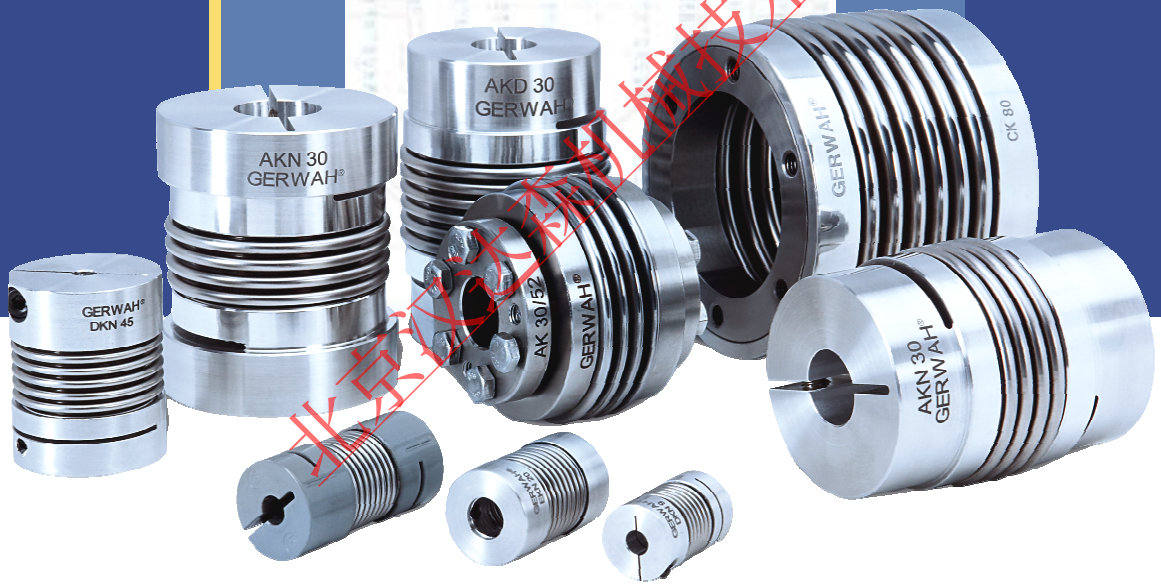
Backlash-free
Metal Bellow Couplings

pioneer in innovation



GERWAH®

Edition 3/2008

GERWAH®
pioneer in innovation

Future made by GERWAH® .

The GERWAH® name is synonymous with development and manufacturing of drive components. Whether automation or machine building: Solutions from GERWAH make visions come true. What counts is your success. This is our commitment since our establishment in 1980.

GERWAH® combines values such as innovation and quality, pioneering spirit and tradition, flexibility and precision. This mixture makes us unique.

Our goals:

We develop innovative products, so you can work even more efficiently. For this purpose we propose individual solutions, customized for your application.

Your advantages:

GERWAH® is known for its know-how and years of experience in design and production of high quality drive components. We are geared towards flexibility when your needs are at stake. We are at your disposal worldwide, through our own subsidiaries as well as a network of distributors.

We are certified according to DIN EN ISO 9001:2000 (Cert.-No. 0063-D)

Our company headquarters in Großwallstadt, Germany

GERWAH

Backlash-free
Metal-Bellow Couplings

Backlash-free metal bellow couplings are used in the area of the machine tool industry, where a torque or a rotary motion has to be transmitted from shaft to shaft in highest accuracy of angle:

- Pumps with axial and vertical drives
- High dynamic portal drives
- Spindle lifting units
- Linear units
- Packaging machines
- Machine tools
- Special machines

Series EKN
Technical data Page 4

Metal bellow coupling with radial set screws

Series DKN
Technical data Page 5

Metal bellow coupling with clamping hubs

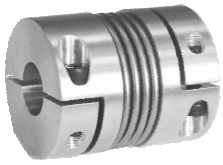
Series DKN/S
Technical data Page 6

Metal bellow coupling with clamping hubs and expanding clamps

Series S-Line
Technical data Page 7

Metal bellow coupling w. pluggable clamping hub

Series AKN
Technical data Page 8



Metal bellow coupling with clamping hubs and shorter length

Series AKD
Technical data Page 9

Metal bellow coupling with clamping hubs

Series AK
Technical data Page 10

Metal bellow coupling with inner conical hub

Series CKN
Technical data Page 11

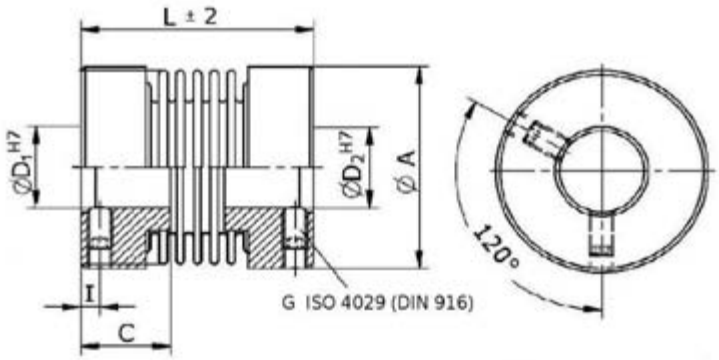
Metal bellow coupling with flange

Characteristics of the metal bellow couplings

- Backlash-free transmission of torque
- High torsional stiffness, precision of transmission of rotational angle
- Different torsional stiffness
- Backlash-free shaft connection
- Metal bellow made of stainless steel
- Simple and operationally safe assembly
- Compensation for radial, axial and angular misalignment
- Free of wear, maintenance-free, no standstilll period
- Not sensitive to temperatures between –30°C and +100°C, higher temperature ranges available on request.
- Economical and friendly due to modular system
- Nominal moments between 0,1—5000 Nm

