



WITTENSTEIN

alpha

Accessories Product Catalog

Precise
Universal
Reliable



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Dear Business Associates,

While we are extremely passionate about technology and innovation, the success of our customers is our top priority. We have designed our products and services to help you achieve competitive advantages –by consistently offering high quality products, permanent availability, and the best service worldwide. Our range of accessories is continuously expanding, and as a result we have restructured our accessories portfolio to make it even easier to find the right product for each specific application .

Our accessories allow you to quickly find an ideal solution for your drive axes. All from a single source, specifically adapted to your axes. Organized by application examples, this catalog offers you quick access to the respective gearbox or actuator accessory options. Our range of products and solutions will continue to grow in the future because we never stop developing new ideas to make your work easier.

Take our word for it!

Norbert Pastoors
Managing Director WITTENSTEIN alpha GmbH



WITTENSTEIN on all axes

Our high standards not only apply to gearboxes, linear systems and actuators, but also to everything surrounding the core product. The WITTENSTEIN alpha accessories ensure we offer the most comprehensive portfolio for our customers. Our accessory products complement our gearboxes and actuators, offering you a broader range of design flexibility. You can save valuable time in the selection of the suitable accessories and for additional order processes since we will provide you with the entire drive solution from one source – in a precise, universal, and reliable manner.

Accessories

**Efficient addition to
your drive solution**



Couplings

The couplings are perfectly adapted to our gearboxes – both in terms of geometry as well as in terms of performance. They can be used in a variety of sectors of drive technology, and contribute to the efficiency and process security of the entire drive train.



Sealing plate

Sealing plates are used in areas in which dust, dirt and humidity cannot be avoided. They prevent the ingress of such substances in between the motor and the gearbox and thus increase the service life of the two components.

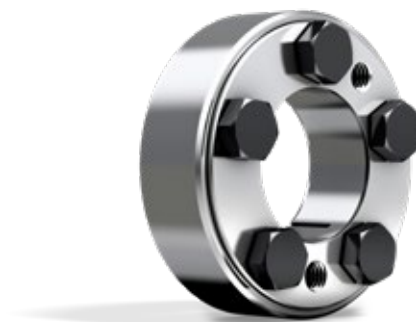


TEIN alpha
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Accessories



Shrink discs

Shrink discs are frictional hub-shaft connections.

Thanks to the compact design, machines can be designed to optimize installation space.

Used with our hollow shaft and/or slip-on shaft gearboxes, the shrink discs are suitable for the direct assembly on load shafts. The connections are designed without circumferential backlash and in a frictionally engaged manner.

Product Accessories

alpha Basic Line

The basic class of the servo drive products for precision requirements of 10-20 arcmin. High-quality servo gearboxes with rapid availability, at very attractive prices – best performance in class.



alpha Value Line

The economic solution with medium requirements on service axes and linear systems. Individually configurable products in the precision range of 6-10 arcmin offer the broadest range of drive interfaces and thus utmost flexibility in this segment.



alpha Advanced Line

Servo gearboxes, servo actuators and linear systems in the alpha Advanced Line offer solutions for applications with the highest precision requirements of 1-5 arcmin. The alpha Advanced Line delivers torsional rigidity and smooth running performance. Each series is optimized for high-precision at the highest speeds in continuous and dynamic cycle operation.



alpha Premium Line

The absolute premium class of servo gearboxes, servo actuators and linear systems, these products deliver superior performance in smooth running, feed force and positioning accuracy at a maximum power density. The alpha Premium Line offers precision range of <1 arcmin, an industry benchmark, as well design principles that offer compactness, modularity, long life expectancy and easy assembly.





alpha Basic

PRODUCTS	COUPLING	SHRINK DISC
Basic Line		
CP / CPK	ELC	
CPS / CPSK	ELC	
CVH		SD
CVS	ELC	

alpha Value

Value Line		
NP / NPK	ELC	
NPL / NPLK	ELC	
NPS / NPSK	ELC	
NPT / NPTK / NTP	ELT	
NPR / NPRK	ELC	
NVH		SD
NVS	ELC	

alpha Advanced

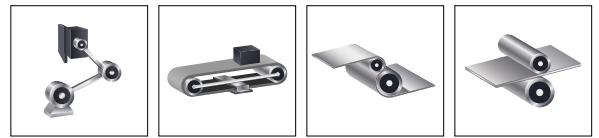
Advanced Line		
SP ⁺ / SPK ⁺ / SPC ⁺	BC2	SD
TP ⁺ / TPK ⁺ / TPC ⁺	BCT	
TP ⁺ / TPK ⁺ HIGH TORQUE	BCT	
HG ⁺		SD
SK ⁺	BC2	
TK ⁺	BCT	SD
SC ⁺	BC2	
VH ⁺		SD
VS ⁺	BC3	
VT ⁺	BCT	
premo [®] SP Line	BC2	
premo [®] TP Line	BCT	
TPM ⁺ DYNAMIC TPM ⁺ HIGH TORQUE TPM ⁺ POWER	BCT	

alpha Premium

Premium Line		
XP ⁺ / XPK ⁺ / XPC ⁺	BC3	
premo [®] XP Line	BC3	

cymex®5 for superior drive train designs

With cymex® 5, the dimensioning and design of the entire drive train (application + transformation + drive + motor) are now quick, simple and secure. A database of pre-defined standard applications provides a foundation for fast and simple calculations. The program accounts for all major impact factors and sizing considerations to help design a drive train that optimizes mechanical efficiency and performance of your machine.



Precise simulation of motion and load variables

The optimized software offers many options for the individual design of the drive train. These have been integrated to supplement the existing applications already in cymex® 3: the crank, conveyor, center winder and feed roll.

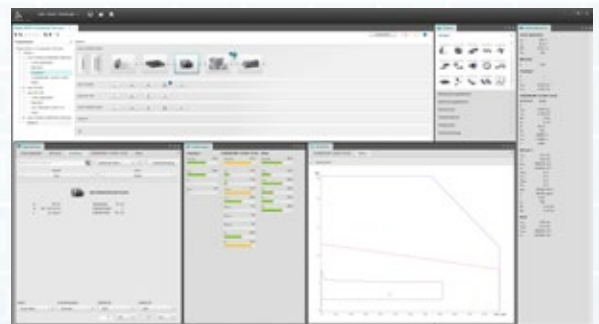
Comprehensive documentation

Following the geometry comparison, cymex®5 creates a calculation documentation and generates data sheets for the gearbox and motor on request. Additionally, 2D and 3D CAD data from selected components can be called up.

Coupling selection guidance

Here, different options exist, depending on the existing knowledge of the user:

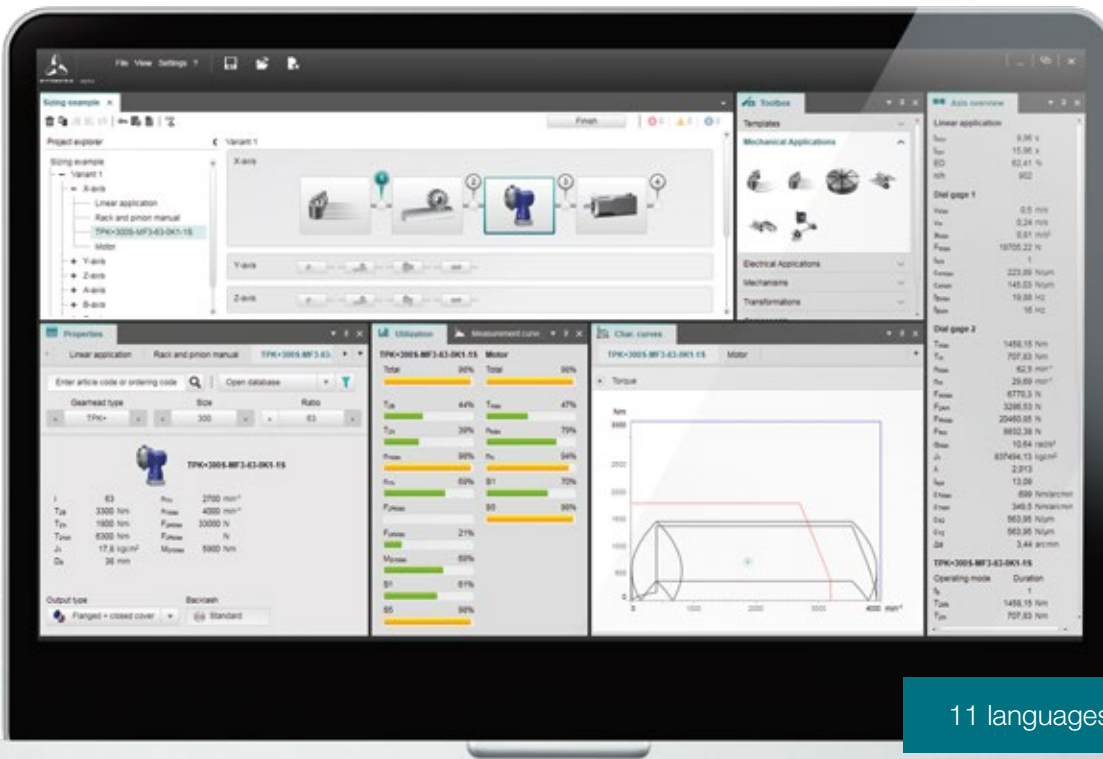
- Ordering code: The coupling is already known.
- Quick lay-out: Four steps to find the right coupling.
- In the utilization window, the technical data can be evaluated.



Application and gearbox interface

With one simple click, the interface, e.g. of a coupling between the drive of the gearbox and the application, can be inserted.

cymex®5



11 languages



Define any number of axes simultaneously

In contrast to other design tools, cymex®5 can define any number of axes simultaneously. Calculations up to 60% faster, optimized sizing and stronger design results. Best of all, the program is available as a free download.

Free Download

The basic version of the cymex®5 design software is available as a free download.



www.wittenstein-cymex.de

Couplings

Versatilely adapted to the specific requirements

Whether used for a reliable product, harmonic continuously running system or as a monitoring unit with quick reaction, couplings are an essential part of modern drive technology. Count on our couplings for reliable and precise performance across a multitude of different requirements.

Perfectionist

Metal bellows couplings have been designed to meet the greatest requirements in servo drive technology. High torsional rigidity enables accurate results and great dynamics.





Continuously running system

Through high-quality manufactured hubs and attachable intermediate elements, elastomer couplings ensure a maximum true-running accuracy in the drive train. Torque shocks and vibrations are significantly absorbed and ensure very smooth running.



Monitoring unit

Torque limiters with integrated mechanic switching mechanism combine a dynamic, quickly reacting transmission with torque limitation.

Elastomer couplings

Plug-in, backlash free, electrically insulating

The core element of elastomer couplings is the elastomer insert. This insert is responsible for the properties of the entire coupling and/or of the entire drive train. Through different degrees of hardness, the rigidity and the dampening behavior can be optimized. By default, they are implemented with the degree of hardness B to meet the torsional rigidity requirements. Thanks to the simple plug-in assembly of the hubs, the coupling assembly is extremely user friendly. A variety of connection options for the shaft and hub ensure that customer-specific requirements are met. Interacting with the precisely manufactured hubs and with the correct selection of elastomer inserts, the torsional oscillations, shocks and axial misalignments can be compensated. When properly applied, they are maintenance-free and fatigue enduring. Elastomer couplings are available as corrosion-resistant and ATEX versions.

PRODUCT HIGHLIGHTS

Vibration dampening and individually adaptable

through freely selectable elastomer inserts.

Durable and maintenance-free for their entire service life

through precisely manufactured components.

Compensation for shaft misalignment

through the excellent damping of the elastomer inserts within the drive.

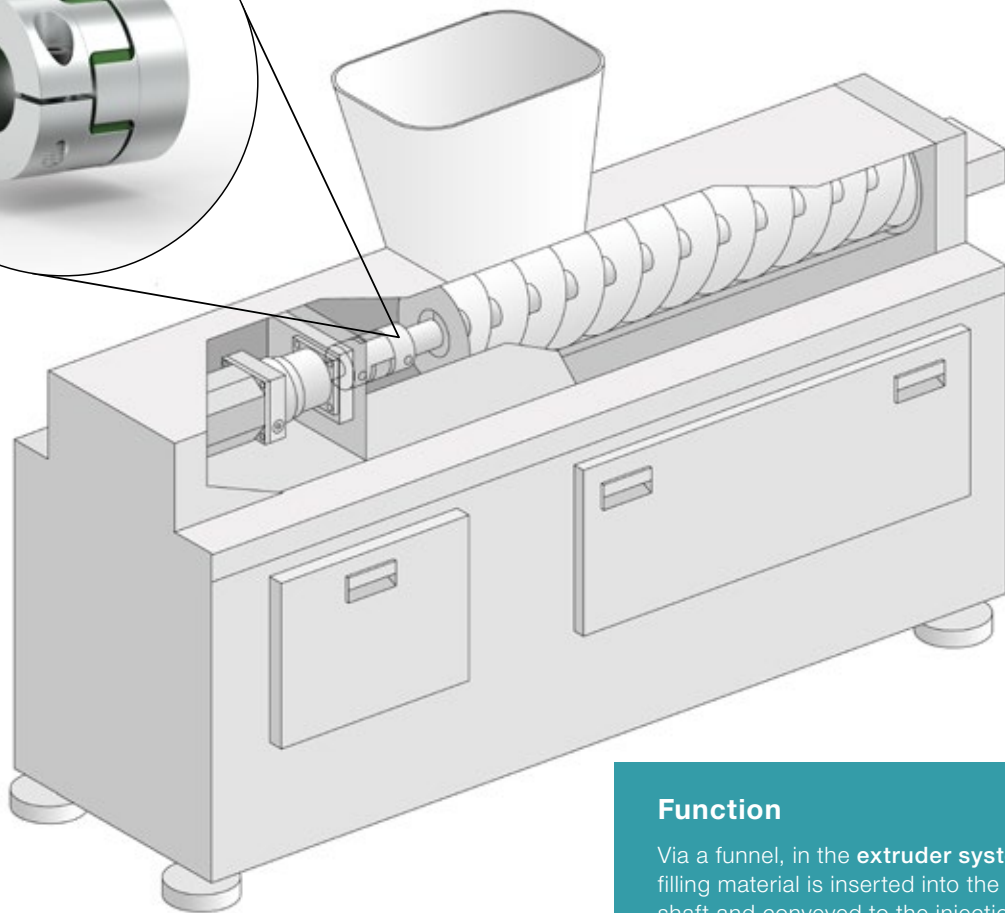


C: Shore hardness 80 Sh A
Excellent damping

A Shore hardness 98Sh A
Good damping

B: Shore hardness 64Sh D
Hight torsional rigidity

	Elastomer material	Hub material	Permitted temperature range		
			Red: Elastomer insert A 98Sh A	Green: Elastomer insert B 64Sh D	Yellow: Elastomer insert C 80Sh A
ELT	Thermoplastic polyurethane TPU	High-strength aluminum	-	-30 to +120° C	-
EL6	Thermoplastic polyurethane TPU	High-strength aluminum, as of size 800: Steel	-30 to +100° C	-30 to +120° C	-30 to +100° C
ELC	Thermoplastic polyurethane TPU	High-strength aluminum, as of size 800: Steel	-30 to +100° C	-30 to +120° C	-30 to +100° C
ECS	Thermoplastic polyurethane TPU	High-strength aluminum	-30 to +100° C	-30 to +120° C	-30 to +100° C



Function

Via a funnel, in the **extruder system**, filling material is inserted into the worm gear shaft and conveyed to the injection molding nozzle under high pressure. Here, the drive consists of an electric motor and a gearbox unit.

The intermediate elastomer coupling absorbs any occurring shocks and vibration and thus increases the service life of the drive.



Application

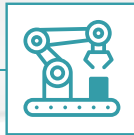
Example applications



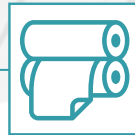
Machine tools



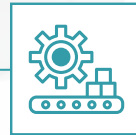
Servo drive technology



Automation



Printing presses



Packaging machines



General mechanical engineering



Benefits

User friendly through radial assembly.

Emergency run features through positive connection, even if the elastomer fails.

Maintenance-free and fatigue enduring if the technical specifications are observed.

Properties

Compensation of external impacts, such as temperature differences or misalignment due to the assembly.

Reduction in heavy vibrations and oscillations in the drive train.

Precise and backlash-free torque transmission through pre-tensioned elastomer inserts.

Compensation of misalignments due to assembly



Axial



Angular



Lateral

EL6 Elastomer coupling / tapered clamping ring, plug in

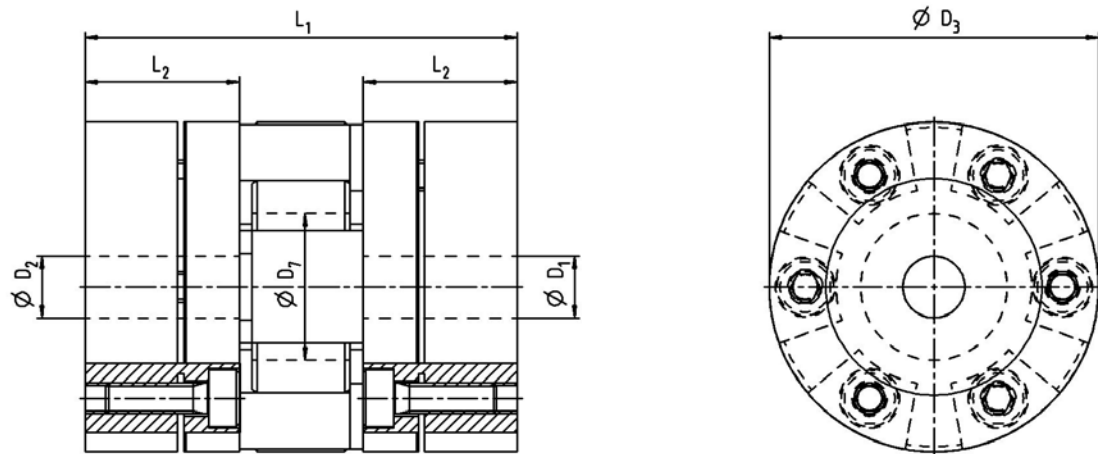
Size			10			20			60			150		
Hardness elastomer insert			A	B	C	A	B	C	A	B	C	A	B	C
Nominal torque	T_N	Nm	12.6	16	4	17	21	6	60	75	20	160	200	42
		lbf.in	112	142	35	150	186	53	531	664	177	1416	1770	372
Max. acceleration torque ^{a)} (max. 1000 cycles per hour)	T_B	Nm	22.7	28.8	6	30.6	37.8	10.8	108	135	35	288	360	75.6
		lbf.in	201	255	53	271	335	96	956	1195	310	2549	3186	669
Emergency stop torque (permitted 1000 times during the service life of the gearbox)	T_{Not}	Nm	25	32	6	34	42	12	120	150	35	320	400	85
		lbf.in	221	283	53	301	372	106	1062	1328	310	2832	3540	752
Max. speed	n_{Max}	rpm	20000			19000			14000			13000		
		mm	1			2			2			2		
Axial misalignment	\pm	in	0.039			0.079			0.079			0.079		
		°	1	0.8	1.2	1	0.8	1.2	1	0.8	1.2	1	0.8	1.2
Angular misalignment	\pm	mm	0.1	0.08	0.22	0.1	0.08	0.25	0.12	0.1	0.25	0.15	0.12	0.3
		in	0.004	0.003	0.009	0.004	0.003	0.01	0.005	0.004	0.01	0.006	0.005	0.012
Lateral misalignment	\pm	mm	0.076	0.175	0.026	0.332	0.728	0.151	0.957	2.837	0.407	1.446	3.085	0.582
		lbf.in/arcmin	0.67	1.5	0.23	2.9	6.4	1.3	8.5	25	3.6	13	27	5.2
Static torsional rigidity (at 50 % TB)	C_{Tstat}	Nm/arcmin	0.157	0.48	0.065	0.739	1.292	0.255	2.31	3.463	0.603	3.899	8.526	1.045
		lbf.in/arcmin	1.4	4.2	0.58	6.5	11	2.3	20	31	5.3	35	75	9.2
Dynamic torsional rigidity (at TB)	C_{Tdyn}	Nm/arcmin	0.08			0.3			1			2		
		lbf.in.s ²	0.07			0.27			0.89			1.8		
Mass moment of inertia	J	kgcm ²	0.08			0.3			1			2		
		lbf.in.s ²	0.07			0.27			0.89			1.8		
Weight	m	kg	0.08			0.12			0.3			0.5		
		lb	0.18			0.26			0.66			1.1		

Dimensions

Total length	L ₁	mm	42	56	64	76
		in	1.7	2.2	2.5	3
Fitting length	L ₂	mm	15	20	23	28.5
		in	0.59	0.79	0.91	1.1
Inner diameter input ^{d)} (Tolerance H7)	D ₁	mm	6 - 16	8 - 24	12 - 32	19 - 35
		in	0.24 - 0.63	0.31 - 0.94	0.47 - 1.3	0.75 - 1.4
Inner diameter output ^{d)} (Tolerance H7)	D ₂	mm	6 - 16	8 - 24	12 - 32	19 - 35
		in	0.24 - 0.63	0.31 - 0.94	0.47 - 1.3	0.75 - 1.4
Outer diameter hub	D ₃	mm	32	43	56	66.5
		in	1.3	1.7	2.2	2.6
Mounting screws (ISO 4762 / 12.9)			3x M3	6x M4	4x M5	8x M5
Inner diameter elastomer insert	D ₇	mm	14.2	19.2	26.2	29.2
		in	0.56	0.76	1	1.1

a) Performance reduction possible with small clamping hub diameters: Technical data available on request

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



Size			300			450			800		
Hardness elastomer insert			A	B	C	A	B	C	A	B	C
Nominal torque	T_N	Nm	325	405	84	530	660	95	950	1100	240
		lbf.in	2877	3585	743	4691	5842	841	8408	9736	2124
Max. acceleration torque ^{a)} (max. 1000 cycles per hour)	T_B	Nm	585	729	151.2	954	1188	171	1710	1980	400
		lbf.in	5178	6452	1338	8444	10515	1513	15135	17525	3540
Emergency stop torque (permitted 1000 times during the service life of the gearbox)	T_{Not}	Nm	650	810	170	1060	1350	190	1900	2150	400
		lbf.in	5753	7169	1505	9382	11949	1682	16817	19029	3540
Max. speed	n_{Max}	rpm	10000			9000			4000		
		mm	2			2			2		
Axial misalignment	\pm	in	0.079			0.079			0.079		
		°	1	0.8	1.2	1	0.8	1.2	1	0.8	1.2
Angular misalignment	\pm	mm	0.18	0.14	0.35	0.2	0.18	0.35	0.25	0.2	0.4
		in	0.007	0.006	0.014	0.008	0.007	0.014	0.01	0.008	0.016
Lateral misalignment	\pm	Nm/arcmin	3.608	5.238	0.873	4.394	7.857	1.199	12.018	19.229	3.003
		lbf.in/arcmin	32	46	7.7	39	70	11	106	170	27
Static torsional rigidity (at 50 % TB)	C_{Tstat}	Nm/arcmin	6.897	11.756	1.772	16.121	23.629	3.376	24.037	52.424	8.323
		lbf.in/arcmin	61	104	16	143	209	30	213	464	74
Dynamic torsional rigidity (at TB)	C_{Tdyn}	kgcm ²	6			17			184		
		lbf.in.s ²	5.3			15			163		
Mass moment of inertia	J	kg	0.9			1.5			9.6		
		lb	2			3.3			21		
Weight	m	kg	0.9			1.5			9.6		
		lb	2			3.3			21		

Dimensions

Total length	L ₁	mm	96	110	138
		in	3.8	4.3	5.4
Fitting length	L ₂	mm	36	42	53.5
		in	1.4	1.7	2.1
Inner diameter input ^{d)} (Tolerance H7)	D ₁	mm	20 - 45	28 - 55	32 - 80
		in	0.79 - 1.8	1.1 - 2.2	1.3 - 3.1
Inner diameter output ^{d)} (Tolerance H7)	D ₂	mm	20 - 45	28 - 55	32 - 80
		in	0.79 - 1.8	1.1 - 2.2	1.3 - 3.1
Outer diameter hub	D ₃	mm	82	102	136.5
		in	3.2	4	5.4
Mounting screws (ISO 4762 / 12.9)			8x M6	8x M8	8x M10
Inner diameter elastomer insert	D ₇	mm	36.2	46.2	60.5
		in	1.4	1.8	2.4

a) Performance reduction possible with small clamping hub diameters: Technical data available on request

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

Elastomer coupling EL6



For the ordering code, please refer to p 78

ELC Elastomer coupling / compact with clamping hub

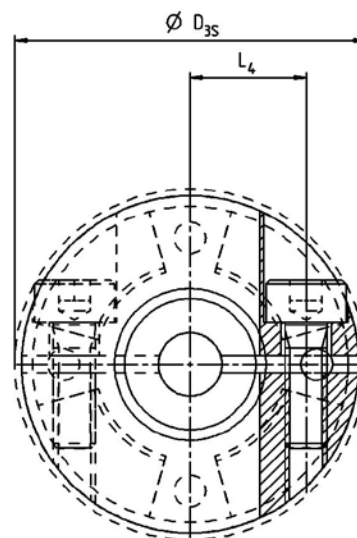
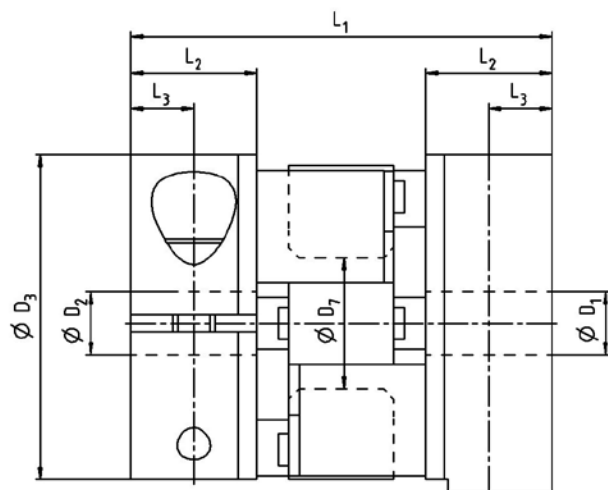
Size			2			5			10			20			60		
Hardness elastomer insert			A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Nominal torque	T_N	Nm	2	2.4	0.5	9	12	2	12.5	16	4	17	21	6	60	75	20
		lbf.in	18	21	4.4	80	106	18	111	142	35	150	186	53	531	664	177
Max. acceleration torque ^{a)} (max. 1000 cycles per hour)	T_B	Nm	3.6	4.32	0.9	16.2	21.6	3.6	22.5	28.8	6	30.6	37.8	10.8	108	135	35
		lbf.in	32	38	8	143	191	32	199	255	53	271	335	96	956	1195	310
Emergency stop torque (permitted 1000 times during the service life of the gearbox)	T_{Not}	Nm	4	4.8	1	18	24	4	25	32	6	34	42	12	120	150	35
		lbf.in	35	42	8.9	159	212	35	221	283	53	301	372	106	1062	1328	310
Max. speed	n_{Max}	rpm	15000			15000			13000			12500			11000		
Axial misalignment	\pm	mm	1			1			1			2			2		
		in	0.039			0.039			0.039			0.079			0.079		
Angular misalignment	\pm	°	1	0.8	1.2	1	0.8	1.2	1	0.8	1.2	1	0.8	1.2	1	0.8	1.2
Lateral misalignment	\pm	mm	0.08	0.06	0.2	0.08	0.06	0.2	0.1	0.08	0.22	0.1	0.08	0.25	0.12	0.1	0.25
		in	0.003	0.002	0.008	0.003	0.002	0.008	0.004	0.003	0.009	0.004	0.003	0.01	0.005	0.004	0.01
Static torsional rigidity (at 50 % T_B)	C_{Tstat}	Nm/arcmin	0.015	0.033	0.005	0.044	0.102	0.015	0.076	0.175	0.026	0.332	0.728	0.151	0.957	2.837	0.407
		lbf.in/arcmin	0.13	0.29	0.04	0.39	0.9	0.13	0.67	1.5	0.23	2.9	6.4	1.3	8.5	25	3.6
Dynamic torsional rigidity (at T_B)	C_{Tdyn}	Nm/arcmin	0.029	0.067	0.01	0.087	0.204	0.031	0.157	0.48	0.065	0.739	1.292	0.255	2.31	3.463	0.603
		lbf.in/arcmin	0.26	0.59	0.09	0.77	1.8	0.27	1.4	4.2	0.58	6.5	11	2.3	20	31	5.3
Mass moment of inertia	J	kgcm ²	0.006			0.04			0.06			0.2			0.8		
		lbf.in.s ²	0.01			0.04			0.05			0.18			0.71		
Weight	m	kg	0.008			0.02			0.05			0.12			0.3		
		lb	0.02			0.04			0.11			0.26			0.66		

