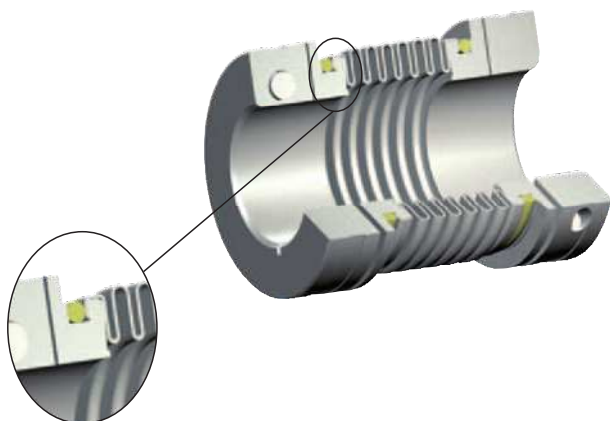


Coupling description

TOOLFLEX® is a metal bellow-type coupling, a coupling system which has proven its worth in the field in many cases. The metal bellow compensates perfectly for axial, radial and angular displacements. At the same time its geometric shape allows for high torsional stiffness and a low mass moment of inertia. TOOLFLEX® is produced in eleven sizes for maximum torques up to 340 Nm.

Its main application ranges are both positioning drives, e. g. ball spindles with a high incline, and indexing tables or planetary and worm gears with small gear ratios.



Subject to its well-approved joint procedure a non-positive connection of the aluminium hubs with the multilayer bellows made from stainless steel is produced.

The flanged insert connection sizes 16 to 45 ensures a torque transmission of every single bellow layer.

Since Toolflex is a metal coupling, it remains fatigue-endurable in the high temperature range up to a maximum of 200 °C.

Moreover, it is resistant to influences of media or critical operating conditions, respectively

The well-known shaft-hub-connection by means of clamping hubs ensures an easy assembly by a radial clamping screw. Subject to two slots in the hub there is no deformation of the bellow when tightening the clamping screw. For higher friction torques type KN with taper hubs can be used.



clamping hub with two slots

Types



Type M and S



Type KN



Type PI



Type CF



Coupling selection

Normally the TOOLFLEX® is selected according to the nominal torque (T_{KN}) shown in the list of technical data, like all other coupling systems. In all cases the torque (T_{KN}) must exceed the maximum torque to be transmitted (accelerating or peak torque). This should mainly be considered in connection with servo motors because their accelerating torques both positive and negative can exceed the nominal torque of the coupling by a significant amount. In case of values exceeding T_{KN} (collision, trouble) only limited alternating load figures are possible. In this torque range there can be permanent deformation of the bellow and fatigue fractures can occur. The torques T_{KN}/T_{Kmax} mentioned refer to the bellow. The shaft-hub-connection has to be investigated by the customer.

Description	Symbol	Definition or explanation
Rated torque of coupling	T_{KN}	Torque that can continuously be transmitted over the entire permissible speed range
Maximum torque of coupling	T_{Kmax}	Torque which can be transmitted temporary (e.g. emergency shut down). $T_{Kmax} = 1,5 \cdot T_{KN}$
Peak torque of machine	T_S	Peak torque on the coupling
Peak torque on the driving side	T_{AS}	Peak torque with torque shock on the driving side, e. g. breakdown torque of the electric motor
Peak torque of load side	T_{LS}	Peak torque with torque shock on load side, e. g. braking
Moment of inertia	$J_{A/L}$	Total of moments of inertia existing on the driving or load side referring to the coupling speed
Rotational inertia coefficient of driving side	m_A	Factor taking into account the mass distribution with shocks and vibrations produced on the driving side
Rotational inertia coefficient of load side	m_L	Factor taking into account the mass distribution with shocks and vibrations produced on the load side

Description	Symbol	Definition or explanation
max. engine performance	P_{max}	max. power in kW which the engine may produce
engine speed	n	Rated speed in rpm of the engine
Torsional angle	ϕ	Transmission error of the metal bellow due to torsional strain
Torsional stiffness	C_T	Torsional stiffness of the coupling in Nm/rad. For data see tables shown on the following pages.
Frequency of the 2-mass-system	f_e	in s^{-1}
Exciting frequency of the drive	f_r	in s^{-1}
Operating factor	k	$k = 1,5$ with uniform movement $k = 2,0$ with ununiform movement $k = 2,5 - 4$ with shocking movement For drives in machine tools (servo motors) k values of $1,5 - 2$ must be used.

