings have an infinite life and are maintenance-free if the technical ratings are not exceeded.

Tolerance: On the hub/shaft connection 0.01 to 0.05 mm.

Non standard: Custom designs with varied tolerances, keyways, non-standard material and bellows are available upon request.

Ordering example

BKL / 80 / 26 / 25.4 / XX

- Model
- Series/Nm
- Ø D1 H7
- Ø D2 H7
- non standard

Model BKL			Series									
			2	4,5	10	15	30	60	80	150	300	500
Rated torque	(Nm)	T_{KN}	2	4.5	10	15	30	60	80	150	300	500
Overall length	(mm)	A	30	40	44	58	68	79	92	92	109	114
Outer diameter	(mm)	B	25	32	40	49	56	66	82	82	110	123
Fit length	(mm)	C	10.5	13	13	21.5	26	28	32.5	32.5	41	42.5
Inner diameter possible from Ø to Ø H7	(mm)	D½	4-12.7	6-16	6-24	8-28	12-32	14-35	16-42	19-42	24-60	35-62
ISO 4762 fastening screw		E	M3	M4	M4	M5	M6	M8	M10	M10	M12	M16
Tightening torque of the fastening screw	(Nm)		2.3	4	4.5	8	15	40	70	85	120	200
Distance between centers	(mm)	F	8	11	14	17	20	23	27	27	39	41
	(mm)	G	4	5	5	6.5	7.5	9.5	11	11	13	17
Moment of inertia	(10^{-3} kgm²)	J_{total}	0.002	0.007	0.016	0.065	0.12	0.3	0.75	1.8 / 0.8	7.5 / 3.1	11.7 / 4.9
Hub material (standard) (steel on request)			AL	AL	AL	AL	AL	AL	AL	Steel optional AL	Steel optional AL	Steel optional AL
Approx. weight	(kg)		0.02	0.05	0.06	0.16	0.25	0.4	0.7	1.7 / 0.75	3.8 / 1.6	4.9 / 2.1
Torsional stiffness	(10^3 Nm/rad)	C_T	1.5	7	9	23	31	72	80	141	157	290
axial	(mm)	Max. values	0.5	1	1	1	1	1.5	2	2	2	2.5
lateral	(mm)		0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.20
axial spring stiffness	(N/mm)	C_a	8	35	30	30	50	67	44	77	112	72
lateral spring stiffness	(N/mm)	C_r	50	350	320	315	366	679	590	960	2940	1450

max. angular misalignment 1 degree (1 Nm = 8.85 in lbs)

optional stainless steel

MODEL **ATEX**

FOR USE IN HAZARDOUS AREAS AND EXPLOSIVE ATMOSPHERE

AT mosphere EX plosible

The ATEX 95 / ATEX 137 is regulated by the new European directive. Generally the explosive atmosphere is classified in 3 different zones.

Zone 0:
A place in which an explosive atmosphere consists out of a mixture of air and flammable substances in the form of gas, vapor or mist, and is present frequently, continuously or for extended periods.

Zone 20:
Is relevant for an explosive atmosphere in the form of clouds of combustible dust in air under the same conditions as above.

Zone 1:
Described as a place in which an explosive atmosphere consists of a mixture of air and flammable substances in the form of gas, vapor or mist, and is likely to occur in normal operation occasionally.

Zone 21:
Is relevant for an explosive atmosphere in the form of clouds of combustible dust in air under the same conditions as above.

Zone 2:
A place in which an explosive atmosphere consists out of mixture of air with flammable substances in the form of gas, vapor or mist, and is not likely to occur in normal operation but, if it does occur, it will persist for a short period only.

Zone 22:
Relevant for an explosive atmosphere in the form of a cloud of combustible dust in air under the same conditions as above.

For the classified zones 1/21 and 2/22 the metal bellows couplings BK-EEx do have an accreditation according to ATEX 95/137

Mounting, Design:

For security reasons all misalignment values and torque ratings are decreased by 20%

Installation and Operation instructions:

Installation and operating instructions are an essential part of the BK-EEx metal bellows couplings.

Including the following facts:
- Design of the BK EEx metal bellows couplings
- Exact tightening torques and misalignment values
- How to put in operation
- Maintenace intervals
- Trouble shooting
- Marking of the coupling
- Declaration of conformity

Identification:

All BK-EEx couplings are permanent labeled to display manufacturer and accreditation data.