Dimensions

Total length	L_1	mm	20	26	32	50	58
		in	0.79	1	1.3	2	2.3
Fitting length	L_2	mm	6	8	10.3	17	20
		in	0.24	0.31	0.41	0.67	0.79
Distance	L_3	mm	3	4	5	8.5	10
		in	0.12	0.16	0.2	0.33	0.39
Centre distance	L_4	mm	5.5	8	10.5	15.5	21
		in	0.22	0.31	0.41	0.61	0.83
Inner diameter input ^{d)} (Tolerance H7)	D_1	mm	3 - 8	4 - 12.7	4 - 16	8 - 25	12 - 32
		in	0.12 - 0.31	0.16 - 0.5	0.16 - 0.63	0.31 - 0.98	0.47 - 1.3
Inner diameter output ^{d)} (Tolerance H7)	D_2	mm	3 - 8	4 - 12.7	4 - 16	8 - 25	12 - 32
		in	0.12 - 0.31	0.16 - 0.5	0.16 - 0.63	0.31 - 0.98	0.47 - 1.3
Outer diameter hub	D_3	mm	16	25	32	42	56
		in	0.63	0.98	1.3	1.7	2.2
Outer diameter with screw head	D_{3S}	mm	17	25.5	32	44.5	57
		in	0.67	1	1.3	1.8	2.2
Inner diameter elastomer insert	D_7	mm	6.2	10.2	14.2	19.2	26.2
		in	0.24	0.4	0.56	0.76	1

a) Performance reduction possible with small clamping hub diameters: Technical data available on request

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



Size			150			300			450			800		
Hardness elastomer insert			A	B	C	A	B	C	A	B	C	A	B	C
Nominal torque	T_N	Nm	160	200	42	325	405	84	530	660	95	950	1100	240
		lbf.in	1416	1770	372	2877	3585	743	4691	5842	841	8408	9736	2124
Max. acceleration torque ^{a)} (max. 1000 cycles per hour)	T_B	Nm	288	360	75.6	585	729	151.2	954	1188	171	1710	1980	400
		lbf.in	2549	3186	669	5178	6452	1338	8444	10515	1513	15135	17525	3540
Emergency stop torque (permitted 1000 times during the service life of the gearbox)	T_{Not}	Nm	320	400	85	650	810	170	1060	1350	190	1900	2150	400
		lbf.in	2832	3540	752	5753	7169	1505	9382	11949	1682	16817	19029	3540
Max. speed	n_{Max}	rpm	10000			9000			8000			4000		
Axial misalignment	\pm	mm	2			2			2			2		
		in	0.079			0.079			0.079			0.079		
Angular misalignment	\pm	°	1	0.8	1.2	1	0.8	1.2	1	0.8	1.2	1	0.8	1.2
Lateral misalignment	\pm	mm	0.15	0.12	0.3	0.18	0.14	0.35	0.2	0.18	0.35	0.25	0.2	0.4
		in	0.006	0.005	0.012	0.007	0.006	0.014	0.008	0.007	0.014	0.01	0.008	0.016
Static torsional rigidity (at 50 % TB)	C_{Tstat}	Nm/arcmin	1.446	3.085	0.582	3.608	5.238	0.873	4.394	7.857	1.199	12.018	19.229	3.003
		lbf.in/arcmin	13	27	5.2	32	46	7.7	39	70	11	106	170	27
Dynamic torsional rigidity (at TB)	C_{Tdyn}	Nm/arcmin	3.899	8.526	1.045	6.897	11.756	1.772	16.121	23.629	3.376	24.037	52.424	8.323
		lbf.in/arcmin	35	75	9.2	61	104	16	143	209	30	213	464	74
Mass moment of inertia	J	kgcm ²	1.6			6			13.2			160		
		lbf.in.s ²	1.4			5.3			12			142		
Weight	m	kg	0.5			0.9			1.5			8.5		
		lb	1.1			2			3.3			19		

Dimensions

Total length	L_1	mm	62			86			94			123		
		in	2.4			3.4			3.7			4.8		
Fitting length	L_2	mm	21			31			34			46		
		in	0.83			1.2			1.3			1.8		
Distance	L_3	mm	11			15			17			23		
		in	0.43			0.59			0.67			0.91		
Centre distance	L_4	mm	24			29			38			50.5		
		in	0.94			1.1			1.5			2		
Inner diameter input ^{d)} (Tolerance H7)	D_1	mm	19 - 36			20 - 45			28 - 60			35 - 80		
		in	0.75 - 1.4			0.79 - 1.8			1.1 - 2.4			1.4 - 3.1		
Inner diameter output ^{d)} (Tolerance H7)	D_2	mm	19 - 36			20 - 45			28 - 60			35 - 80		
		in	0.75 - 1.4			0.79 - 1.8			1.1 - 2.4			1.4 - 3.1		
Outer diameter hub	D_3	mm	66.5			82			102			136.5		
		in	2.6			3.2			4			5.4		
Outer diameter with screw head	D_{3S}	mm	68			85			105			139.5		
		in	2.7			3.3			4.1			5.5		
Inner diameter elastomer insert	D_7	mm	29.2			36.2			46.2			60.5		
		in	1.1			1.4			1.8			2.4		

- a) Performance reduction possible with small clamping hub diameters: Technical data available on request
d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

Elastomer coupling ELC



For the ordering code, please refer to p 78

ELT Elastomer coupling / flange

Size			20	60	150
Hardness elastomer insert			B	B	B
Nominal torque	T_N	Nm	7.8	31	69
		lbf.in	69	270	615
Max. acceleration torque (max. 1000 cycles per hour)	T_B	Nm	14	55	125
		lbf.in	124	487	1106
Emergency stop torque (permitted 1000 times during the service life of the gearbox)	T_{Not}	Nm	26	75	190
		lbf.in	230	664	1682
Max. speed	n_{Max}	rpm	10000	10000	8000
Axial misalignment	\pm	mm	2	2	2
		in	0.079	0.079	0.079
Angular misalignment	\pm	°	0.8	0.8	0.8
Lateral misalignment	\pm	mm	0.08	0.1	0.12
		in	0.003	0.004	0.005
Static torsional rigidity (at 50 % TB)	C_{Tstat}	Nm/arcmin	0.73	2.84	3.08
		lbf.in/arcmin	6.5	25	27
Dynamic torsional rigidity (at TB)	C_{Tdyn}	Nm/arcmin	1.29	3.46	8.53
		lbf.in/arcmin	11	31	75
Mass moment of inertia	J	kgcm ²	0.28	1.1	2.4
		lbf.in.s ²	0.25	0.98	2.1
Weight	m	kg	0.11	0.24	0.37
		lb	0.24	0.53	0.82

Mountable to

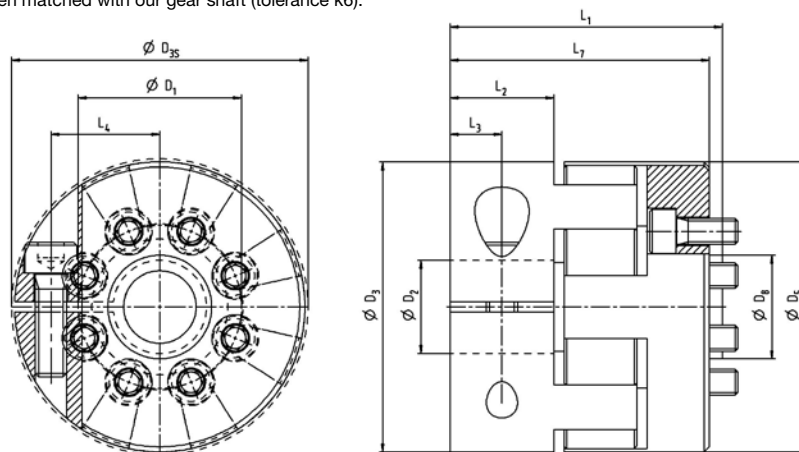
NPT, NPTK, NTP	005	015	025
Gearbox model	MF	MF / MA	MF / MA

Dimensions

Total length (Tolerance ± 2)	L_1	mm	44	52.5	57
		in	1.7	2.1	2.2
Fitting length	L_2	mm	17	20	21
		in	0.67	0.79	0.83
Distance	L_3	mm	8.5	10	11
		in	0.33	0.39	0.43
Centre distance	L_4	mm	15.5	21	24
		in	0.61	0.83	0.94
Length of mounting space (Tolerance ± 2)	L_7	mm	42	50	54
		in	1.7	2	2.1
Pitch circle input ^{a)}	D_1	mm	25	31.5	50
		in	0.98	1.2	2
Mounting screws (ISO 4762 / 12.9) (input)			4 x M4	8 x M5	8 x M6
Inner diameter output ^{d)} (Tolerance H7)	D_2	mm	8 - 25	18 - 32	24 - 36
		in	0.31 - 0.98	0.71 - 1.3	0.94 - 1.4
Outer diameter hub	D_3	mm	42	56	66.5
		in	1.7	2.2	2.6
Outer diameter with screw head	D_{3S}	mm	44.5	57	68
		in	1.8	2.2	2.7
Outer diameter flange (Tolerance -0,2)	D_5	mm	42	56	66.5
		in	1.7	2.2	2.6
Inner diameter elastomer insert	D_7	mm	19.2	26.2	29.2
		in	0.76	1	1.1
Centering diameter (Tolerance h7)	D_8	mm	16	20	31.5
		in	0.63	0.79	1.2

a) Screws contained in scope of delivery

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



Size			300	450
Hardness elastomer insert			B	B
Nominal torque	T_N	Nm	169	278
		lbf.in	1500	2459
Max. acceleration torque (max. 1000 cycles per hour)	T_B	Nm	305	500
		lbf.in	2699	4425
Emergency stop torque (permitted 1000 times during the service life of the gearbox)	T_{Not}	Nm	480	1000
		lbf.in	4248	8851
Max. speed	n_{Max}	rpm	7000	6000
Axial misalignment	\pm	mm	2	2
		in	0.079	0.079
Angular misalignment	\pm	°	0.8	0.8
Lateral misalignment	\pm	mm	0.14	0.18
		in	0.006	0.007
Static torsional rigidity (at 50 % TB)	C_{Tstat}	Nm/arcmin	5.24	7.86
		lbf.in/arcmin	46	70
Dynamic torsional rigidity (at TB)	C_{Tdyn}	Nm/arcmin	11.76	23.63
		lbf.in/arcmin	104	209
Mass moment of inertia	J	kgcm ²	6.7	16.3
		lbf.in.s ²	5.9	14
Weight	m	kg	0.67	1.15
		lb	1.5	2.5

Mountable to

NPT, NPTK, NTP	035	045
Gearbox model	MF / MA	MF

Dimensions

Total length (Tolerance ±2)		L ₁	mm	72	82
			in	2.8	3.2
Fitting length		L ₂	mm	31	34
			in	1.2	1.3
Distance		L ₃	mm	15	17.5
			in	0.59	0.69
Centre distance		L ₄	mm	29	38
			in	1.1	1.5
Length of mounting space (Tolerance ±2)		L ₇	mm	68	78
			in	2.7	3.1
Pitch circle input ^{a)}		D ₁	mm	63	80
			in	2.5	3.1
Mounting screws (ISO 4762 / 12.9) (input)			10 x M6		8 x M8
Inner diameter output ^{d)} (Tolerance H7)		D ₂	mm	35 - 45	42 - 60
			in	1.4 - 1.8	1.7 - 2.4
Outer diameter hub		D ₃	mm	82	102
			in	3.2	4
Outer diameter with screw head		D ₃ S	mm	85	105
			in	3.3	4.1
Outer diameter flange (Tolerance -0,2)		D ₅	mm	82	102
			in	3.2	4
Inner diameter elastomer insert		D ₇	mm	36.2	46.2
			in	1.4	1.8
Centering diameter (Tolerance h7)		D ₈	mm	40	50
			in	1.6	2

a) Screws contained in scope of delivery

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

Elastomer coupling ELT



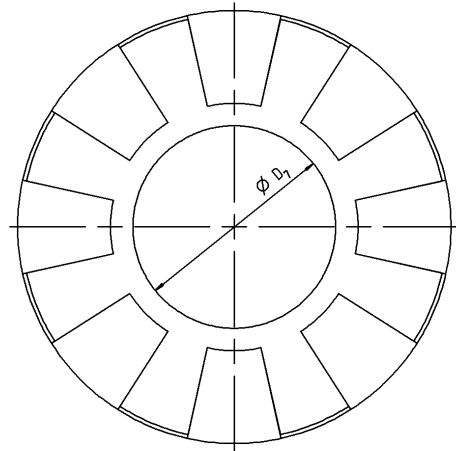
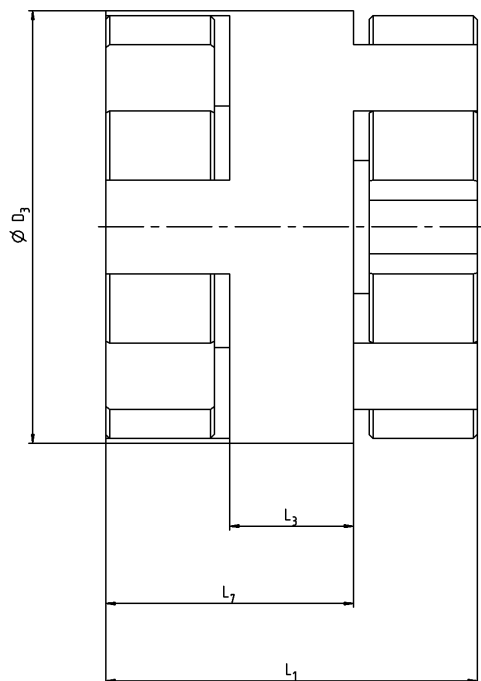
For the ordering code, please refer to p 79

ECS Elastomer coupling / intermediate spacer

Size			2			5			10			20		
Hardness elastomer insert			A	B	C	A	B	C	A	B	C	A	B	C
Nominal torque	T_N	Nm	2.0	2.4	0.50	9.0	12	2.0	13	16	4.0	17	21	6.0
		lbf.in	18	21	4.4	80	106	18	111	142	35	150	186	53
Max. acceleration torque (max. 1000 cycles per hour)	T_B	Nm	3.6	4.3	0.90	16	22	3.6	23	29	6.0	31	38	11
		lbf.in	32	38	8	143	191	32	199	255	53	271	335	96
Max. speed	n_{Max}	rpm	15000			15000			13000			12500		
Mass moment of inertia	J	kgcm ²	0.001			0.005			0.02			0.08		
		lbf.in.s ²	0			0			0.02			0.07		
Weight	m	kg	0.007			0.02			0.04			0.09		
		lb	0.02			0.04			0.09			0.2		

Dimensions

Total length	L_1	mm	20			26			30			39		
		in	0.79			1			1.2			1.5		
Distance	L_9	mm	9			9			9			10		
		in	0.35			0.35			0.35			0.39		
Length of mounting space (Tolerance ± 2)	L_7	mm	14.5			17.5			19.5			24.5		
		in	0.57			0.69			0.77			0.96		
Outer diameter hub	D_3	mm	16			25			32			42		
		in	0.63			0.98			1.3			1.7		
Inner diameter elastomer insert	D_7	mm	6.2			10.2			14.2			19.2		
		in	0.24			0.4			0.56			0.76		

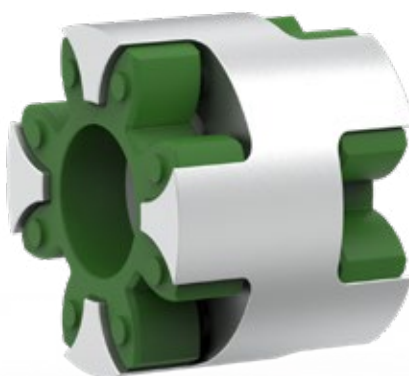


Size			60			150			300			450			800		
Hardness elastomer insert			A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Nominal torque	T_N	Nm	60	75	20	160	200	42	325	405	84	530	660	95	950	1100	240
		lbf.in	531	664	177	1416	1770	372	2877	3585	743	4691	5842	841	8408	9736	2124
Max. acceleration torque (max. 1000 cycles per hour)	T_B	Nm	108	135	35	288	360	76	585	729	151	954	1188	171	1710	1980	400
		lbf.in	956	1195	310	2549	3186	669	5178	6452	1338	8444	10515	1513	15135	17525	3540
Max. speed	n_{Max}	rpm	11000			10000			9000			8000			4000		
Mass moment of inertia	J	kgcm ²	0.30			0.50			1.0			6.0			11		
		lbf.in.s ²	0.27			0.44			0.89			5.3			9.8		
Weight	m	kg	0.21			0.33			0.58			1.4			2.1		
		lb	0.46			0.73			1.3			3			4.6		

Dimensions

Total length	L_1	mm	48			53			62			86			81		
		in	1.9			2.1			2.4			3.4			3.2		
Distance	L_9	mm	16			18			20			40			25		
		in	0.63			0.71			0.79			1.6			0.98		
Length of mounting space (Tolerance ± 2)	L_7	mm	32.0			35.5			41			63			53		
		in	1.3			1.4			1.6			2.5			2.1		
Outer diameter hub	D_3	mm	56			66.5			82			102			136.5		
		in	2.2			2.6			3.2			4			5.4		
Inner diameter elastomer insert	D_7	mm	26.2			29.2			36.2			46.2			60.5		
		in	1			1.1			1.4			1.8			2.4		

Elastomer coupling ECS



For the ordering code, please refer to p 79

Metal bellows couplings

Torsionally rigid, reliable, for dynamic applications

Metal bellows couplings mainly consist of two components: The stainless steel metal bellows and the hubs. Depending on the application, the hubs can be designed as flange, expanding mandrel, clamping hub or as cone clamping set. Aluminum, steel or stainless steel can be used as hub material. The core element of the coupling is the metal bellows. The stainless steel metal bellows transfers the rotational motion of the coupling and compensates any design-related misalignment, such as lateral, axial and angular shaft misalignment with low restoring forces. Low-backlash, torsionally rigid metal bellows couplings guarantee an accurate positioning. However, the vibration damping is not as pronounced as it is with elastomer couplings.

PRODUCT HIGHLIGHTS

High positioning accuracy and torsional rigidity

thanks to the thin-walled metal bellows, which also compensate smaller misalignments.

Backlash-free

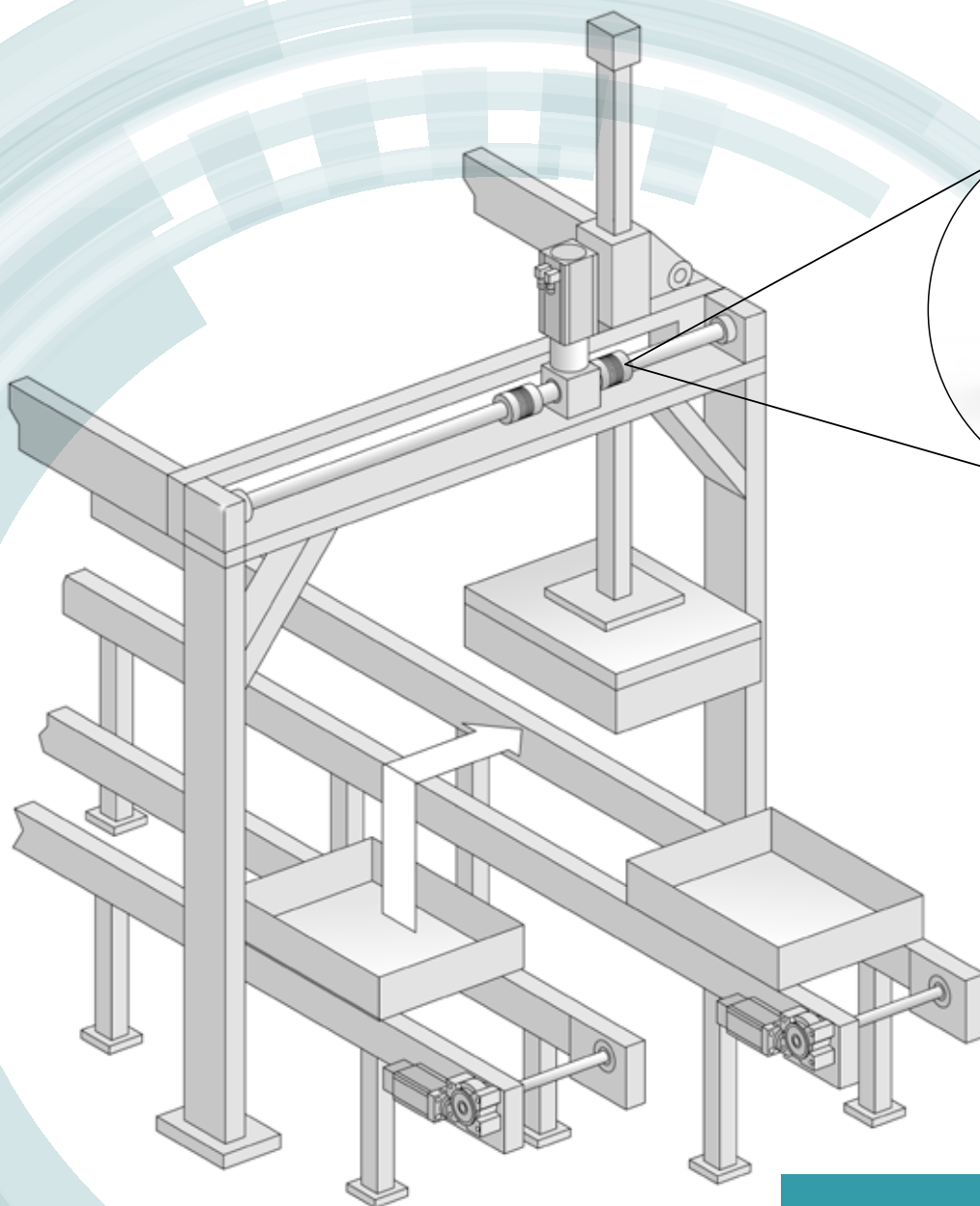
thanks to the accurately manufactured components and comprehensive testing.

Durable and maintenance-free for their entire service life

thanks to precisely manufactured components.



	Bellows material	Hub material	Permitted temperature range
BC2	Highly elastic stainless steel	High-strength aluminum, as of size 150: Steel	-30 to +100° C, as of size 800: -30 to +300° C
BC3	Highly elastic stainless steel	Steel	-30 to +100° C, as of size 800: -30 to +300° C
BCL	Highly elastic stainless steel	High-strength aluminum, as of size 150: Steel	-30 to +100° C
BCH	Highly elastic stainless steel	High-strength aluminum, as of size 150: Steel	-30 to +100° C, as of size 800: -30 to +300° C
BCT	Highly elastic stainless steel	High-strength aluminum, as of size 1500: Steel	-30 to +100° C, as of size 1500: -30 to +300° C
BCT HT	Highly elastic stainless steel	Steel	-30 to +300° C



Function

Handling systems support the placement of workpieces or products from one manufacturing step to another automatically, significantly increasing productivity and quality. To ensure the highest quality performance, it is essential that the processes are implemented precisely and consistently, to ensure torques are transmitted without any backlash.

Thanks to their great torsional rigidity, metal bellows couplings support the transmission of movements without any backlash and, if applicable, compensate production-related misalignments and light shocks. Thanks to their robust design, they are maintenance-free.

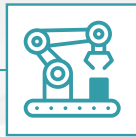


Application

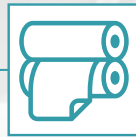
Example applications



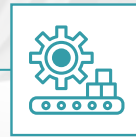
Machine tools



Automation



Printing presses



Packaging machines



General mechanical engineering



Benefits

Transmission of torques without backlash thanks to the high torsional rigidity.

Minimal installation space required thanks to the very compact design.

High rotational speeds possible thanks to low moments of inertia.

Properties

Dimensional accuracy thanks to the use of highly elastic stainless steel bellows.

Compensation of external impacts, such as temperature differences and misalignment due to the assembly.

Extremely smooth running thanks to the high true-running accuracy and symmetric components.