Judgement calculation

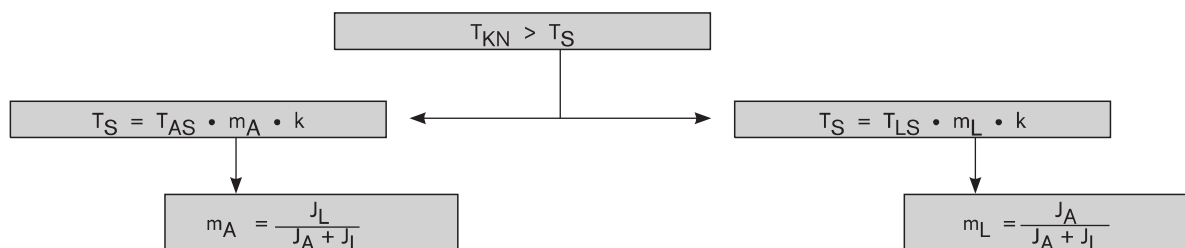
The size of the coupling must be selected so that the following conditions are met.

$$T_{KN} \geq T_{AS/LS} \cdot k$$

$$T_{AS} [Nm] = 9550 \cdot \frac{P_{max} [kW]}{n [rpm]}$$

When selecting servo motors the calculations are made with the torque values of the engine suppliers and not with P_{max} . When dimensioning the coupling please use the respective data of the manufacturer considering the servo controller to be used.

Accelerating torque (drive side / load side)



Inspection of torsional stiffness

$$\phi = \frac{180 \cdot T_{AS}}{\pi \cdot C_T}$$

Inspection of resonance frequency

The natural frequency of the coupling must be above or below the frequency of the unit. Valid for the mechanical spare model of the 2-mass-system:

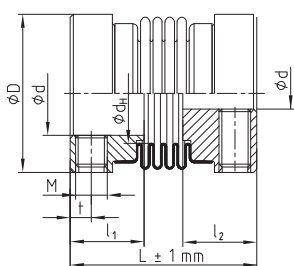
$$f_e = \frac{1}{2 \cdot \pi} \sqrt{C_T \left(\frac{J_L + J_A}{J_L \cdot J_A} \right)} [Hz]$$

Valid in practice: $f_e \geq 2 \cdot f_r$

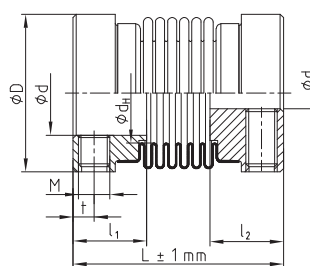
Type S/M with set screw



- Backlash-free, torsionally stiff
- Maintenance-free
- Low mass moment of inertia
- Easy assembly due to tolerance F7
- Temperature range for size 5 to 12: -30 °C to +100 °C
Temperature range for size 16 to 20: max. 200 °C
- Finish bore from Ø 6 mm also available with feather key acc. to DIN 6885 sheet 1 – JS9



TOOLFLEX® S Type 1.1



TOOLFLEX® M type 1.1

TOOLFLEX® S/M with set screw (type 1.1) Hub material aluminium/bellow material stainless steel																	
Size	Design 1/2)	Bellow-hub-connection	Bellow torque T _{KN} [Nm]	Dimensions [mm]									Perm. displacements			Torsional stiffness C _T [Nm/rad]	Weight ⁴⁾ [kg]
				Finish bore		General				Set screw			Axial [mm]	Radial [mm]	Angular [degrees]		
				min. d	max. d	D _H	d _H	L	l ₁ ; l ₂	M	t	number ³⁾					
5	S	Bonded	0,1	2	5	10	6	15 ¹⁾	6	M2	1,8	1	±0,30	0,10	0,7	97	0,0027
	17 ²⁾							±0,40					0,15	1,0	75	0,003	
7	S		1,0	3	8	15	9	18 ¹⁾	7	M3	2,0	1	±0,30	0,10	0,7	390	0,005
	20 ²⁾							±0,40					0,15	1,0	300	0,006	
9	S		1,5	4	10	20	12	21 ¹⁾	8	M3	2,2	2	±0,35	0,15	1,0	750	0,010
	24 ²⁾							±0,50					0,20	1,5	580	0,011	
12	S	2,0	5	14	25	16	27,5 ¹⁾	11	M4	2,8	2	±0,40	0,15	1,0	1270	0,017	
	31 ²⁾						±0,60					0,20	1,5	980	0,019		
16	S	5,0	6	18	32	20	37 ¹⁾	13	M5	4	2	±0,30	0,15	1,0	4500	0,046	
	41 ²⁾						±0,50					0,20	1,5	3050	0,049		
20	S	Flanged	15	6	25	40	42 ¹⁾	15	M5	5	2	±0,40	0,15	1,0	9600	0,076	
	49 ²⁾						±0,60					0,20	1,5	6600	0,082		

