

**VERSATILE AND PRECISE.**

# MINIATURE METAL BELLOWS COUPLINGS

**SERIES MK | 0.05 – 10 Nm**



**R+W**<sup>®</sup>  
COUPLING TECHNOLOGY

THE ULTIMATE COUPLING FROM 0.05 – 10 Nm

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# BACKLASH FREE MINIATURE BELLOWS COUPLINGS

## Areas of application:

Ideal for precise transmission of angular motion and torque in applications including:

- Optical encoders
- Potentiometers
- Tachometers
- Small servo motors
- Stepper motors
- Measurement systems

## Features:

- zero backlash
- torsionally rigid
- precise transmission of angular motion and torque
- infinite life
- wear and maintenance free
- compensates for axial, angular and lateral misalignment
- easy assembly

## MODELS

## FEATURES

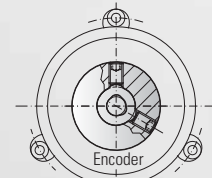
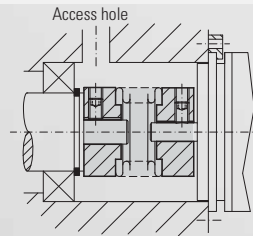
## APPLICATION EXAMPLES

### MK1



**with radial set screws from 0.05-10 Nm**

- cost effective design
- integral "dismounting groove"
- mounting groove or flatted shaft is not required



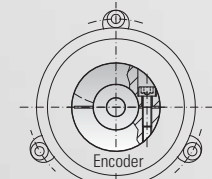
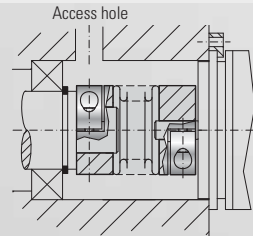
see page 4

### MK2



**with clamping hubs from 0.5-10 Nm**

- easy assembly
- for highly dynamic applications
- finely balanced up to 90,000 rpm available



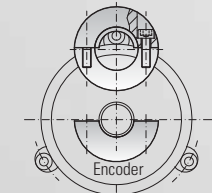
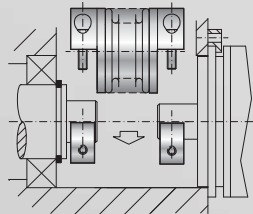
see page 5

### MKH



**with fully split hubs from 0.5-10 Nm**

- for lateral mounting
- multiple lengths available
- suited for pre-aligned shafts



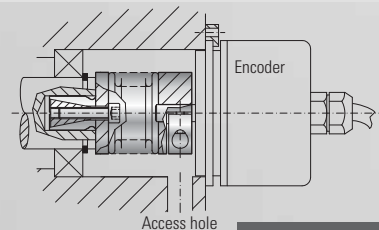
see page 6

### MK3



**with expanding shaft from 0.5-10 Nm**

- compact design
- for easy hollow shaft mounting
- adapts mismatched shaft and bore diameters



see page 7



## MODELS

## FEATURES

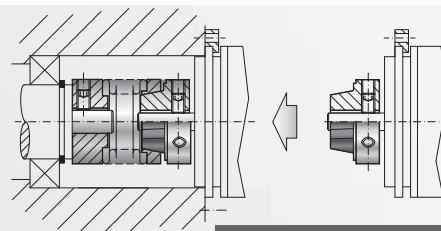
## APPLICATION EXAMPLES

### MK4



#### with radial set screws from 0.5-10 Nm

- wear free, press fit connection
- electrically and thermally isolating
- integral "dismounting groove"
- mounting groove or flatted shaft is not required
- easy mounting and dismounting



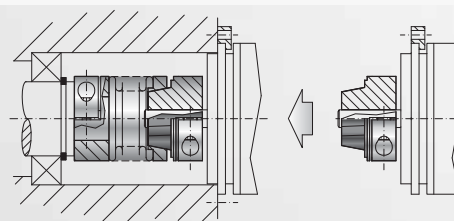
see page 8

### MK5



#### with clamping hubs from 0.5-10 Nm

- wear free, press fit connection
- electrically and thermally isolating
- easy mounting and dismounting



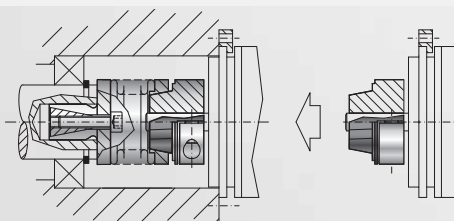
see page 9

### MK6



#### with expanding shaft from 0.5-10 Nm

- wear free, press fit connection
- compact design
- for easy hollow shaft mounting
- saves assembly space and cost
- adapts mismatched shaft and bore diameters



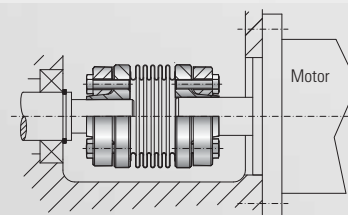
see page 10

### MKS



#### with conical clamping rings from 4.5-10 Nm

- balanced to 120,000 rpm
- high operational dependability
- for highly dynamic applications



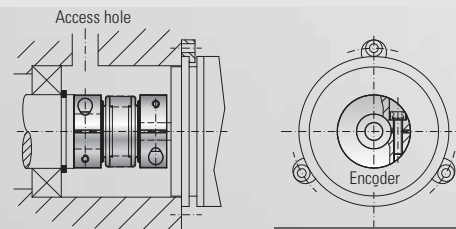
see page 11

### BKL



#### with clamping hubs up to 3 Nm

- extremely cost effective
- easy mounting and dismounting
- temperatures up to 200° C



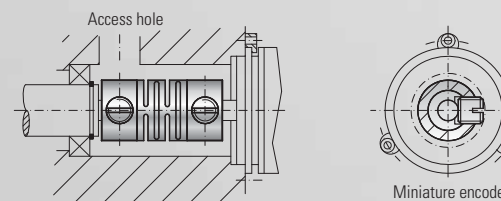
see page 12

### FK1



#### with set screws up to 1 Ncm

- extremely compact design
- for miniature applications

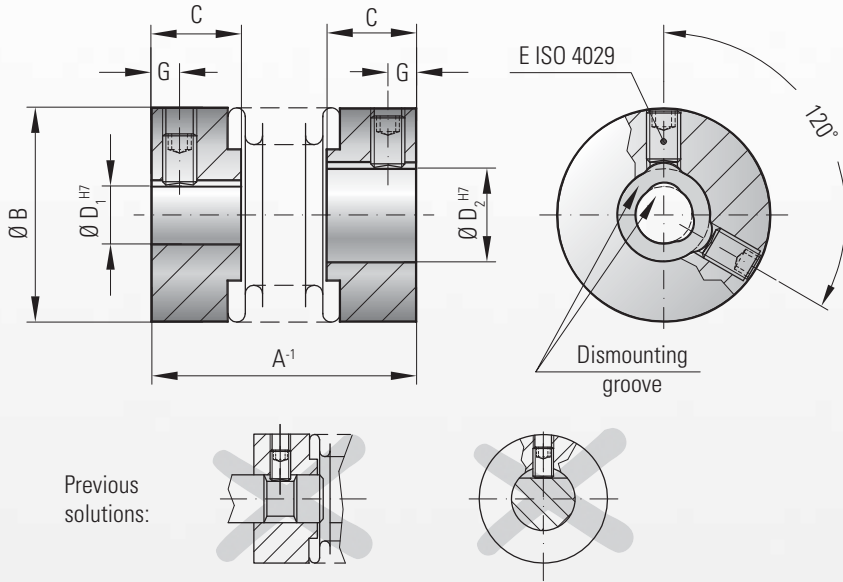


see page 13



# MODEL MK1

## TECHNICAL SPECIFICATIONS



Previous solutions:

### Ordering example

MK1 / 5 / 26 / 4 / 5 / XX

Model  
Series  
Overall length  
Bore Ø D1 H7  
Bore Ø D2 H7  
Non standard e.g. stainless steel



with radial set screws

### Features:

- backlash free and torsionally rigid
- cost effective design
- low moment of inertia
- compensates for 3 types of misalignment
- mounting groove or flatted shaft is not required due to integral "dismounting groove"

### Material:

Bellows made from highly flexible, high grade stainless steel; hubs made from aluminum

### Design:

With 1x or 2x ISO 4029 radial set screw per hub and integral "dismounting groove"

### Temperature range:

-30 to +110° C (-22 to +230° F)

### Speeds:

Up to 20,000 rpm; in excess of 20,000 rpm with finely balanced version

### Service life:

Maintenance free with infinite life when operated within the technical specifications

### Fit tolerance:

Overall clearance between hub and shaft  
0.01-0.08 mm

### Non standard applications:

Custom designs with various tolerances, keyways, materials, dimensions, etc. available upon request

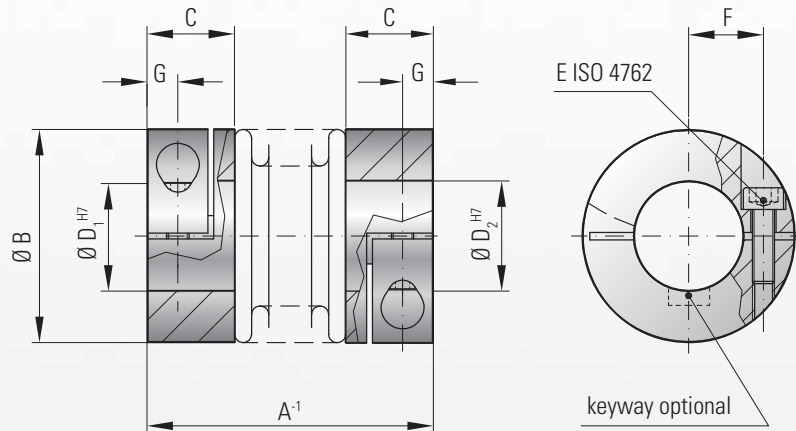
Model MK 1		Series																
		0.5		1		5		10		15		20		45		100		
Rated torque (Nm)	T <sub>KN</sub>	0.05	0.1	0.5		1.0		1.5		2.0		4.5		10				
Overall length (mm)	A	14	20	20	23	26	22	25	28	24	29	26	31	35	37	45	43	53
Outside diameter (mm)	B	6.5	10	15		15		19		25		32		40				
Fit length (mm)	C	4	5	6.5		6.5		7.5		11		13		15				
Inside diameter possible from Ø to Ø H7 (mm)	D <sub>1/2</sub>	1-3	1-5	3-9		3-9		3-12		3-16		6-22		6-28				
Standard bore H7 (mm)	D <sub>1/2</sub>	2	3	6		6		6/10		6/10		10		10				
Clamping screw ISO 4029	E	1xM2	1xM2.5	1xM3		1xM3		2xM3		2xM4		2xM5		2xM6				
Tightening torque of the assembly screws (Nm)	E	0.35	0.75	1.3		1.3		1.3		2.5		4		6				
Distance (mm)	G	1.5	1.8	2		2		2		2.5		3.5		4				
Moment of inertia (gcm <sup>2</sup> )	J <sub>total</sub>	0.1	0.4	1.1	1.2	1.3	1.3	1.8	2	4.7	5.5	15	18	20	65	70	180	220
Weight (g)		1	5	6	6	6	6	7	8	12	14	22	24	26	54	58	106	114
Torsional stiffness (Nm/rad)	C <sub>T</sub>	50	70	280	210	170	510	380	320	750	700	1200	1300	1200	7000	5000	9050	8800
Axial  ± (mm)	Max. values	0.4	0.4	0.4	0.5	0.6	0.4	0.5	0.6	0.5	0.7	0.5	0.6	0.7	0.7	1	1	1.2
Lateral  ± (mm)		0.1	0.15	0.15	0.2	0.25	0.15	0.2	0.25	0.15	0.2	0.15	0.2	0.25	0.2	0.25	0.2	0.3
Angular  ± (degree)		1	1	1	1.5	2	1	1.5	2	1.5	1.5	1.5	1.5	2	1.5	2	1.5	2

1 Nm = 8.85 in lbs

optional  
stainless  
steel

# MODEL MK2

## TECHNICAL SPECIFICATIONS



with clamping hubs

### Features:

- with frictional clamp connection
- for highly dynamic applications
- backlash free and torsionally rigid
- low moment of inertia
- compensates for 3 types of misalignment

### Material:

Bellows made from highly flexible, high grade stainless steel; hubs made from aluminum

### Design

With a single ISO 4762 radial clamping screw per hub

### Temperature range:

-30 to +110° C (-22 to +230° F)

### Speeds:

Up to 10,000 rpm; in excess of 10,000 rpm with finely balanced version (up to G = 2.5)

### Service life:

Maintenance free with infinite life when operated within the technical specifications

### Fit tolerance:

Overall clearance between hub and shaft  
0.01-0.05 mm

### Non standard applications:

Custom designs with various tolerances, keyways, materials, dimensions, etc. available upon request

### Ordering example

MK2 / 5 / 25 / 4 / 5 / XX

Model  
Series  
Overall length  
Bore Ø D1 H7  
Bore Ø D2 H7  
Non standard e.g. stainless steel