Backlash-free metal bellow coupling

Series EKN miniature



Technical data

Type		4			9			15		20			45		100	
Nominal torque	(Nm) T_{KN}	0,4			0,9			1,5		2			4,5		10	
Torsional stiffness	(10^3 Nm/rad) $C_{y\,dyn}$	250	190	150	500	380	300	750	700	1500	1300	1000	6500	4000	8100	6700
Max.	(mm) radial ΔK_r	0,1	0,15	0,2	0,1	0,15	0,2	0,1	0,15	0,1	0,2	0,25	0,1	0,2	0,15	0,25
approved	(mm) axial ΔK_a	0,2	0,3	0,4	0,2	0,3	0,4	0,25	0,4	0,3	0,4	0,5	0,3	0,5	0,4	0,5
misalignment	(degree) angular ΔK_w	1,2	2	2	1,2	2	2	1,2	2	1,2	2	2	1,2	2	1,2	2
Moment of inertia	(g cm^2) J	2			2	2,3	2,6	7,5	8	14	16	17	68	73	200	220
Tightening torque of the retaining screws	(Nm) M_A	0,5			0,5			1,5		1,5			3		3	
Weight	(g) m	6			6	7	8	17	19	22	24	26	54	58	104	114
Max. rotating speed at V = 30 m/s	(min^{-1}) n_{max}	15000			15000			15000		15000			15000		15000	

Dimensions

Type		4			9			15		20			45		100	
L	(mm) +/-1	20	23	26	21	25	28	25	30	26	32	36	39	48	44	54
Ø A	(mm)	16			16			20		25			33		40	
Ø D1 / D2	min. (mm H7)	3			3			3		3			6		6	
	max. (mm H7)	8			8			10		12			16		19	
C	(mm)	6			6			10		11			16		20	
G	(ISO 4029/DIN 912) 8.8	M3			M3			2xM4		2xM3			2xM6		2xM6	
I	(mm)	2			2			3		2			4		4	

Moment of inertia and weight (mass) are calculated with reference to the largest bore size.
Technical specifications subject to change without notice.

Hub bores: Standard quality of fitting H7
Standard quality of keyway JS9

Standard bores:

EKN 4-15	Ø 6H7
EKN 20	Ø 6H7 and 10H7
EKN 45-100	Ø 10H7

Materials: Hubs made of aluminium
Metal bellow made of stainless steel

Customized version: Stainless steel version on request
Keyway acc. to DIN 6885

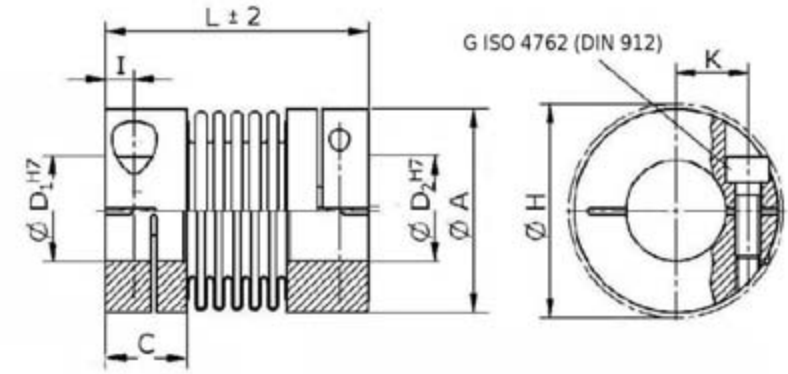
Ordering data:

EKN 20/26 - 6,35H7 - 10H7 - XX

Type
Length (L)
Ø D1
Ø D2
Further details
e.g. keyway, material

Backlash-free metal bellow coupling

Series DKN miniature



Technical data

Type			4			9			15		20			45		100	
Nominal torque	(Nm)	T_{KN}	0,4			0,9			1,5		2			4,5		10	
Torsional stiffness	(10^3 Nm/rad)	$C_{y\,dyn}$	250	190	150	500	380	300	750	700	1500	1300	1000	6500	4000	8100	6700
Max.	(mm)	radial ΔK_r	0,1	0,15	0,2	0,1	0,15	0,2	0,1	0,15	0,1	0,2	0,25	0,1	0,2	0,15	0,25
approved	(mm)	axial ΔK_a	0,2	0,3	0,4	0,2	0,3	0,4	0,25	0,4	0,3	0,4	0,5	0,3	0,5	0,4	0,5
misalignment	(degree)	angular ΔK_w	1,2	2	2	1,2	2	2	1,2	2	1,2	2	2	1,2	2	1,2	2
Moment of inertia	(g cm^2)	J	2,6			2,6	2,9	3,2	11	12	25	27	28	98	103	231	250
Tightening torque of the retaining screws	(Nm)	M_A	0,3			0,3			0,8		1			3		3	
Weight	(g)	m	9			9	10	11	22	24	36	38	40	74	78	120	130
Max. rotating speed at V = 30 m/s	(min^{-1})	n_{max}	15000			15000			15000		15000			15000		15000	

Dimensions

Type		4			9			15		20			45		100	
L	(mm) +/-1	21	24	28	23	26	30	26	30	32	38	42	41	50	47	57
Ø A	(mm)	16			16			20		25			33		40	
Ø H	(mm) max.	18			18			21		27			34		42	
Ø D1 / D2	min. (mm H7)	3			3			3		3			6		6	
	max. (mm H7)	7			7			10		12			16		19	
C	(mm)	7			7			9		11			13		14	
G	(ISO 4762/DIN 912) 8.8	M2			M2			M2,5		M3			M4		M4	
K	(mm)	5			5			7		9			12		16	
I	(mm)	2			2			3		4			5		5	

Moment of inertia and weight (mass) are calculated with reference to the largest bore size.
Technical specifications subject to change without notice.

Hub bores: Standard quality of fitting H7
Standard quality of keyway JS9

Standard bores:

DKN 4-15	Ø 6H7
DKN 20	Ø 6H7 and 10H7
DKN 45-100	Ø 10H7

Materials: Hubs made of aluminium
Metal bellow made of stainless steel

Customized version: Stainless steel version on request
Keyway acc. to DIN 6885

Ordering data:

DKN 20/42 - 6,35H7 - 10H7 - XX

Type
Length (L)
Ø D1
Ø D2
Further details
e.g. keyway, material

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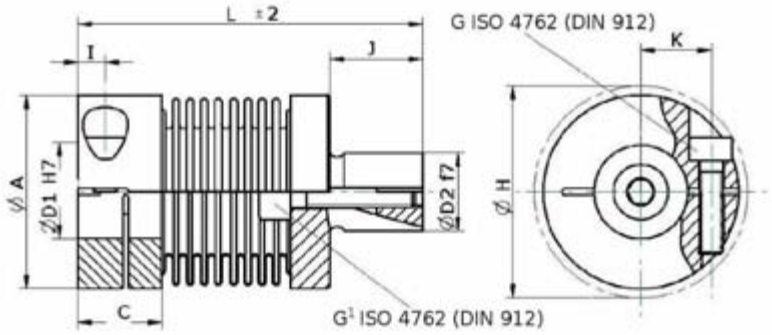
Backlash-free metal bellow coupling