¹⁾ Design S = 4 section bellows ²⁾ Design M = 6 section bellows ³⁾ For selection please have a look on page 160 ⁴⁾ Quantity each hub, from size 9: 2x120° offset ⁵⁾ Figures refer to the complete coupling with max. bores

Circumferential speed v_{max} = 20 m/s

Hub design 1.1 = hub without keyway with set screw. Hub design 1.0 = hub with keyway with set screw.

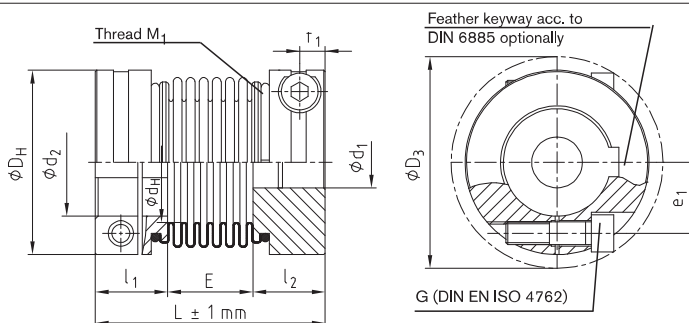
Order form:

TOOLFLEX® 7 M	1.1	-	Ø4	1.1	-	Ø6
Coupling size	Hub design		Finish bore	Hub design		Finish bore

Type M with clamping hubs



- Backlash-free, torsionally stiff
- Non-positive bellow-hub connection
- Frictionally engaged clamping hubs
- Maintenance-free
- Temperature range:
for size 5 to 12: -30 °C to +100 °C
from size 16: suitable for high temperatures due to flanged insert connection (max. 200 °C)
- Well-resistant to corrosion
- Finish bore from Ø 6 mm also available with feather key acc. to DIN 6885 sheet 1 – JS9



TOOLFLEX Type M with clamping hubs Hub material aluminium / bellow material stainless steel

Size	Dimensions [mm]												
	Finish bore		General					Clamping screws DIN EN ISO 4762					
	min. d	max. d	L	I ₁ ; I ₂	E	D _H	d _H	M ₁	D ₃	t ₁	e ₁	T _A [Nm]	
7	3	7	26	9	8	15	9	M2	16,5	3,2	5	0,37	
9	3	9	32	11	10	20	12	M2,5	21,5	3,5	7,1	0,76	
12	4	12	38	13	12	25	16	M3	26,5	4	8,5	1,34	
16	5	16	49	17,0	15	32	20	M4	35,0	5	12	2,9	
20	8	20	62	21,5	19	40	27	M5	43,5	6	14,5	6	
30	10	30	72	23,0	26	55	33	M6	58,0	7	19	10	
38	12	38	81	25,5	30	65	42	M8	72,6	9	25	25	
42	14	42	95	30,0	35	70	46	M8	76,1	9	27	25	
45	14	45	103	32,0	39	83	58	M10	89,0	11	30	49	
55 ⁴⁾	20	55	125	40,0	45	100	73	M12	106,0	14	37	120	

Technical data

Size	Bellow-hub-connection	Bellow torque T _{KN} ¹⁾ [Nm]	Speed n ²⁾ [rpm]	Moment of inertia ³⁾ [x10 ⁻⁶ kgm ²]	Torsional stiffness C _T [Nm/rad]	Axial spring stiffness [N/mm]	Radial spring stiffness [N/mm]	Perm. displacements			Mass ⁴⁾ [x10 ⁻³ kg]
								Axial [mm]	Radial [mm]	Angular [degrees]	
7	Bonded	1	31800	0,3	300	—	—	±0,4	0,15	1,0	0,008
9	Bonded	1,5	23800	1,0	580	—	—	±0,5	0,20	1,5	0015
12	Bonded	2	19100	2,7	980	—	—	±0,6	0,20	1,5	0,027
16	Bonded	5	14900	10	3050	29	92	±0,5	0,20	1,5	0,061
20	Bonded	15	11950	32	6600	42	126	±0,6	0,20	1,5	0,144
30	Flanged	35	8700	123	14800	65	155	±0,8	0,25	2,0	0,306
38	Flanged	65	7350	262	24900	72	212	±0,8	0,25	2,0	0,448
42	Flanged	95	6820	427	36500	80	333	±0,8	0,25	2,0	0,520
45	Flanged	150	5750	1020	64000	88	492	±1,0	0,30	2,0	1,125
55 ⁴⁾	Flanged	340	4800	5118	96100	107	598	±1,0	0,30	2,0	3,300