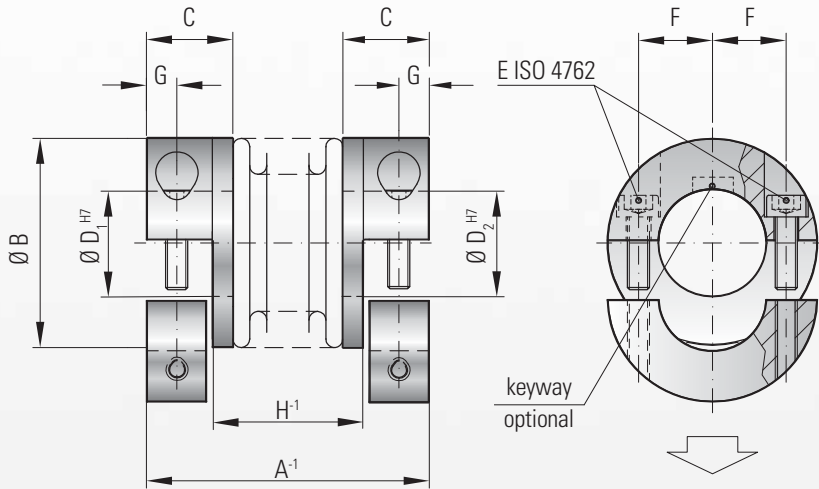
Model MK 2	Series																
	5			10			15		20			45		100			
Rated torque (Nm)	T <sub>KN</sub>		0.5			1.0			1.5		2.0			4.5		10	
Overall length (mm)	A		25	28	31	27	30	33	30	35	35	40	44	46	54	50	60
Outside diameter (mm)	B		15			15			19		25			32		40	
Fit length (mm)	C		9			9			11		13			16		16	
Inside diameter possible from Ø to Ø H7 (mm)	D <sub>1/2</sub>		3-7			3-7			3-8		3-12.7			5-16		5-24	
Standard bore H7 (mm)	D <sub>1/2</sub>		6			6			6		6/10			10		10	
Fastening screw ISO 4762	E		M2			M2			M2.5		M3			M4		M4	
Tightening torque of the fastening screws (Nm)	E		0.43			0.43			0.85		2.3			4		4.5	
Distance between centerlines (mm)	F		4.5			4.5			6		8			10		15	
Distance (mm)	G		3			3			3.5		4			5		5	
Moment of inertia (gcm <sup>2</sup> )	J <sub>total</sub>		2.6	2.8	3	3	3.4	3.6	8.5	9.5	25	27	29	100	108	160	205
Weight (g)	J <sub>total</sub>		9	9	9	9	10	11	22	24	36	38	40	74	78	120	130
Torsional stiffness (Nm/rad)	C <sub>T</sub>		280	210	170	510	380	320	750	700	1200	1300	1200	7000	5000	9050	8800
Axial ± (mm)	Max. values		0.4	0.5	0.6	0.4	0.5	0.6	0.5	0.7	0.5	0.6	0.7	0.7	1	1	1.2
Lateral ± (mm)	Max. values		0.15	0.2	0.25	0.15	0.2	0.25	0.15	0.2	0.15	0.2	0.25	0.2	0.25	0.2	0.3
Angular ± (degree)	Max. values		1	1.5	2	1	1.5	2	1.5	1.5	1.5	1.5	2	1.5	2	1.5	2

1 Nm = 8.85 in lbs



# MODEL MKH

## TECHNICAL SPECIFICATIONS



### Ordering example

MKH / 20 / 35 / 8 / 10 / XX

Model  
Series  
Overall length  
Bore Ø D1 H7  
Bore Ø D2 H7  
Non standard e.g. stainless steel



with fully split hubs

### Features:

- for lateral mounting
- easy mounting and dismounting
- lightweight and low inertia
- suited for pre-aligned shafts

### Material:

Bellows made from highly flexible, high grade stainless steel; hubs made from aluminum

### Design:

With fully removable split hubs and 2x ISO 4762 clamping screws per hub

### Temperature range:

-30 to +110° C (-22 to +212° F)

### Speeds:

Up to 10,000 rpm; in excess of 10,000 rpm with finely balanced version (up to G = 2.5)

### Service life:

Maintenance free with infinite life when operated within the technical specifications

### Brief overloads:

Acceptable up to 1.5x the rated torque

### Fit tolerance:

Overall clearance between hub and shaft 0.01-0.05 mm

### Non standard applications:

Custom designs with various tolerances, keyways, materials, dimensions, etc. available upon request

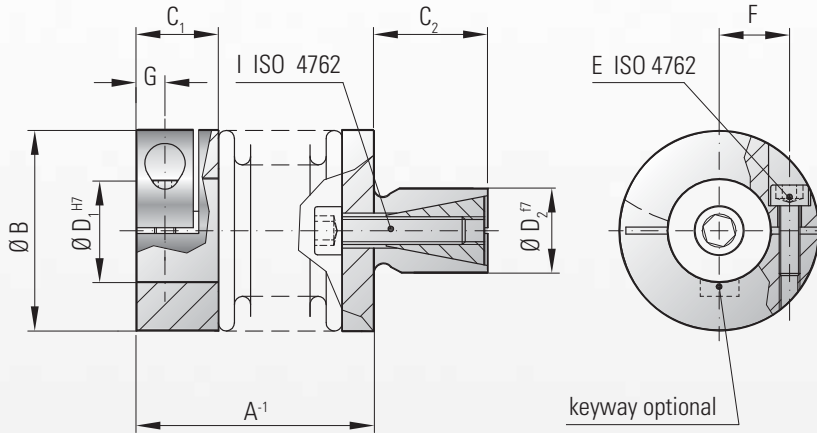
Model MKH			Series														
			5			10			15		20			45		100	
Rated torque (Nm)	$T_{KN}$		0.5			1.0			1.5		2.0			4.5		10	
Overall length (mm)	$A^{-1}$		25	28	31	27	30	33	30	35	35	40	44	46	54	50	60
Outside diameter (mm)	B		15			15			19		25			32		40	
Fit length (mm)	C		9			9			11		13			16		16	
Inside diameter possible from Ø to Ø H7 (mm)	$D_{1/2}$		3-7			3-7			3-8		3-12.7			5-16		5-24	
Standard bore H7 (mm)	$D_{1/2}$		6			6			6		6/10			10		10	
Fastening screw ISO 4762	E		M2			M2			M2.5		M3			M4		M4	
Tightening torque of the fastening screws (Nm)	E		0.43			0.43			0.85		2.3			4		4.5	
Distance between centerlines (mm)	F		4.5			4.5			6		8			10		15	
Distance (mm)	G		3			3			3.5		4			5		5	
Distance (mm)	$H^{-1}$		12	15	18	14	17	20	14.5	19.5	17	22	26	23.5	31.5	27.5	37.5
Moment of inertia (gcm <sup>2</sup> )	$J_{total}$		2.6	2.8	3	3	3.4	3.6	8.5	9.5	25	27	29	100	108	160	205
Weight (g)			9	9	9	9	10	11	22	24	36	38	40	74	78	120	130
Torsional stiffness (Nm/rad)	$C_T$		280	210	170	510	380	320	750	700	1200	1300	1200	7000	5000	9050	8800
Axial		± (mm)	0.4	0.5	0.6	0.4	0.5	0.6	0.5	0.7	0.5	0.6	0.7	0.7	1	1	1.2
Lateral		± (mm)	0.15	0.2	0.25	0.15	0.2	0.25	0.15	0.2	0.15	0.2	0.25	0.2	0.25	0.2	0.3
Angular		± (degree)	1	1.5	2	1	1.5	2	1.5	1.5	1.5	1.5	2	1.5	2	1.5	2

1 Nm = 8.85 in lbs

optional  
stainless  
steel

# MODEL MK3

## TECHNICAL SPECIFICATIONS



### Ordering example

MK3 / 20 / 36 / 6 / 12 / XX

Model  
Series  
Overall length  
Bore  $\varnothing$  D1 H7  
Shaft  $\varnothing$  D2 f7  
Non standard e.g. stainless steel



with expanding shaft

### Features:

- backlash free and torsionally rigid
- compensates for 3 types of misalignment
- for easy hollow shaft mounting
- adapts mismatched shaft and bore diameters
- low moment of inertia

### Material:

Bellows made from highly flexible, high grade stainless steel; clamping hub made from aluminum; expanding shaft and cone made from steel

### Design:

With a single ISO 4762 radial clamping screw on one hub; shaft with internal cone for expansion

### Temperature range:

-30 to +110° C (-22 to +230° F)

