Technical information for couplings

Note:
The zero backlash, flexible metal bellows or elastomer couplings are particularly suited to highly accurate drives with average torque values. They are the ideal solution for accurately connecting two shaft journals at a true angle. Axial, radial and angular displacement between two ends of a shaft can be compensated within defined limits. This produces minimal bearing stresses as a result of the low restoring forces. A strong shaft to hub connection guarantees zero backlash transmission of torque, even without additional parallel key. Low mass moments of inertia and a high quality kinetic energy guarantee excellent dynamic behaviour, even at high revolutions. As a basic principle, the couplings are wear and maintenance-free. The range of possible uses extends from challenging drive systems in general mechanical engineering through applications in metrology and automatic control to the spindle and axial drives of machine tools. Other typical examples of their use include textile, packaging and timber processing machines as well as industrial robots and multi-spindle drilling heads.

Specifications

Comparison	Metal bellows couplings	Elastomer couplings	Beam couplings
Major functional features	– very high torsion resistance, therefore accurate transfer of the angle of rotation – low mass moments of inertia – full metal version – minimal restoring forces on the bearing	– plug-in (blind assembly is possible) – vibration dampening – no-play, due to pre-tensioning of the coupling star in the claws – 23021 DIN 69002 suitable for the highest speeds	– compact design – play-free, absolute synchronism – high torsion resistance – low mass moments of inertia – full metal version – models in aluminium and stainless steel
Connection or compensating elements	– stainless steel metal bellows	– polyurethane elastomer star	– full metal version with slotted structure
Hub version	– easy to assemble clamp hub (strong, no-play)	– easy to assemble clamp hub – conical connection to clamping ring hub	– easy to assemble clamp hub, fixed or removable (strong, no-play)
Temperature range	max. 200 °C	-30 °C to +90 °C	-50 °C to +150 °C
Speeds	Couplings are prebalanced. Additional balancing is recommended for revolutions in excess of 5000 r.p.m.	Version with clamping ring hub (23021) is suitable for up to 20000 r.p.m.	Depending on model, suitable for speeds up to 10000 r.p.m.

Configuration

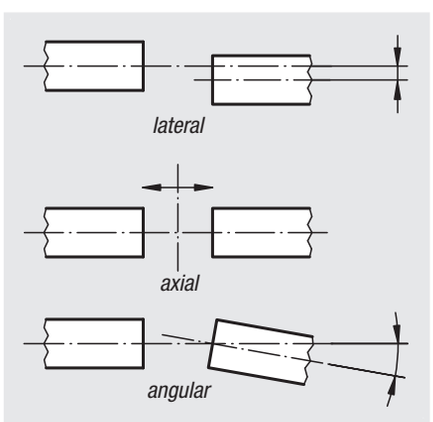
Rough calculation:

$$M_N \geqq 1{,}5 \cdot M_{max.}\ [Nm]$$

$M_N \triangleq$ nom. torque of coupling

$M_{max.} \triangleq$ max. motor torque

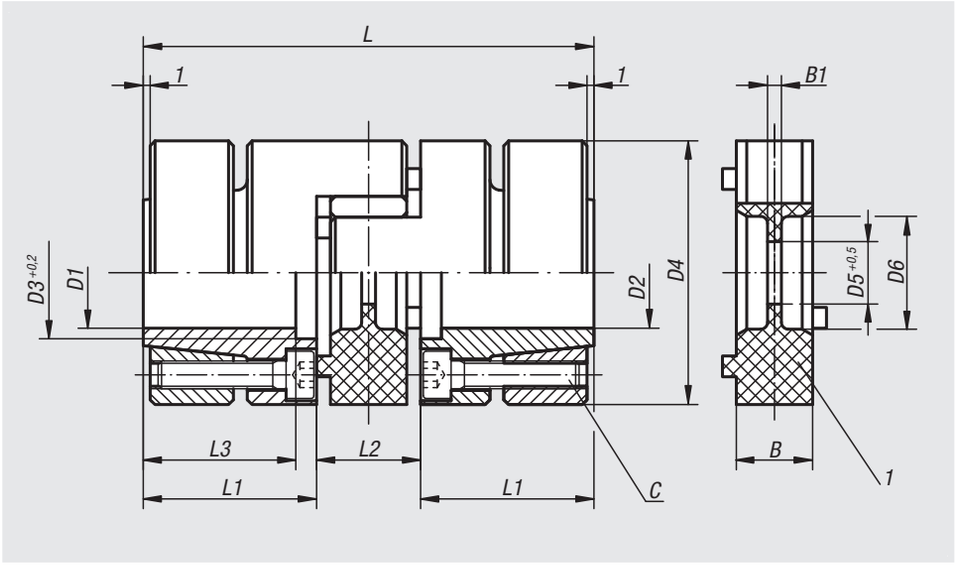
For accurate dimensioning the actual acting torques must be calculated from the cutting or acceleration forces. In exceptional cases and only for short periods, e.g. during a collision, increased loading of up to twice the nominal torque is possible.