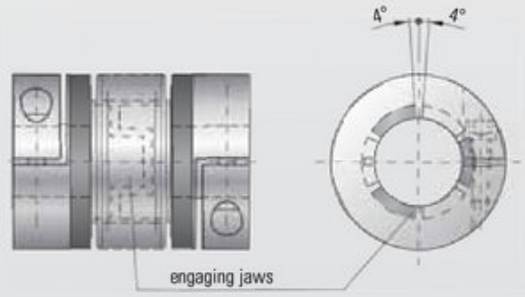
Example Accreditation data:

Type: BKL 150 EEx-2003
II 2 G D
EEx II c 40°C
Ser.No.: A 44305
Tech.Ref.No.:2003/003RW

Design of the BK-EEx metal bellows couplings

All BK-EEX metal bellows couplings are designed to eliminate the possibility of sparks or unsafe levels of heat are generated, even in the event of a faiture.

All dimensions of the standard models are retained. The coupling hubs are generally equipped with internal jaws for additional support of the bellows. If the bellows were to tear or break, the internal jaws would eliminate the risk of sparking or heat generation and continue to drive the load. In case of damage the angle of turn between the driving and the driven side is ± 4° degrees . All hubs are made of steel or stainless steel materials only.



ATTENTION!
This relative motion between the drive and driven elements must be monitored, and the machine shut down immediately in the event of a failure.

optional stainless steel

THE SELECTION

According to torque

In most cases couplings are rated according to the peak torque to be regularly transmitted.

The peak torque may not exceed the rated torque of the coupling.

By rated torque we mean: the torque that is continuously transmittable within the specified acceptable speed and misalignment ranges.

The following calculation has proven itself to be a good rule of thumb:

$$T_{KN} \geq 1{,}5 \cdot T_{AS} \quad \text{(Nm)}$$

T_{KN} = rated torque of coupling (Nm)

T_{AS} = peak torque of motor (Nm)

According to acceleration torques

For precise rating, the acceleration torque and moments of inertia of the entire machine have to be taken into consideration.

In the case of servo motors ensure that their acceleration or deceleration torque is greater than their torque by a multiple.

S_A = Shock or load factor

S_A = 1 (uniform load)

S_A = 2 (non-uniform load)

S_A = 3-4 (Shocking load)

Values for S_A = 2-3 are usual for servo drives on maschine tools.

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

T_{KN} = rated torque of coupling (Nm)

T_{AS} = max. acceleration torque on the driving element (Nm)

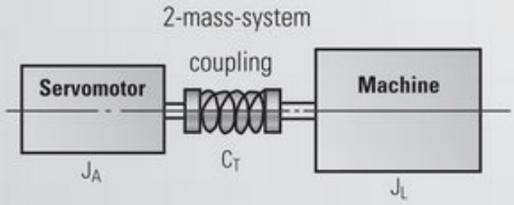
- or max. deceleration torque of the load face (Nm)

J_L = maschine´s moment of inertia (Spindle + slide + workpiece+ half of coupling) (kgm^2)

J_A = motor´s moment of inertia (kgm^2)

According to resonace frequency

For the mech. substitutional model of the 2-mass-system the following is valid:



As a value of practise the following is valid: $f_e \geq 2 \times f_{er}$

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

C_T = torsional stiffness of the coupling (Nm/rad)

f_e = resonance frequency of the 2 mass system (Hz)

f_{er} = frequency of the drive (Hz)

According to torsional stiffness

Transmission errors due to the torsional load:

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

φ = torsional deflection (degrees)

C_T = torsional stiffness of coupling (Nm/rad)

T_{AS} = max. torque (Nm)

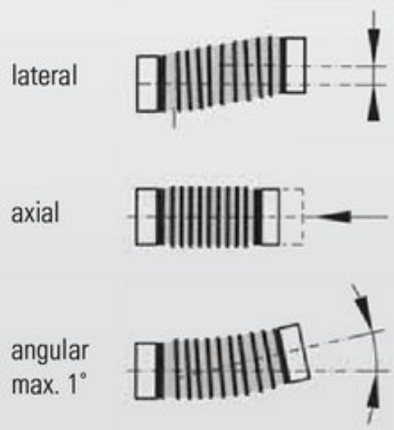
INSTALLATION INSTRUCTION

optional stainless steel

Mounting preparation

- In the case of models BKC / BKL the tolerance between shaft/hub connection must not exceed 0.01 and 0.05 mm.
- Prior to mounting check for smooth running of the coupling hub on the shaft.
- Prior to mounting, make sure that the shaft is slightly oiled. Shaft keyways have no effect upon the function of the clamped connection.
- When mounting the coupling ensure that the metal bellows are not damaged or bent.
- During mounting, the torque and axis misalignments may exceed 2 times the value specified without the operation of the coupling being restricted.
- However, for continuous operation, the axial and lateral misalignments specified in the catalog must not be exceeded. Only then the coupling will provide infinite performance. **Lateral axis misalignment requires special attention** (see table values).