### Speeds:

Up to 10,000 rpm; in excess of 10,000 rpm with finely balanced version

### Service life:

Maintenance free with infinite life when operated within the technical specifications

### Fit tolerance:

Overall clearance between hub and shaft  
0.01-0.05 mm

### Non standard applications:

Custom designs with various tolerances, keyways, materials, dimensions, etc. available upon request

**Recommended bore tolerance for expanding shaft: H7**

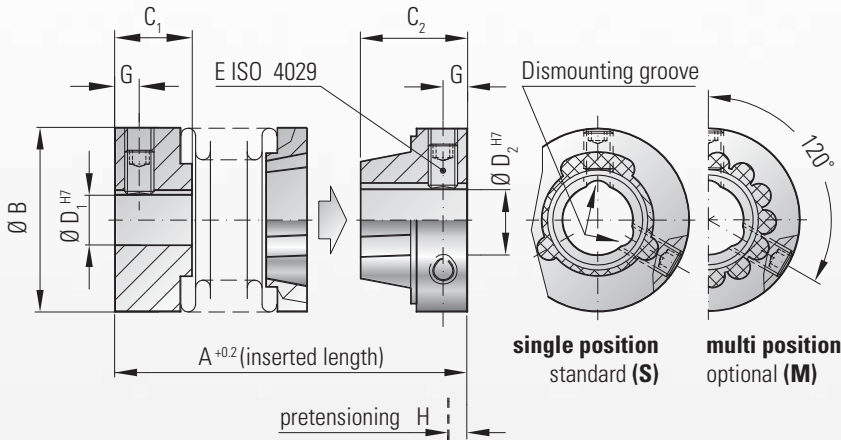
Model MK3	Series															
	5			10			15		20			45		100		
Rated torque (Nm)	$T_{KN}$	0.5			1			1.5		2			4.5		10	
Overall length (mm)	$A^{-1}$	20	23	26	22	25	28	24	30	27	33	36	36	44	41	51
Outside diameter (mm)	B	15			15			19		25			32		40	
Fit length (mm)	$C_1$	9			9			11		13			16		16	
Shaft length (mm)	$C_2$	10			10			12		12			15		20	
Inside diameter possible $\varnothing$ to $\varnothing$ H7 (mm)	$D_1$	3-7			3-7			4-8		4-12.7			5-16		6-24	
Standard bore H7 (mm)	$D_1$	6			6			6		6/10			10		10	
Standard shaft f7 (mm)	$D_2$	8			8			10		12			14		16	
Fastening screw ISO 4762		M2			M2			M2.5		M3			M4		M4	
Tightening torque of the fastening screws (Nm)	E	0.43			0.43			0.85		2.3			4		4.5	
Distance between centerlines (mm)	F	4.5			4.5			6		8			10		15	
Distance (mm)	G	3			3			3.5		4			5		5	
Fastening screw ISO 4762		M3			M3			M4		M4			M5		M6	
Tightening torque of the fastening screws (Nm)	I	1.5			1.5			3		4			6.5		11	
Moment of inertia (gcm <sup>2</sup> )	$J_{total}$	2.6	2.8	3.0	3.0	3.4	3.6	8.5	9.5	25	27	29	100	108	160	205
Torsional stiffness (Nm/rad)	$C_T$	280	210	170	510	380	320	750	700	1200	1300	1200	7000	5000	9050	8800
Axial  ± (mm)		0.4	0.5	0.6	0.4	0.5	0.6	0.5	0.7	0.5	0.6	0.7	0.7	1	1	1.2
Lateral  ± (mm)		0.15	0.2	0.25	0.15	0.2	0.25	0.15	0.2	0.15	0.2	0.25	0.2	0.25	0.2	0.3
Angular  ± (degree)	$J_{max. values}$	1	1.5	2	1	1.5	2	1.5	1.5	1.5	1.5	2	1.5	2	1.5	2

1 Nm = 8.85 in lbs



# MODEL MK4

## TECHNICAL SPECIFICATIONS



### Ordering example

MK4 / 20 / 37 / 8 / 10 / XX

Model  
Series  
Overall length  
Bore Ø D1 H7  
Bore Ø D2 H7  
Non standard e.g. multi position re-engagement



blind mate with radial set screws

### Features:

- electrically and thermally isolating
- wear and maintenance free
- easy mounting and dismounting
- absolutely backlash free and torsionally rigid
- low moment of inertia
- compensates for 3 types of misalignment

### Material:

Bellows made from highly flexible, high grade stainless steel; hubs and bellows side adapter plate made from aluminum; tapered male segment made from glass reinforced plastic molded directly onto the hub

### Design:

With 1x or 2x ISO 4029 radial set screw per hub and integral "dismounting groove"; with blind mate, press fit connection

**Temperature range:** -30 to +110° C (-22 to +230° F)

**Speeds:** Up to 20,000 rpm; in excess of 20,000 rpm with finely balanced version

### Service life:

Maintenance free with infinite life when operated within the technical specifications

### Fit tolerance:

Overall clearance between hub and shaft  
0.01-0.08 mm

### Non standard applications:

Custom designs with various tolerances, keyways, materials, dimensions, etc. available upon request

Model MK 4		Series											
		5			15		20			45		100	
Rated torque (Nm)	$T_{KN}$	0.5			1.5		2			4.5		10	
Overall length (inserted) (mm)	A	22	25	28	26	31	28	33	37	39	47	46	56
Outside diameter (mm)	B	15			19		25			32		40	
Fit length (mm)	$C_1$	6.5			7.5		11			13		15	
Fit length (mm)	$C_2$	9			10		11			14		16	
Inside diameter possible from Ø to Ø H7 (mm)	$D_1$	3-9			3-12		3-16			6-22		6-28	
Inside diameter possible from Ø to Ø H7 (mm)	$D_2$	3-6.35			3-9		3-12.7			6-16		6-20	
Standard bore H7 (mm)	$D_{1/2}$	6			6		6/10			10		10	
Fastening screw ISO 4029	E	1xM3			2xM3		2xM4			2xM5		2xM6	
Tightening torque of the fastening screws (Nm)	E	1.3			1.3		2.5			4		6	
Distance (mm)	G	2			2		2.5			3.5		4	
Approximate pretensioning (mm)	H	0.4			0.5		0.5			0.7		1	
Axial recovery force at maximum pretensioning (N)		5	3	2	4	3	3	4	3	15	10	33	46
Moment of inertia (gcm <sup>2</sup> )	$J_{total}$	2.0	2.2	2.5	5.5	6.0	21	23	25	80	85	200	210
Torsional stiffness (Nm/rad)	$C_T$	280	210	170	750	700	1200	1300	1200	7000	5000	9050	8800
Axial*  ± (mm)	Max. values	0.4	0.5	0.6	0.5	0.7	0.5	0.6	0.7	0.7	1	1	1.2
Lateral  ± (mm)		0.15	0.2	0.25	0.15	0.2	0.15	0.2	0.25	0.2	0.25	0.2	0.3
Angular  ± (degree)		1	1.5	2	1.5	1.5	1.5	1.5	2	1.5	2	1.5	2