Transmittable friction torque T_R [Nm] of the clamping hub without keyway type 2.5

Size	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø9	Ø10	Ø11	Ø12	Ø14	Ø15	Ø16	Ø18	Ø19	Ø20	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø50	Ø55
7	0,84	0,91	0,97	1,04	1,10																							
9	1,87	1,98	2,09	2,20	2,31	2,41	2,52																					
12		3,48	3,65	3,81	3,98	4,14	4,31	4,48	4,64	4,81																		
16			8,5	8,8	9,1	9,4	9,7	9,9	10,2	10,5	11,1	11,4	11,7															
20						17,6	18,1	18,6	19,1	19,5	20,5	21,0	21,4	22,4	22,9	23,3												
30									33,1	33,8	35,1	35,8	36,5	37,8	38,5	39,2	41,9	42,5	44,6	45,9								
38											79,2	80,4	81,7	84,2	85,4	86,6	91,6	92,8	96,5	99,0	102	105	109					
42											84,2	85,4	86,6	89,1	90,3	91,6	96,5	97,8	102	104	106	110	114	116	119			
45																157	165	167	173	177	181	187	193	197	200	206		
55 ⁴⁾																397	401	413	421	429	442	454	462	470	482	502	523	

¹⁾ For selection please see page 160 ²⁾ With v = 25 m/s ³⁾ Figures refer to the complete coupling with max. bores
Hub design 2.5 = clamping hub without keyway, Hub design 2.6 = clamping hub with keyway

⁴⁾ Hubs from steel welded with bellow

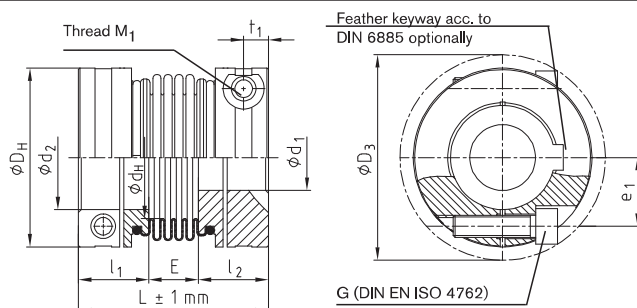
Order form:

TOOLFLEX® 30 M	2.5	Ø25	2.5	Ø30
Coupling size	Hub design	Finish bore	Hub design	Finish bore

Type S with clamping hubs



- Short design
- Higher stiffness of torsion spring
- Lower mass moment of inertia
- Temperatur range:
for size 5 to 12: -30 °C to +100 °C
from size 16: suitable for high temperatures due to flanged insert connection (max. 200 °C)
- Well-resistant to corrosion
- Finish bore from Ø 6 mm also available with feather key acc. to DIN 6885 sheet 1 – JS9



TOOLFLEX Type S with clamping hubs Hub material aluminium / bellow material stainless steel

Size	Dimensions [mm]											
	Finish bore		General					Clamping screws DIN EN ISO 4762				
	min. d	max. d	L	l ₁ :l ₂	E	D _H	d _H	M ₁	D ₃	t ₁	e ₁	T _A [Nm]
7	3	7	24	9	6	15	9	M2	16,5	3,2	5	0,37
9	3	9	29	11	7	20	12	M2,5	21,5	3,5	7,1	0,76
12	4	12	34,5	13	8,5	25	16	M3	26,5	4	8,5	1,34
16	5	16	45	17,0	11	32	20	M4	35,0	5	12,0	2,9
20	8	20	55	21,5	12	40	27	M5	43,5	6	14,5	6
30	10	30	63	23,0	17	55	33	M6	58,0	7	19	10
38	12	38	69	25,5	18	65	42	M8	72,6	9	25	25
42	14	42	84	30,0	24	70	46	M8	76,1	9	27	25
45	14	45	86,5	32,0	22,5	83	58	M10	89,0	11	30	49
55 ⁴⁾	20	55	111	40,0	31	100	73	M12	106,0	14	37	120