Series DKN/S



Technical data

Type			4			9			15		20			45		100	
Nominal torque	(Nm)	T_{KN}	0,4			0,9			1,5		2			4,5		10	
Torsional stiffness	(10^3 Nm/rad)	$C_{y\,dyn}$	250	190	150	500	380	300	750	700	1500	1300	1000	6500	4000	8100	6700
Max.	(mm)	radial ΔK_r	0,1	0,15	0,2	0,1	0,15	0,2	0,1	0,15	0,1	0,2	0,25	0,1	0,2	0,15	0,25
approved	(mm)	axial ΔK_a	0,2	0,3	0,4	0,2	0,3	0,4	0,25	0,4	0,3	0,4	0,5	0,3	0,5	0,4	0,5
misalignment	(degree)	angular ΔK_w	1,2	2	2	1,2	2	2	1,2	2	1,2	2	2	1,2	2	1,2	2
Moment of inertia	($g\,cm^2$)	J	3			3			11	12	21	23	25	80	86	229	256
Tightening torque of the retaining screws	(Nm)	M_A	0,3			0,3			0,8		1			3		3	
Weight	(g)	m	11			12	13	13	24	25	38	41	42	83	89	130	147
Max. rotating speed at V = 30 m/s	(min^{-1})	n_{max}	15000			15000			15000		15000			15000		15000	

Dimensions

Type		4			9			15		20			45		100	
L	(mm) +/-1	29	31	35	30	33	37	37	41	41	47	51	52	61	61	71
J	(mm)	8			8			12		12			16		20	
Ø A	(mm)	16			16			20		25			33		40	
Ø H	(mm) max.	18			18			21		27			34		42	
Ø D1 hub:	min.-max. (mm H7)	3-7			3-7			3-10		3-12			6-16		6-19	
Ø D2 clamp:	(mm f7)	8			8			10		10			14		16	
C	(mm)	7			7			9		11			13		14	
G	(ISO 4762/DIN 912) 8.8	M2			M2			M2,5		M3			M4		M4	
G1	(ISO 4762/DIN 912) 8.8	M3			M3			M4		M4			M5		M6	
K	(mm)	5			5			7		9			12		16	
I	(mm)	2			2			3		4			5		5	

Moment of inertia and weight (mass) are calculated with reference to the largest bore size.
Technical specifications subject to change without notice.

Hub bores: Standard quality of fitting H7

Clamp fitting: Standard quality of fitting f7

Standard quality of keyway JS9

Standard bores:

DKN/S 4-15	Ø 6H7
DKN/S 20	Ø 6H7 and 10H7
DKN/S 45-100	Ø 10H7

Materials: Hubs made of aluminium
Metal bellow made of stainless steel

Customized version: Stainless steel version on request
Keyway acc. to DIN 6885

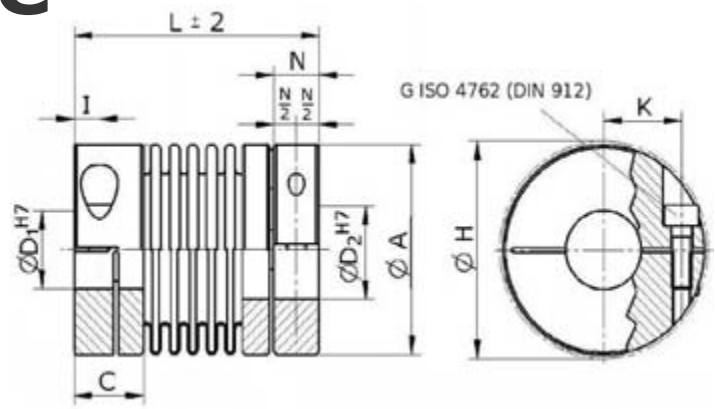
Ordering data:

DKN/S 20/41 - 10H7 - XX

Type
Length (L)
Ø D1
Further details
e.g. keyway, material

Backlash-free metal bellow coupling

Series S-Line



Technical data

Type		2	4,5	10	18	30	60	80	150
Nominal torque	(Nm) T_{KN}	2	4,5	10	18	30	60	80	150
Torsional stiffness	(10^3 Nm/rad) C_{dyn}	0,97	4,8	6	6	26	56	97	112
Misalignment	(mm) radial ΔK_r	0,2	0,1	0,15	0,2	0,1	0,1	0,2	0,2
	(mm) axial ΔK_a	0,4	0,3	0,4	0,5	0,4	0,4	0,4	0,4
	(degree) angular ΔK_w	1,2	1,2	1,2	1,5	1	1	1	1
Moment of inertia	(10^{-3} Kgm^2) J	0,02	0,03	0,04	0,054	0,123	0,325	0,884	0,884
Tightening torque of the retaining screws	(Nm) M_A	1	3	3	6	12	30	60	85
Weight	(ca kg) m	0,05	0,08	0,1	0,17	0,28	0,52	1	1
Max. rotating speed at V = 30 m/s	(min^{-1}) n_{max}	22900	17600	14100	12700	10200	8600	6800	6800

Dimensions

Type		2	4,5	10	18	30	60	80	150
L	(mm) +/-2	34	44	49	63	64	78	90	90
Ø A	(mm)	25	33	40	45	55	66	80	80
Ø H	(mm) max.	28	35	42	48	56	67	85	85
Ø D1 1)	(mm H7 min.-max.)	3-12	6-16	6-19	10-25	10-25	14-35	20-40	20-40
Ø D2 (pluggable side) 1)	(mm H7 min.-max.)	3-9	6-16	6-19	10-19	10-22	14-25	20-38	20-38
C	(mm)	11	13	14	20	25	29	34	34
N	(mm)	9	9	9	11	15	20	22	22
K	(mm)	9	12	16	18	20	24	28	28
I	(mm)	4	5	5	6	8	10	12	12
G	(ISO 4762/DIN 912) 8.8	M3	M4	M4	M5	M6	M8	M10	M10