1 Nm = 8.85 in lbs

\* in addition to maximum pretensioning

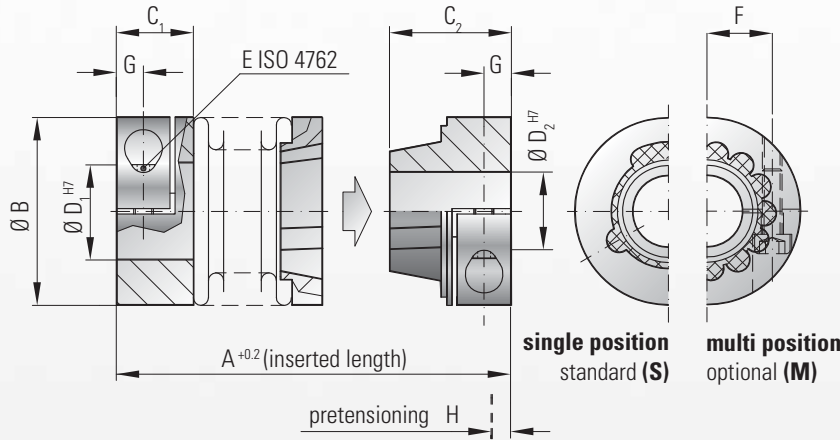
optional  
stainless steel

# MODEL MK5

## TECHNICAL SPECIFICATIONS



blind mate with clamping hubs



### Ordering example

MK5 / 20 / 37 / 6 / 10 / XX

Model  
Series  
Overall length  
Bore Ø D1 H7  
Bore Ø D2 H7  
Non standard e.g. multi position re-engagement

### Features:

- electrically and thermally isolating
- wear and maintenance free
- easy mounting and dismounting
- absolutely backlash free and torsionally rigid
- low moment of inertia
- compensates for 3 types of misalignment

### Material:

Bellows made from highly flexible, high grade stainless steel; hubs and bellows side adapterplate made from aluminum; tapered male segment made from glass reinforced plastic molded directly onto the hub

### Design:

With a single ISO 4762 radial clamping screw per hub; with blind mate, press fit connection

**Temperature range:** -30 to +110° C (-22 to +230° F)

### Speed:

Up to 10,000 rpm; in excess of 10,000 rpm with finely balanced version

### Service life:

Maintenance free with infinite life when operated within the technical specifications

### Fit tolerance:

Overall clearance between hub and shaft  
0.01-0.05 mm

### Non standard applications:

Custom designs with various tolerances, keyways, materials, dimensions, etc. available upon request

Model MK 5		Series											
		5			15		20			45		100	
Rated torque (Nm)	$T_{KN}$	0.5			1.5		2			4.5		10	
Overall length (inserted) (mm)	A	27	30	33	34	39	37	43	46	49	57	55	65
Outside diameter (mm)	B	15			19		25			32		40	
Fit length (mm)	$C_1$	9			11		13			16		16	
Fit length (mm)	$C_2$	12			14		16			20		21.5	
Inside diameter possible from Ø to Ø H7 (mm)	$D_{1/2}$	3-6.35			3-8		3-12.7			5-16		5-20 (D <sub>1</sub> -24)	
Standard bore H7 (mm)	$D_{1/2}$	6			6		6/10			10		10	
Fastening screw ISO 4762	E	M2			M2.5		M3			M4		M4	
Tightening torque of the fastening screws (Nm)		0.43			0.85		2.3			4		4.5	
Distance between centerlines (mm)	F	4.5			6		8			10		15	
Distance (mm)	G	3			3.5		4			5		5	
Approximate pretensioning (mm)	H	0.4			0.5		0.5			0.7		1	
Axial recovery force at maximum pretensioning (N)	$J_{total}$	5	3	2	4	3	3	4	3	15	10	33	46
Moment of inertia (gcm <sup>2</sup> )		3.0	3.2	3.5	9.0	10	28	30	33	110	120	220	230
Torsional stiffness (Nm/rad)	$C_T$	280	210	170	750	700	1200	1300	1200	7000	5000	9050	8800
Axial*  ±(mm)	Max. values	0.4	0.5	0.6	0.5	0.7	0.5	0.6	0.7	0.7	1	1	1.2
Lateral  ±(mm)		0.15	0.2	0.25	0.15	0.2	0.15	0.2	0.25	0.2	0.25	0.2	0.3
Angular  ±(degree)		1	1.5	2	1.5	1.5	1.5	1.5	2	1.5	2	1.5	2

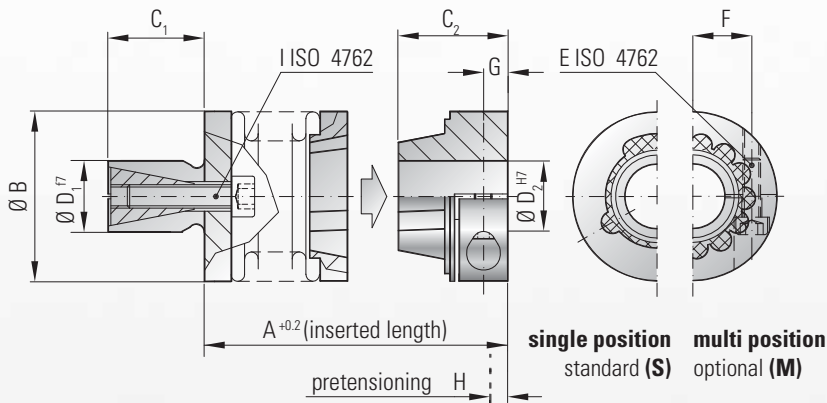
1 Nm = 8.85 in lbs

\* in addition to maximum pretensioning



# MODEL MK6

## TECHNICAL SPECIFICATIONS



### Ordering example

MK6/20 / 28 / 12 / 12 / XX

Model  
Series  
Overall length (mm)  
Shaft  $\varnothing D1 f7$   
Bore  $\varnothing D2 H7$   
Non standard e.g. multi position re-engagement



blind mate with expanding shaft

### Features:

- electrically and thermally isolating
- wear and maintenance free
- compensates for 3 types of misalignment
- easy mounting and dismounting
- backlash free and torsionally rigid
- low moment of inertia

### Material:

Bellows made from highly flexible, high grade stainless steel; clamping hub and bellows side adapter plate made from aluminum; expanding shaft and cone made from steel; tapered male segment made from glass reinforced plastic molded directly onto the hub

### Design:

With a single ISO 4762 radial clamping screw on one hub; shaft with internal cone for expansion; with blind mate, press fit connection

**Temperature range:** -30 to +110° C (-22 to +230° F)

**Speed:** Up to 10,000 rpm; in excess of 10,000 rpm with finely balanced version

### Service life:

Maintenance free with infinite life when operated within the technical specifications