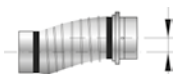
Compensation of misalignments due to assembly



Axial



Angular



Lateral

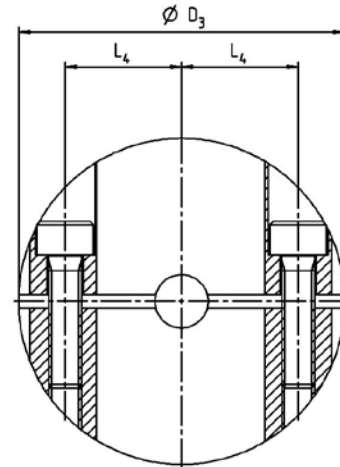
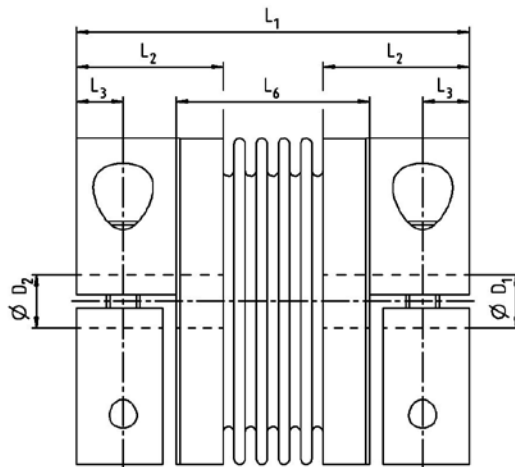
BCH Metal bellows coupling / split clamping hub

Size			15		30		60		80		150	
Overall length			A	B	A	B	A	B	A	B	A	B
Max. acceleration torque (max. 1000 cycles per hour)	T_B	Nm	15		30		60		80		150	
		lbf.in	133		266		531		708		1328	
Emergency stop torque (permitted 1000 times during the service life of the gearbox)	T_{Not}	Nm	22.5		45		90		120		225	
		lbf.in	199		398		797		1062		1991	
Max. speed	n_{Max}	rpm	10000									
Axial misalignment	\pm	mm	1	2	1	2	1.5	2	2	3	2	3
		in	0.039	0.079	0.039	0.079	0.059	0.079	0.079	0.118	0.079	0.118
Angular misalignment	\pm	°	1	1.5	1	1.5	1	1.5	1	1.5	1	1.5
Lateral misalignment	\pm	mm	0.15	0.2	0.2	0.25	0.2	0.25	0.2	0.25	0.2	0.25
		in	0.006	0.008	0.008	0.01	0.008	0.01	0.008	0.01	0.008	0.01
Axial spring rigidity	C_a	N/mm	25	15	50	30	72	48	48	32	82	52
		lbf/in	143	86	286	171	411	274	274	183	468	297
Lateral spring rigidity	C_l	N/mm	475	137	900	270	1200	420	920	290	1550	435
		lbf/in	2712	782	5139	1542	6852	2398	5253	1656	8851	2484
Torsional rigidity	C_T	Nm/arcmin	5.8	4.4	11	8.1	22	16	38	25	51	32
		lbf.in/arcmin	51	39	97	72	195	142	336	221	451	283
Mass moment of inertia	J	kgcm ²	0.7	0.8	1.4	1.5	2.3	2.6	6.5	6.7	25	32
		lbf.in.s ²	0.62	0.71	1.2	1.3	2	2.3	5.8	5.9	22	28
Weight	m	kg	0.15		0.3		0.4		0.8		1.7	
		lb	0.33		0.66		0.88		1.8		3.7	

Dimensions

Total length (Tolerance -2)	L_1	mm	59	66	69	77	83	93	94	106	95	107
		in	2.3	2.6	2.7	3	3.3	3.7	3.7	4.2	3.7	4.2
Fitting length	L_2	mm	22		26.5		31		35.5		35.5	
		in	0.87		1		1.2		1.4		1.4	
Distance	L_3	mm	7		7.5		9.5		12		12	
		in	0.28		0.3		0.37		0.47		0.47	
Centre distance	L_4	mm	17.5		19		23		27		27	
		in	0.69		0.75		0.91		1.1		1.1	
Insert length (Tolerance -2)	L_6	mm	29	36	35	43	41	51	47	59	48	60
		in	1.1	1.4	1.4	1.7	1.6	2	1.9	2.3	1.9	2.4
Inner diameter input ^{d)} (Tolerance H7)	D_1	mm	8 - 28		10 - 30		12 - 35		14 - 42		19 - 42	
		in	0.31 - 1.1		0.39 - 1.2		0.47 - 1.4		0.55 - 1.7		0.75 - 1.7	
Inner diameter output ^{d)} (Tolerance H7)	D_2	mm	8 - 28		10 - 30		12 - 35		14 - 42		19 - 42	
		in	0.31 - 1.1		0.39 - 1.2		0.47 - 1.4		0.55 - 1.7		0.75 - 1.7	
Outer diameter hub	D_3	mm	49		55		66		81		81	
		in	1.9		2.2		2.6		3.2		3.2	

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



Size			200		300		500		800	1500	4000
Overall length			A	B	A	B	A	B	A	A	A
Max. acceleration torque (max. 1000 cycles per hour)	T _B	Nm	200		300		500		800	1500	4000
		lbf.in	1770		2655		4425		7081	13276	35403
Emergency stop torque (permitted 1000 times during the service life of the gearbox)	T _{Not}	Nm	300		450		750		1200	2250	6000
		lbf.in	2655		3983		6638		10621	19914	53105
Max. speed	n _{Max}	rpm	10000								
Axial misalignment	±	mm	2	3	2.5	3.5	2.5	3.5	3.5	3.5	3.5
		in	0.079	0.118	0.098	0.138	0.098	0.138	0.138	0.138	0.138
Angular misalignment	±	°	1	1.5	1	1.5	1	1.5	1.5	1.5	1.5
Lateral misalignment	±	mm	0.25	0.3	0.25	0.3	0.3	0.35	0.35	0.35	0.4
		in	0.01	0.012	0.01	0.012	0.012	0.014	0.014	0.014	0.016
Axial spring rigidity	C _a	N/mm	90	60	105	71	70	48	100	320	565
		lbf/in	514	343	600	405	400	274	571	1827	3226
Lateral spring rigidity	C _l	N/mm	2040	610	3750	1050	2500	840	2000	3600	6070
		lbf/in	11648	3483	21413	5996	14275	4796	11420	20556	34660
Torsional rigidity	C _T	Nm/arcmin	56	41	131	102	148	146	227	379	989
		lbf.in/arcmin	496	363	1159	903	1310	1292	2009	3354	8753
Mass moment of inertia	J	kgcm ²	45	54	85	105	173	196	243	492	1650
		lbf.in.s ²	40	48	75	93	153	174	215	436	1463
Weight	m	kg	2.5		4		7.5		7	12	28
		lb	5.5		8.8		17		15	26	62

Dimensions

Total length (Tolerance -2)	L_1	mm	104	116	111	125	132	146	141	167	229
		in	4.1	4.6	4.4	4.9	5.2	5.7	5.6	6.6	9
Fitting length	L_2	mm	40.5		42.5		50.5		45	55.5	85
		in	1.6		1.7		2		1.8	2.2	3.3
Distance	L_3	mm	12.5		14		16.5		17.5	22.5	28.5
		in	0.49		0.55		0.65		0.69	0.89	1.1
Centre distance	L_4	mm	30.5		39		41		48	55	65
		in	1.2		1.5		1.6		1.9	2.2	2.6
Insert length (Tolerance -2)	L_6	mm	51	62	55	69	61	75	66	71	109
		in	2	2.4	2.2	2.7	2.4	3	2.6	2.8	4.3
Inner diameter input ^{d)} (Tolerance H7)	D_1	mm	22 - 45		24 - 60		35 - 60		40 - 75	50 - 80	50 - 90
		in	0.87 - 1.8		0.94 - 2.4		1.4 - 2.4		1.6 - 3	2 - 3.1	2 - 3.5
Inner diameter output ^{d)} (Tolerance H7)	D_2	mm	22 - 45		24 - 60		35 - 60		40 - 75	50 - 80	50 - 90
		in	0.87 - 1.8		0.94 - 2.4		1.4 - 2.4		1.6 - 3	2 - 3.1	2 - 3.5
Outer diameter hub	D_3	mm	90		110		124		133	157	200
		in	3.5		4.3		4.9		5.2	6.2	7.9

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

Metal bellows couplings BCH



For the ordering code, please refer to p 80

BCT Metal bellows coupling / standard

Size			15	60	150
Overall length			A	A	A
Max. acceleration torque ^{a)} (max. 1000 cycles per hour)	T _B	Nm	50	210	380
		lbf.in	443	1859	3363
Emergency stop torque (permitted 1000 times during the service life of the gearbox)	T _{Not}	Nm	75	315	570
		lbf.in	664	2788	5045
Max. speed	n _{Max}	rpm	6000		
Axial misalignment	±	mm	1	1.5	2
		in	0.039	0.059	0.079
Angular misalignment	±	°	1	1	1
Lateral misalignment	±	mm	0.25	0.25	0.25
		in	0.01	0.01	0.01
Axial spring rigidity	C _a	N/mm	29	77	87
		lbf/in	166	440	497
Lateral spring rigidity	C _l	N/mm	475	1410	1620
		lbf/in	2712	8051	9250
Torsional rigidity	C _T	Nm/arcmin	6.7	27.1	51.7
		lbf.in/arcmin	59	240	458
Mass moment of inertia	J	kgcm ²	1.5	6.5	13
		lbf.in.s ²	1.3	5.8	12
Weight	m	kg	0.3	0.7	1
		lb	0.66	1.5	2.2

Dimensions

Total length (Tolerance -2)	L ₁	mm	51.5	72.5	77.5
		in	2	2.9	3.1
Fitting length	L ₂	mm	16.5	23	27.5
		in	0.65	0.91	1.1
Distance	L ₃	mm	6.5	9.5	11
		in	0.26	0.37	0.43
Centre distance	L ₄	mm	1 x 17.5	1 x 23.5	1 x 27
		in	1 x 0.69	1 x 0.93	1 x 1.1
Length of mounting space (Tolerance -2)	L ₇	mm	48.5	67	71.5
		in	1.9	2.6	2.8
Pitch circle input ^{c)}	D ₁	mm	31.5	50	63
		in	1.2	2	2.5
Mounting screws (ISO 4017 / 10.9) (input)			8 x M5	8 x M6	12 x M6
Inner diameter output ^{d)} (Tolerance H/7)	D ₂	mm	12 - 28	14 - 35	19 - 42
		in	0.47 - 1.1	0.55 - 1.4	0.75 - 1.7
Outer diameter hub	D ₃	mm	49	66	82
		in	1.9	2.6	3.2
Outer diameter flange (Tolerance -0,2)	D ₅	mm	63.5	86.5	108
		in	2.5	3.4	4.3
Pitch circle intermediate flange ^{b)}	D ₆	mm	56.5	76	97
		in	2.2	3	3.8
Mounting screws (ISO 4762 / 12.9) (Intermediate flange)			10 x M4	10 x M5	10 x M6

Mountable to

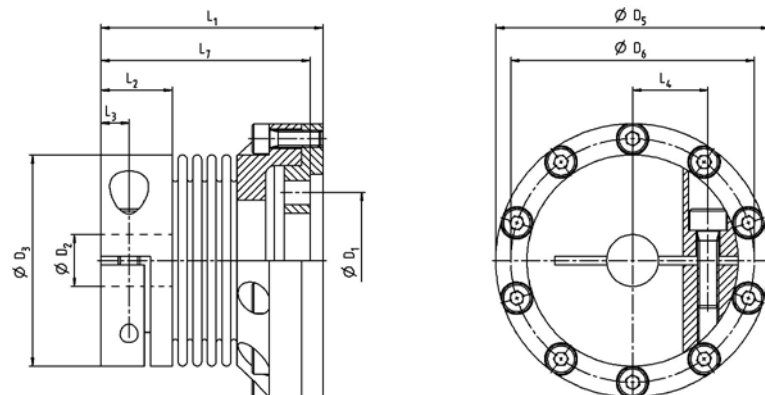
TP ⁺ , TK ⁺ , TPC ⁺ , TPM ⁺ DYNAMIC, TPM ⁺ POWER	004	010	025
TPK ⁺	-	010	025
VT ⁺	-	050	063
premo [®] TP Line	1	2	3

a) Performance reduction possible with small clamping hub diameters: Technical data available on request

b) Intermediate flange incl. screws contained in scope of delivery

c) Screws contained in scope of delivery

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



Size			300	1500
Overall length			A	A
Max. acceleration torque ^{a)} (max. 1000 cycles per hour)	T _B	Nm	750	2600
		lbf.in	6638	23012
Emergency stop torque (permitted 1000 times during the service life of the gearbox)	T _{Not}	Nm	1125	3900
		lbf.in	9957	34518
Max. speed	n _{Max}	rpm	6000	
Axial misalignment	±	mm	2.5	3
		in	0.098	0.118
Angular misalignment	±	°	1	1
Lateral misalignment	±	mm	0.25	0.25
		in	0.01	0.01
Axial spring rigidity	C _a	N/mm	112	322
		lbf/in	640	1839
Lateral spring rigidity	C _l	N/mm	3960	5890
		lbf/in	22612	33632
Torsional rigidity	C _T	Nm/arcmin	105	353.9
		lbf.in/arcmin	929	3132
Mass moment of inertia	J	kgcm ²	55	450
		lbf.in.s ²	49	399
Weight	m	kg	2.8	10
		lb	6.2	22

Dimensions

Dimensions				
Total length (Tolerance -2)	L ₁	mm	95.5	148.5
		in	3.8	5.8
Fitting length	L ₂	mm	34	55.5
		in	1.3	2.2
Distance	L ₃	mm	12.5	22.5
		in	0.49	0.89
Centre distance	L ₄	mm	1 x 39	2 x 55
		in	1 x 1.5	2 x 2.2
Length of mounting space (Tolerance -2)	L ₇	mm	89	141
		in	3.5	5.6
Pitch circle input ^{c)}	D ₁	mm	80	125
		in	3.1	4.9
Mounting screws (ISO 4017 / 10.9) (input)			12 x M8	12 x M10
Inner diameter output ^{d)} (Tolerance H7)	D ₂	mm	24 - 60	50 - 80
		in	0.94 - 2.4	2 - 3.1
Outer diameter hub	D ₃	mm	110	157
		in	4.3	6.2
Outer diameter flange (Tolerance -0,2)	D ₅	mm	132	188.5
		in	5.2	7.4
Pitch circle intermediate flange ^{b)}	D ₆	mm	120	170.5
		in	4.7	6.7
Mounting screws (ISO 4762 / 12.9) (Intermediate flange)			12 x M6	16 x M8

Mountable to

TP ⁺ , TK ⁺ , TPC ⁺ , TPM ⁺ DYNAMIC, TPM ⁺ POWER	050	110
TPK ⁺	050	110
VT ⁺	080	100
premo [®] TP Line	-	-

a) Performance reduction possible with small clamping hub diameters: Technical data available on request

b) Intermediate flange incl. screws contained in scope of delivery

c) Screws contained in scope of delivery

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

Metal bellows coupling BCT



For the ordering code, please refer to p 80

BCT Metal bellows coupling / HIGH TORQUE

Size			150	300		1500
Overall length			A	A	A	A
Max. acceleration torque (max. 1000 cycles per hour)	T_B	Nm	230	530	1000	3100
		lbf.in	2036	4691	8851	27437
Emergency stop torque (permitted 1000 times during the service life of the gearbox)	T_{Not}	Nm	345	795	1500	4650
		lbf.in	3054	7036	13276	41156
Max. speed	n_{Max}	rpm	6000	6000	5000	4500
Axial misalignment	\pm	mm	2	2.5	2.5	1.5
		in	0.079	0.098	0.098	0.059
Angular misalignment	\pm	°	1	1	1	0.7
		mm	0.25	0.25	0.25	0.15
Lateral misalignment	\pm	in	0.01	0.01	0.01	0.006
		N/mm	85	110	240	1000
Axial spring rigidity	C_a	lbf/in	485	628	1370	5710
Lateral spring rigidity	C_l	N/mm	1620	3860	6600	21000
		lbf/in	9250	22041	37686	119910
Torsional rigidity	C_T	Nm/arcmin	49.5	101.9	139.7	815
		lbf.in/arcmin	438	902	1236	7213
Mass moment of inertia	J	kgcm ²	22	71	74	370
		lbf.in.s ²	20	63	66	328
Weight	m	kg	1.8	3.6	3.6	8.7
		lb	4	7.9	7.9	19

Dimensions

Total length (without LS / Tolerance -2)	L ₁	mm	75	93	95	135
		in	3	3.7	3.7	5.3
Fitting length	L ₂	mm	32	41	41	61
		in	1.3	1.6	1.6	2.4
Length of mounting space (without LS / Tolerance -2)	L ₇	mm	69	87	88.5	127.5
		in	2.7	3.4	3.5	5
Screw head length	L _s	mm	4	5.3	5.3	7.5
		in	0.16	0.21	0.21	0.3
Pitch circle input ^{b)}	D ₁	mm	50	63	80	125
		in	2	2.5	3.1	4.9
Mounting screws (ISO 4017 / 10.9) (input)			12 x M6	12 x M8	12 x M10	12 x M12
Inner diameter output ^{d)} (Tolerance H7)	D ₂	mm	16 - 38	30 - 56	45 - 56	55 - 70
		in	0.63 - 1.5	1.2 - 2.2	1.8 - 2.2	2.2 - 2.8
Outer diameter bellows	D ₄	mm	81	110	110	157
		in	3.2	4.3	4.3	6.2
Outer diameter flange (Tolerance -0,2)	D ₅	mm	108	132	132	188.5
		in	4.3	5.2	5.2	7.4
Pitch circle intermediate flange ^{a)}	D ₆	mm	97	120	120	170.5
		in	3.8	4.7	4.7	6.7
Mounting screws (ISO 4762 / 12.9) (Intermediate flange)			10 x M6	12 x M6	12 x M6	16 x M8

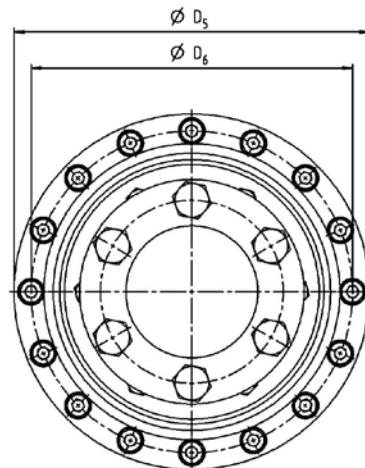
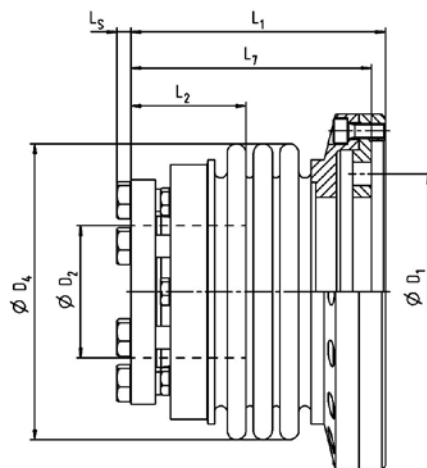
Mountable to

TP ⁺	010	025	050	110
TPK ⁺	010	025	050	110
TPM ⁺ HIGH TORQUE	010	025	050	110

a) Screws contained in scope of delivery

b) Intermediate flange incl. screws contained in scope of delivery

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



Size			4000	6000	10000
Overall length			A	A	A
Max. acceleration torque (max. 1000 cycles per hour)	T_B	Nm	6000	9000	12000
		lbf.in	53105	79657	106210
Emergency stop torque (permitted 1000 times during the service life of the gearbox)	T_{Not}	Nm	9000	13500	18000
		lbf.in	79657	119486	159314
Max. speed	n_{Max}	rpm	3500	3500	3500
Axial misalignment	\pm	mm	3.5	3	3
		in	0.138	0.118	0.118
Angular misalignment	\pm	°	1.5	1.5	1.5
Lateral misalignment	\pm	mm	0.4	0.4	0.4
		in	0.016	0.016	0.016
Axial spring rigidity	C_a	N/mm	1100	1050	980
		lbf/in	6281	5996	5596
Lateral spring rigidity	C_l	N/mm	7750	19200	21800
		lbf/in	44253	109632	124478
Torsional rigidity	C_T	Nm/arcmin	1484	2735	3172
		lbf.in/arcmin	13135	24207	28075
Mass moment of inertia	J	kgcm ²	1680	4330	7000
		lbf.in.s ²	1489	3839	6206
Weight	m	kg	22.5	41	55
		lb	50	90	121

Dimensions

Total length (without LS / Tolerance -2)	L ₁	mm	209	214	211
		in	8.2	8.4	8.3
Fitting length	L ₂	mm	80	85	92
		in	3.1	3.3	3.6
Length of mounting space (without LS / Tolerance -2)	L ₇	mm	197	201	198
		in	7.8	7.9	7.8
Screw head length	L _s	mm	10	10	10
		in	0.39	0.39	0.39
Pitch circle input ^{b)}	D ₁	mm	145	166	166
		in	5.7	6.5	6.5
Mounting screws (ISO 4762 / 12.9) (input)			12 x M20	12 x M24	12 x M24
Inner diameter output ^{d)} (Tolerance H7)	D ₂	mm	70 - 100	95 - 140	80 - 180
		in	2.8 - 3.9	3.7 - 5.5	3.1 - 7.1
Outer diameter bellows	D ₄	mm	200	253	303
		in	7.9	10	12
Outer diameter flange (Tolerance -0,2)	D ₅	mm	244	299	345
		in	9.6	12	14
Pitch circle intermediate flange ^{a)}	D ₆	mm	221	276	322
		in	8.7	11	13
Mounting screws (ISO 4762 / 12.9) (Intermediate flange)			20 x M12	20 x M12	24 x M12

Mountable to

TP*	300	500	500
TPK*	300	500	500
TPM* HIGH TORQUE	-	-	-

a) Screws contained in scope of delivery

b) Intermediate flange incl. screws contained in scope of delivery

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

Metal bellows coupling BCT



For the ordering code, please refer to p 80

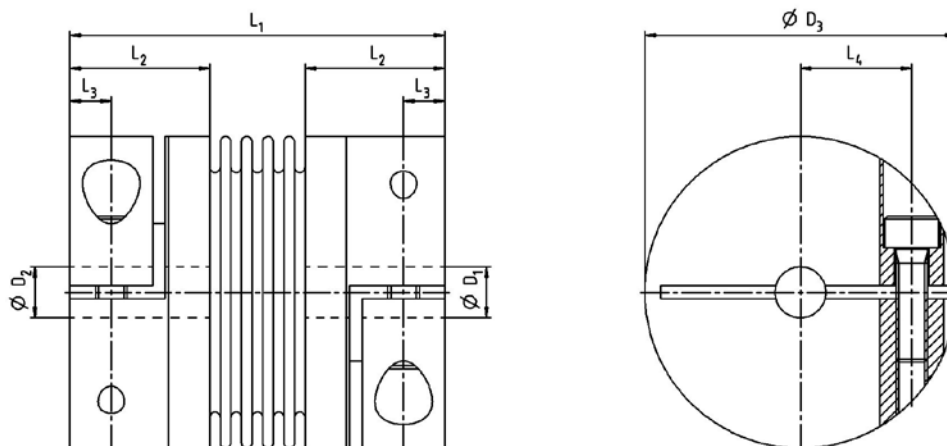
BC2 Metal bellows coupling / clamping hub

Size			15		30		60		80		150		200		300	
Overall length			A	B	A	B	A	B	A	B	A	B	A	B	A	B
Max. acceleration torque (max. 1000 cycles per hour)	T_B	Nm	15		30		60		80		150		200		300	
		lbf.in	133		266		531		708		1328		1770		2655	
Emergency stop torque (permitted 1000 times during the service life of the gearbox)	T_{Not}	Nm	22.5		45		90		120		225		300		450	
		lbf.in	199		398		797		1062		1991		2655		3983	
Max. speed	n_{Max}	rpm	10000													
Axial misalignment	\pm	mm	1	2	1	2	1.5	2	2	3	2	3	2	3	2.5	3.5
		in	0.039	0.079	0.039	0.079	0.059	0.079	0.079	0.118	0.079	0.118	0.079	0.118	0.098	0.138
Angular misalignment	\pm	°	1	1.5	1	1.5	1	1.5	1	1.5	1	1.5	1	1.5	1	1.5
Lateral misalignment	\pm	mm	0.15	0.2	0.2	0.25	0.2	0.25	0.2	0.25	0.2	0.25	0.25	0.3	0.25	0.3
		in	0.006	0.008	0.008	0.01	0.008	0.01	0.008	0.01	0.008	0.01	0.01	0.012	0.01	0.012
Axial spring rigidity	C_a	N/mm	25	15	50	30	72	48	48	32	82	52	90	60	105	71
		lbf/in	143	86	286	171	411	274	274	183	468	297	514	343	600	405
Lateral spring rigidity	C_l	N/mm	475	137	900	270	1200	420	920	290	1550	435	2040	610	3750	1050
		lbf/in	2712	782	5139	1542	6852	2398	5253	1656	8851	2484	11648	3483	21413	5996
Torsional rigidity	C_T	Nm/arcmin	5.8	4.4	11.3	8.1	22.1	16	37.5	24.7	50.9	32	55.6	40.7	131	102
		lbf.in/arcmin	51	39	100	72	196	142	332	219	451	283	492	360	1159	903
Mass moment of inertia	J	kgcm ²	0.6	0.7	1.2	1.3	3.2	3.5	8	8.5	19	20	32	34	76	79
		lbf.in.s ²	0.53	0.62	1.1	1.2	2.8	3.1	7.1	7.5	17	18	28	30	67	70
Weight	m	kg	0.16		0.26		0.48		0.8		1.85		2.65		4	
		lb	0.35		0.57		1.1		1.8		4.1		5.8		8.8	

Dimensions

Total length (Tolerance -2)	L_1	mm	59	66	69	77	83	93	94	106	95	107	104	116	111	125
		in	2.3	2.6	2.7	3	3.3	3.7	3.7	4.2	3.7	4.2	4.1	4.6	4.4	4.9
Fitting length	L_2	mm	22		26.5		31		35.5		35.5		40.5		42.5	
		in	0.87		1		1.2		1.4		1.4		1.6		1.7	
Distance	L_3	mm	6.5		7.5		9.5		11		11		12.5		13	
		in	0.26		0.3		0.37		0.43		0.43		0.49		0.51	
Centre distance ^a	L_4	mm	17.5		19		23		27		27		30.5		39	
		in	0.69		0.75		0.91		1.1		1.1		1.2		1.5	
Inner diameter input ^{d)} (Tolerance H7)	D_1	mm	8 - 28		10 - 30		12 - 35		14 - 42		19 - 42		22 - 45		24 - 60	
		in	0.31 - 1.1		0.39 - 1.2		0.47 - 1.4		0.55 - 1.7		0.75 - 1.7		0.87 - 1.8		0.94 - 2.4	
Inner diameter output ^{d)} (Tolerance H7)	D_2	mm	8 - 28		10 - 30		12 - 35		14 - 42		19 - 42		22 - 45		24 - 60	
		in	0.31 - 1.1		0.39 - 1.2		0.47 - 1.4		0.55 - 1.7		0.75 - 1.7		0.87 - 1.8		0.94 - 2.4	
Outer diameter hub	D_3	mm	49		55		66		81		81		90		110	
		in	1.9		2.2		2.6		3.2		3.2		3.5		4.3	

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



Size			500		800		1500		4000	6000	10000
Overall length			A	B	A	B	A	B	A	A	A
Max. acceleration torque (max. 1000 cycles per hour)	T _B	Nm	500		800		1500		4000	6000	10000
		lbf.in	4425		7081		13276		35403	53105	88508
Emergency stop torque (permitted 1000 times during the service life of the gearbox)	T _{Not}	Nm	750		1200		2250		6000	9000	15000
		lbf.in	6638		10621		19914		53105	79657	132762
Max. speed	n _{Max}	rpm	10000								
Axial misalignment	±	mm	2.5	3.5	3.5	4.5	3.5	4.5	3.5	3	3
		in	0.098	0.138	0.138	0.177	0.138	0.177	0.138	0.118	0.118
Angular misalignment	±	°	1	1.5	1.5	2	1.5	2	1.5	1.5	1.5
Lateral misalignment	±	mm	0.3	0.35	0.35	1	0.35	1	0.4	0.4	0.4
		in	0.012	0.014	0.014	0.039	0.014	0.039	0.016	0.016	0.016
Axial spring rigidity	C _a	N/mm	70	48	100	285	320	440	565	1030	985
		lbf/in	400	274	571	1627	1827	2512	3226	5881	5624
Lateral spring rigidity	C _l	N/mm	2500	840	2000	1490	3600	1700	6070	19200	21800
		lbf/in	14275	4796	11420	8508	20556	9707	34660	109632	124478
Torsional rigidity	C _T	Nm/arcmin	148	145.5	227	207	379	343	989	1659	3186
		lbf.in/arcmin	1310	1288	2009	1832	3354	3036	8753	14683	28199
Mass moment of inertia	J	kgcm ²	143	146	162	170	430	450	1650	4950	12140
		lbf.in.s ²	127	129	144	151	381	399	1463	4388	10762
Weight	m	kg	6.3		5.7		11.5		28.8	49.4	80.9
		lb	14		13		25		64	109	178

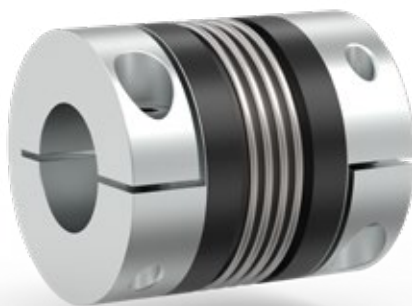
Dimensions

Total length (Tolerance -2)	L_1	mm	132	146	140	178	167	231	229	252	288
		in	5.2	5.7	5.5	7	6.6	9.1	9	9.9	11
Fitting length	L_2	mm	50.5		45		55.5		85	107	129
		in	2		1.8		2.2		3.3	4.2	5.1
Distance	L_3	mm	16.5		17.5		22.5		28.5	35.5	42
		in	0.65		0.69		0.89		1.1	1.4	1.7
Centre distance ^{a)}	L_4	mm	41		2 x 48		2 x 55		2 x 65	2 x 90	2 x 117
		in	1.6		2 x 1.9		2 x 2.2		2 x 2.6	2 x 3.5	2 x 4.6
Inner diameter input ^{d)} (Tolerance H7)	D_1	mm	35 - 60		40 - 75		50 - 80		50 - 90	60 - 140	70 - 180
		in	1.4 - 2.4		1.6 - 3		2 - 3.1		2 - 3.5	2.4 - 5.5	2.8 - 7.1
Inner diameter output ^{d)} (Tolerance H7)	D_2	mm	35 - 60		40 - 75		50 - 80		50 - 90	60 - 140	70 - 180
		in	1.4 - 2.4		1.6 - 3		2 - 3.1		2 - 3.5	2.4 - 5.5	2.8 - 7.1
Outer diameter hub	D_3	mm	124		134		157		200	253	303
		in	4.9		5.3		6.2		7.9	10	12

a) Starting at size 800, two screws per clamping hub offset by 180°.