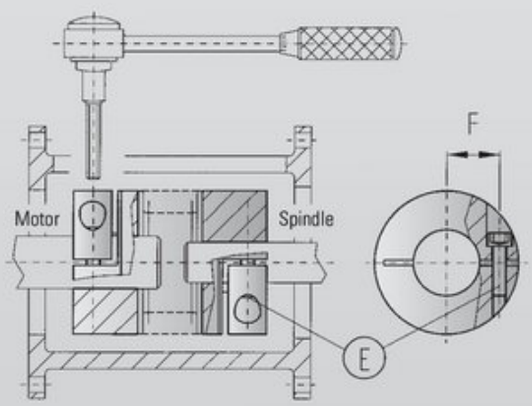
Maximum shaft misalignments



CAUTION: Lateral misalignment has a negative effect on the service life to the bellows. Exact alignment of the R+W metal bellows coupling considerably increases the service life of the coupling. By reducing or eliminating lateral misalignment the radial loading of the adjacent bearings is eliminated increasing service life and reducing heat.

For drives running at high speed we recommend aligning the R+W metal bellows coupling with a dial indicator.
(see values at table page 3 + 4)

Mounting



Mounting:
Prior to mounting make sure that the shafts to be connected do not exceed the angular or lateral misalignment limits for the coupling to be used. This data can be found in the catalog. Slide the metal bellows coupling onto the motor shaft end. When the correct axial position has been reached tighten the clamp screw (E) to the correct tightening torque as indicated in table 1 with a torque wrench. Insert the spindle shaft into the other end of the coupling to the proper axial position. Make sure that the coupling is free of any axial forces before tightening. Tighten the clamp screw (E) as above using a torque wrench to the proper tightening torque. For the split hub design it is necessary to maintain the proper separation between shaft ends (dimension H in the catalog).

Dismounting:
Simply loosen the clamp screws and remove the coupling.

Maintenance

R+W metal bellows couplings are maintenance free as long as they are properly mounted and the maximum misalignment values are not exceeded.

THE R+W-PRODUCT RANGE

R+W®
COUPLING TECHNOLOGY

Experience and Know-how for your special requirements.

TORQUE LIMITERS
Series SK

From 0,1 – 2.800 Nm, Bore diameters 3 – 100 mm
Available as a single position, multi-position, load holding, or full disengagement version
Single piece or press-fit design

BELLOWS COUPLINGS
Series BK

From 15 – 10.000 Nm
Bore diameters 10 – 180 mm
Single piece or press-fit design

BELLOWS COUPLINGS
ECONOMY CLASS
Series BKC / BKL

From 2 – 500 Nm
Bore diameters 4 – 62 mm

LINE SHAFTS
Series ZA/ZAE

From 10 – 4.000 Nm
Bore diameters 10 – 100 mm
Available up to 6 mtr. length

MINIATURE BELLOWS COUPLINGS
Series MK

From 0,05 – 10 Nm
Bore diameters 1 – 28 mm
Single piece or press-fit design

SERVOMAX®
ELASTOMER COUPLINGS
Series EK

From 2 – 2.000 Nm
Shaft diameters 3 – 80 mm
backlash-free, press-fit design

LINEAR COUPLINGS
Series LK

From 70 – 2.000 N
Thread M5 – M16

POLYAMID COUPLINGS
MICROFLEX
Series FK 1

Rated torque 1 Ncm
Bore diameters 1 – 1,5 mm

R+W Antriebselemente GmbH
Alexander-Wiegand-Straße 8
D-63911 Klingenberg/Germany

Tel. +49-(0)9372 – 9864-0
Fax +49-(0)9372 – 9864-20

info@rw-kupplungen.de
www.rwcouplings.com

QUALITY MANAGEMENT
We are certified
according to ISO 9001:2000

TGA-ZM-05-91-00
Registration No. 9605022

424/11/06/3.000