### Fit tolerance:

Overall clearance between hub and shaft 0.01-0.05 mm

Model MK 6		Series											
		5			15		20			45		100	
Rated torque (Nm)	$T_{KN}$	0.5			1.5		2			4.5		10	
Overall length (inserted) (mm)	A	21	24	27	27	32	28	34	38	38	46	45	55
Outside diameter (mm)	B	15			19		25			32		40	
Shaft length (mm)	$C_1$	10			12		12			15		20	
Standard shaft $\varnothing f7$ (mm)	$D_1$	8			10		12			14		16	
Fit length (mm)	$C_2$	12			14		16			20		21.5	
Inside diameter possible from $\varnothing$ to $\varnothing H7$ (mm)	$D_2$	3-6.35			3-8		3-12.7			5-16		5-20	
Standard bore H7 (mm)	$D_2$	6			6		6/10			10		10	
Fastening screw ISO 4762	E	M2			M2.5		M3			M4		M4	
Tightening torque of the fastening screws (Nm)		0.43			0.85		2.3			4		4.5	
Distance between centerlines (mm)	F	4.5			6		8			10		15	
Distance (mm)	G	3			3.5		4			5		5	
Approximate pretensioning (mm)	H	0.4			0.5		0.5			0.7		1	
Axial recovery force at maximum pretensioning (N)	I	5	3	2	4	3	3	4	3	15	10	33	46
Fastening screw ISO 4762		M3			M4		M4			M5		M6	
Tightening torque of the fastening screws (Nm)	J	1.5			3		4			6.5		11	
Moment of inertia (gcm <sup>2</sup> )		$J_{total}$	3.0	3.2	3.5	9.0	10	28	30	33	110	120	220
Torsional stiffness $\pm$ (Nm/rad)	$C_T$	280	210	170	750	700	1200	1300	1200	7000	5000	9050	8800
Lateral $\pm$ (mm)	Max. values	0.15	0.2	0.25	0.15	0.2	0.15	0.2	0.25	0.2	0.25	0.2	0.3
Angular $\pm$ (degree)		1	1.5	2	1.5	1.5	1.5	1.5	2	1.5	2	1.5	2

1 Nm = 8.85 in lbs



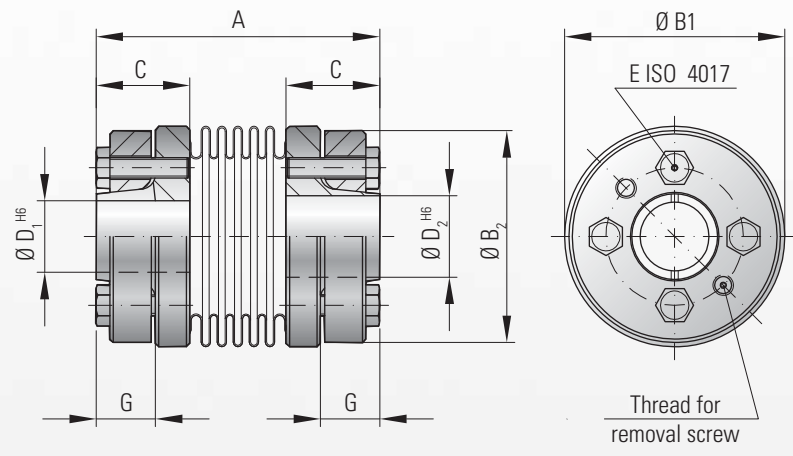
High speed

# MODEL MKS

## TECHNICAL SPECIFICATIONS



with conical clamping rings



**Ordering example**

MKS/45 / 10 / 8 / XX

Model	_____
Series	_____
Bore Ø D1 H6	_____
Bore Ø D2 H6	_____
Non standard e.g. anodized	_____

Model MKS		Series			
		45		100	
Rated torque (Nm)	$T_{KN}$	4.5		10	
Overall length (mm)	A	42		48	
Outside diameter (mm)	$B_1$	32		40	
Hub diameter (mm)	$B_2$	30		38	
Fit length (mm)	C	14		16	
Inside diameter possible from Ø to Ø H6 (mm)	$D_{1/2}$	6-10		8-14	
Standard bore Ø H6 (mm)	$D_{1/2}$	10		12	
Fastening screw ISO 4017 (mm)		3x M3		4x M3	
Tightening torque of the fastening screws (Nm)	E	1.3		1.3	
Distance (mm)	G	8.5		9.5	
Moment of inertia (gcm <sup>2</sup> )	$J_{total}$	65		160	
Approximate weight (g)		51		75	
Torsional stiffness (Nm/rad)	$C_T$	7000		9050	
Axial	± (mm)	0.5		0.75	
Lateral	± (mm)	0.1		0.05*	
Angular	± (degree)	0.5		0.5	

1 Nm = 8.85 in lbs

**Note: It is very important to precisely align the shafts when operating at high speeds.**

For speeds over 50,000 please refer to specifications marked with an asterisk\*

**Features:**

- for high speed applications
- compensates for 3 types of misalignment
- high strength conical clamping connection
- for highly dynamic applications

**Material:**

Bellows made from highly flexible, high grade stainless steel; hubs and conical clamping rings made from high strength aluminum

**Design:**

Hubs with conical clamping rings, each with 3/4x ISO 4017 fastening screws

**Temperature range:**

-30 to +110° C (-22 to +230° F)

**Balancing grade:**

Standard balancing grade G = 2.5 (higher balancing grade upon request)

**Speeds:**

Maximum 120,000 rpm\*

**Service life:**

Maintenance free with infinite life when operated within the technical specifications

**Fit tolerance:**

Overall clearance between hub and shaft 0.01-0.025 mm

**Non standard applications:**

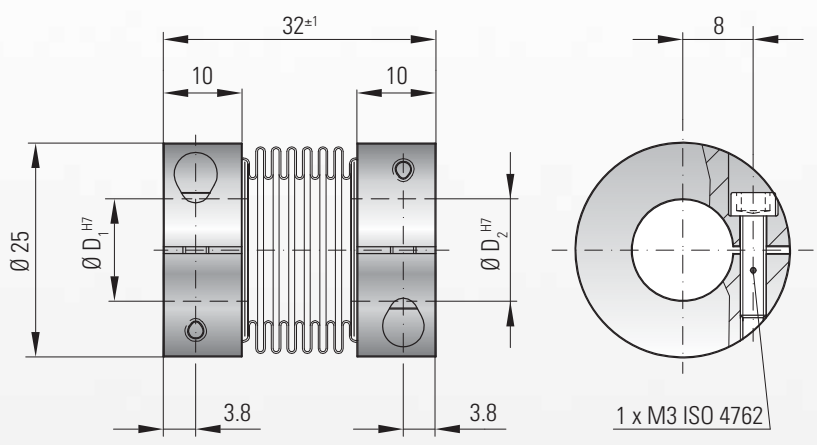
Custom designs with various tolerances, materials, dimensions, etc. available upon request



low cost

# MODEL BKL 003

## TECHNICAL SPECIFICATIONS



### Ordering example

BKL/ 003 / 3 / 5 / XX

Model  
Series  
Bore  $\varnothing D_1^{H7}$   
Bore  $\varnothing D_2^{H7}$   
Non standard e.g. anodized

Model BKL 003		Series	
		3	
Rated torque (Nm)	$T_{KN}$	3	
Standard bore diameters H7 (mm)	$D_1, D_2$	3 / 4 / 4.76 / 5 / 6 / 6.35 / 7 / 8 / 9 / 9.53 / 10 / 11 / 12 / 12.7	
Moment of inertia (gcm <sup>2</sup> )	$J_{total}$	20	
Approximate weight (g)		23	
Tightening torque of the fastening screws (Nm)		2.3	
Torsional stiffness (Nm/rad)	$C_T$	994	
Axial	$\pm$ (mm)	max. values	1
Lateral	$\pm$ (mm)		0.2
Angular	$\pm$ (degree)		2

1 Nm = 8.85 in lbs



## ECOFLEX®

### Features:

- low cost
- backlash free and torsionally rigid
- compensates for 3 types of misalignment
- wear free and robust

### Material:

Bellows made from highly flexible, high grade stainless steel; clamping hubs made from high strength aluminum