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

Metal bellows coupling BC2



For the ordering code, please refer to p 80

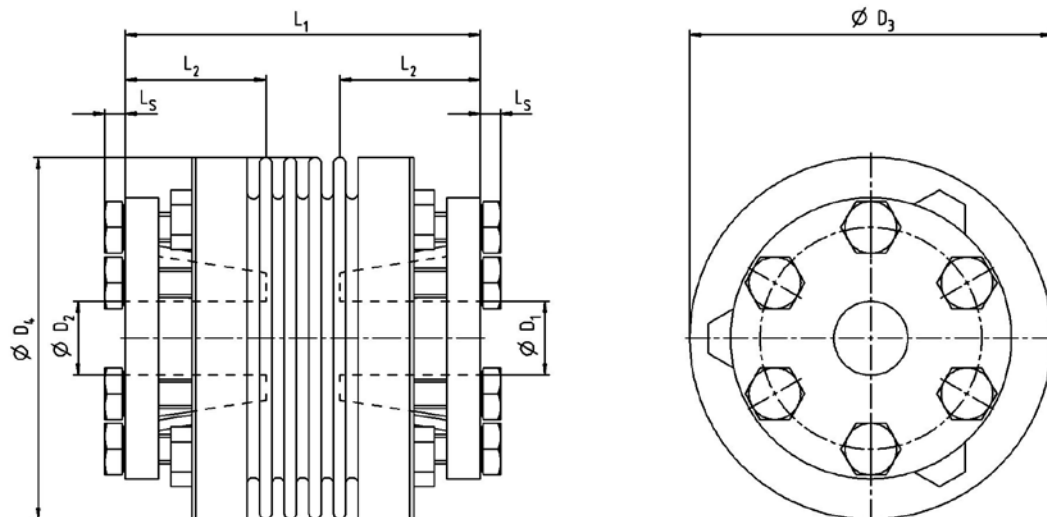
BC3 Metal bellows coupling / tapered clamping hub

Size			15		30		60		150		200		300	
Overall length			A	B	A	B	A	B	A	B	A	B	A	B
Max. acceleration torque ¹⁾ (max. 1000 cycles per hour)	T _B	Nm	15		30		60		150		200		300	
		lbf.in	133		266		531		1328		1770		2655	
Emergency stop torque (permitted 1000 times during the service life of the gearbox)	T _{Not}	Nm	22.5		45		90		225		300		450	
		lbf.in	199		398		797		1991		2655		3983	
Max. speed	n _{Max}	rpm	10000											
Axial misalignment	±	mm	1	2	1	2	1.5	2	2	3	2	3	2.5	3.5
		in	0.039	0.079	0.039	0.079	0.059	0.079	0.079	0.118	0.079	0.118	0.098	0.138
Angular misalignment	±	°	1	1.5	1	1.5	1	1.5	1	1.5	1	1.5	1	1.5
Lateral misalignment	±	mm	0.15	0.2	0.2	0.25	0.2	0.25	0.2	0.25	0.25	0.3	0.25	0.3
		in	0.006	0.008	0.008	0.01	0.008	0.01	0.008	0.01	0.01	0.012	0.01	0.012
Axial spring rigidity	C _a	N/mm	25	15	50	30	72	48	82	52	90	60	105	71
		lbf/in	143	86	286	171	411	274	468	297	514	343	600	405
Lateral spring rigidity	C _l	N/mm	475	137	900	270	1200	420	1500	435	2040	610	3750	1050
		lbf/in	2712	782	5139	1542	6852	2398	8565	2484	11648	3483	21413	5996
Torsional rigidity	C _T	Nm/arcmin	5.8	4.4	11.3	8.1	22.1	16	50.9	32	55.6	40.7	131	101.9
		lbf.in/arcmin	51	39	100	72	196	142	451	283	492	360	1159	902
Mass moment of inertia	J	kgcm ²	0.7	0.8	1.5	1.6	3.9	4.1	12	16	17	25	51	59
		lbf.in.s ²	0.62	0.71	1.3	1.4	3.5	3.6	11	14	15	22	45	52
Weight	m	kg	0.25		0.4		0.7		1.2		1.8		3	
		lb	0.55		0.88		1.5		2.6		4		6.6	

Dimensions

Total length (without LS / Tolerance -2)	L_1	mm	48	55	55	63	66	76	73	85	76	88	89	103
		in	1.9	2.2	2.2	2.5	2.6	3	2.9	3.3	3	3.5	3.5	4.1
Fitting length	L_2	mm	19		21.5		27.5		32		32		41.5	
		in	0.75		0.85		1.1		1.3		1.3		1.6	
Screw head length	L_S	mm	2.8		3.5		3.5		4		4		5.3	
		in	0.11		0.14		0.14		0.16		0.16		0.21	
Inner diameter input ^{d)} (Tolerance H7)	D_1	mm	10 - 22		12 - 23		12 - 29		15 - 38		15 - 44		24 - 56	
		in	0.39 - 0.87		0.47 - 0.91		0.47 - 1.1		0.59 - 1.5		0.59 - 1.7		0.94 - 2.2	
Inner diameter output ^{d)} (Tolerance H7)	D_2	mm	10 - 22		12 - 23		12 - 29		15 - 38		15 - 44		24 - 56	
		in	0.39 - 0.87		0.47 - 0.91		0.47 - 1.1		0.59 - 1.5		0.59 - 1.7		0.94 - 2.2	
Outer diameter hub	D_3	mm	49		55		66		81		90		110	
		in	1.9		2.2		2.6		3.2		3.5		4.3	
Outer diameter bellows	D_4	mm	49		55		66		81		90		110	
		in	1.9		2.2		2.6		3.2		3.5		4.3	

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



Size			500		800	1500	4000	6000	10000
Overall length			A	B	A	A	A	A	A
Max. acceleration torque ^{a)} (max. 1000 cycles per hour)	T_B	Nm	500		800	1500	4000	6000	10000
		lbf.in	4425		7081	13276	35403	53105	88508
Emergency stop torque (permitted 1000 times during the service life of the gearbox)	T_{Not}	Nm	750		1200	2250	6000	9000	15000
		lbf.in	6638		10621	19914	53105	79657	132762
Max. speed	n_{Max}	rpm	10000						
Axial misalignment	\pm	mm	2.5	3.5	3.5	3.5	3.5	3	3
		in	0.098	0.138	0.138	0.138	0.138	0.118	0.118
Angular misalignment	\pm	°	1	1.5	1.5	1.5	1.5	1.5	1.5
Lateral misalignment	\pm	mm	0.3	0.35	0.35	0.35	0.4	0.4	0.4
		in	0.012	0.014	0.014	0.014	0.016	0.016	0.016
Axial spring rigidity	C_a	N/mm	70	48	100	320	565	1030	985
		lbf/in	400	274	571	1827	3226	5881	5624
Lateral spring rigidity	C_l	N/mm	2500	840	2000	3600	6070	19200	21800
		lbf/in	14275	4796	11420	20556	34660	109632	124478
Torsional rigidity	C_T	Nm/arcmin	148	145.5	227	379	989	1659	3186
		lbf.in/arcmin	1310	1288	2009	3354	8753	14683	28199
Mass moment of inertia	J	kgcm ²	91	99	132	349	855	2540	6290
		lbf.in.s ²	81	88	117	309	758	2252	5576
Weight	m	kg	4.2		5.6	8.2	23	32.6	45.5
		lb	9.3		12	18	51	72	100

Dimensions

Total length (without LS / Tolerance -2)	L_1	mm	96	110	115	140	198	210	217
		in	3.8	4.3	4.5	5.5	7.8	8.3	8.5
Fitting length	L_2	mm	41.5		50	61	80.5	85	93.5
		in	1.6		2	2.4	3.2	3.3	3.7
Screw head length	L_S	mm	5.3		6.4	7.5	10	10	10
		in	0.21		0.25	0.3	0.39	0.39	0.39
Inner diameter input ^{d)} (Tolerance H7)	D_1	mm	24 - 56		30 - 60	35 - 70	50 - 100	60 - 140	70 - 180
		in	0.94 - 2.2		1.2 - 2.4	1.4 - 2.8	2 - 3.9	2.4 - 5.5	2.8 - 7.1
Inner diameter output ^{d)} (Tolerance H7)	D_2	mm	24 - 56		30 - 60	35 - 70	50 - 100	60 - 140	70 - 180
		in	0.94 - 2.2		1.2 - 2.4	1.4 - 2.8	2 - 3.9	2.4 - 5.5	2.8 - 7.1
Outer diameter hub	D_3	mm	122		116	135	180	246	295
		in	4.8		4.6	5.3	7.1	9.7	12
Outer diameter bellows	D_4	mm	124		133	157	200	253	303
		in	4.9		5.2	6.2	7.9	10	12

a) Performance reduction possible with small clamping hub diameters: Technical data available on request

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

Metal bellows coupling BC3



For the ordering code, please refer to p 80

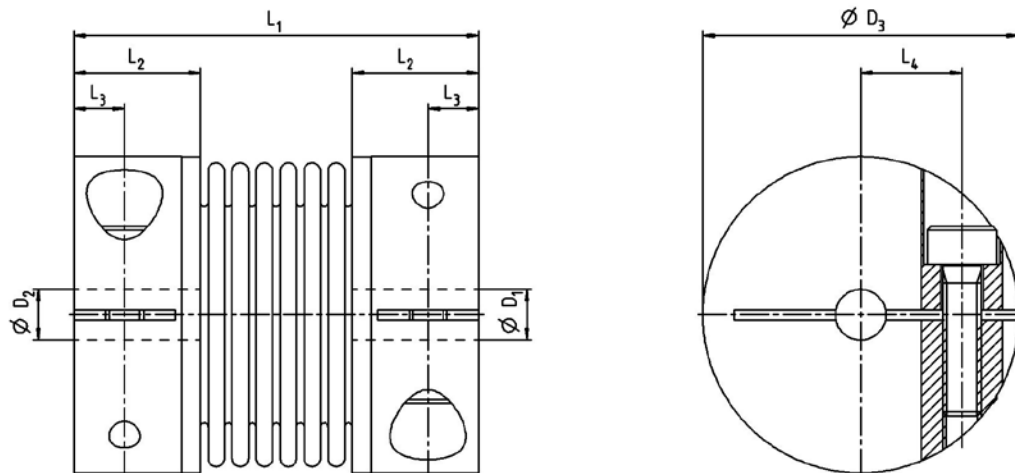
BCL Metal bellows coupling / Economy

Size			2	4.5	10	15	30
Overall length			A	A	A	A	A
Max. acceleration torque (max. 1000 cycles per hour)	T_B	Nm	2	4.5	10	15	30
		lbf.in	18	40	89	133	266
Emergency stop torque (permitted 1000 times during the service life of the gearbox)	T_{Not}	Nm	3	6.75	15	22.5	45
		lbf.in	27	60	133	199	398
Max. speed	n_{Max}	rpm	10000				
Axial misalignment	\pm	mm	0.5	1	1	1	1
		in	0.02	0.039	0.039	0.039	0.039
Angular misalignment	\pm	°	1	1	1	1	1
Lateral misalignment	\pm	mm	0.2	0.2	0.2	0.2	0.2
		in	0.008	0.008	0.008	0.008	0.008
Axial spring rigidity	C_a	N/mm	8	35	30	30	50
		lbf/in	46	200	171	171	286
Lateral spring rigidity	C_l	N/mm	50	350	320	315	366
		lbf/in	286	1999	1827	1799	2090
Torsional rigidity	C_T	Nm/arcmin	0.44	2	2.6	6.7	9
		lbf.in/arcmin	3.9	18	23	59	80
Mass moment of inertia	J	kgcm ²	0.02	0.07	0.16	0.65	1.2
		lbf.in.s ²	0.02	0.06	0.14	0.58	1.1
Weight	m	kg	0.02	0.05	0.06	0.16	0.25
		lb	0.04	0.11	0.13	0.35	0.55

Dimensions

Total length (Tolerance -2)	L_1	mm	32	40	44	58	68
		in	1.3	1.6	1.7	2.3	2.7
Fitting length	L_2	mm	10	13	13	21.5	26
		in	0.39	0.51	0.51	0.85	1
Distance	L_3	mm	4	5	5	6.5	7.5
		in	0.16	0.2	0.2	0.26	0.3
Centre distance	L_4	mm	8	11	14.5	17.5	20
		in	0.31	0.43	0.57	0.69	0.79
Inner diameter input ^{d)} (Tolerance H7)	D_1	mm	4 - 12.7	6 - 16	6 - 24	8 - 28	10 - 32
		in	0.16 - 0.5	0.24 - 0.63	0.24 - 0.94	0.31 - 1.1	0.39 - 1.3
Inner diameter output ^{d)} (Tolerance H7)	D_2	mm	4 - 12.7	6 - 16	6 - 24	8 - 28	10 - 32
		in	0.16 - 0.5	0.24 - 0.63	0.24 - 0.94	0.31 - 1.1	0.39 - 1.3
Outer diameter hub	D_3	mm	25	32	40	49	56
		in	0.98	1.3	1.6	1.9	2.2

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



Size			60	80	150	300	500
Overall length			A	A	A	A	A
Max. acceleration torque (max. 1000 cycles per hour)	T_B	Nm	60	80	150	300	500
		lbf.in	531	708	1328	2655	4425
Emergency stop torque (permitted 1000 times during the service life of the gearbox)	T_{Not}	Nm	90	120	225	450	750
		lbf.in	797	1062	1991	3983	6638
Max. speed	n_{Max}	rpm	10000				
Axial misalignment	\pm	mm	1.5	2	2	2	2.5
		in	0.059	0.079	0.079	0.079	0.098
Angular misalignment	\pm	°	1	1	1	1	1
Lateral misalignment	\pm	mm	0.2	0.2	0.2	0.2	0.2
		in	0.008	0.008	0.008	0.008	0.008
Axial spring rigidity	C_a	N/mm	67	44	77	112	72
		lbf/in	383	251	440	640	411
Lateral spring rigidity	C_l	N/mm	679	590	960	2940	1450
		lbf/in	3877	3369	5482	16787	8280
Torsional rigidity	C_T	Nm/arcmin	21	23.3	41	45.7	84.4
		lbf.in/arcmin	186	206	363	404	747
Mass moment of inertia	J	kgcm ²	3	7.5	18	75	117
		lbf.in.s ²	2.7	6.6	16	66	104
Weight	m	kg	0.4	0.7	1.7	3.8	4.9
		lb	0.88	1.5	3.7	8.4	11

Dimensions

Total length (Tolerance -2)	L_1	mm	79	92	92	108	114
		in	3.1	3.6	3.6	4.3	4.5
Fitting length	L_2	mm	28	32.5	32.5	41	41.5
		in	1.1	1.3	1.3	1.6	1.6
Distance	L_3	mm	9.5	11	11	13.5	17
		in	0.37	0.43	0.43	0.53	0.67
Centre distance	L_4	mm	23	27	27	39	41
		in	0.91	1.1	1.1	1.5	1.6
Inner diameter input ^{d)} (Tolerance H7)	D_1	mm	14 - 35	16 - 42	19 - 42	24 - 60	35 - 62
		in	0.55 - 1.4	0.63 - 1.7	0.75 - 1.7	0.94 - 2.4	1.4 - 2.4
Inner diameter output ^{d)} (Tolerance H7)	D_2	mm	14 - 35	16 - 42	19 - 42	24 - 60	35 - 62
		in	0.55 - 1.4	0.63 - 1.7	0.75 - 1.7	0.94 - 2.4	1.4 - 2.4
Outer diameter hub	D_3	mm	66	82	82	110	123
		in	2.6	3.2	3.2	4.3	4.8

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

Metal bellows coupling BCL



For the ordering code, please refer to p 80

Torque limiters

Torque limiters with integrated switching mechanism combine the dynamic and precise transmission with torque limitation.

Torque limiters are mainly backlash-, wear- and maintenance-free. They are positioned directly in the interface between the drive and output side. In the event of overload, they react quickly to separate the interfaces and protect the machines against damage.

Depending on the requirements, different re-engagement designs are used for torque limiters. Please note, the functional systems presented below only re-engage during a standstill or with very low rotational speeds and after a reduction in the overload. Variable shaft connections are available as special versions.

PRODUCT HIGHLIGHTS

Compact and completely backlash-free

thanks to accurately manufactured components.

Ideal utilization of the entire system

thanks to the maintenance-free and accurate torque limitation.

Fast shut-off within milliseconds

due to the use of high-performance positioning springs.



	Bellows material	Hub material	Permitted temperature range
TL1	-	Size 1.5 to 10: Aluminum; size 15 to 2500: Steel	-30 to +120° C
TL2	Highly elastic stainless steel	High-strength aluminum, as of size 150: Steel	-30 to +100° C, as of size 800: -30 to +300° C
TL3	Highly elastic stainless steel	Steel	-30 to +100° C, as of size 800: -30 to +300° C

Selectable functions – re-engagement after overload has been secured

Single position re-engagement (W) (standard)



- Re-engagement after exactly 360°
- Guaranteed synchrony
- Switch signal in the event of overload*

Application:

- Packaging machines
- Machine tools
- Automation systems

Multi-position (D)



- Re-engagement after exactly 60° (standard)
- Optionally after 30, 45, 60, 90, 120°
- System is immediately available again
- Switch signal in the event of overload*

Application:

- Packaging machines
- Machine tools
- Automation systems

Full disengagement (F)



- Permanent separation of drive and output
- Free deceleration of centrifugal masses
- Manual re-engagement (every 60°)
- Switch signal in the event of overload*

Application:

Applications with extremely high speeds and kinetic energy

Blocked version (G)



- None and/or limited separation of drive and output
- Only slow rotation possible during overload
- Re-engagement after torque drop
- Guaranteed load safety
- Switch signal in the event of overload*

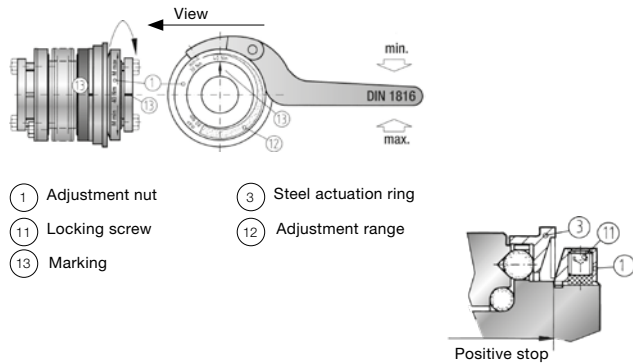
Application:

Ideal for vertical axes, such as presses or load lifting equipment

* For suitable switches, see 44

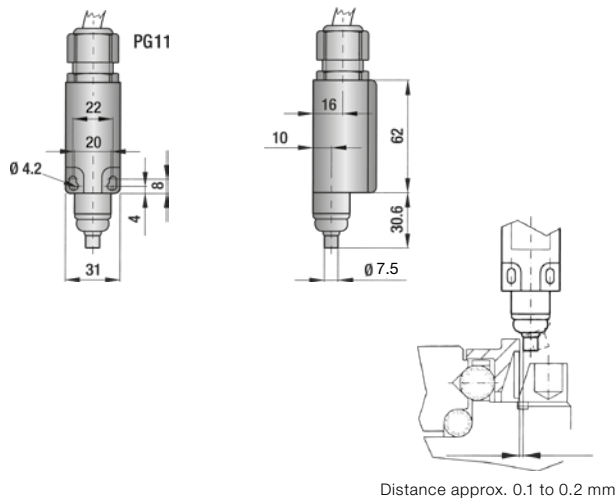
Accessories for TL – torque limiters

WITTENSTEIN alpha torque limiters are factory adjusted to your specified disengagement torque. Thanks to the installed disc springs with special degressive spring characteristics, it is also possible to adjust the preset disengagement torque using a cant dog key.



Torque adjusting wrench for DIN 1816 nuts

Smaller coupling sizes do not require the use of a cant dog key. The adjusting nut for the 1.5/2/4.5/10 series can be adjusted with a stud or pin.

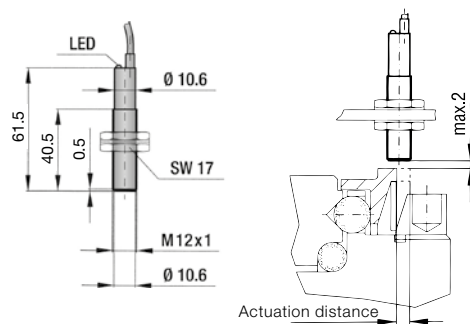


Mechanical end switch (EMERGENCY STOP function)

Caution:

The switch function must always be checked 100% after the assembly in every instance.

The actuation tappet should be positioned as close as possible to the actuation ring of the torque limiter (approx. 0.1 – 0.2 mm).



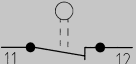
Proximity switch (EMERGENCY STOP function)

Caution:

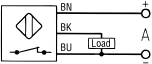
The switch function must always be checked by 100% after the assembly in any case.

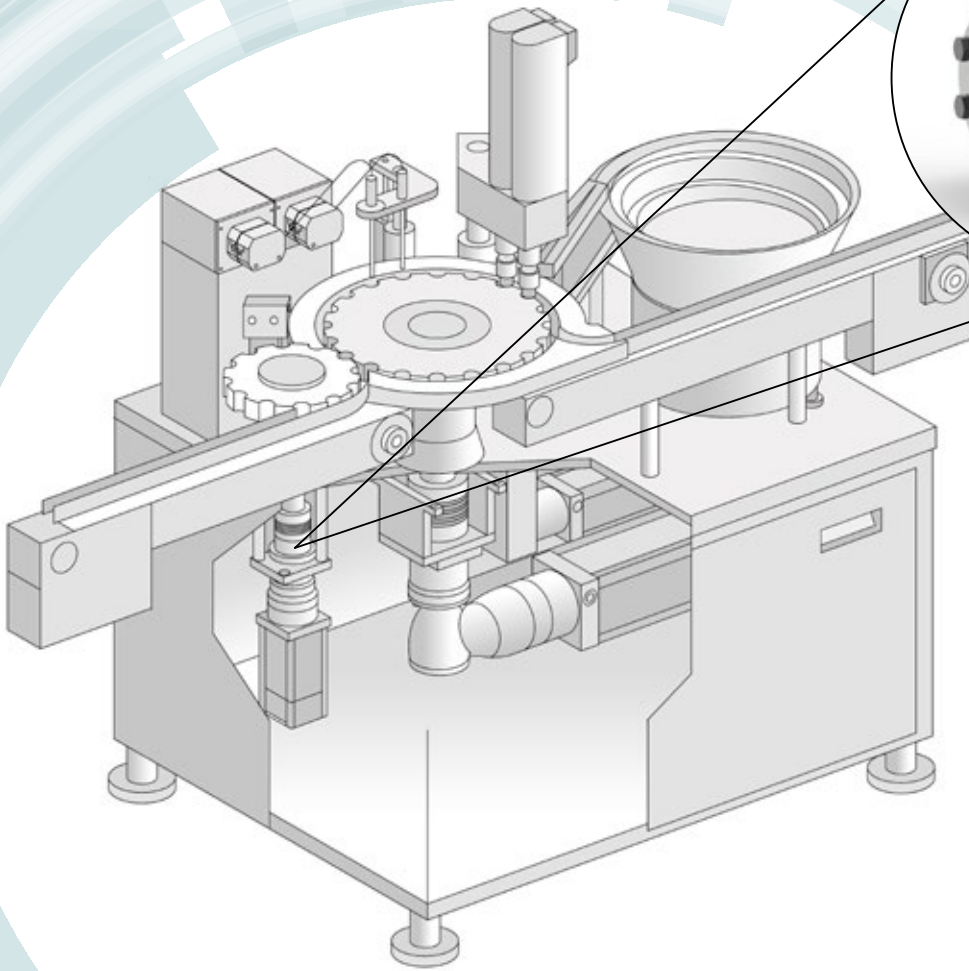
Torque adjusting wrench			
Size	Designation	Material number according to the function systems	
		W, D, G*	F*
15	GHS 15	20047730	20047730
30	GHS 30	20047731	20047731
60	GHS 60	20047732	20047732
80	GHS 80	20047733	20047733
150	GHS 150	20047733	20047733
200	GHS 200	20047734	20047750
300	GHS 300	20047735	20047735
500	GHS 500	20047736	20047736
800	GHS 800	20047737	20047751
1500	GHS 1500	20047738	20047738
2500	GHS 2500	20047739	20047752

* Function systems: Single position (W), re-engaging (D), blocked (G), full disengagement (F)

Technical data	ME TL Material number: 20022999
Max. voltage	500 V AC
Max. constant current	10 A
Protection class	IP 65
Contact type	NC contact (positive opening)
Ambient temperature	-30 °C to +80 °C
Actuation	Tappet (metal)
Circuit symbol	

The mechanical limit switch is suitable for size 30 and above.

Technical data	NAS TL Material number: 20022998
Voltage range	10 to 30 V DC
Max. output current	200 mA
Max. switching frequency	800 Hz
Temperature range	-25 °C to +70 °C
Protection class	IP 67
Switch type	PNP NC contact
Detection gap	max. 2 mm
Circuit symbol	



Function

The **filling and closing machine** is used for quick and automatic filling of e.g. liquid pharmaceutical products and the subsequent secure closure of the containers.

Torque limiters protect the system against major damage in the event of malfunctions since they can be placed directly at the axis and are triggered within milliseconds. Therefore, more complex monitoring systems are obsolete.

The torque limiter can transmit the error message directly to the control unit by means of a sensor. They fulfill their tasks in a backlash-, wear- and maintenance-free manner and are thus a cost-efficient alternative to more complex control concepts.



Application

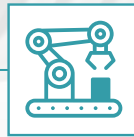
Example applications



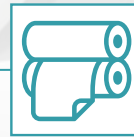
Machine tools



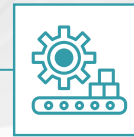
Servo drive technology



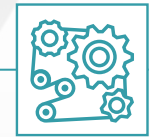
Automation



Printing presses



Packaging machines



General mechanical engineering



Benefits

Extremely high machine availability and dynamics thanks to the quickly reacting feedback in the event of error messages.

Low maintenance effort thanks to maintenance-free torque limiters.

Protection against machine damage due to overload.

Properties

Torsional rigidity and backlash-free design analogously to the metal bellows couplings.

Fast shut-off within milliseconds through the use of high-performance positioning springs.

Accurate torque limitation through simple re-adjustment of the setting ring at the application axis.