Moment of inertia and weight (mass) are calculated with reference to the largest bore size.
Technical specifications subject to change without notice.
1) Stretched length

Hub bores: Standard quality of fitting H7
Keyway fitting: Standard quality of fitting JS9

Materials: Hubs made of aluminium
Metal bellow made of stainless steel

Customized version: Stainless steel version on request
Keyway acc. to DIN 6885

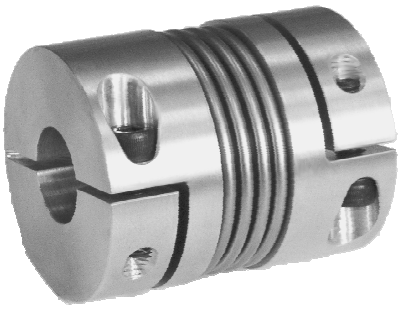
Ordering data:

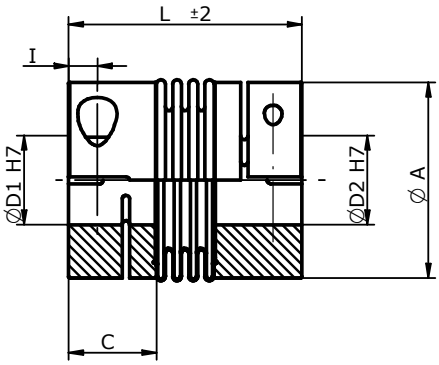
S-Line 150 - 30H7 - 35H7 - XX

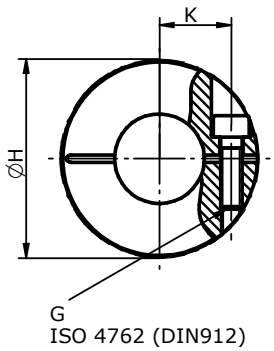
Type
Ø D1
Ø D2
Further details
e.g. keyway, material

Backlash-free metal bellow coupling

Series AKN







ISO 4762 (DIN912)

Technical data

Type		18	30	60	80	150	200	300	500
Nominal torque	(Nm) T_{KN}	18	30	60	80	150	200	300	500
Torsional stiffness	(10^3 Nm/rad) $C_{y\,dyn}$	8	35	75	130	150	170	500	680
Radial spring stiffness	(N/mm) C_r	200	720	1100	1200	2000	2500	6300	8800
Axial spring stiffness	(N/mm) C_a	50	50	90	80	150	150	280	100
Max. approved misalignment	(mm) radial ΔK_r	0,2	0,1	0,1	0,2	0,2	0,2	0,2	0,2
	(mm) axial ΔK_a	0,5	0,4	0,4	0,4	0,4	0,4	0,4	0,5
	(degree) angular ΔK_w	1,5	1	1	1	1	1	1	1
Moment of inertia	(10^{-3} Kgm^2) J	0,05	0,11	0,29	0,87	0,87	1,44	3	4,7
Tightening torque of the retaining screws	(Nm) M_A	6	12	30	60	85	100	120	190
Weight	(kg) m	0,16	0,26	0,44	0,98	0,98	1,16	1,35	1,71
Max. rotating speed at V=30 m/s	(min^{-1}) n_{max}	12700	10200	8600	6800	6800	6300	5900	4900

Dimensions

Typ		18	30	60	80	150	200	300	500
L	(mm) +/-2	63	65	78	91	91	100	104	111
Ø A	(mm)	45	55	64	80	80	90	109	119
Ø H	(mm) max.	47	56	67	84	84	93	110	122
Ø D1 / D2	min. (mm H7)	10	10	14	20	20	25	32	40
	max. (mm H7)	25	25	32	40	40	44	50	60
C	(mm)	20	25	29	34	34	38	38	41
G	(ISO 3762/DIN 912) 8.8	M5	M6	M8	M10	M10	M12	M12	M14
K	(mm)	18	20	24	28	28	31	39	43
I	(mm)	6	8	10	12	12	13	13	15

Moment of inertia and weight (mass) are calculated with reference to the largest bore size.
Technical specifications subject to change without notice.

Hub bores: Standard quality of fitting H7
Standard quality of keyway JS9

Materials: Hubs made of aluminium
Metal bellow made of stainless steel

Customized version: Stainless steel version on request
Keyway acc. to DIN 6885

Ordering data:

AKN 150 - 30H7 - 35H7 - XX

Type
Ø D1
Ø D2
Further details
e.g. keyway, material

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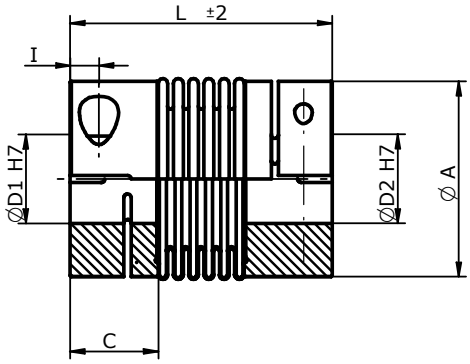
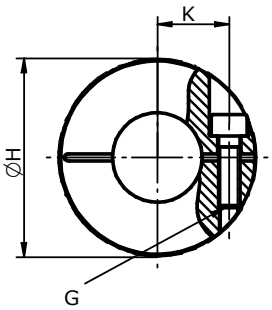
Backlash-free metal bellow coupling

Series AKD





ISO 4762 (DIN912)

Technical data

Type		18	30	60	80	150	200	300	500
Nominal torque	(Nm) T_{KN}	18	30	60	80	150	200	300	500
Torsional stiffness	(10^3 Nm/rad) $C_{y\ dyn}$	6	25	50	75	100	120	280	310
Radial spring stiffness	(N/mm) Cr	85	220	330	400	600	450	1500	1000
Axial spring stiffness	(N/mm) Ca	40	30	55	55	85	85	150	85
Max. approved misalignment	(mm) radial ΔK_r	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2
	(mm) axial ΔK_a	0,5	0,5	0,5	0,5	0,5	0,5	0,5	1
	(degree) angular ΔK_w	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5
Moment of inertia	(10^{-3} Kgm^2) J	0,06	0,1	0,3	0,9	0,9	1,5	3,2	4,9
Tightening torque of the retaining screws	(Nm) M_A	6	12	30	60	85	100	120	190
Weight	(ca kg) m	0,17	0,27	0,47	1	1	1,2	1,4	1,8
Max. rotating speed at V = 30 m/s	(min^{-1}) n_{max}	12700	10200	8600	6800	6800	6300	5900	4900