Shaft displacement
Axial and angular displacement are generally not a problem and are also easy to check. Conversely, great attention should be paid to radial shaft displacement, i.e. the lateral parallel displacement of the axes of rotation. This error must not exceed the value prescribed in the table.

Elastomer dog couplings

with conical hub and clamping ring (similar to DIN 69002)



Material:
Spider polyurethane hardness Shore 98A.
Hub aluminium.
Conical ring carbon steel.

Sample order:
nlm 23021-010,
D1 = 6
D2 = 6
(The hubs are supplied pre-bored).

Note:
This coupling series is particularly suitable for use in high speed main spindle or drill spindle drives. Before the plug-in assembly, both clamping ring hubs must be fastened to the shafts with the correct tightening torque. Lightly oil the spider to ease assembly.

Assembly:
The shaft to hub bore fit should be a transition fit. The play should be max. 0.02 mm. i.e:
shaft Ø 25 k6
bore Ø 25 G6.
Bores smaller than D1/D2 min. are possible, however an optimal transfer of the nominal torque is no longer guaranteed.

On request:
Hub bores D1 and D2 with separate tolerance class or range.

Drawing reference:
1) elastomer spider

Order No.	Size	Nominal torque Nm	Moment of inertia (10^{-3} kgm^2)	Static resistance to torsion Nm/arcmin	Max. axial shaft displacement ±	Max. lateral shaft displacement	Radial spring stiffness N/mm	Tightening torque of screws Nm	Max. rpm
23021-010	10	10	0,015	0,04	0,5	0,1	600	2	30000
23021-017	17	17	0,05	0,24	0,5	0,1	2100	3	24000
23021-043	43	43	0,19	0,4	0,5	0,1	2500	6	19000
23021-060	60	60	0,28	0,6	0,5	0,1	2600	6	17500
23021-150	150	150	0,65	1,05	1	0,1	3300	6	15000
23021-320	320	320	2	2	1	0,12	4500	30	12000
23021-500	500	500	5,6	5,8	1	0,15	5900	50	9500
23021-700	700	700	13	8	1	0,15	7000	100	8000

Order No.	D1/D2 predrilled	D1/D2 min.	D1/D2 max.	D3	D4	D5	D6	L	L1	L2	L3	B	B1	C (DIN 912-12.9)
23021-010	6	6	14	17	32	8,5	10,5	50	18,5	13	15,5	10	2	4x M3
23021-017	9	9	19	22	40	9,5	18	66	25	16	21	12	3	6x M4
23021-043	10	12	24	29	50	12,5	27	78	30	18	25	14	3	4x M5
23021-060	12	12	26	30	55	12,5	27	78	30	18	25	14	3	4x M5
23021-150	12	17	36	40	65	14,5	30	90	35	20	30	15	4	8x M5
23021-320	18	20	40	46	80	16,5	38	114	45	24	40	18	4	4x M8
23021-500	20	22	48	58	100	20,5	47	138	55	28	49	22	5	4x M10
23021-700	24	25	60	72	120	22,5	58	155	61	33	54	25	6	4x M12