Compensation of misalignments due to assembly



Axial



Angular



Lateral

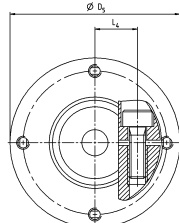
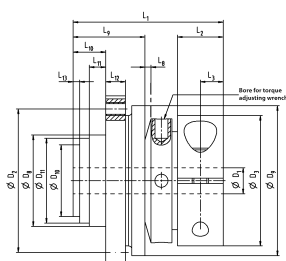
TL1 – Torque limiter / for belt pulley

Size				1.5	2	4.5	10	15	30	60	150	
Overall length				A	A	A	A	A	A	A	A	
Release torque (Adjustable)	A	T _{Dis}	Nm	0.1 - 0.6	0.2 - 1.5	1 - 3	2 - 6	5 - 15	5 - 20	10 - 30	20 - 70	
			lbf.in	0.89 - 5.3	1.8 - 13	8.9 - 27	18 - 53	44 - 133	44 - 177	89 - 266	177 - 620	
	B		Nm	0.4 - 1	0.5 - 2.2	2 - 4.5	4 - 12	12 - 25	10 - 30	25 - 80	45 - 150	
			lbf.in	3.5 - 8.9	4.4 - 19	18 - 40	35 - 106	106 - 221	89 - 266	221 - 708	398 - 1328	
	C		Nm	0.8 - 2	1.5 - 3.5	3 - 7	7 - 18	20 - 40	20 - 60	50 - 115	80 - 225	
			lbf.in	7.1 - 18	13 - 31	27 - 62	62 - 159	177 - 354	177 - 531	443 - 1018	708 - 1991	
	D		Nm	-	-	-	-	35 - 70	50 - 100	-	-	
lbf.in		-	-	-	-	310 - 620	443 - 885	-	-			
Max. speed		n _{Max}	rpm	3000								2000
Max. lateral force (Belt pretension)		F _R	N	50	100	200	600	1400	1800	2200	3000	
			lbf	11	22	45	135	315	405	495	674	
Distance (Relating to the force application point)		S	mm	3 - 6	5 - 8	5 - 11	6 - 14	7 - 17	10 - 24	10 - 24	12 - 24	
			in	0.12 - 0.24	0.2 - 0.31	0.2 - 0.43	0.24 - 0.55	0.28 - 0.67	0.39 - 0.94	0.39 - 0.94	0.47 - 0.94	
Mass moment of inertia		J	kgcm ²	0.1	0.2	0.5	0.7	1.5	2.5	5	16	
			lbf.in.s ²	0.09	0.18	0.44	0.62	1.3	2.2	4.4	14	
Weight		m	kg	0.03	0.065	0.12	0.22	0.4	0.7	1	1.3	
			lb	0.07	0.14	0.26	0.49	0.88	1.5	2.2	2.9	

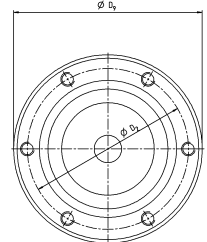
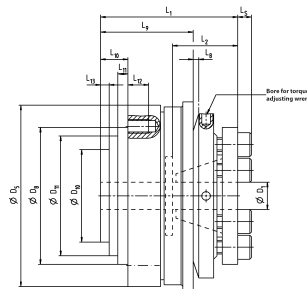
Dimensions

Total length (without LS)	L ₁	mm	23	28	32	39	40	50	54	58
		in	0.91	1.1	1.3	1.5	1.6	2	2.1	2.3
Fitting length	L ₂	mm	7	8	10	10.5	19	21.5	27.5	32
		in	0.28	0.31	0.39	0.41	0.75	0.85	1.1	1.3
Distance	L ₃	mm	3.5	4	5	5	-	-	-	-
		in	0.14	0.16	0.2	0.2	-	-	-	-
Centre distance	L ₄	mm	6.5	8.5	11.5	15	-	-	-	-
		in	0.26	0.33	0.45	0.59	-	-	-	-
Actuation distance	L ₈	mm	0.7	0.8	0.8	1.2	1.5	1.7	1.7	1.9
		in	0.03	0.03	0.03	0.05	0.06	0.07	0.07	0.07
Distance	L ₉	mm	11	15	17	22	27	35	37	39
		in	0.43	0.59	0.67	0.87	1.1	1.4	1.5	1.5
Distance	L ₁₀	mm	5	6	8	11	8	11	11	12
		in	0.2	0.24	0.31	0.43	0.31	0.43	0.43	0.47
Centering length (Tolerance -0,2)	L ₁₁	mm	2.5	3.5	5	8	3	5	5	5
		in	0.1	0.14	0.2	0.31	0.12	0.2	0.2	0.2
Thread			4xM2	4xM2.5	6xM2.5	6xM3	6xM4	6xM5	6xM5	6xM6
Thread length	L ₁₂	mm	3	4	4	5	6	8	9	10
		in	0.12	0.16	0.16	0.2	0.24	0.31	0.35	0.39
Distance	L ₁₃	mm	1	1.3	1.5	1.5	2.5	2.5	2.5	2.5
		in	0.04	0.05	0.06	0.06	0.1	0.1	0.1	0.1
Screw head length	L _S	mm	-	-	-	-	4	5	5	6
		in	0	0	0	0	0.16	0.2	0.2	0.24
Inner diameter input ^{d)} (Tolerance H7)	D ₁	mm	4 - 8	4 - 12	5 - 14	6 - 17	8 - 22	12 - 22	12 - 29	15 - 37
		in	0.16 - 0.31	0.16 - 0.47	0.2 - 0.55	0.24 - 0.68	0.31 - 0.87	0.47 - 0.87	0.47 - 1.1	0.59 - 1.5
Pitch circle belt pulley (Tolerance ±0,2)	D ₂	mm	22	28	35	43	47	54	63	78
		in	0.87	1.1	1.4	1.7	1.9	2.1	2.5	3.1
Outer diameter hub	D ₃	mm	20	25	32	40	-	-	-	-
		in	0.79	0.98	1.3	1.6	0	0	0	0
Outer diameter flange (Tolerance -0,2)	D ₅	mm	26	32	40	50	53	63	72	87
		in	1	1.3	1.6	2	2.1	2.5	2.8	3.4
Centering diameter (Tolerance h7)	D ₈	mm	14	22	25	34	40	47	55	68
		in	0.55	0.87	0.98	1.3	1.6	1.9	2.2	2.7
Outer diameter actuation ring	D ₉	mm	23	29	35	45	55	65	73.5	92
		in	0.91	1.1	1.4	1.8	2.2	2.6	2.9	3.6
Diameter (Tolerance h7)	D ₁₀	mm	11	14	17	24	27	32	39	50
		in	0.43	0.55	0.67	0.94	1.1	1.3	1.5	2
Diameter	D ₁₁	mm	13	18	21	30	35	42	49	62
		in	0.51	0.71	0.83	1.2	1.4	1.7	1.9	2.4

TL 1 miniature version (1.5 - 10 series)
with standard clamping hub



TL 1 standard version (15 - 2500 series)
with tapered clamping hub

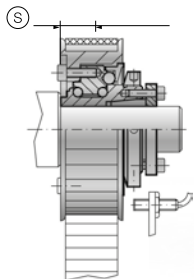


Size				200	300	500	800	1500	2500
Overall length				A	A	A	A	A	A
Release torque (Adjustable)	A	T _{Dis}	Nm	30 - 90	100 - 200	80 - 200	400 - 650	600 - 800	1500 - 2000
			lbf.in	266 - 797	885 - 1770	708 - 1770	3540 - 5753	5310 - 7081	13276 - 17702
	B		Nm	60 - 160	150 - 240	200 - 350	500 - 800	700 - 1200	2000 - 2500
			lbf.in	531 - 1416	1328 - 2124	1770 - 3098	4425 - 7081	6196 - 10621	17702 - 22127
	C		Nm	140 - 280	220 - 440	320 - 650	650 - 950	1000 - 1800	2300 - 2800
			lbf.in	1239 - 2478	1947 - 3894	2832 - 5753	5753 - 8408	8851 - 15931	20357 - 24782
	D		Nm	-	-	-	-	-	-
			lbf.in	-	-	-	-	-	-
Max. speed		n _{Max}	rpm	2000		1000			
Max. lateral force (Belt pretension)		F _R	N	3400	4400	5600	8000	10000	14000
			lbf	764	989	1259	1798	2248	3147
Distance (Relating to the force application point)		S	mm	12 - 26	12 - 28	16 - 38	16 - 42	20 - 50	28 - 60
			in	0.47 - 1	0.47 - 1.1	0.63 - 1.5	0.63 - 1.7	0.79 - 2	1.1 - 2.4
Mass moment of inertia		J	kgcm ²	27	52	86	200	315	2100
			lbf.in.s ²	24	46	76	177	279	1862
Weight		m	kg	2	3	4	5.5	10	28
			lb	4.4	6.6	8.8	12	22	62

Dimensions

Total length (without LS)	L ₁	mm	63	70	84	95	109	146
		in	2.5	2.8	3.3	3.7	4.3	5.7
Fitting length	L ₂	mm	32	41.5	41.5	49	61	80.5
		in	1.3	1.6	1.6	1.9	2.4	3.2
Distance	L ₃	mm	-	-	-	-	-	-
		in	-	-	-	-	-	-
Centre distance	L ₄	mm	-	-	-	-	-	-
		in	-	-	-	-	-	-
Actuation distance	L ₈	mm	2.2	2.2	2.2	2.2	3	3
		in	0.09	0.09	0.09	0.09	0.12	0.12
Distance	L ₉	mm	44	47	59	67	82	112
		in	1.7	1.9	2.3	2.6	3.2	4.4
Distance	L ₁₀	mm	12	15	21	19	25	34
		in	0.47	0.59	0.83	0.75	0.98	1.3
Centering length (Tolerance -0,2)	L ₁₁	mm	5	6	9	10	13.5	20
		in	0.2	0.24	0.35	0.39	0.53	0.79
Thread			6xM6	6xM8	6xM8	6xM10	6xM12	6xM16
Thread length	L ₁₂	mm	10	10	12	15	16	24
		in	0.39	0.39	0.47	0.59	0.63	0.94
Distance	L ₁₃	mm	3	3	4	4	4.5	6
		in	0.12	0.12	0.16	0.16	0.18	0.24
Screw head length	L _S	mm	6	8	8	10	12	16
		in	0.24	0.31	0.31	0.39	0.47	0.63
Inner diameter input ^{d)} (Tolerance H7)	D ₁	mm	20 - 44	25 - 56	25 - 56	30 - 60	35 - 70	50 - 100
		in	0.79 - 1.7	0.98 - 2.2	0.98 - 2.2	1.2 - 2.4	1.4 - 2.8	2 - 3.9
Pitch circle belt pulley (Tolerance ±0,2)	D ₂	mm	85	98	110	120	148	202
		in	3.3	3.9	4.3	4.7	5.8	8
Outer diameter hub	D ₃	mm	-	-	-	-	-	-
		in	0	0	0	0	0	0
Outer diameter flange (Tolerance -0,2)	D ₅	mm	98	112	128	140	165	240
		in	3.9	4.4	5	5.5	6.5	9.4
Centering diameter (Tolerance h7)	D ₈	mm	75	82	90	100	125	168
		in	3	3.2	3.5	3.9	4.9	6.6
Outer diameter actuation ring	D ₉	mm	99	120.5	135	152.5	174	243
		in	3.9	4.7	5.3	6	6.9	9.6
Diameter (Tolerance h7)	D ₁₀	mm	55	65	72	75	92	128
		in	2.2	2.6	2.8	3	3.6	5
Diameter	D ₁₁	mm	67	75	84	91	112	152
		in	2.6	3	3.3	3.6	4.4	6

Torque limiter TL1



For the ordering code, please refer to p 81

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

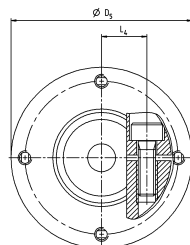
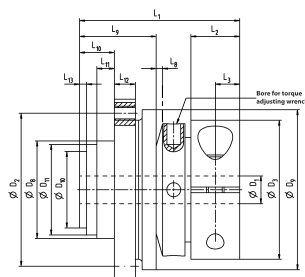
TL1 – Torque limiter / for belt pulley

Size				1.5	2	4.5	10	15	30	60	150	
Overall length				A	A	A	A	A	A	A	A	
Release torque (Adjustable)	A	T _{Dis}	Nm	0.3 - 0.8	0.2 - 1	2.5 - 4.5	2 - 5	7 - 15	8 - 20	10 - 30	20 - 60	
			lbf.in	2.7 - 7.1	1.8 - 8.9	22 - 40	18 - 44	62 - 133	71 - 177	89 - 266	177 - 531	
	B		Nm	0.6 - 1.3	0.7 - 2	-	4 - 10	-	16 - 30	20 - 40	40 - 80	
			lbf.in	5.3 - 12	6.2 - 18	0 - 0	35 - 89	0 - 0	142 - 266	177 - 354	354 - 708	
	C		Nm	-	-	-	8 - 15	-	-	30 - 60	80 - 150	
			lbf.in	-	-	-	71 - 133	-	-	266 - 531	708 - 1328	
Max. speed		n _{Max}	rpm	3000								2000
Max. lateral force (Belt pretension)		F _R	N	50	100	200	600	1400	1800	2200	3000	
			lbf	11	22	45	135	315	405	495	674	
Distance (Relating to the force application point)		S	mm	3 - 6	5 - 8	5 - 11	6 - 14	7 - 17	10 - 24	10 - 24	12 - 24	
			in	0.12 - 0.24	0.2 - 0.31	0.2 - 0.43	0.24 - 0.55	0.28 - 0.67	0.39 - 0.94	0.39 - 0.94	0.47 - 0.94	
Mass moment of inertia		J	kgcm ²	0.1	0.2	0.5	0.7	1.5	2.5	5	16	
			lbf.in.s ²	0.09	0.18	0.44	0.62	1.3	2.2	4.4	14	
Weight		m	kg	0.03	0.065	0.12	0.22	0.4	0.7	1	1.3	
			lb	0.07	0.14	0.26	0.49	0.88	1.5	2.2	2.9	

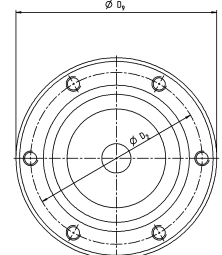
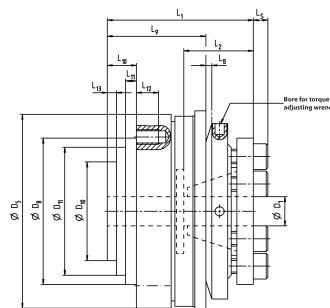
Dimensions

Total length (Tolerance -2)	L ₁	mm	23	28	32	39	40	50	54	58
		in	0.91	1.1	1.3	1.5	1.6	2	2.1	2.3
Fitting length	L ₂	mm	7	8	10	10.5	19	21.5	27.5	32
		in	0.28	0.31	0.39	0.41	0.75	0.85	1.1	1.3
Distance	L ₃	mm	3.5	4	5	5	-	-	-	-
		in	0.14	0.16	0.2	0.2	-	-	-	-
Centre distance	L ₄	mm	6.5	8.5	11.5	15	-	-	-	-
		in	0.26	0.33	0.45	0.59	-	-	-	-
Actuation distance	L ₈	mm	0.7	0.8	0.8	1.2	1.5	1.7	1.7	1.9
		in	0.03	0.03	0.03	0.05	0.06	0.07	0.07	0.07
Distance	L ₉	mm	11.5	16	18	24	27	37	39	41.5
		in	0.45	0.63	0.71	0.94	1.1	1.5	1.5	1.6
Distance	L ₁₀	mm	5	6	8	11	8	11	11	12
		in	0.2	0.24	0.31	0.43	0.31	0.43	0.43	0.47
Centering length (Tolerance -0,2)	L ₁₁	mm	2.5	3.5	5	8	3	5	5	5
		in	0.1	0.14	0.2	0.31	0.12	0.2	0.2	0.2
Thread			4xM2	4xM2.5	6xM2.5	6xM3	6xM4	6xM5	6xM5	6xM6
Thread length	L ₁₂	mm	3	4	4	5	6	8	9	10
		in	0.12	0.16	0.16	0.2	0.24	0.31	0.35	0.39
Distance	L ₁₃	mm	1	1.3	1.5	1.5	2.5	2.5	2.5	2.5
		in	0.04	0.05	0.06	0.06	0.1	0.1	0.1	0.1
Screw head length	L _S	mm	-	-	-	-	4	5	5	6
		in	0	0	0	0	0.16	0.2	0.2	0.24
Inner diameter input ^{d)} (Tolerance H7)	D ₁	mm	4 - 8	4 - 12	5 - 14	6 - 17	8 - 22	12 - 22	12 - 29	15 - 37
		in	0.16 - 0.31	0.16 - 0.47	0.2 - 0.55	0.24 - 0.68	0.31 - 0.87	0.47 - 0.87	0.47 - 1.1	0.59 - 1.5
Pitch circle belt pulley (Tolerance ±0,2)	D ₂	mm	22	28	35	43	47	54	63	78
		in	0.87	1.1	1.4	1.7	1.9	2.1	2.5	3.1
Outer diameter hub	D ₃	mm	20	25	32	40	-	-	-	-
		in	0.79	0.98	1.3	1.6	-	-	-	-
Outer diameter flange (Tolerance -0,2)	D ₅	mm	26	32	40	50	53	63	72	87
		in	1	1.3	1.6	2	2.1	2.5	2.8	3.4
Centering diameter (Tolerance h7)	D ₈	mm	14	22	25	34	40	47	55	68
		in	0.55	0.87	0.98	1.3	1.6	1.9	2.2	2.7
Outer diameter actuation ring	D ₉	mm	24	32	42	51.5	61.5	70	83	98
		in	0.94	1.3	1.7	2	2.4	2.8	3.3	3.9
Diameter (Tolerance h7)	D ₁₀	mm	11	14	17	24	27	32	39	50
		in	0.43	0.55	0.67	0.94	1.1	1.3	1.5	2
Diameter	D ₁₁	mm	13	18	21	30	35	42	49	62
		in	0.51	0.71	0.83	1.2	1.4	1.7	1.9	2.4

TL 1 miniature version (1.5 - 10 series)
with standard clamping hub



TL 1 standard version (15 - 2500 series)
with tapered clamping hub

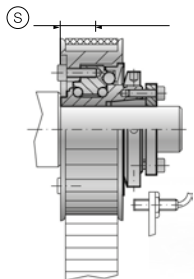


Size				200	300	500	800	1500	2500
Overall length				A	A	A	A	A	A
Release torque (Adjustable)	A	T _{Dis}	Nm	80 - 140	120 - 180	50 - 150	200 - 400	1000 - 1250	1400 - 2200
			lbf.in	708 - 1239	1062 - 1593	443 - 1328	1770 - 3540	8851 - 11064	12391 - 19472
	B		Nm	130 - 200	160 - 300	100 - 300	450 - 850	1250 - 1500	1800 - 2700
			lbf.in	1151 - 1770	1416 - 2655	885 - 2655	3983 - 7523	11063 - 13276	15931 - 23897
	C		Nm	-	300 - 450	250 - 500	-	-	-
			lbf.in	-	2655 - 3983	2213 - 4425	-	-	-
Max. speed		n _{Max}	rpm	2000		1000			
Max. lateral force (Belt pretension)		F _R	N	3400	4400	5600	8000	10000	14000
			lbf	764	989	1259	1798	2248	3147
Distance (Relating to the force application point)		S	mm	12 - 26	12 - 28	16 - 38	16 - 42	20 - 50	28 - 60
			in	0.47 - 1	0.47 - 1.1	0.63 - 1.5	0.63 - 1.7	0.79 - 2	1.1 - 2.4
Mass moment of inertia		J	kgcm ²	27	52	86	200	315	2100
			lbf.in.s ²	24	46	76	177	279	1862
Weight		m	kg	2	3	4	5.5	10	28
			lb	4.4	6.6	8.8	12	22	62

Dimensions

Total length (Tolerance -2)	L ₁	mm	66	73	88	95	117	152
		in	2.6	2.9	3.5	3.7	4.6	6
Fitting length	L ₂	mm	32	41.5	41.5	49	61	80.5
		in	1.3	1.6	1.6	1.9	2.4	3.2
Distance	L ₃	mm	-	-	-	-	-	-
		in	-	-	-	-	-	-
Centre distance	L ₄	mm	-	-	-	-	-	-
		in	-	-	-	-	-	-
Actuation distance	L ₈	mm	2.2	2.2	2.2	2.2	3	3
		in	0.09	0.09	0.09	0.09	0.12	0.12
Distance	L ₉	mm	47	51.5	62	75	94	120
		in	1.9	2	2.4	3	3.7	4.7
Distance	L ₁₀	mm	12	15	21	19	25	34
		in	0.47	0.59	0.83	0.75	0.98	1.3
Centering length (Tolerance -0,2)	L ₁₁	mm	5	6	9	10	13.5	20
		in	0.2	0.24	0.35	0.39	0.53	0.79
Thread			6xM6	6xM8	6xM8	6xM10	6xM12	6xM16
Thread length	L ₁₂	mm	10	10	12	15	16	24
		in	0.39	0.39	0.47	0.59	0.63	0.94
Distance	L ₁₃	mm	3	3	4	4	4.5	6
		in	0.12	0.12	0.16	0.16	0.18	0.24
Screw head length	L _S	mm	6	8	8	10	12	16
		in	0.24	0.31	0.31	0.39	0.47	0.63
Inner diameter input ^{d)} (Tolerance H7)	D ₁	mm	20 - 44	25 - 56	25 - 56	30 - 60	35 - 70	50 - 100
		in	0.79 - 1.7	0.98 - 2.2	0.98 - 2.2	1.2 - 2.4	1.4 - 2.8	2 - 3.9
Pitch circle belt pulley (Tolerance ±0,2)	D ₂	mm	85	98	110	120	148	202
		in	3.3	3.9	4.3	4.7	5.8	8
Outer diameter hub	D ₃	mm	-	-	-	-	-	-
		in	-	-	-	-	-	-
Outer diameter flange (Tolerance -0,2)	D ₅	mm	98	112	128	140	165	240
		in	3.9	4.4	5	5.5	6.5	9.4
Centering diameter (Tolerance h7)	D ₈	mm	75	82	90	100	125	168
		in	3	3.2	3.5	3.9	4.9	6.6
Outer diameter actuation ring	D ₉	mm	117	132	155	176	187	258
		in	4.6	5.2	6.1	6.9	7.4	10
Diameter (Tolerance h7)	D ₁₀	mm	55	65	72	75	92	128
		in	2.2	2.6	2.8	3	3.6	5
Diameter	D ₁₁	mm	67	75	84	91	112	152
		in	2.6	3	3.3	3.6	4.4	6

Torque limiter TL1



For the ordering code, please refer to p 81

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

TL2 Torque limiter / clamping hub

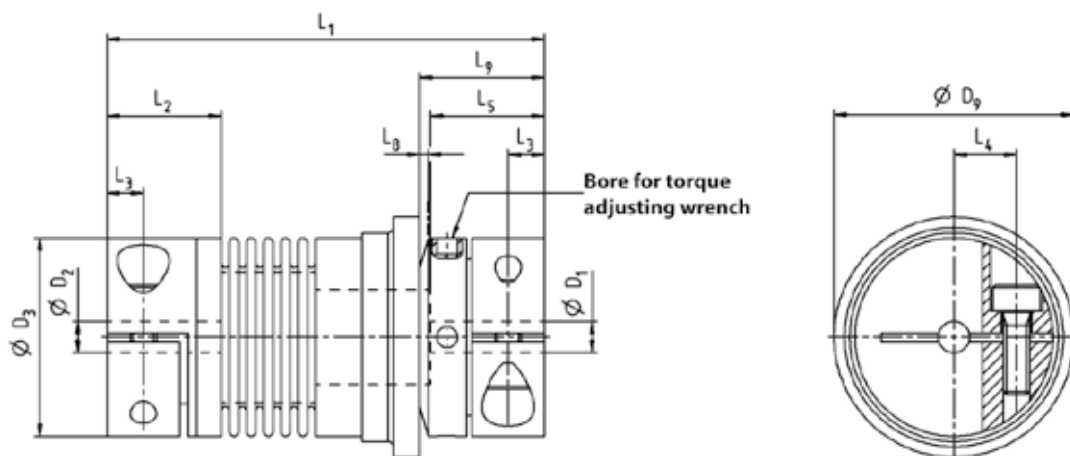
Size				1.5	2		4.5		10		15		30		60				
Overall length				A	A	B	A	B	A	B	A	B	A	B	A	B			
Release torque (Adjustable)		A	T _{Dis}	Nm	0.1 - 0.6	0.2 - 1.5		1 - 3		2 - 6		5 - 10		10 - 25		10 - 30			
				lbf.in	0.89 - 5.3	1.8 - 13		8.9 - 27		18 - 53		44 - 89		89 - 221		89 - 266			
		B		Nm	0.4 - 1	0.5 - 2		3 - 6		4 - 12		8 - 20		20 - 40		25 - 80			
				lbf.in	3.5 - 8.9	4.4 - 18		27 - 53		35 - 106		71 - 177		177 - 354		221 - 708			
		C		Nm	0.8 - 1.5	-		-		-		-		-		-		-	
				lbf.in	7.1 - 13	-		-		-		-		-		-		-	
Max. speed			n _{Max}	rpm	3000														
Angular misalignment			±	°	1	1	1.5	1.5	2	1.5	2	1	1.5	1	1.5	1	1.5		
Lateral misalignment			±	mm	0.15	0.15	0.2	0.2	0.25	0.2	0.3	0.15	0.2	0.2	0.25	0.2	0.25		
				in	0.006	0.006	0.008	0.008	0.01	0.008	0.012	0.006	0.008	0.008	0.01	0.008	0.01		
Lateral spring rigidity			C _l	N/mm	70	40	30	290	45	280	145	475	137	900	270	1200	420		
				lbf/in	400	228	171	1656	257	1599	828	2712	782	5139	1542	6852	2398		
Torsional rigidity			C _r	Nm/arcmin	0.2	0.35	0.38	2	1.5	2.6	2.3	5.8	4.4	11.3	8.1	22.1	16		
				lbf.in/arcmin	1.8	3.1	3.4	18	13	23	20	51	39	100	72	196	142		
Mass moment of inertia			J	kgcm ²	0.1	0.1	0.1	0.2	0.2	0.6	0.7	1	1.5	2.7	3.2	7.5	8		
				lbf.in.s ²	0.09	0.09	0.09	0.18	0.18	0.53	0.62	0.89	1.3	2.4	2.8	6.6	7.1		
Weight			m	kg	0.047	0.07		0.2		0.3		0.4		0.6		1			
				lb	0.1	0.15		0.44		0.66		0.88		1.3		2.2			

Dimensions

Total length (Tolerance -2)	L ₁	mm	42	46	51	57	65	65	75	75	82	87	95	102	112
		in	1.7	1.8	2	2.2	2.6	2.6	3	3	3.2	3.4	3.7	4	4.4
Fitting length	L ₂	mm	11	13		16		16		22		26.5		31	
		in	0.43	0.51		0.63		0.63		0.87		1		1.2	
Distance	L ₃	mm	3.5	4		5		5		6.5		7.5		9.5	
		in	0.14	0.16		0.2		0.2		0.26		0.3		0.37	
Centre distance ^{b)}	L ₄	mm	6.7 / 6	8 / 8.5		10.3 / 11.5		15		17.5		19		23	
		in	0.26 / 0.24	0.31 / 0.33		0.41 / 0.45		0.59		0.69		0.75		0.91	
Fitting length	L ₅	mm	11	13		16		16		21.5		26.5		31.5	
		in	0.43	0.51		0.63		0.63		0.85		1		1.2	
Actuation distance	L ₈	mm	0.7	0.8		0.8		1.2		1.5		1.5		1.7	
		in	0.03	0.03		0.03		0.05		0.06		0.06		0.07	
Distance	L ₉	mm	12	13		15		17		19		24		28	
		in	0.47	0.51		0.59		0.67		0.75		0.94		1.1	
Inner diameter input ^{d)} (Tolerance H7)	D ₁	mm	3 - 8	4 - 12		5 - 14		6 - 17		10 - 26		12 - 30		15 - 32	
		in	0.12 - 0.31	0.16 - 0.47		0.2 - 0.55		0.24 - 0.68		0.39 - 1		0.47 - 1.2		0.59 - 1.3	
Inner diameter output ^{d)} (Tolerance H7)	D ₂	mm	3 - 8	4 - 12.7		5 - 16		6 - 24		10 - 28		12 - 30		15 - 35	
		in	0.12 - 0.31	0.16 - 0.5		0.2 - 0.63		0.24 - 0.94		0.39 - 1.08		0.47 - 1.2		0.59 - 1.42	
Outer diameter hub	D ₃	mm	19	25		32		40		49		55		66	
		in	0.75	0.98		1.3		1.6		1.9		2.2		2.6	
Outer diameter actuation ring	D ₉	mm	23	29		35		45		55		65		73	
		in	0.91	1.1		1.4		1.8		2.2		2.6		2.9	

b) Valid up to size 4.5, two different values for output/input.