Dimensions

Type		18	30	60	80	150	200	300	500
L	(mm) +/-2	71	73	89	103	103	113	115	122
Ø A	(mm)	45	55	64	80	80	90	109	119
Ø H	(mm) max.	47	56	67	84	84	93	110	122
Ø D1 / D2	min. (mm H7)	10	10	14	20	20	25	32	40
	max. (mm H7)	25	25	32	40	40	44	50	60
C	(mm)	20	25	29	34	34	38	38	41
G	(ISO 4762/DIN 912) 8.8	M5	M6	M8	M10	M10	M12	M12	M14
K	(mm)	18	20	24	28	28	31	39	43
I	(mm)	6	8	10	12	12	13	13	15

Moment of inertia and weight (mass) are calculated with reference to the largest bore size.
Technical specifications subject to change without notice.

Hub bores: Standard quality of fitting H7
Standard quality of keyway JS9

Materials: Hubs made of aluminium
Metal bellow made of stainless steel

Customized version: Stainless steel version on request
Keyway acc. to DIN 6885

Ordering data:

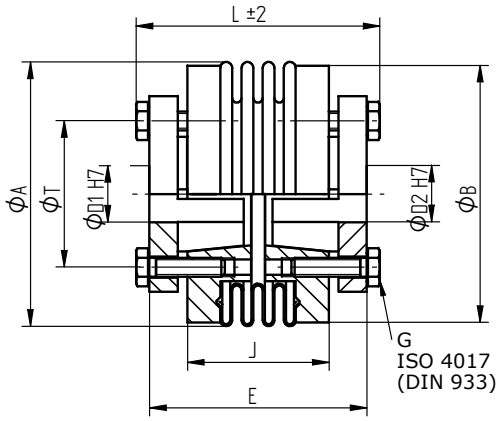
AKD 150 - 30H7 - 35H7 - XX

Type
Length (L)
Ø D1
Ø D2
Further details
e.g. Keyway, material

GERWAH

Backlash-free metal bellow coupling

Series AK



Technical data

Type		30		60		80		150		200		300		500		800	1400	3000	5000
Nominal torque	(Nm) T_{KN}	30		60		80		150		200		300		500		800	1400	3000	5000
Torsional stiffness	(10^3 Nm/rad) $C_{y\,dyn}$	35	25	75	50	130	75	150	100	170	120	500	280	680	310	760	1300	2800	4800
Radial spring stiffness	(N/mm) C_r	720	220	1100	330	1200	400	2000	600	2500	450	6300	1500	8800	1000	510	710	2950	4920
Axial spring stiffness	(N/mm) C_a	50	30	90	55	80	55	150	85	150	85	280	150	100	85	190	280	310	510
Max. approved misalignment	(mm) radial ΔK_r	0,1	0,2	0,1	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2
	(mm) axial ΔK_a	0,4	0,5	0,4	0,5	0,4	0,5	0,4	0,5	0,4	0,5	0,4	0,5	0,5	1	1,0	1,0	1,0	1,0
	(degree) angular ΔK_w	1	1,5	1	1,5	1	1,5	1	1,5	1	1,5	1	1,5	1	1,5	1,5	1,5	1,5	1,5
Moment of inertia	(10^{-3} Kgm^2) J	0,15		0,24		0,65		0,65		0,87		2,33		3,61		26,1	26,1	48	62
Tightening torque of the retaining screws	(Nm) M_A	3		8,5		10		14		14		18		26		45	80	85	210
Weight	(ca. kg) m	0,4		0,8		1,3		1,3		1,6		3,4		4,7		8,5	8,5	15	21
Max. rotating speed at V=30 m/s	(min^{-1}) n_{max}	11000		9100		7000		7000		6700		5200		4600		3700	3700	2800	2800

Dimensions

Type		30		60		80		150		200		300		500		800	1400	3000	5000
L[1]	(mm) +/-2	52	60	63	73	80	91	80	92	80	93	91	104	102	113	170	170	206	206
E	(mm)	45	53	55	65	72	83	72	84	72	85	80	93	94	105	150	150	190	186
J	(mm)	30	38	35	46	49	61	49	61	50	63	56	67	64	72	110	110	150	146
Ø A	(mm)	56		66		82		82		90		110		122		152	152	152	190
Ø B	(mm)	55		64		80		80		90		109		120		157	157	157	208
Ø D1/D2	min. (mm H7)	12		15		20		20		20		25		35		50	50	70	60
	max. (mm H7)	20		25		35		35		40		50		55		70[2]	70[2]	80[2]	85[2]
Ø T	(mm)	31	31	37	37	51	51	51	51	51	56	62	75	80	80	92	100	92	100	100	100	125
G	(ISO 4017/DIN 933) 10.9	6xM4		6xM6		6xM6		6xM6		6xM6		6xM8		6xM8		6xM16	6xM16	6xM12	6xM12

Moment of inertia and weight (mass) are calculated with reference to the largest bore size.
Technical specifications subject to change without notice.
1) Keep space for the releasing screws
2) Larger bores on request

Hub bores: Standard quality of fitting H7

Materials:
Hubs made of aluminium (Type 30-500)
Hubs made of steel (Type 800 - 5000)
Metal bellow made of stainless steel
Stainless steel version also available

Ordering data:

AK 150/80 - 30H7 - 35H7 - XX

Type
Length (L)
Ø D1
Ø D2
Further details
e.g. keyway, material

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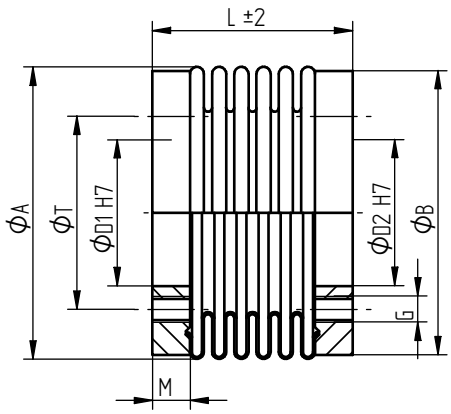
Backlash-free metal bellow coupling