### Design:

With a single ISO 4762 radial clamping screw per hub

### Temperature range:

-40 to +200° C (-40 to +392° F)

### Speeds:

Up to 10,000 rpm; in excess of 10,000 rpm with finely balanced version

### Service life:

Maintenance free with infinite life when operated within the technical specifications

### Fit tolerance:

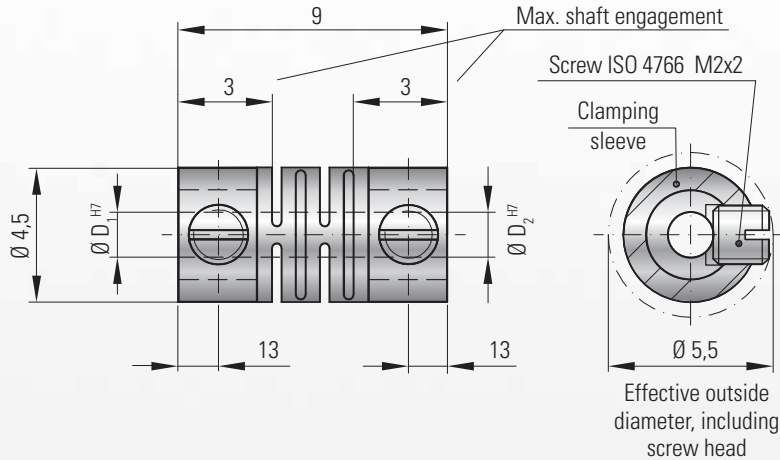
Overall clearance between hub and shaft  
0.01-0.05 mm

**ECOFLEX®:** The cost effective option for encoders, potentiometers, stepper motors and small servo motors.



# MODEL FK1 001/9

## TECHNICAL SPECIFICATIONS



### Ordering example

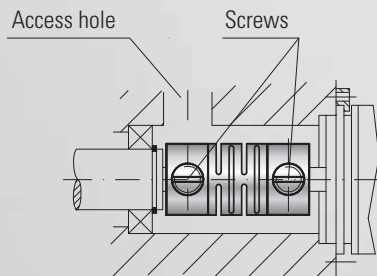
FK1 / 001 / 9 / 1.5 / 1.5 / XX

Model  
Series  
Overall length (mm)  
Bore  $\varnothing D_1$  H7  
Bore  $\varnothing D_2$  H7  
Non standard e.g. custom screws

Model FK1 001/9		Series	
Rated torque (Ncm)	$T_{KN}$	1	
Standard bore H7 (mm)	$D_1, D_2$	1.5 / 1.5 or 2 / 1.5 additional bore diameters available upon request	
Moment of inertia (gcm <sup>2</sup> )	$J_{total}$	5.39	
Approximate weight (g)		0.47	
Torsional stiffness (Ncm/rad)	$C_r$	23 (measured at +20° C)	
Axial	$\pm$ (mm)	0.2	
Lateral	$\pm$ (mm)	0.1	
Angular	$\pm$ (degree)	1.5	
	max. values		

### Dismounting

To dismount the coupling, simply loosen the setscrews. The coupling can now be removed from the shaft.



## MICROFLEX with clamping rings

### Features:

- extremely compact design
- compensates for 3 types of misalignment
- backlash free
- vibration damping

### Material:

Flexible element made from polyamide; clamping rings made from stainless steel

### Design:

The flexible element is molded and includes the shaft bores; ISO 4766 screws are threaded into the clamping rings

**Temperature range:** -35 to +90° C (-31 to +194° F)

**Speeds:** maximum 20,000 rpm

### Service life:

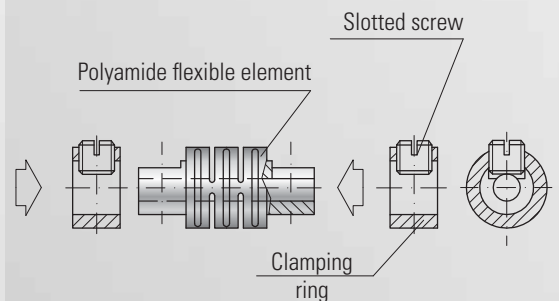
Maintenance free with infinite life when operated within the technical specifications

### Fit tolerance:

Overall clearance between hub and shaft 0.01-0.025 mm

### Custom Solutions:

The effective outside diameter can be reduced by using a shaft with a flat. Custom M2 x 1.5 screws can also be used to reduce the effective diameter of the coupling to 4.5 mm (additional charge)



The set screw is securely guided through the clamping ring, which is partially supported by the flexible element. The set screw contacts the shaft directly. A flat on the shaft can improve the torque transmission.

**Caution:** Always use proper tools to tighten the set screws



# ASSEMBLY INSTRUCTIONS

## Mounting Preparation

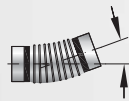
### Mounting Preparation:

The bellows can tolerate up to 1.5x the catalog misalignment values prior to installation, and any excess bending stress is to be avoided. Ensure that the shafts and bores are free of burrs and debris. Shaft and bore (and keyway) dimensions should be inspected prior to installation.

The overall clearance between the shaft and hub should be 0.01 to 0.05mm. This clearance fit, along with a thin film of oil on the shaft, are recommended in order to ease the installation process. This has no negative effect on the clamping force.

**Caution:** Greases with molybdenum disulfate or other high pressure additives nor other sliding greases should not be used.

## Maximum Misalignment Values



Angular misalignment  $\Delta K\alpha$



Lateral misalignment  $\Delta K\lambda$

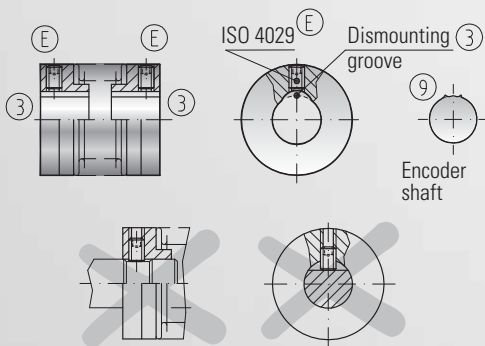


Axial misalignment  $\Delta K\lambda_r$



**Caution:** Excessive lateral misalignment is detrimental to the fatigue life of the metal bellows. Precise alignment significantly increases the service life of the coupling, reduces restoring loads placed on adjacent equipment, and results in smooth, vibration free operation.

## Set Screw Connection: Model MK1 + MK4



### Installation:

Slide the coupling completely onto one shaft. Once the coupling is in the proper axial position, tighten the set screw(s) according to the tightening torque value specified in the data sheet. Insert the second shaft to the correct axial position and tighten the set screws (shown below) to the recommended tightening torque values.

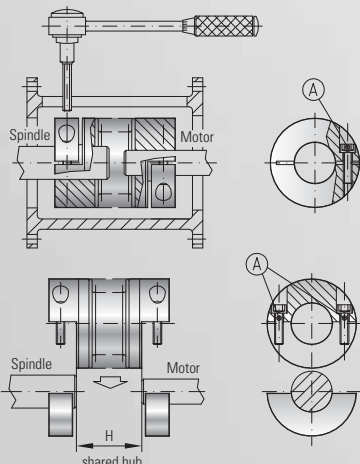
Series 1 - 10: 1x set screw per hub

Series 15 - 100: 2x set screws per hub, 120° apart

### Removal:

Loosen the set screw (E). The dismounting groove (3) allows for clearance of the hub over any burr in the shaft (9) created by the set screw (E).