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



Size				80		150		200		300		500		800	1500
Overall length				A	B	A	B	A	B	A	B	A	B	A	A
Release torque (Adjustable)	A	T _{Dis}	Nm	20 - 70		20 - 70		30 - 90		100 - 200		80 - 200		400 - 650	650 - 800
			lbf.in	177 - 620		177 - 620		266 - 797		885 - 1770		708 - 1770		3540 - 5753	5753 - 7081
	B		Nm	30 - 90		45 - 150		60 - 160		150 - 240		200 - 350		500 - 800	700 - 1200
			lbf.in	266 - 797		398 - 1328		531 - 1416		1328 - 2124		1770 - 3098		4425 - 7081	6196-10621
	C		Nm	-		80 - 180		120 - 240		200 - 320		300 - 500		650 - 850	1000 - 1800
			lbf.in	-		708 - 1593		1062 - 2124		1770 - 2832		2655 - 4425		5753 - 7523	8851-15931
Max. speed		n _{Max}	rpm	2000								1000			
Angular misalignment		±	°	1	1.5	1	1.5	1.5	2	1.5	2	2	2.5	2.5	2.5
Lateral misalignment		±	mm	0.2	0.25	0.2	0.25	0.25	0.3	0.25	0.3	0.3	0.35	0.35	0.35
			in	0.008	0.01	0.008	0.01	0.01	0.012	0.01	0.012	0.012	0.014	0.014	0.014
Lateral spring rigidity		C _l	N/mm	920	255	1550	435	2040	610	3750	1050	2500	840	2000	3600
			lbf/in	5253	1456	8851	2484	11648	3483	21413	5996	14275	4796	11420	20556
Torsional rigidity		C _r	Nm/arcmin	37.5	24.7	50.9	32	55.6	40.7	122	102	148	146	227	379
			lbf.in/arcmin	332	219	451	283	492	360	1080	903	1310	1292	2009	3354
Mass moment of inertia		J	kgcm ²	18	19	25	28	51	53	115	118	228	230	420	830
			lbf.in.s ²	16	17	22	25	45	47	102	105	202	204	372	736
Weight		m	kg	2		2.4		4		5.9		9.6		14	21
			lb	4.4		5.3		8.8		13		21		31	46

Dimensions

Total length (Tolerance -2)	L ₁	mm	115	127	116	128	128	140	139	153	163	177	190	223
		in	4.5	5	4.6	5	5	5.5	5.5	6	6.4	7	7.5	8.8
Fitting length	L ₂	mm	35.5		35.5		40.5		42.5		50.5		48	55.5
		in	1.4		1.4		1.6		1.7		2		1.9	2.2
Distance	L ₃	mm	11		11		12.5		13		16.5		17.5	22.5
		in	0.43		0.43		0.49		0.51		0.65		0.69	0.89
Centre distance ^{a)}	L ₄	mm	27		27		30.5		39		41		2 x 48	2 x 55
		in	1.1		1.1		1.2		1.5		1.6		2 x 1.9	2 x 2.2
Fitting length	L ₅	mm	35		35		42		42		52.5		48	67
		in	1.4		1.4		1.7		1.7		2.1		1.9	2.6
Actuation distance	L ₈	mm	1.9		1.9		2.2		2.2		2.2		2.2	3
		in	0.07		0.07		0.09		0.09		0.09		0.09	0.12
Distance	L ₉	mm	31		31		35		35		45		50	63
		in	1.2		1.2		1.4		1.4		1.8		2	2.5
Inner diameter input ^{d)} (Tolerance H7)	D ₁	mm	19 - 42		19 - 42		24 - 45		30 - 60		35 - 60		40 - 75	50 - 80
		in	0.75 - 1.7		0.75 - 1.7		0.94 - 1.8		1.2 - 2.4		1.4 - 2.4		1.6 - 3	2 - 3.1
Inner diameter output ^{d)} (Tolerance H7)	D ₂	mm	19 - 42		19 - 42		24 - 45		30 - 60		35 - 60		40 - 75	50 - 80
		in	0.75 - 1.7		0.75 - 1.7		0.94 - 1.8		1.2 - 2.4		1.4 - 2.4		1.6 - 3	2 - 3.1
Outer diameter hub	D ₃	mm	81		81		90		110		123		134	157
		in	3.2		3.2		3.5		4.3		4.8		5.3	6.2
Outer diameter actuation ring	D ₉	mm	92		92		99		120.5		135		152.5	174
		in	3.6		3.6		3.9		4.7		5.3		6	6.9

a) Starting at size 800, two screws per clamping hub offset by 180°.

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

Torque limiter TL2



For the ordering code, please refer to p 81

TL2 Torque limiter / clamping hub

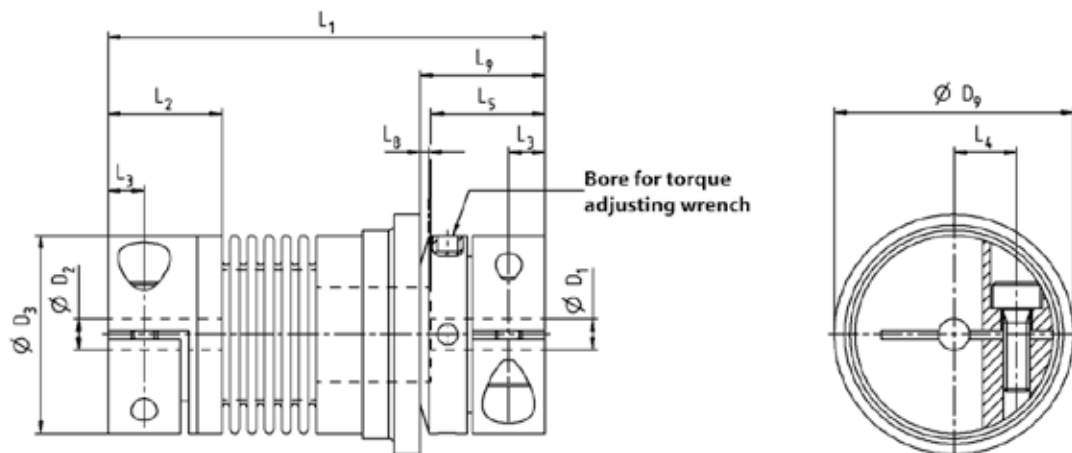
Size				1.5		2		4.5		10		15		30		60			
Overall length				A		A	B	A	B	A	B	A	B	A	B	A	B		
Release torque (Adjustable)		A	T _{Dis}	Nm	0.3 - 0.8	0.2 - 1		2.5 - 4.5		2 - 5		7 - 15		8 - 20		20 - 40			
				lbf.in	2.7 - 7.1	1.8 - 8.9		22 - 40		18 - 44		62 - 133		71 - 177		177 - 354			
		B		Nm	0.6 - 1.3	0.7 - 2		-		5 - 10		-		16 - 30		30 - 60			
				lbf.in	5.3 - 12	6.2 - 18		-		44 - 89		-		142 - 266		266 - 531			
		C		Nm	-	-		-		-		-		-		-		-	
				lbf.in	-	-		-		-		-		-		-		-	
Max. speed			n _{Max}	rpm	3000														
Angular misalignment			±	°	1	1	1.5	1.5	2	1.5	2	1	1.5	1	1.5	1	1.5		
Lateral misalignment			±	mm	0.15	0.15	0.2	0.2	0.25	0.2	0.3	0.15	0.2	0.2	0.25	0.2	0.25		
				in	0.006	0.006	0.008	0.008	0.01	0.008	0.012	0.006	0.008	0.008	0.01	0.008	0.01		
Lateral spring rigidity			C _l	N/mm	70	40	30	290	45	280	145	475	137	900	270	1200	420		
				lbf/in	400	228	171	1656	257	1599	828	2712	782	5139	1542	6852	2398		
Torsional rigidity			C _r	Nm/arcmin	0.2	0.35	0.38	2	1.5	2.6	2.3	5.8	4.4	11.3	8.1	22.1	16		
				lbf.in/arcmin	1.8	3.1	3.4	18	13	23	20	51	39	100	72	196	142		
Mass moment of inertia			J	kgcm ²	0.1	0.1	0.1	0.2	0.2	0.6	0.7	1	1.5	2.7	3.2	7.5	8		
				lbf.in.s ²	0.09	0.09	0.09	0.18	0.18	0.53	0.62	0.89	1.3	2.4	2.8	6.6	7.1		
Weight			m	kg	0.047	0.07		0.2		0.3		0.4		0.6		1			
				lb	0.1	0.15		0.44		0.66		0.88		1.3		2.2			

Dimensions

Total length (Tolerance -2)	L ₁	mm	42	46	51	57	65	65	75	75	82	87	95	102	112
		in	1.7	1.8	2	2.2	2.6	2.6	3	3	3.2	3.4	3.7	4	4.4
Fitting length	L ₂	mm	11	13		16		16		22		26.5		31	
		in	0.43	0.51		0.63		0.63		0.87		1		1.2	
Distance	L ₃	mm	3.5	4		5		5		6.5		7.5		9.5	
		in	0.14	0.16		0.2		0.2		0.26		0.3		0.37	
Centre distance ^{b)}	L ₄	mm	6.7 / 6	8 / 8.5		10.3 / 11.5		15		17.5		19		23	
		in	0.26 / 0.24	0.31 / 0.33		0.41 / 0.45		0.59		0.69		0.75		0.91	
Fitting length	L ₅	mm	11	13		16		16		21.5		26.5		31.5	
		in	0.43	0.51		0.63		0.63		0.85		1		1.2	
Actuation distance	L ₈	mm	0.7	0.8		0.8		1.2		1.5		1.5		1.7	
		in	0.03	0.03		0.03		0.05		0.06		0.06		0.07	
Distance	L ₉	mm	11.5	12		14		16		19		22		29	
		in	0.45	0.47		0.55		0.63		0.75		0.87		1.1	
Inner diameter input ^{d)} (Tolerance H7)	D ₁	mm	3 - 8	4 - 12		5 - 14		6 - 17		10 - 26		12 - 30		15 - 32	
		in	0.12 - 0.31	0.16 - 0.47		0.2 - 0.55		0.24 - 0.68		0.39 - 1		0.47 - 1.2		0.59 - 1.3	
Inner diameter output ^{d)} (Tolerance H7)	D ₂	mm	3 - 8	4 - 12.7		5 - 16		6 - 24		10 - 28		12 - 30		15 - 35	
		in	0.12 - 0.31	0.16 - 0.5		0.2 - 0.63		0.24 - 0.94		0.39 - 1.08		0.47 - 1.2		0.59 - 1.42	
Outer diameter hub	D ₃	mm	19	25		32		40		49		55		66	
		in	0.75	0.98		1.3		1.6		1.9		2.2		2.6	
Outer diameter actuation ring	D ₉	mm	24	32		42		51.5		61.5		70		83	
		in	0.94	1.3		1.7		2		2.4		2.8		3.3	

b) Valid up to size 4.5, two different values for output/input.

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



Size				80		150		200		300		500		800	1500	
Overall length				A	B	A	B	A	B	A	B	A	B	A	A	
Release torque (Adjustable)	A	T _{Dis}	Nm	20 - 60		20 - 60		80 - 140		120 - 180		60 - 150		200 - 400		1000-1250
			lbf.in	177 - 531		177 - 531		708 - 1239		1062 - 1593		531 - 1328		1770 - 3540		8851-11064
	B		Nm	40 - 80		40 - 80		130 - 200		160 - 300		100 - 300		450 - 800		1250-1500
			lbf.in	354 - 708		354 - 708		1151 - 1770		1416 - 2655		885 - 2655		3983 - 7081		11064-13276
	C		Nm	-		80 - 150		-		-		250 - 500		-		-
lbf.in		-		708 - 1328		-		-		2213 - 4425		-		-		
Max. speed		η _{Max}	rpm	2000								1000				
Angular misalignment		±	°	1	1.5	1	1.5	1.5	2	1.5	2	2	2.5	2.5	2.5	
Lateral misalignment		±	mm	0.2	0.25	0.2	0.25	0.25	0.3	0.25	0.3	0.3	0.35	0.35	0.35	
			in	0.008	0.01	0.008	0.01	0.01	0.012	0.01	0.012	0.012	0.014	0.014	0.014	
Lateral spring rigidity		C _i	N/mm	920	255	1550	435	2040	610	3750	1050	2500	840	2000	3600	
			lbf/in	5253	1456	8851	2484	11648	3483	21413	5996	14275	4796	11420	20556	
Torsional rigidity		C _T	Nm/arcmin	37.5	24.7	50.9	32	55.6	40.7	122	102	148	146	227	379	
			lbf.in/arcmin	332	219	451	283	492	360	1080	903	1310	1292	2009	3354	
Mass moment of inertia		J	kgcm ²	18	19	25	28	51	53	115	118	228	230	420	830	
			lbf.in.s ²	16	17	22	25	45	47	102	105	202	204	372	736	
Weight		m	kg	2		2.4		4		5.9		9.6		14	21	
			lb	4.4		5.3		8.8		13		21		31	46	

Dimensions

Total length (Tolerance -2)	L ₁	mm	117	129	118	130	131	143	142	156	167	181	201	232
		in	4.6	5.1	4.6	5.1	5.2	5.6	5.6	6.1	6.6	7.1	7.9	9.1
Fitting length	L ₂	mm	35.5		35.5		40.5		42.5		50.5		48	55.5
		in	1.4		1.4		1.6		1.7		2		1.9	2.2
Distance	L ₃	mm	11		11		12.5		13		16.5		17.5	22.5
		in	0.43		0.43		0.49		0.51		0.65		0.69	0.89
Centre distance ^{a)}	L ₄	mm	27		27		30.5		39		41		2 x 48	2 x 55
		in	1.1		1.1		1.2		1.5		1.6		2 x 1.9	2 x 2.2
Fitting length	L ₅	mm	35		35		42		42		52.5		48	67
		in	1.4		1.4		1.7		1.7		2.1		1.9	2.6
Actuation distance	L ₈	mm	1.9		1.9		2.2		2.2		2.2		2.2	3
		in	0.07		0.07		0.09		0.09		0.09		0.09	0.12
Distance	L ₉	mm	31		30		33		35		43		54	61
		in	1.2		1.2		1.3		1.4		1.7		2.1	2.4
Inner diameter input ^{d)} (Tolerance H7)	D ₁	mm	19 - 42		19 - 42		24 - 45		30 - 60		35 - 60		40 - 75	50 - 80
		in	0.75 - 1.7		0.75 - 1.7		0.94 - 1.8		1.2 - 2.4		1.4 - 2.4		1.6 - 3	2 - 3.1
Inner diameter output ^{d)} (Tolerance H7)	D ₂	mm	19 - 42		19 - 42		24 - 45		30 - 60		35 - 60		40 - 75	50 - 80
		in	0.75 - 1.7		0.75 - 1.7		0.94 - 1.8		1.2 - 2.4		1.4 - 2.4		1.6 - 3	2 - 3.1
Outer diameter hub	D ₃	mm	81		81		90		110		123		134	157
		in	3.2		3.2		3.5		4.3		4.8		5.3	6.2
Outer diameter actuation ring	D ₉	mm	98		98		117		132		155		177	187
		in	3.9		3.9		4.6		5.2		6.1		7	7.4

a) Starting at size 800, two screws per clamping hub offset by 180°.

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

Torque limiter TL2



For the ordering code, please refer to p 81

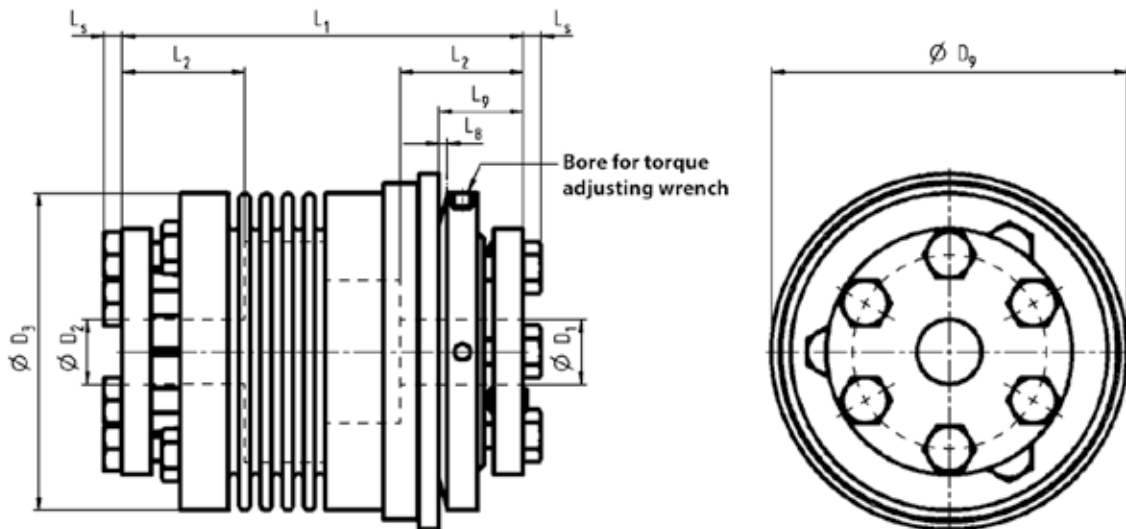
TL3 Torque limiter / tapered clamping hub

Size				15		30		60		150		200	
Overall length				A	B	A	B	A	B	A	B	A	B
Release torque (Adjustable)	A	T _{Dis}	Nm	5 - 10		10 - 25		10 - 30		20 - 70		30 - 90	
			lbf.in	44 - 89		89 - 221		89 - 266		177 - 620		266 - 797	
	B		Nm	8 - 20		20 - 40		25 - 80		45 - 150		60 - 160	
			lbf.in	71 - 177		177 - 354		221 - 708		398 - 1328		531 - 1416	
	C		Nm	-		-		-		80 - 200		140 - 280	
			lbf.in	-		-		-		708 - 1770		1239 - 2478	
Max. speed		n _{Max}	rpm	3000						2000			
Angular misalignment		±	°	1	1.5	1	1.5	1	1.5	1	1.5	1.5	2
Lateral misalignment		±	mm	0.15	0.2	0.2	0.25	0.2	0.25	0.2	0.25	0.25	0.3
			in	0.006	0.008	0.008	0.01	0.008	0.01	0.008	0.01	0.01	0.012
Lateral spring rigidity		C _i	N/mm	475	137	900	270	1200	380	1550	435	2040	610
			lbf/in	2712	782	5139	1542	6852	2170	8851	2484	11648	3483
Torsional rigidity		C _T	Nm/arcmin	5.8	4.4	11.3	8.1	22.1	16	50.9	32	55.6	40.7
			lbf.in/arcmin	51	39	100	72	196	142	451	283	492	360
Mass moment of inertia		J	kgcm ²	1	1.5	2.8	3	7.5	8	19	20	28	30
			lbf.in.s ²	0.89	1.3	2.5	2.7	6.6	7.1	17	18	25	27
Weight		m	kg	0.3		0.4		1.2		2.3		3	
			lb	0.66		0.88		2.6		5.1		6.6	

Dimensions

Total length (without LS)	L_1	mm	62	69	72	80	84	94	93	105	99	111
		in	2.4	2.7	2.8	3.1	3.3	3.7	3.7	4.1	3.9	4.4
Fitting length	L_2	mm	19		21.5		27.5		32		32	
		in	0.75		0.85		1.1		1.3		1.3	
Actuation distance	L_8	mm	1.5		1.5		1.7		1.9		2.2	
		in	0.06		0.06		0.07		0.07		0.09	
Distance	L_9	mm	13		16		18		19		19	
		in	0.51		0.63		0.71		0.75		0.75	
Screw head length	L_s	mm	2.8		3.5		3.5		4		4	
		in	0.11		0.14		0.14		0.16		0.16	
Inner diameter input ^{d)} (Tolerance H7)	D_1	mm	10 - 22		12 - 23		12 - 29		15 - 37		20 - 44	
		in	0.39 - 0.87		0.47 - 0.91		0.47 - 1.1		0.59 - 1.5		0.79 - 1.7	
Inner diameter output ^{d)} (Tolerance H7)	D_2	mm	10 - 22		12 - 23		12 - 29		15 - 37		20 - 44	
		in	0.39 - 0.87		0.47 - 0.91		0.47 - 1.1		0.59 - 1.5		0.79 - 1.7	
Outer diameter hub	D_3	mm	49		55		66		81		90	
		in	1.9		2.2		2.6		3.2		3.5	
Outer diameter actuation ring	D_9	mm	55		65		73.5		92		99	
		in	2.2		2.6		2.9		3.6		3.9	

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



Dimensions									
Total length (without LS)	L ₁	mm	114	128	123	137	151	175	246
		in	4.5	5	4.8	5.4	5.9	6.9	9.7
Fitting length	L ₂	mm	41.5		41.5		49	61	80.5
		in	1.6		1.6		1.9	2.4	3.2
Actuation distance	L ₈	mm	2.2		2.2		2.2	3	3
		in	0.09		0.09		0.09	0.12	0.12
Distance	L ₉	mm	23		25		31	30	34
		in	0.91		0.98		1.2	1.2	1.3
Screw head length	L ₅	mm	5.3		5.3		6.4	7.5	10
		in	0.21		0.21		0.25	0.3	0.39
Inner diameter input ^{d)} (Tolerance H7)	D ₁	mm	25 - 56		25 - 60		30 - 60	35 - 70	50 - 100
		in	0.98 - 2.2		0.98 - 2.4		1.2 - 2.4	1.4 - 2.8	2 - 3.9
Inner diameter output ^{d)} (Tolerance H7)	D ₂	mm	25 - 56		25 - 60		30 - 60	35 - 70	50 - 100
		in	0.98 - 2.2		0.98 - 2.4		1.2 - 2.4	1.4 - 2.8	2 - 3.9
Outer diameter hub	D ₃	mm	110		123		133	157	200
		in	4.3		4.8		5.2	6.2	7.9
Outer diameter actuation ring	D ₉	mm	120.5		135		152.5	174	243
		in	4.7		5.3		6	6.9	9.6

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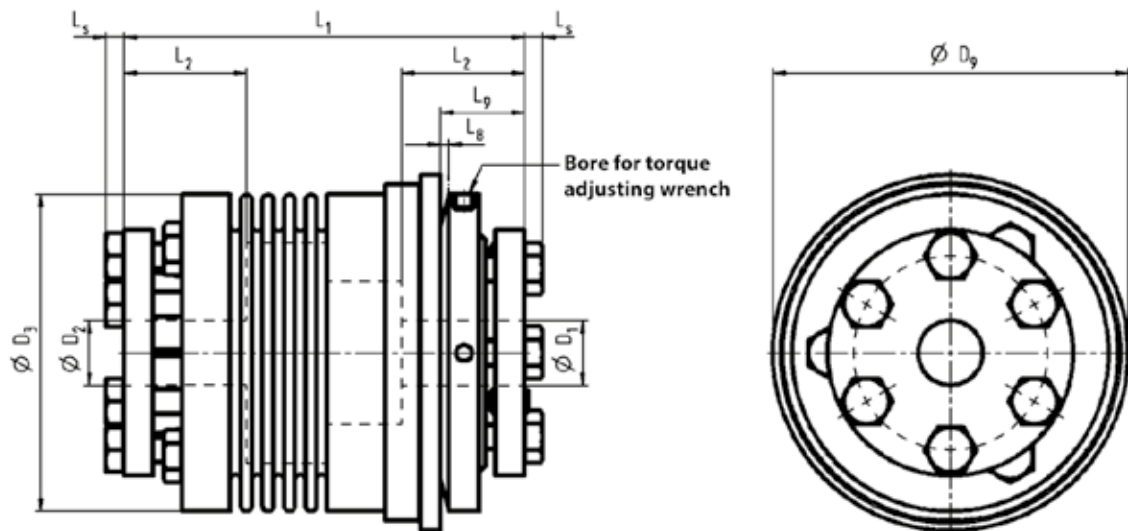
TL3 Torque limiter / tapered clamping hub

Size				15		30		60		150		200	
Overall length				A	B	A	B	A	B	A	B	A	B
Release torque (Adjustable)	A	T _{Dis}	Nm	7 - 15		8 - 20		20 - 40		20 - 60		80 - 140	
			lbf.in	62 - 133		71 - 177		177 - 354		177 - 531		708 - 1239	
	B		Nm	-		16 - 30		30 - 60		40 - 80		130 - 200	
			lbf.in	-		142 - 266		266 - 531		354 - 708		1151 - 1770	
	C		Nm	-		-		-		80 - 150		-	
			lbf.in	-		-		-		708 - 1328		-	
Max. speed		n _{Max}	rpm	3000						2000			
Angular misalignment		±	°	1	1.5	1	1.5	1	1.5	1	1.5	1.5	2
Lateral misalignment		±	mm	0.15	0.2	0.2	0.25	0.2	0.25	0.2	0.25	0.25	0.3
			in	0.006	0.008	0.008	0.01	0.008	0.01	0.008	0.01	0.01	0.012
Lateral spring rigidity		C _l	N/mm	475	137	900	270	1200	380	1550	435	2040	610
			lbf/in	2712	782	5139	1542	6852	2170	8851	2484	11648	3483
Torsional rigidity		C _T	Nm/arcmin	5.8	4.4	11.3	8.1	22.1	16	50.9	32	55.6	40.7
			lbf.in/arcmin	51	39	100	72	196	142	451	283	492	360
Mass moment of inertia		J	kgcm ²	1	1.5	2.8	3	7.5	8	19	20	28	30
			lbf.in.s ²	0.89	1.3	2.5	2.7	6.6	7.1	17	18	25	27
Weight		m	kg	0.3		0.4		1.2		2.3		3	
			lb	0.66		0.88		2.6		5.1		6.6	

Dimensions

Total length (without LS)	L_1	mm	62	69	72	80	84	94	93	105	102	114
		in	2.4	2.7	2.8	3.1	3.3	3.7	3.7	4.1	4	4.5
Fitting length	L_2	mm	19		21.5		27.5		32		32	
		in	0.75		0.85		1.1		1.3		1.3	
Actuation distance	L_8	mm	1.5		1.5		1.7		1.9		2.2	
		in	0.06		0.06		0.07		0.07		0.09	
Distance	L_9	mm	13		16		17		18		17	
		in	0.51		0.63		0.67		0.71		0.67	
Screw head length	L_s	mm	2.8		3.5		3.5		4		4	
		in	0.11		0.14		0.14		0.16		0.16	
Inner diameter input ^{d)} (Tolerance H7)	D_1	mm	10 - 22		12 - 23		12 - 29		15 - 37		20 - 44	
		in	0.39 - 0.87		0.47 - 0.91		0.47 - 1.1		0.59 - 1.5		0.79 - 1.7	
Inner diameter output ^{d)} (Tolerance H7)	D_2	mm	10 - 22		12 - 23		12 - 29		15 - 37		20 - 44	
		in	0.39 - 0.87		0.47 - 0.91		0.47 - 1.1		0.59 - 1.5		0.79 - 1.7	
Outer diameter hub	D_3	mm	49		55		66		81		90	
		in	1.9		2.2		2.6		3.2		3.5	
Outer diameter actuation ring	D_9	mm	61.5		70		83		98		117	
		in	2.4		2.8		3.3		3.9		4.6	

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).