Series CKN



Technical data

Type		18		30		60		80		150		200		300		500	800	1400	3000	5000
Nominal torque	(Nm) T_{KN}	18		30		60		80		150		200		300		500	800	1400	3000	5000
Torsional stiffness	(10^3 Nm/rad) $C_{y\,dyn}$	8	6	35	25	75	50	130	75	150	100	170	120	500	280	310	760	1300	2800	4800
Radial spring stiffness	(N/mm) C_r	200	85	720	220	1100	330	1200	400	2000	600	2500	450	6300	1500	1000	510	710	2950	4920
Axial spring stiffness	(N/mm) C_a	50	40	50	30	90	55	80	55	150	85	150	85	280	150	85	190	280	310	510
Max. approved misalignment	(mm) radial ΔK_r	0,2		0,1	0,2	0,1	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2
	(mm) axial ΔK_a	0,5		0,4	0,5	0,4	0,5	0,4	0,5	0,4	0,5	0,4	0,5	0,4	0,5	1	1	1	1	1
	(degree) angular ΔK_w	1,5		1	1,5	1	1,5	1	1,5	1	1,5	1	1,5	1	1,5	1,5	1,5	1,5	1,5	1,5
Moment of inertia	(10^{-3} Kgm^2) J	0,05		0,09		0,16		0,43		0,43		0,8		1,7		2,3	11	11	11	35
Weight	(ca kg) m	0,13		0,16		0,26		0,44		0,44		0,6		0,75		0,86	3,5	3,5	3,5	7,5
Max. rotating speed at V = 30 m/s	(min^{-1}) n_{max}	13900		11000		9000		7100		7100		6600		5200		4600	3700	3700	3700	3000

Dimensions

Type		18		30		60		80		150		200		300		500	800	1400	3000	5000
L	(mm) +/-2	36	44	30	38	42	52	51	61	51	61	51	63	55	66	72	130	130	135	145
Ø A	(mm)	46		56		66		82		82		90		110		122	157	157	157	208
Ø B	(mm)	45		55		65		80		80		90		109		119	152	152	152	208
Ø D1/D2 [1]	(mm H7)	22		28		38		50		50		50		65		70	85	85	85	100
Ø T	(mm)	31		37		46		62		62		62		80		94	110	110	110	130
M (Gewindetiefe)	(mm)	6		7		10		13		13		13		13		16	18	18	22	25
G		6xM5		6xM5		6xM6		6xM6		6xM6		6xM6		6xM8		6xM8	6xM16	6xM16	6xM16	6xM16

Moment of inertia and weight (mass) are calculated with reference to the largest bore size.
Technical specifications subject to change without notice.
1) Custom bores on request

Hub bores: Standard quality of fitting H7

Materials:
Hubs made of aluminium (Type 18 - 500)
Hubs made of aluminium (Type 800 - 5000)
Metal bellow made of stainless steel
Stainless steel version on request

Ordering data:

CKN 150/52 - 50H7 - 50H7 - XX

Type
Length (L)
Ø D1
Ø D2
Further details
e.g. keyway, material

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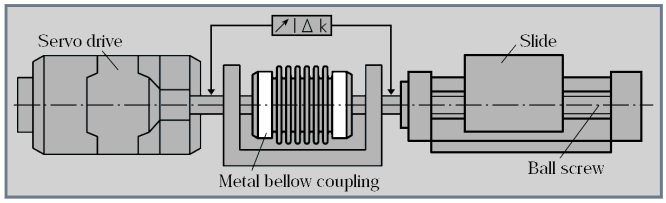
Design
Sample Calculation

Design/Product information
Backlash-free, torsionally stiff metal bellow couplings are ready to install when delivered. The metal bellows are made of stainless steel, all other parts are made of aluminium or steel and partly have environmental friendly protective coating.



As a standard, the boreholes are equipped with a fitting in accordance with ISO-H7. For the shafts, we recommend a transition, e.g. H7/g6. When selecting other shaft fitting, the fitting should not exceed a maximum of 0,01-0,05 mm.

The power transmission between the coupling hub and the shaft occurs through compression and friction between the contact surfaces. Special attention must be paid to the tightening torque of the retaining screws as well as the perfect condition surfaces. The contact surfaces must be free of oil and grease when having a depth of roughness of R_{tmax}. 16µ for the shaft. Versions with keyway are available.

The torques indicated can only be safely transferred if these points are complied with. Otherwise compromises must be accepted.

Dimensioning in accordance with the torque:
Metal bellow couplings are generally designed according to the nominal torque stated in the list of technical data below as T_{KN}. The nominal torque must always be higher than the regular transferred torque. This generally applies to the use of servo motors, whose acceleration moment in positive and negative directions is much higher than the nominal moment. For the use of metal bellow couplings which are put in controlled, high dynamic drives, the following dimensioning values have proven to be reliable in practice:

$$T_{KN} \geq K \times T_{AS} \times \frac{J_{Masch}}{J_{Mot} + J_{Masch}} = [Nm]$$

K = 1,5 for evenly shaped movements
K = 2 for unevenly shaped movements
K = 2,5 – 4 for jerky movements
For servo drives within tool making machines, the values for K = 1,5 – 2 should be used.

Design with consideration for dynamic torsional stiffness
Although metal bellow couplings are backlash-free and torsion-rigid, it should not be overlooked that they link two rotating masses. In disadvantageous cases the couplings can effect like torsion springs with high stiffness. The hunting of the drives and the harmonic oscillation in the armature current of the motor must therefore never be within the range of the mechanical resonance frequency. In practice the resonance frequency „fres" must be twice as large as the excitation frequency of the drive. The dynamic torsional stiffness C_{Tdyn} was selected so that it would not be within the range of clearance diameter from most applications. Various levels of torsional stiffness are available as standard versions. We would be pleased to design your metal bellow couplings for you. Feel free to use our experience and know-how for your success. **Speak to us!**

$$f_{res} = \frac{1}{2\pi} \sqrt{C_{Tdyn} \times \frac{J_{Mot} + J_{Masch}}{J_{Mot} \times J_{Masch}}} = [Hz]$$

Calculation for the application of a metal bellow coupling in a machine tool drive