## Clamping Hub Connection: Model MK2 + MKH + MK5 + BKL 003



### Installation:

Slide the coupling completely onto one shaft. Once the coupling is in the proper axial position, tighten the clamping screw(s) according to the tightening torque value specified in the data sheet. Insert the second shaft into the second clamping hub, ensuring that the bellows is in a relaxed state once the adjacent equipment is installed, and that the coupling is evenly spaced between the two shafts.



**Caution:** Ensure that the shafts are fully engaged through the fit lengths of the clamping hubs.

Ensure that the shaft misalignment does not exceed the maximum values specified in the catalog. Tighten the clamping screw(s) according to the tightening torque value specified in the data sheet.

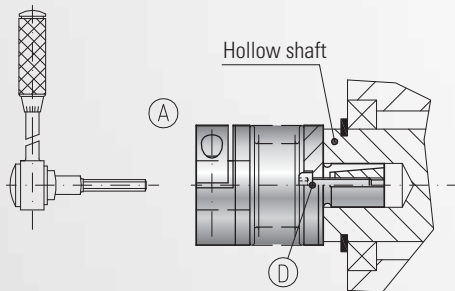
### Removal:

Loosen the clamping screws (A). Remove the coupling from the shafts.



# INSTALLATION INSTRUCTIONS

## Expanding Shaft Connection: Model MK3 + MK6



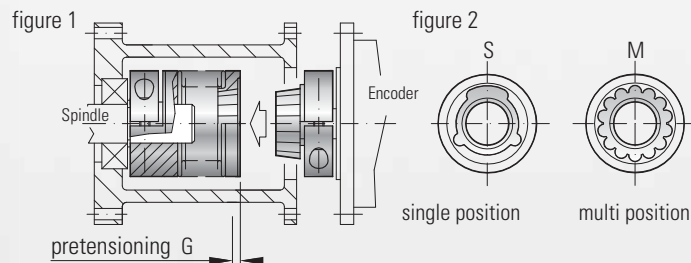
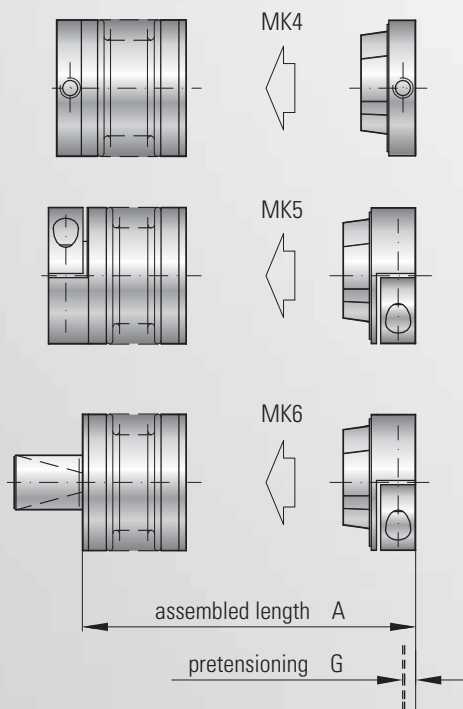
### Installation:

Completely insert the expanding shaft hub into its respective bore. Tighten the fastening screw (D) to the torque value specified in the data sheet. Insert the male shaft (e.g. encoder shaft) into the clamping hub of the bellows body and tighten the clamping screw (A) to the torque value specified in the data sheet.

### Removal:

To remove the coupling, first loosen both screws (A/D). Axial pressure applied to the screw (D) will cause the internal cone to be released from the expanding shaft.

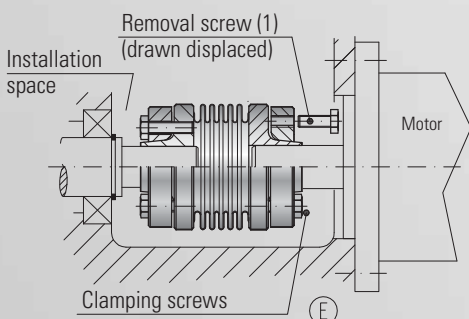
## Blind Mate Connection: Model MK4 + MK5 + MK6



### Installation:

**Caution!** It is extremely important that the overall length of the installed coupling is taken into consideration during the assembly process. Models MK4, MK5 and MK6 are blind mate, press fit couplings. They operate free of backlash only if properly pretensioned. First mount the female segment (bellows body) to its respective shaft or bore. Then loosely mount the male segment onto its respective shaft so that it slides axially on the shaft, though with some friction. Temporarily assemble the coupled equipment so that the male segment is moved by the bellows body to the correct axial position on its shaft (figure 1). Remove the drive component and make note of the axial position of the male segment. Slide the male segment toward the end of the shaft by the pretensioning distance (G) and tighten the clamping screw to the torque value specified in the data sheet. Two versions of the blind mate connection are available: single position and multi position (figure 2).

## Conical Clamping Hub Connection: Model MKS



### Installation:

Care must be taken that the clamping screws (E) are evenly tightened in a crosswise pattern multiple times around, and with increasing torque. The final tightening torque values (specified on page 11) must be precisely applied with a torque wrench.

The clamping screws are also secured with thread retainer (e.g. Loctite 243).

The installation space should allow for access to tighten the clamping screws, depending on what type of screw will be used (e.g. ISO 4017 / DIN 915).

### Removal:

Once the clamping screws have been removed they can be inserted into the adjacent removal threads and used to jack the conical ring away from the conical hub.

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## **TORQUE LIMITERS** **Series SK + ST**

From 0.1 – 160,000 Nm, Bore diameters 3 – 290 mm  
Available as a single position, multi-position, load holding, or full disengagement version  
Single piece or press-fit design



## **BELLOWS COUPLINGS** **Series BK + BX**

From 2 – 100,000 Nm  
Bore diameters 3 – 280 mm  
Single piece or press-fit design



## **LINE SHAFTS** **Series ZA + ZAE + EZ2 + EZV**

From 10 – 25,000 Nm  
Bore diameters 5 – 140 mm  
Available up to 6 mtr. length



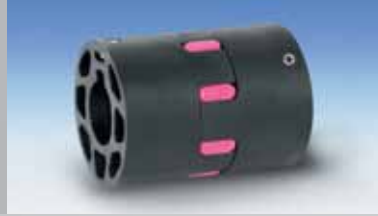
## **MINIATURE BELLOWS COUPLINGS** **Series MK**

From 0.05 – 10 Nm  
Bore diameters 1 – 28 mm  
Single piece or press-fit design



## **SERVOMAX® ELASTOMER COUPLINGS** **Series EK**

From 2 – 25,000 Nm, Shaft diameters 3 – 170 mm  
backlash-free, press-fit design



## **ECOLIGHT® ELASTOMER COUPLINGS** **Series TX 1**

From 2 – 810 Nm  
Shaft diameters 3 – 45 mm



## **LINEAR COUPLINGS** **Series LK**

From 70 – 2,000 N  
Thread M5 – M16



## **POLYAMIDE COUPLINGS** **MICROFLEX** **Series FK 1**

Rated torque 1 Ncm  
Bore diameters 1.5 – 2 mm