Size				300		500		800	1500	2500
Overall length				A	B	A	B	A	A	A
Release torque (Adjustable)	A	T _{Dis}	Nm	120 - 180	60 - 150		200 - 400		1000 - 1250	1400 - 2200
			lbf.in	1062 - 1593	531 - 1328		1770 - 3540		8851 - 11064	12391 - 19472
	B		Nm	160 - 300	100 - 300		450 - 800		1250 - 1500	1800 - 2700
			lbf.in	1416 - 2655	885 - 2655		3983 - 7081		11064 - 13276	15931 - 23897
	C		Nm	-	250 - 500		-		-	-
			lbf.in	-	2213 - 4425		-		-	-
Max. speed		n _{Max}	rpm	2000		1000				
Angular misalignment		±	°	1.5	2	2	2.5	2.5	2.5	2.5
Lateral misalignment		±	mm	0.25	0.3	0.3	0.35	0.35	0.35	0.35
			in	0.01	0.012	0.012	0.014	0.014	0.014	0.014
Lateral spring rigidity		C _l	N/mm	3750	1050	2500	840	2000	3600	6070
			lbf/in	21413	5996	14275	4796	11420	20556	34660
Torsional rigidity		C _T	Nm/arcmin	122	102	148	146	227	379	989
			lbf.in/arcmin	1080	903	1310	1292	2009	3354	8753
Mass moment of inertia		J	kgcm ²	55	60	110	128	200	420	2570
			lbf.in.s ²	49	53	98	113	177	372	2278
Weight		m	kg	5		6.5		9	16.3	35
			lb	11		14		20	36	77

Dimensions

Total length (without LS)	L_1	mm	117	131	127	141	151	184	252
		in	4.6	5.2	5	5.6	5.9	7.2	9.9
Fitting length	L_2	mm	41.5		41.5		49	61	80.5
		in	1.6		1.6		1.9	2.4	3.2
Actuation distance	L_8	mm	2.2		2.2		2.2	3	3
		in	0.09		0.09		0.09	0.12	0.12
Distance	L_9	mm	20		22		20	26	31
		in	0.79		0.87		0.79	1	1.2
Screw head length	L_S	mm	5.3		5.3		6.4	7.5	10
		in	0.21		0.21		0.25	0.3	0.39
Inner diameter input ^{d)} (Tolerance H7)	D_1	mm	25 - 56		25 - 60		30 - 60	35 - 70	50 - 100
		in	0.98 - 2.2		0.98 - 2.4		1.2 - 2.4	1.4 - 2.8	2 - 3.9
Inner diameter output ^{d)} (Tolerance H7)	D_2	mm	25 - 56		25 - 60		30 - 60	35 - 70	50 - 100
		in	0.98 - 2.2		0.98 - 2.4		1.2 - 2.4	1.4 - 2.8	2 - 3.9
Outer diameter hub	D_3	mm	110		123		133	157	200
		in	4.3		4.8		5.2	6.2	7.9
Outer diameter actuation ring	D_9	mm	132		155		176	187	258
		in	5.2		6.1		6.9	7.4	10

d) In order to reach the recommended fitting tolerance of 0.01 – 0.05 mm between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft (tolerance k6).

Torque limiter TL3



For the ordering code, please refer to p 81

Shrink discs

Shrink discs are mainly used in hollow-shaft connections

With our hollow shaft or blind hollow shaft gearboxes for the direct assembly on load shafts, machines can be designed for minimal installation space. Technically adjusted to the gearbox, these shrink discs offer safety even in the event of an emergency stop. Thanks to the simple assembly and/or disassembly, they can be re-used several times without compromising on their performance.



PRODUCT HIGHLIGHTS

Reliable and secure torque transmission

thanks to the backlash-free frictional connection.

Huge installation space reduction

due to the omission of constructive intermediate elements.

Reusable multiple times

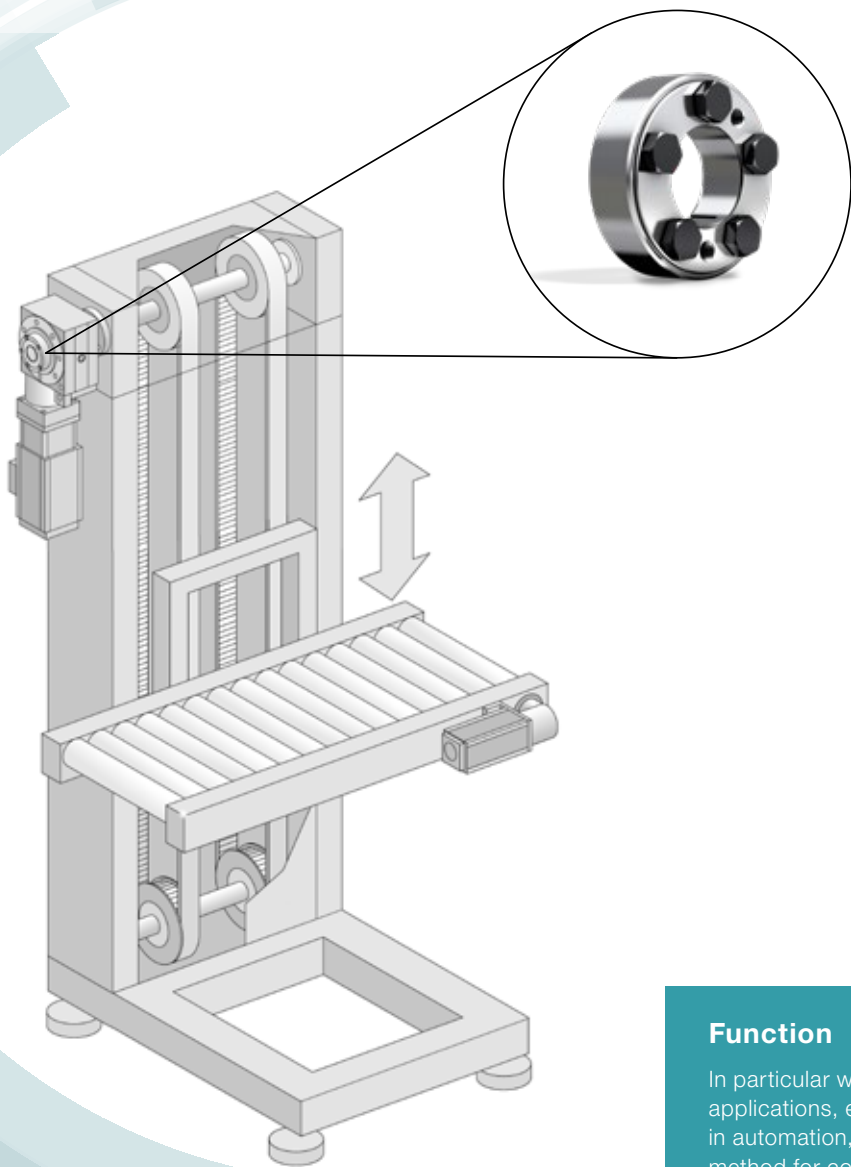
thanks to almost no wear.

High dynamics and smooth running

thanks to the excellent true-running accuracy.

Versatile application options

thanks to corrosion-resistant materials, also in food-grade applications.



Function

In particular with installation-space critical applications, e.g. **belt and lifting conveyors** in automation, shrink discs are a proven method for connecting drive units.

Shrink discs are inserted above the hollow shaft of the drive, producing a completely backlash-free friction-type connection between the shaft and the hub. The assembly is very easy and is implemented with high-strength screws and defined torque.



Application

Example applications



Machine tools



Drive technology



Wood industry



Food industry



General mechanical engineering



Benefits

Reliable transmission of torques through validated calculations.

Great reduction of installation space thanks to the direct connection to the hollow shaft gearbox.

Reusable multiple times due to the simple screw system.

High true-running accuracy thanks to the precise, symmetrically structured components.

Properties

Transmission of torques without backlash thanks to the high power transmission.

Easy assembly and disassembly thanks to the screw system.

Equal distribution of the applied forces around the scope thanks to a positive connection.

Non-destructive removal through relieving the tension of the screws.

Quick shrink disc selection

Gearbox		Version			Geometry					
		Standard	Nickel-plated	Stainless steel	d	D	A	H*	H2*	J [kgcm ²]
HG ⁺ / SP ⁺ / SPC ⁺ 060	Ordering code	SD 018x044 S2	SD 018x044 N2	SD 018x044 E2	18	44	30	15	19	0.252
	Material number	20000744	20048496	20048491						
	T _{2Max} [Nm]	100	51	51						
HG ⁺ / SP ⁺ / SPK ⁺ / SPC ⁺ 075	Ordering code	SD 024x050 S2	SD 024x050 N2	SD 024x050 E2	24	50	36	18	22	0.729
	Material number	20001389	20047957	20043198						
	T _{2Max} [Nm]	250	136	136						
HG ⁺ / SP ⁺ / SPK ⁺ / SPC ⁺ 100	Ordering code	SD 036x072 S2	SD 036x072 N2	SD 036x072 E2	36	72	52	22	27.5	3.94
	Material number	20001391	20048497	20035055						
	T _{2Max} [Nm]	650	575	450						
HG ⁺ / SP ⁺ / SPK ⁺ / SPC ⁺ 140	Ordering code	SD 050x090 S2	SD 050x090 N2	SD 050x090 E2	50	90	68	26	31.5	11.1
	Material number	20001394	20048498	20047937						
	T _{2Max} [Nm]	1320	1015	770						
HG ⁺ / SP ⁺ / SPK ⁺ / SPC ⁺ 180	Ordering code	SD 068x115 S2	SD 068x115 N2	SD 068x115 E2	68	115	86	29	34.5	31.1
	Material number	20001396	20048499	20048492						
	T _{2Max} [Nm]	2450	1820	1500						
VH ⁺ / NVH / CVH 040	Ordering code	SD 024x050 S2	SD 024x050 N2	SD 024x050 E2	24	50	36	18	22	0.729
	Material number	20001389	20047957	20043198						
	T _{2Max} [Nm]	250	136	136						
VH ⁺ / NVH / CVH 050	Ordering code	SD 030x060 S2V	SD 030x060 N2	SD 030x060 E2	30	60	44	20	24	1.82
	Material number	20020687	20047934	20047885						
	T _{2Max} [Nm]	550	375	230						
VH ⁺ / NVH / CVH 063	Ordering code	SD 036x072 S2V	SD 036x072 N2V	SD 036x072 E2	36	72	52	22	27.5	3.94
	Material number	20020688	20047530	20035055						
	T _{2Max} [Nm]	640	560	450						
VH ⁺ 080	Ordering code	SD 050x090 S2V	SD 050x090 N2V	SD 050x090 E2	50	90	68	26	31.5	11.1
	Material number	20020689	20047935	20047937						
	T _{2Max} [Nm]	1400	950	900						
VH ⁺ 100	Ordering code	SD 062x110 S2V	SD 062x110 N2	SD 062x110 E2	62	110	80	29	34.5	27
	Material number	20020690	20047927	20047860						
	T _{2Max} [Nm]	2300	1540	1000						

*Applicable to the unclamped condition. ** Maximum torque without axial forces. Shrink discs suitable for XP⁺ and PKF gearboxes upon request

One shrink disk per gearhead is sufficient.
Refer to the operating manual for information on correct shrink disc installation and additional cleaning instructions, particularly for stainless steel shrink disks.
The instructions are enclosed with the order.

Mounting/operating manual at www.wittenstein-alpha.de/en/

Recommendation for the load shaft:

Tolerance h6

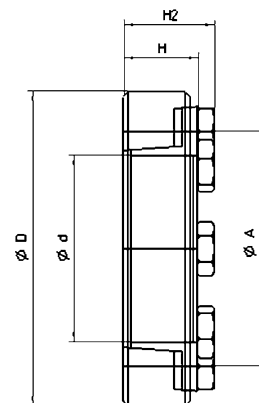
Surface roughness ≤ Rz 16

Minimum yield strength (standard) Rp 0.2 ≥ 385 N/mm²

Minimum yield strength (nickel-plated) Rp 0.2 ≥ 260 N/mm²

Minimum yield strength (stainless steel) Rp 0.2 ≥ 260 N/mm²

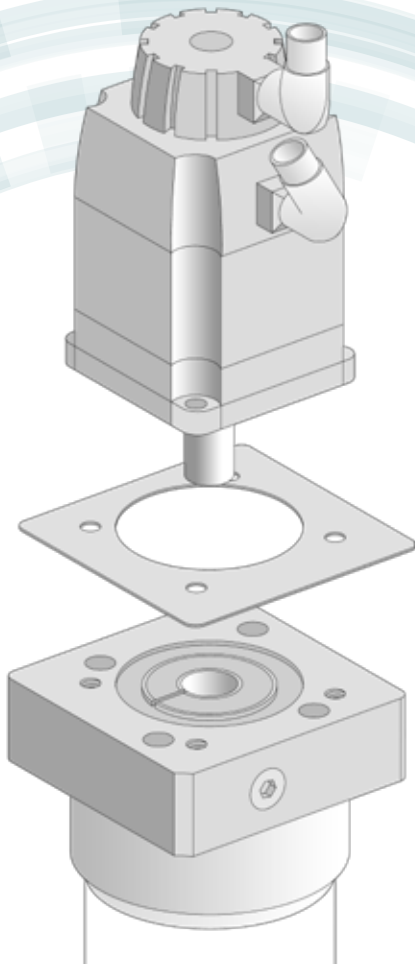
The shrink disc is not included in the scope of delivery of the gearhead. Therefore, it must be ordered separately.



Sealing plate

Use for applications in environments with increased volumes of dust and pollutants

The sealing plate is installed between the adapter plate and the motor. It is used if the motor flange of the motor does not fully cover the adapter plate, leaving gaps where fluids or contamination may accumulate.



PRODUCT HIGHLIGHTS

Universally adaptable

for the motor and the related adapter plate.

Plate thickness	SQ	With overlap of > 10 mm/side
1.0 mm	0 - 120 mm	1.5 mm plate thickness
1.5 mm	>120 mm - 300 mm	

Standard material: 1.4310 / X10CrNi18-8,
non-corrosive spring steel, DIN EN 10088

Function

Sealing plates are used in environments in which an increased level of contamination, such as dust and moisture, is expected.





Benefits

Protection against damage of high-quality components such as gearboxes and motors due to the wear of the critical contact surfaces.

Properties

Corrosion-free thanks to the use of non-corrosive spring steel according to DIN EN 10088.

The WITTENSTEIN group – The company and its fields of business



WITTENSTEIN

With approximately 2,800 employees worldwide, the WITTENSTEIN group stands for innovation, precision and excellence in the world of mechatronic drive technology, both nationally and internationally. The group is active in six innovative fields of business. Furthermore, WITTENSTEIN group is represented by some 60 subsidiaries in around 40 countries in all important technology and sales markets worldwide.



Our fields of expertise

We provide know-how for a host of different sectors:

- Machine and plant construction
- Software development
- Aerospace
- Automotive & E-mobility
- Energy
- Oil & Gas Exploration and Production
- Medical technology
- Measurement and testing technology
- Nanotechnology
- Simulation

The WITTENSTEIN Group



WITTENSTEIN alpha GmbH
High-precision servo drives and linear systems



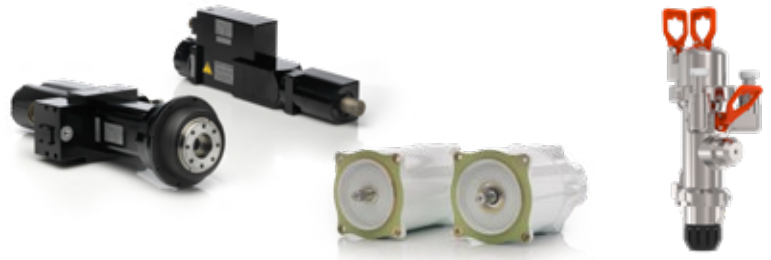
WITTENSTEIN cyber motor GmbH
Highly dynamic servo motors and drive electronics



WITTENSTEIN galaxie GmbH
Superior gearboxes and drive systems



WITTENSTEIN motion control GmbH
Drive systems for the most extreme environmental requirements



attocube systems AG
Nanoprecision drive and measurement technology solutions

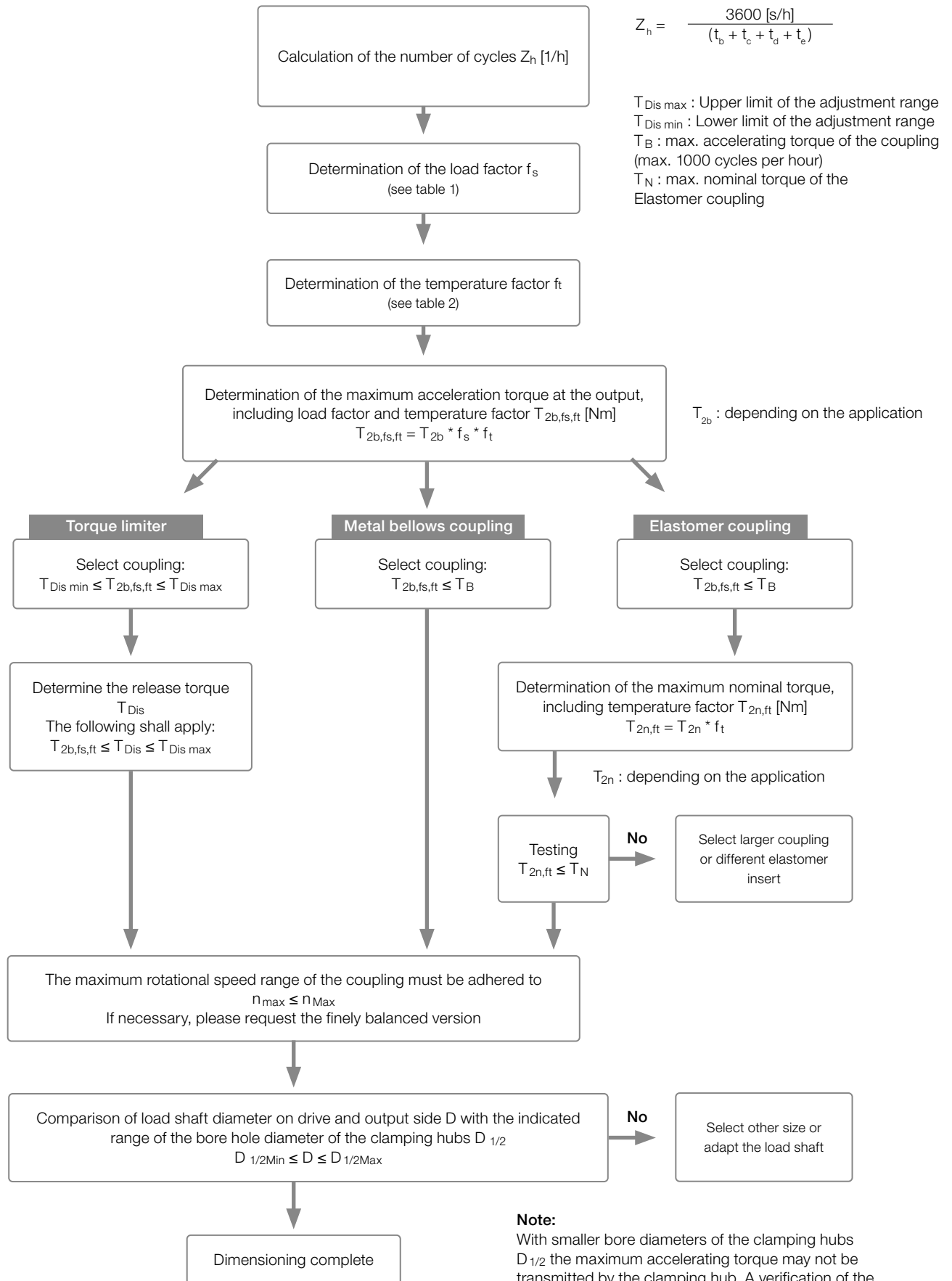


baramundi software GmbH
Secure management of the IT infrastructure in offices and production



WITTENSTEIN – one with the future

Detailed design - coupling



Load factor f_s

Number of cycles Z_h [1/h]	Metal bellow couplings and torque limiters	Elastomer couplings
< 1000	1.0	1.0
< 2000	1.1	1.2
< 3000	1.2	1.4
< 4000	1.8	1.8
> 4000	2.0	2.0

Table 1: Load factor

Temperature factor f_t

Temperature [°C]	Elastomer insert			Metal bellows
	A	B	C	
> -30 to -10	1.5	1.3	1.4	1.0
> -10 to +30	1.0	1.0	1.0	1.0
> +30 to +40	1.2	1.1	1.3	1.0
> +40 to +60	1.4	1.3	1.5	1.0
> +60 to +80	1.7	1.5	1.8	1.0
> +80 to +100	2.0	1.8	2.1	1.0
> +100 to +120	-	2.4	-	1.0

Table 2: Temperature factor

Notes

Resonance frequency

Couplings reduce the rigidity of the drive train. Therefore, the drive train with cymex® should be checked for its natural frequency and thus resonance-resulting overloads should be avoided. If you have any further questions, please consult the technical support of WITTENSTEIN alpha.

Maximum misalignments:

Admissible misalignments (axial, angular, lateral) for shaft extensions must be complied with since, otherwise, an overload of the coupling and adjacent components may occur.

Emergency stop torque:

If there is a need for the transmission of EMERGENCY STOP situations, it is recommended using torque limiters (TL1, TL2 and TL3) to protect the other drive components and thereby increase the service life.

The models BCL, BC2, BC3 and BCH can briefly transmit the 1.5 fold of T_B of the coupling (corresponds to T_{Emer}). In this respect, please observe the notes of the corresponding catalog page.

With TL1 with the function system "Blocked", a 2-fold load securing is guaranteed. The models TL2 and TL3 are to be dimensioned sufficiently: The blocking load may not exceed the nominal torque of the coupling.

Shaft - hub fitting clearance:

0.01 - 0.05 mm

In order to reach this fitting tolerance between shaft and coupling hub, we recommend tolerance F7 when matched with our gear shaft k6.

Glossary – alphabetical

Acceleration torque (T_{2B})

The acceleration torque T_{2B} is the torque that the gearbox toothing can permanently transmit. To calculate the acceleration torque, a **coefficient of impact** which is appropriate for the application must also be taken into account.

Adapter plate

WITTENSTEIN alpha uses a system of standardized adapter plates for connecting the motor and gearbox. This makes it as simple as possible to attach motors from any manufacturer to WITTENSTEIN alpha gearboxes.

Angle of rotation

Angle by which the connection element of the coupling rotates under the torque load. The admissible angle of rotation for torsionally rigid couplings is $< 0.05^\circ$ and for vibration-damping couplings $< 5^\circ$.

Angular minute

A degree is subdivided into 60 angular minutes ($= 60 \text{ arcmin} = 60'$).

Example:

If the backlash is $j_t = 1 \text{ arcmin}$, the output may rotate by $1/60^\circ$. The impacts on the application are determined by the arc length: $b = 2 \cdot \pi \cdot r \cdot \alpha^\circ / 360^\circ$.

Example:

A pinion with a radius $r = 50 \text{ mm}$ mounted on a gearbox with a backlash of $j_t = 3 \text{ arcmin}$ can be rotated by $b = 0.04 \text{ mm}$.

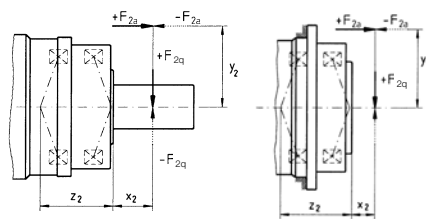
Angular misalignment

Angular misalignment of drive and output shaft. In most cases due to assembly. Causes an increased strain on the coupling.

Axial force (F_{2AMax})

An axial force on a gearbox runs parallel to its output shaft or perpendicular to its output flange. Under certain circumstances, it acts offset from the axis with a lever arm y_2 . In this case, it also creates a bending moment. If the axial force exceeds the permissible catalog values (max. axial force F_{2AMax}), an additional component (e.g. axial bearing) must be provided to absorb these forces.

Example with output shaft and flange:



Axial misalignment

Length variation along the longitudinal axes of the drive and output shaft. Generally caused by thermal expansion.

Axial spring rigidity (C_a)

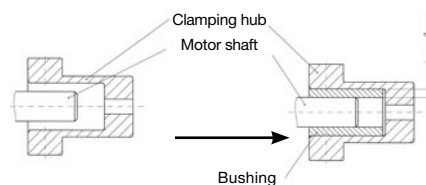
Counter-force of the coupling in the event of axial misalignment [N/mm]. This additional force should be taken into consideration in the sizing of the drive train and bearings.

Backlash-free

Changes in the rotational speed, direction of rotation or torque do not cause any backlash and thus no shocks in the coupling. However, it should be noted that an **angle of rotation** still occurs.

Bushing

If the diameter of the motor shaft is smaller than the **clamping hub**, a bushing is used to compensate for the difference in diameter. A minimum wall thickness of 1 mm and a motor shaft diameter of 2 mm difference are required.



CAD POINT

Performance data, dimension sheets and CAD data for all gearboxes can be found online in our CAD POINT, including clear documentation of the selection. (www.wittenstein-cad-point.com)

Clamping hub (couplings)

The clamping hub ensures a friction contact connection between the coupling and the gearbox shaft as well as with the application. Clamping hubs are available in all motor shaft diameters; therefore, a bushing as connection piece is not required and also not recommended. Optionally, a form fit connection via a key is also possible.

Clamping hub (gearbox)

The clamping hub ensures a friction contact connection between the motor shaft and gearbox. If the diameter of the motor shaft is smaller than the diameter of the clamping hub, a **bushing** is used as a connection piece.

For gearboxes in the alpha Advanced Line and the alpha Premium Line, a form fit connection via a key is also possible.

Connection between the clamping hub and the metal bellows

For metal bellows couplings which transmit torques of up to 500 Nm, the stainless steel bellow is bonded onto the clamping hub. In the event of higher torques, the connection is welded.

Continuous operation (S1)

In continuous operation, it is particularly important to ensure that the maximum gearbox temperature is maintained (see temperature behavior). For optimum drive behavior in continuous operation, we recommend our HIGH SPEED gearbox model.

Cyclic operation (S5)

The cyclic operation is defined via the **duty cycle**. If the duty cycle is less than 60% and shorter than 20 minutes, it qualifies as cyclic operation (**operating modes**).

cymex®

cymex® is the calculation software developed by our company for dimensioning complete drive trains. The software enables the precise simulation of motion and load variables. The software is available to download from our website (www.wittenstein-cymex.de). We can also provide training to enable you to make full use of all the possibilities provided by the software.

cymex® select

The cymex® select quick layout tool from WITTENSTEIN alpha allows for efficient and innovative product selection in seconds and is available online.

You get suitable recommendations for your application and your motor in no time based on technical and economic suitability. (cymex-select.wittenstein-group.com)

Degrees of protection (IP)

The various degrees of protection are defined in DIN EN 60529 "Degrees of protection offered by enclosures (IP code)". The IP degree of protection (International Protection) is represented by two digits. The first digit indicates the protection against the ingress of impurities and the second is the protection against the ingress of water.

Example: **IP65**

Protection against the ingress of dust (dust-proofness)

Protection against water jets

Disengagement torque (T_{Dis})

Adjustable torque of torque limiters with which the coupling separates the drive and output side of the system.

Duty cycle (DC)

The cycle determines the duty cycle (DC). The times for acceleration (t_a), constant travel if applicable (t_c) and deceleration (t_d) combined yield the duty cycle in minutes.

The duty cycle is expressed as a percentage with inclusion of the dwell time t_e .

$$DC [\%] = \frac{t_a + t_c + t_d}{t_a + t_c + t_d + t_e} \cdot 100 \quad \frac{\text{Motion duration}}{\text{Cycle time}}$$

$$DC [\text{min}] = t_a + t_c + t_d$$

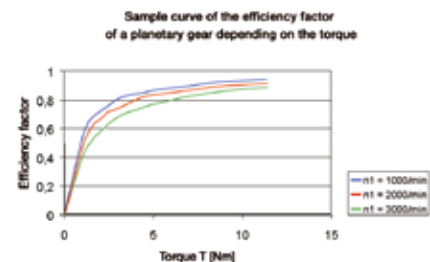
Dynamic torsional rigidity (C_{Tdyn})

Torsional rigidity with T_N

Efficiency (η)

The efficiency [%] η is the ratio of output power to input power. Power lost through friction reduces efficiency to less than 1 or 100%.

$$\eta = P_{\text{off}} / P_{\text{on}} = (P_{\text{on}} - P_{\text{loss}}) / P_{\text{on}}$$



WITTENSTEIN alpha always indicates the efficiency of a gearbox during operation at full load. If the input power or torque is lower, the efficiency rating is also lower due to the constant no-load torque. Power losses do not increase as a result. A lower efficiency is also to be expected at high speeds (see figure).

Emergency stop torque (T_{2Emer})

The emergency stop torque T_{2Emer} is the maximum permissible torque at the gearbox output. It must not be reached more than 1000 times during the service life of the gearbox. It must never be exceeded! The following cases in particular should be checked: controlled emergency stop, power failure, brake application, and crash.



Ex symbol

Devices bearing the Ex symbol comply with EU Directive 94 / 9 / EC (ATEX) and are approved for use in defined explosion-hazardous zones.