Drive related data for servo motor / FT 5104 — Maximum torque TAS = 160 Nm,
Moment of inertia $J_{Mot} = 18{,}3 \times 10^{-3}$ kgm²

Output data for machine tool: — Moment of inertia of ball screw and slide:
$J_{Masch} = 17 \times 10^{-3}$ kgm²

The low moment of inertia for the metal bellow coupling is disregarded. K=Load factor, impulse factor selected for this drive K = 2 ;

Design according to torque:

$$T_{KN} \geq K \times T_{AS} \times \frac{J_{Masch}}{J_{Mot} + J_{Masch}} = 2 \times 160\ Nm \times \frac{17 \times 10^{-3}\ Kgm^2}{(18{,}3 + 17) \times 10^{-3}\ Kgm^2} = 154\ Nm$$

Coupling selection: AKD 200, T_{KN} = 200 Nm, C_{Tdyn} = 116 x 10^3 Nm/rad
The metal bellow coupling is sufficient dimensioned, since 200 Nm³ >=154 Nm

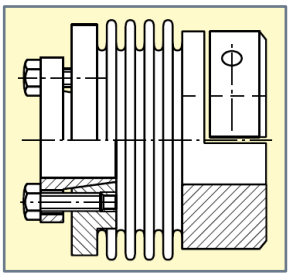
Design according the resonance frequency:

$$f_{res} = \frac{1}{2\pi} \sqrt{C_{Tdyn} \times \frac{J_{Mot} + J_{Masch}}{J_{Mot} \times J_{Masch}}} = \frac{1}{2\pi} \times \sqrt{116000\ Nm/rad \times \frac{0{,}0183 + 0{,}017\ Kgm^2}{0{,}0183 \times 0{,}017\ Kgm^2}} = 578\ Hz$$

The arithmetic calculation is clearly much higher than the expected resonance frequency

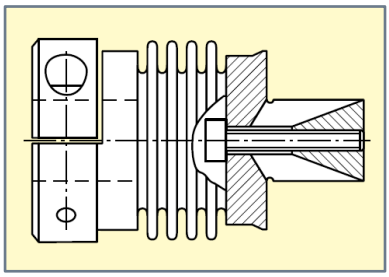
Type Series Versions and Installation Examples

Series AK/AKD



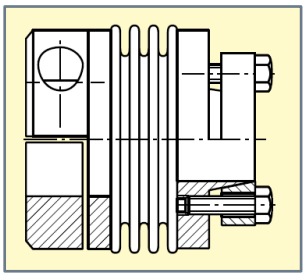
Model with clamping hub and inner conical hub

Series AKN/S



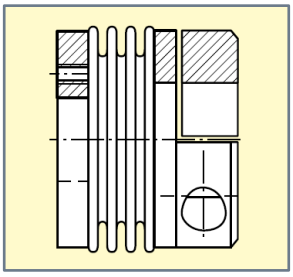
Model with clamping hub and expanding clamps

Series AKD und AK/SB



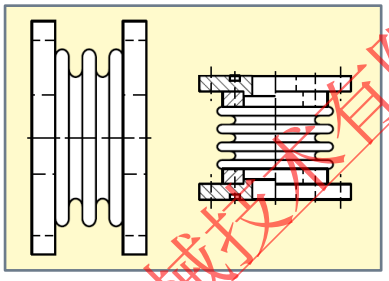
Model with clamping hub and outer conical hub

Series AKD/CKN



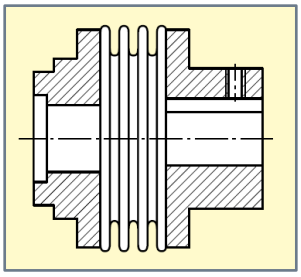
Model with clamping hub and flange

Series CKN-XX



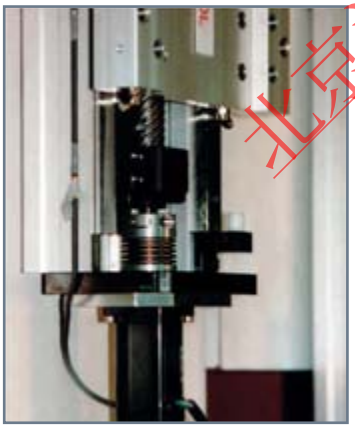
Model with special flange

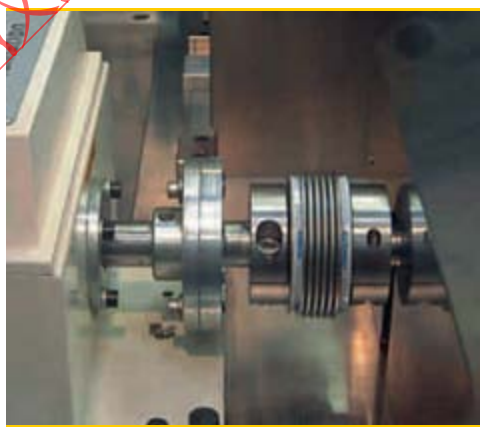
Series AKN-XX



Version with special hub on both sides

Sample applications:





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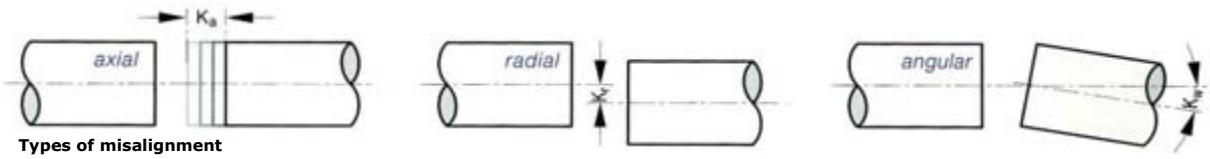
Metal Bellow Couplings
Mounting Instruction



Types of misalignment

Assembly
Clean shaft ends and bores in hubs, degrease and check the tolerances.
Insert both shaft trunks into the hubs of the metal bellow coupling, and firmly tighten the screws, after examining the axial installation dimensions.
The tightening torque of the screws and the maximum approved misalignment sould not be exceeded (refer the list of technical data).

Removal
After loosening the backlash-free shaft hub connections, the drive can be pulled apart and the metall-bellow coupling can be removed. Conical bushings for series AK are forced off with a hexagonal socket screw.