Detailed information on the explosion group and category, as well as further information on the respective gearbox, is available upon request.

Food-grade lubrication (F)

These products are designed with food-grade lubrication and can therefore be used in the food industry. It is important to note the reduction in torque compared to the standard. (V-Drive excluded). See cymex® 5 or the CAD POINT for the exact torques.

HIGH SPEED (MC)

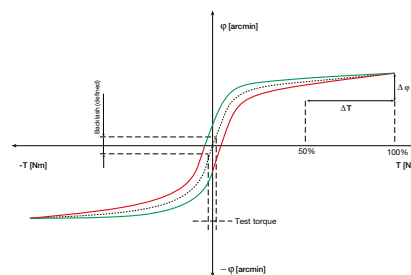
The HIGH SPEED version of our gearbox has been specifically developed for applications in continuous operation at high input speeds. It is used, for example, in the printing and the packaging industry.

HIGH TORQUE (MA)

WITTENSTEIN alpha gearboxes are also available in a HIGH TORQUE version. These gearboxes are particularly suitable for applications requiring extremely high torques and maximum rigidity.

Hysteresis curve

The hysteresis is measured to determine the torsional rigidity of a gearbox. The result of this measurement is known as the hysteresis curve.



If the input shaft is locked, the gearbox is continuously loaded and relieved at the output in both directions of rotation up to a defined torque. The angle of rotation is plotted against the torque. This yields a closed curve from which the → **backlash** and → **torsional rigidity** can be calculated.

Jerk (j)

The jerk is the derivative of the acceleration with respect to time, that is, the change in acceleration in a unit of time. It is referred to as a shock if the acceleration curve shows a jump, i.e. the jerk is infinitely large.

Lateral force (F_{2QMax})

The maximum lateral force F_{2QMax} [N] is the force component that acts perpendicular to the output shaft or parallel to the output flange. It acts perpendicular to the → **axial force** and can have an axial distance x_2 to the shaft shoulder or to the shaft flange that acts as a lever arm. The lateral force creates a side load (also see → **axial force**).

Glossary – alphabetical

Lateral misalignment

Parallel misalignment of the drive and output shaft. Causes an additional strain on the bearings and other components of the drive train.

Lateral spring rigidity (C_l)

Counter-force of the coupling in the event of lateral misalignment [N/mm]. This additional force should be taken into consideration in the sizing of the drive train and bearings.

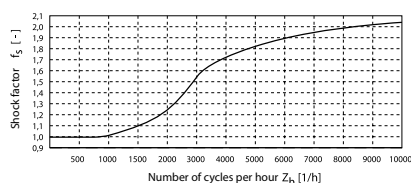
Load factor (f_s) (gearbox)

The maximum admissible acceleration torque (T_{2B}) indicated in the catalog in cyclic operation applies to less than 1000 cycles/h. Greater numbers of cycles in connection with shorter acceleration times can lead to oscillations in the drive train. The resulting excessive torque increases are taken into consideration with the load factor f_s berücksichtigt. WITTENSTEIN alpha suggests taking these unknown overloads into account using the following curve.

This determined value is multiplied by the actual acceleration torque T_{2b} before it is compared with the maximum permissible acceleration torque T_{2B} .

$$(T_{2b} \cdot f_s = T_{2b}, f_s < T_{2B})$$

The following applies to gearboxes:



The following applies to couplings:

Number of cycles N_f [1/h]	Metal bellow couplings and torque limiters	Elastomer couplings
< 1000	1.0	1.0
< 2000	1.1	1.2
< 3000	1.2	1.4
< 4000	1.8	1.8
> 4000	2.0	2.0

Mass moment of inertia (J)

The mass moment of inertia J [kg/cm²] is a measurement of the effort applied by an object to maintain its momentary condition (at rest or moving).

Maximum torque (T_{2a})

$T_{2\alpha}$ represents the maximum torque that can be transmitted by the gearbox. Depending on application-specific boundary conditions and the precise evaluation of the motion profile, the gearbox may be operated with a maximum torque $T_{2b,ls}$ above the specified maximum acceleration torque T_{2B} (See diagram 3.) For detailed sizing, please use **cymex cymex®**

$$T_{2\alpha} \geq T_{2b.fs} \geq T_{2B}$$

No-load running torque (T_{012})

The no-load running torque T_{012} is the torque which must be applied to a gearbox in order to overcome the internal friction; it is therefore considered lost torque. The WITTENSTEIN alpha catalog values are determined at a speed $n_1=3.000 \text{ min}^{-1}$ and an ambient temperature of 20°C .

$$T_{012}: \quad 0 \qquad 1 \rightarrow 2$$

no load from input side toward
output side

No-load running torques decrease during operation.

NSF

Lubricants certified as grade H1 by the NSF (National Sanitation Foundation) can be used in the food sector where occasional unavoidable contact with food cannot be excluded.

Operating modes (continuous operation **S1** and cyclic operation **S5**)

Gearboxes are selected depending on whether the motion profile is characterized by frequent acceleration and deceleration phases in → **cyclic operation** (S5) as well as dwell times, or whether it is designed for → **continuous operation** (S1), i.e. with long phases of constant motion.

Operating noise (L_{PA})

The gear ratio and speed influence the operating noise. As a general rule, the higher the speed, the higher the operating noise and the higher the gear ratio, the lower the operating noise. Our catalog specifications refer to a reference gear ratio and speed. The reference speed is $n_1 = 3000$ rpm or $n_1 = 2000$ rpm, depending on the size of the gearbox. Ratio-specific values can be found in cymex® - www.wittenstein-cymex.com

Output shaft revolution (f_g)

The factor f_{α} determines the number of service life cycles for the required service life of the gearbox. It describes the number of revolutions at the output to assess the permissible torque at the output.

Positioning accuracy

The positioning accuracy is determined by the angular deviation from the setpoint and is the sum of the load-dependent → **(torsional rigidity and torsional backlash)** and kinematic → **(synchronization)** angles of rotation that occur simultaneously in practice.

Quality control

All Premium and Advanced gearboxes at WITTENSTEIN alpha are subjected to an outgoing inspection before they leave the factory. This ensures that every gearbox is delivered within specification.

Ratio (i)

The ratio i indicates the factor by which the gearbox transforms the three relevant parameters of motion (speed, torque and mass moment of inertia).

The factor is a result of the geometry of the toothing elements (example.: $i = 10$).

$n_1 = 3000 \text{ min}^{-1}$ \nearrow $T_2 = 200 \text{ Nm}$
 $T_1 = 20 \text{ Nm}$ \searrow $n_2 = 300 \text{ min}^{-1}$
 $J_1 = 0,10 \text{ kgm}^2$ \longleftarrow $J_2 = 10 \text{ kgm}^2$
(Application)

Ratio of mass moment of inertia ($\lambda = \text{lambda}$)

The ratio of mass moment of inertia λ is the ratio of external inertia (application side) to internal inertia (motor and gearbox side). It is an important parameter determining the controllability of an application. Accurate control of dynamic processes becomes more difficult with increased differing mass moments of inertia and as λ becomes greater. WITTENSTEIN alpha recommends that a guideline value of $\lambda < 5$ is maintained. A gearbox reduces the external mass moment of inertia by a factor of $1/i^2$.

$$\lambda = \frac{J_{\text{external}}}{J_{\text{internal}}}$$

J_{external} reduced to input:

$$J'_{\text{external}} = J_{\text{external}} / i^2$$

Simple applications ≤ 10
Dynamic applications ≤ 5
Highly dynamic applications ≤ 1

Safety instruction

For applications with special safety requirements (e.g. vertical axes, distorted gear inputs) we recommend exclusively employing our Premium and Advanced products (V-Drive excluded).

Servo actuators

In addition to a high-precision planetary gearbox, the servo actuator is equipped with a powerful, permanent magnet synchronous servo motor, which ensures high power density and a high speed stability thanks to the distributed winding. This enables even more compact and powerful linear drives to be realized. The investment costs for the drive train and the ongoing operating costs can be positively influenced by downsizing. The goal is to achieve a smaller input and therefore a smaller servo controller and lower energy consumption with the same productivity. A low mass moment of inertia combined with higher rigidity is the way to achieve this.

Shaft misalignment

One main function of the coupling is the compensation of the shaft misalignment which occurs in almost all applications between the drive and the output side. A distinction is made between \rightarrow axial, \rightarrow lateral- and \rightarrow angular misalignment. When complying with the indicated maximum misalignment, the couplings are safe for the duration of their service life.

Slipping torque

With a smaller clamping hub diameter, it is possible that the transmittable torque of the shaft-hub connection is lower than the maximum accelerating torque T_B of the coupling. In particular, this is applicable to the series BC3, BCT Standard, EL6 and ELC. More detailed information is available on request.

Speed (n)

The permitted maximum speed n_{IMax} must be compared with the maximum speed n_{IMax} during operation. The maximum permissible speed n_{IMax} must not be exceeded at any time.

The average speed n_{im} is determined as the arithmetic mean of the speeds in the cycle or over a maximum of 20 minutes. It must be below the permitted nominal speed n_{IN} at all times. This applies to both cyclic and continuous operation.

$$n_{\text{im}} = \frac{|n_{1,0}| \cdot t_0 + \dots + |n_{1,n}| \cdot t_n}{t_0 + \dots + t_n} \text{ incl. pause time with } \sum t_n \leq 20 \text{ min}$$

WITTENSTEIN alpha determines the thermal speed limit or thermal limit of the nominal speed in the laboratory at an ambient temperature of 20°C while maintaining a gearbox temperature of 90°C.

speedline® delivery

If required, standard series can be delivered within 24 or 48 hours ex works. Fast deliveries at short notice thanks to a high level of flexibility

Spring rigidity (C)

Counter-force of the coupling in the event of axial or lateral misalignment [N/mm]. A distinction is made between \rightarrow axial and \rightarrow lateral spring rigidity.

Static torsional rigidity (C_{Tstat})

Torsional rigidity at 50 % T_N

Synchronous run

The synchronous run refers to the measurable variation in speed between the input and output during one revolution of the output shaft. It is caused by manufacturing tolerances and results in ratio fluctuations within one revolution.

Technical data

Further technical data for our complete product portfolio is available to download from our website.

Temperature factor (f_t)

With elastomer couplings, the ambient temperature impacts the maximum admissible accelerating torque of the coupling. This is taken into consideration in the coupling design by means of the temperature factor f_t . The temperature factor depending on the elastomer insert used can be determined by means of the table.

Temperature °C	Elastomer insert			Metal bellows
	A	B	C	
> -30 to -10	1.5	1.3	1.4	1.0
> -10 to +30	1.0	1.0	1.0	1.0
> +30 to +40	1.2	1.1	1.3	1.0
> +40 to +60	1.4	1.3	1.5	1.0
> +60 to +80	1.7	1.5	1.8	1.0
> +80 to +100	2.0	1.8	2.1	1.0
> +100 to +120	-	2.4	-	1.0

Glossary – alphabetical

Thermal behavior - temperature

It is necessary to measure the maximum temperature of the gearbox in the application.

The gearbox temperature is significantly influenced by the following application-specific factors:

- Load spectrum with nominal torque and nominal speed
- Motor temperature (e.g. heat input from the motor)
- Heat dissipation to the machine interface (e.g. mounting on a stainless steel structure or very thin mounting plates)
- Convection (e.g. convection prevented by installation location)
- Ambient temperature (e.g. excessively high ambient temperature of the air and the mechanical interface parts)

If the permissible gearbox temperature is exceeded, the service life of the gearbox is reduced considerably.

Tilting moment (M_{2k})

The tilting moment M_{2k} is a result of the → **axial and lateral forces** applied and their respective force application points in relation to the inner radial bearing on the output side.

Tilting rigidity

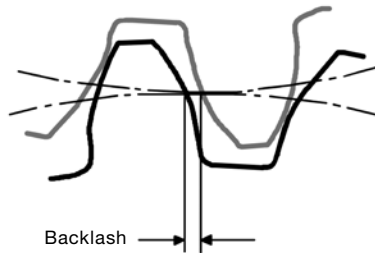
The tilting rigidity C_{2k} of the gearbox is made up of the bending rigidity of the output or pinion shaft and the bearing stiffness of the output bearing. It is defined as a quotient of the tilting moment M_{2k} [Nm] and tilting angle Φ [arcmin] ($C_{2k} = M_{2k} / \Phi$).

Tooth engagement frequency (f_z)

In certain circumstances, the tooth engagement frequency can lead to vibration problems in the application, specifically if the excitation frequency corresponds to a natural frequency of the applications. For planetary gearboxes from WITTENSTEIN alpha (exception: gearboxes with ratio $i = 8$) the tooth engagement frequency can be calculated using the formula $f_z = 1,8 \cdot n_2$ [min⁻¹]. It is independent of the ratio in planetary gearboxes from Wittenstein alpha. If it does prove problematic, either the natural frequency of the system can be changed or a different gearbox (e.g. hypoid gearbox) with a different tooth engagement frequency can be chosen.

Torsional backlash (j_t)

Torsional backlash j_t [arcmin] describes the maximum angle of rotation of the output shaft in relation to the input. In simple terms, the torsional backlash describes the distance between two tooth flanks.

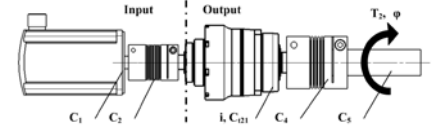


The measurement is taken with the input shaft blocked.

The output is then loaded with a defined test torque in order to overcome the internal gearbox friction. The main influence of the backlash is the flank backlash between the teeth. The low torsional backlash of the WITTENSTEIN alpha gearbox is achieved through high manufacturing precision and selective combination of the toothed wheels.

Torsional rigidity (C_{t21}) (gearbox)

The torsional rigidity [Nm/arcmin] C_{t21} is defined as the quotient of applied torque and resulting angle of rotation ($C_{t21} = \Delta T / \Delta \Phi$). It indicates the torque required to turn the output shaft by one angular minute. The torsional rigidity can be determined using the → **hysteresis curve** Torsional rigidity C , angle of rotation Φ



Reduce all torsional rigidity to the output:

$$C_{(n),ab} = C_{(n),an} \cdot i^2$$

with i = gearbox ratio [-]

$C_{(n)}$ = Individual rigidities [Nm/arcmin]

Note: The torsional rigidity C_{t21} for the gearbox always relates to the output.

Series connection of torsional rigidities

$$1/C_{ges} = 1/C_{1,ab} + 1/C_{2,ab} + \dots + 1/C_{(n)}$$

Angle of rotation Φ [arcmin]

$$\Phi = T_2 \cdot 1/C_{ges}$$

with T_2 = output torque [Nm]

Torsional rigidity (C_T) (couplings)

The torsional rigidity [Nm/arcmin] C_T is defined as the quotient of applied torque and resulting angle of rotation. It shows the torque required to turn the two clamping hubs against each other by one angular minute. If the maximum value is exceeded, the coupling can no longer transmit the applied torque since the → **angle of rotation** of the coupling becomes too large. A distinction is made between → **static** and → **dynamic torsional rigidity**.

Torque ($T_{2\alpha}$)

$T_{2\alpha}$ represents the maximum torque that can be transmitted by the gearbox. This value may be reduced depending on application-specific boundary conditions and the precise evaluation of the motion profile.

Glossary – Formulae

Formulae

Torque [Nm]	$T = J \cdot \alpha$	J = Mass moment of inertia [kgm ²] α = Angular acceleration [1/s ²]
Torque [Nm]	$T = F \cdot l$	F = Force [N] l = Lever, length [m]
Acceleration force [N]	$F_b = m \cdot a$	m = Mass [kg] a = Linear acceleration [m/s ²]
Frictional force [N]	$F_{\text{Reib}} = m \cdot g \cdot \mu$	g = Acceleration due to gravity 9.81 m/s ² μ = Coefficient of friction
Angular speed [1/s]	$\omega = 2 \cdot \pi \cdot n / 60$	n = Speed [rpm] π = PI = 3.14...
Linear speed [m/s]	$v = \omega \cdot r$	v = Linear speed [m/s] r = Radius [m]
Linear speed [m/s] (spindle)	$v_{\text{sp}} = \omega \cdot h / (2 \cdot \pi)$	h = Screw pitch [m]
Linear acceleration [m/s²]	$a = v / t_b$	t_b = Acceleration time [s]
Angular acceleration [1/s²]	$\alpha = \omega / t_b$	
Pinion path [mm]	$s = m_n \cdot z \cdot \pi / \cos \beta$	m_n = Normal module [mm] z = Number of teeth [-] β = Helix angle [°]

Conversion table

1 mm	= 0.039 in
1 Nm	= 8.85 in.lb
1 kgcm²	= 8.85 x 10 ⁻⁴ in.lb.s ²
1 N	= 0.225 lb _f
1 kg	= 2.21 lb _m

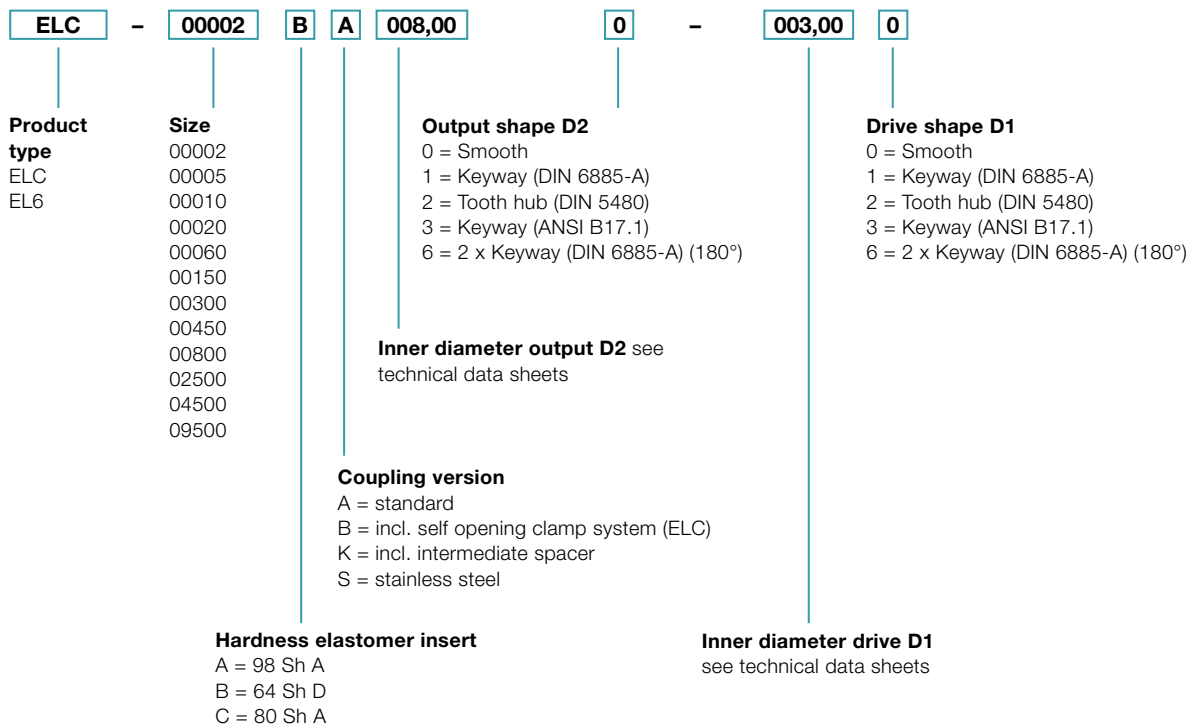
Symbol

Symbol	Unit	Designation
C	Nm/arcmin	Stiffness
ED	%, min	Duty cycle
F	N	Force
f_s	–	Load factor
f_e	–	Factor for duty cycle
i	–	Ratio
j	arcmin	Backlash
J	kgm ²	Mass moment of inertia
$K1$	Nm	Factor for bearing calculation
L	h	Service life
L_{PA}	dB(A)	Operating noise
m	kg	Mass
M	Nm	Torque
n	rpm	Speed
p	–	Exponent for bearing calculation
η	%	Efficiency
t	s	Time
T	Nm	Torque
v	m/min	Linear speed
z	1/h	Number of cycles

Index

Index	Designation
Capital letter	Permissible values
Small letter	Actual values
1	Input
2	Output
A/a	Axial
B/b	Acceleration
c	Constant
d	Deceleration
e	Pause
h	Hours
K/k	Tilting
m	Mean
Max/max	Maximum
Mot	Motor
N	Nominal
Not/not	Emergency stop
0	No load
Q/q	Lateral
t	Torsional
T	Tangential

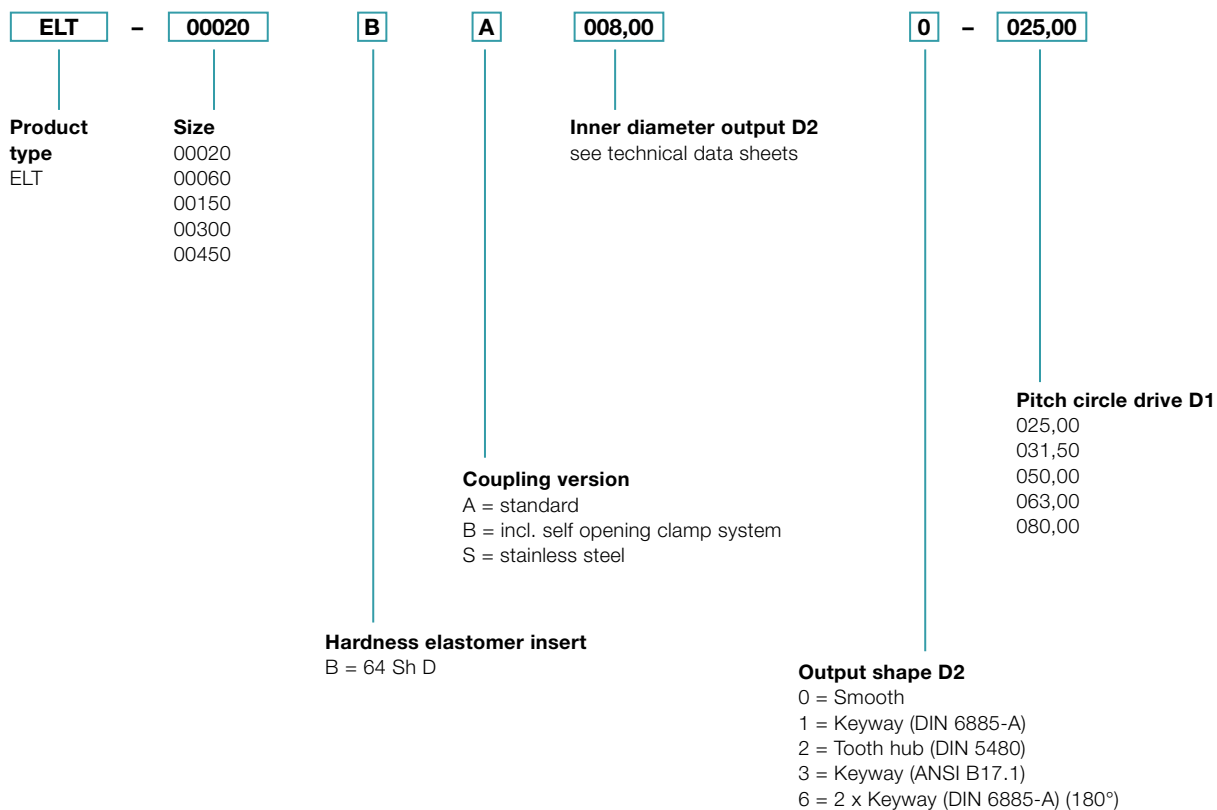
Ordering codes – Elastomer couplings



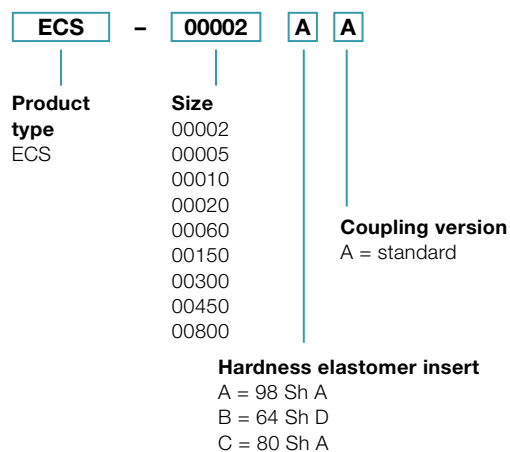
Note:

In case of different inner diameters of the clamping hubs, the respective larger one is to be defined as output D 2

Ordering codes – Elastomer couplings ELT



Ordering codes – Intermediate spacer



Ordering codes – Metal bellows couplings

[illegible]

Note:

In case of different inner diameters of the clamping hubs, the respective larger one is to be defined as output D 2

Ordering codes – Metal bellows couplings BCT

Product type	Size	Overall length	Coupling version	Inner diameter output D2	Output shape D2	Pitch circle drive D1	Gearbox model
BCT	00015 00060 00150 00300 01500 04000 06000 10000	Optional length A	A = standard B = including self opening clamp system (BCT-MF) S = Stainless steel, welded bellows	012,00 see technical data sheets	0 = Smooth 1 = Keyway (DIN 6885-A) 2 = Tooth hub (DIN 5480) 3 = Keyway (ANSI B17.1) 6 = 2 x Keyway (DIN 6885-A) (180°)	031,50 050,00 063,00 080,00 125,00 145,00 166,00	A = Flange pattern MA F = Flange pattern MF

For information purposes only – not required when placing orders!
Please contact WITTENSTEIN alpha for deviating mounting positions.

Ordering codes – Torque limiters

TL2	-	001,5	A	W	03,00	0	-	08,00	0	-	A	00,3
Product type		Size			Output shape D2						Adjustment range	
TL2		001,5			0 = Smooth						A = first series	
TL3		00002			1 = Keyway (DIN 6885-A)						B = second series	
		004,5			2 = Tooth hub (DIN 5480)						C = third series	
		00005			3 = Keyway (ANSI B17.1)							
		00010			6 = 2 x Keyway (DIN 6885-A) (180°)							
		00020										
		00015										
		00030										
		00060										
		00080										
		00150										
		00200										
		00300										
		00450										
		00500										
		00800										
		01500										
		02500										
					Inner diameter output D2						Release torque	
					see technical data sheets						see technical data sheets	
					Coupling version						Drive shape D1	
					W = single position (360°)						0 = Smooth	
					D = re-engaging (60°)						1 = Keyway (DIN 6885-A)	
					G = blocked						2 = Tooth hub (DIN 5480)	
					F = full disengagement						3 = Keyway (ANSI B17.1)	
											6 = 2 x Keyway (DIN 6885-A) (180°)	
											Inner diameter drive D1	
											see technical data sheets	
					Overall length							
					Optional length A							
					Optional length B							

Ordering codes – Torque limiters TL1

TL1	-	00015	A	W	047,0	-	08,00	0	-	A	0010
Product type		Size			Pitch circle belt pulley		Inner diameter drive D1			Release torque	
TL1		001,5			022,0		see technical data sheets			see technical data sheets	
		00002			028,0						
		004,5			035,0						
		00005			043,0						
		00010			047,0						
		00020			054,0						
		00015			063,0						
		00030			078,0						
		00060			085,0						
		00150			098,0						
		00200			110,0						
		00300			120,0						
		00450			148,0						
		00500			202,0						
		00800									
		01500									
		02500									
					Coupling version		Drive shape D1			Adjustment range	
					W = single position (360°)		0 = Smooth			A = first series	
					D = re-engaging (60°)		1 = Keyway (DIN 6885-A)			B = second series	
					G = blocked		2 = Tooth hub (DIN 5480)			C = third series	
					F = full disengagement		3 = Keyway (ANSI B17.1)			D = fourth series	
							6 = 2 x Keyway (DIN 6885-A) (180°)				
					Overall length						
					Optional length A						

For information purposes only – not required when placing orders!
Please contact WITTENSTEIN alpha for deviating mounting positions.



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WITTENSTEIN Inc. · 1249 Humbracht Circle · Bartlett, IL 60103 · USA · Phone 1-630-540-5300

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