Alignment
If several types of misalignment appear simultaneously, then each of the individual values should not exceed 100 %. The diagram below shows how to regulate.
The more precise the alignment, the more reserves are available to handle additional misalignments for operation. This will have an advantegeous effect on the service life, balance quality, and the accuracy of transmission.
If several types of misalignment occur at once, then the value must be lower than each of the maximum values.

Please ask for our detailed assembly instructions.

Design example

Application:
A bellow coupling CKN 80/61 has to be installed. The following misalignment values result from the installation situation:

ΔK_r = 0,1 mm
ΔK_a = 0,1 mm
ΔK_w = 0,2°

Are the misalignment values for the CKN 80/61 acceptable?

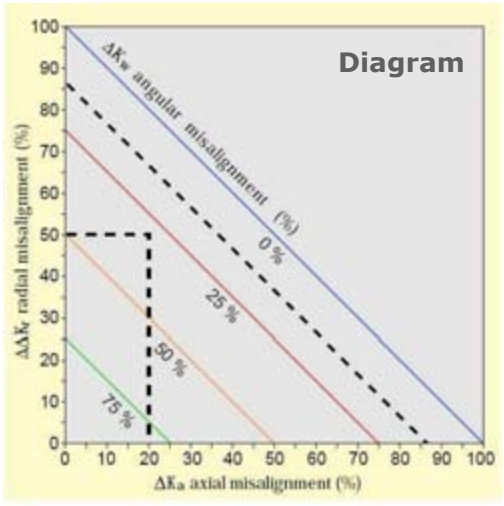
Selection:
The tolerable misalignment values are: (cp. Datasheet Series CKN):

ΔK_{rn} = 0,2 mm
ΔK_{an} = 0,5 mm
ΔK_{wn} = 1,5°

The reacched radial misalignment ΔK_r = 0,1 mm corresponds to 50% of the max. tolerable value. The value ΔK_a = 0,1 mm corresponds to 20% of the max. tolerable axial misalignment. The angular misalignment with ΔK_w = 0,2° correspond to 13% of the overall view.

Interpretation by means of the diagram:
Enter the calculated values in the diagram on the right side (dashed line). The combination of the different misalignment values is the tolerable area.

Interpretation by means of the empirical formula:
50% + 20% + 13% < 100%.
The coupling can be installed.



Empirical formula :

$$\frac{\Delta K_r}{\Delta K_{rn}} \times 100\% + \frac{\Delta K_a}{\Delta K_{an}} \times 100\% + \frac{\Delta K_w}{\Delta K_{wn}} \times 100\% < 100\%$$

Checklist for
Your Couplings Inquiry

For your convenience just copy, fill out and fax back to us!

Please ask for personalized technical assistance!	
company	name
street	dpt.
ZIP/town	eMail
phone	fax

1. Application: How is the coupling supposed to be used? (machine, machine group or system)							
2. Type of connection	☐ clamp ring hub	☐ shrink disc hub	☐ locking assembly hub	☐ hub with set screw			
	☐ flange connection	☐ outer cone	☐ Fanuc	☐ spec. customer drawing			
3. Dimensions	Length	mm	bore size D1	mm	keyway	☐ yes	☐ no
	Diameter	mm	bore size D2	mm	keyway	☐ yes	☐ no
4. Misalignment of shafts	axial	mm	radial	mm	angular	°	
5. Drive	5.1 Drive output		P_{AN} =	kW			
	5.2 Drive speed		n =	1/min			
	5.3 Nominal torque of drive		Mt_{nenn} =	Nm			
	5.4 Peak torque of drive		Mt_{max} =	Nm			
	5.5 Shaft diameter		drive side =	mm			
			driven side =	mm			
6. Mass moment of inertia	6.1 drive side		J_A =	Nm			
	6.2 driven side		J_L =	Nm			
7. Special influences	7.1 Ambient temperature surrounding the coupling?			T =	°C		
	7.2 Are there any shock loads?	☐ light	☐ medium	☐ heavy			
	7.3 Special materials (e.g. stainless steel)						
	7.4 Special circumstances						
8. Planned quantities	☐ production	☐ prototype	☐ repair	yearly	quantity		
9. Target price	/piece						

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- **Complete catalogue information**
- **3D-CAD-product drawings**
- **Calculation software**
- **Product– and company news**
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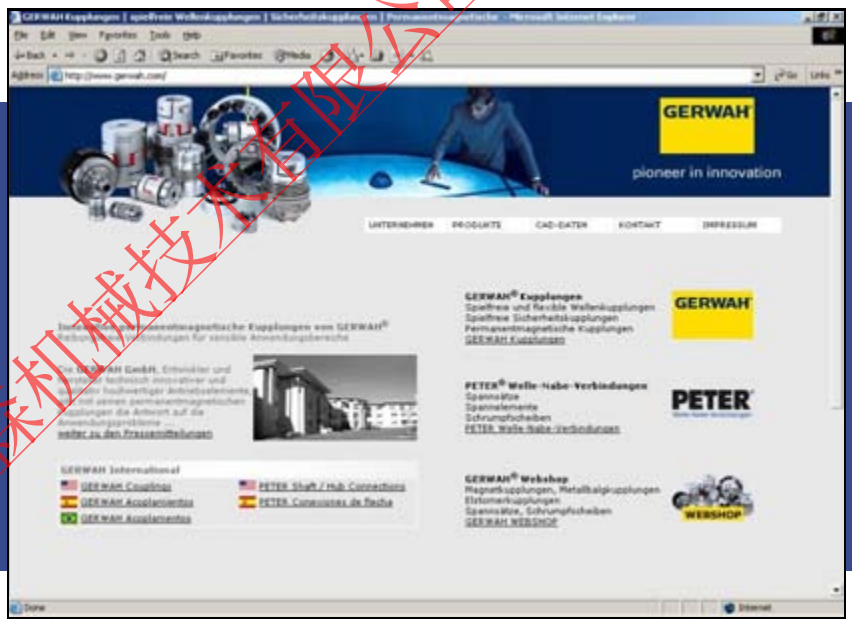

GERWAH GmbH
Lützeltaler Straße 5a
63868 Großwallstadt
Germany

phone: +49 (0)6022 2204-0
fax: +49 (0)6022 2204-11
eMail: info@gerwah.com

DIN EN ISO 9001:2000-certified

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