Technical data

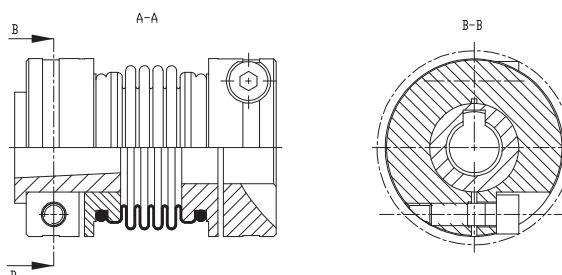
Size	Bellow-hub-connection	Bellow torque T _{KN} ¹⁾ [Nm]	Speed n ²⁾ [rpm]	Moment of inertia ³⁾ [x10 ⁻³ kgm ²]	Torsional stiffness C _T [Nm/rad]	Axial spring stiffness [N/mm]	Radial spring stiffness [N/mm]	Perm. displacements			Mass ³⁾ [x10 ⁻³ kg]
								Axial [mm]	Radial [mm]	Angular [degrees]	
7	Bonded	1	31800	0,26	390	—	—	±0,3	0,10	0,7	0,007
9		1,5	23800	0,97	750	—	—	±0,35	0,15	1,0	0,014
12		2	19100	2,6	1270	—	—	±0,4	0,15	1,0	0,025
16	Flanged	5	14900	9	4500	43	138	±0,3	0,15	1,0	0,061
20		15	11950	30	9600	63	189	±0,4	0,15	1,0	0,121
30		35	8700	114	17800	97	233	±0,5	0,20	1,5	0,243
38		65	7350	245	37400	108	318	±0,6	0,20	1,5	0,351
42		95	6820	396	54700	120	499	±0,6	0,20	1,5	0,485
45	150	5750	931	95800	132	738	±0,9	0,25	1,5	0,824	
55 ⁴⁾	340	4800	4996	144100	160	894	±1,0	0,25	1,5	3,213	

¹⁾ For selection please see page 160 ²⁾ With v = 25 m/s ³⁾ Figures refer to the complete coupling with max. bores
Hub design 2.5= clamping hub without keyway, Hub design 2.6 = clamping hub with keyway

⁴⁾ Hubs from steel welded with bellow

Info:
Torques of frictional engagement of the clamping hub shown under Type M (page 161)

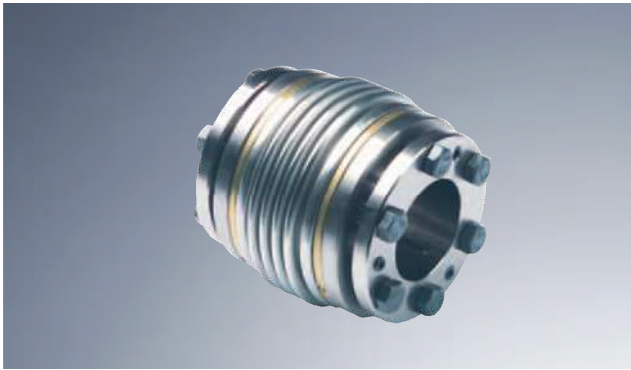
Other designs: Type for FANUC-Motors



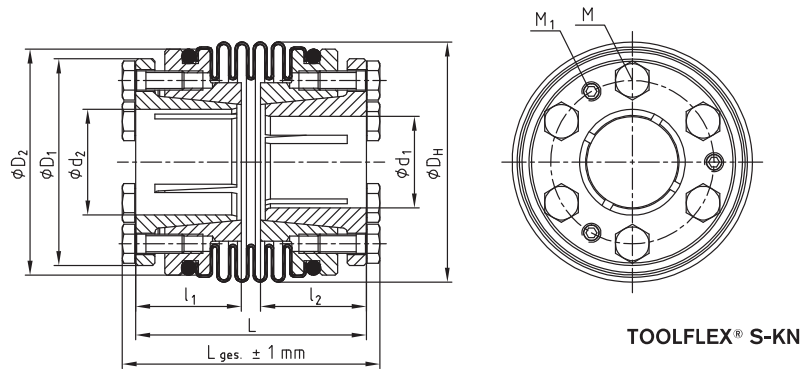
Order form:

TOOLFLEX®30 S	2.5	Ø25	2.5	Ø30
Coupling size	Hub design	Finish bore	Hub design	Finish bore

Type KN



- Backlash-free, torsionally stiff
- Non-positive bellow-hub connection
- High friction torques
- Maintenance-free
- Good properties of concentric running with high speeds
- Maximum speed up to 40 m/s circumferential speed



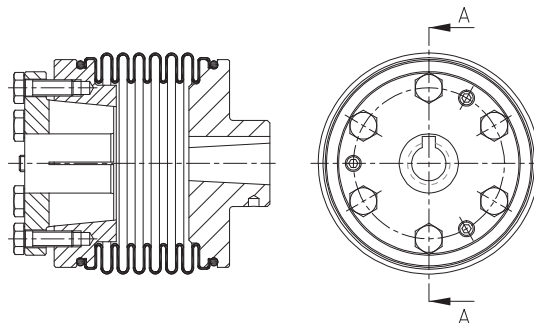
TOOLFLEX® S-KN

TOOLFLEX® Type KN Hub material steel / bellow material stainless steel																	
Size	Bellow torque T_{KN} [Nm] ¹⁾	Dimensions [mm]															
		Finish bore		L		L _{ges.}			Clamping screw				Pull-off threads				
		min. d	max. d	4 ²⁾	6 ³⁾	4 ²⁾	6 ³⁾	6 ³⁾	$l_1; l_2$	D_H	D_1	D_2	M	T_A [Nm]	Number z	M_1	Number z
30	35	12	22	48	57	54	63	22	50	43	47	M4	2,9	12	M4	6	1,2
38	65	12	28	56	68	63	75	26	60,5	52	56	M5	6	12	M5	6	1,4
42	95	14	35	64	75	71	82	29	66	60	63	M5	6	12	M5	6	1,4
45	150	15	40	74,5	91	82,5	99	34	82	68	77	M6	14	12	M6	6	3
55 ⁴⁾	340	15	56	95,5	109	106	120	40	97	95	95	M8	35	12	M8	6	6

Transmittable friction torques T_R [Nm] of the hub KN																		
Size	Ø14	Ø15	Ø16	Ø19	Ø20	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø48	Ø50	Ø55
30	50	58	66	71	79													
38		81	92	130	103	149	161	202										
42				105	117	168	131	164	189	215	257							
45					230	332	230	288	331	376	451	531	589					
55 ⁴⁾							483	606	696	792	585	690	764	843	967	1101	1194	1445

¹⁾ Selection please see page 160 ²⁾ Design S = 4 section bellows ³⁾ Design M = 6 section bellows ⁴⁾ Hubs from steel welded with bellow
⁵⁾ After assembly of the clamping screws (M) tighten the pull-off thread (M₁) to the torque T_{A1} indicated.

Other designs: TOOLFLEX® KN for FANUC engines

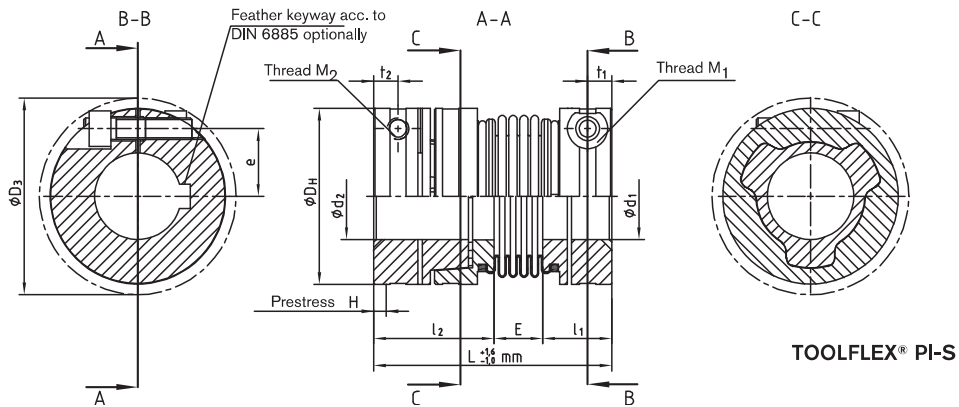


Order form:	TOOLFLEX® 38 S-KN	Ø15	Ø22
	Coupling size	Finish bore	Finish bore

Type PI



- Axial plug-in
- Backlash-free, torsionally stiff
- Maintenance-free
- Suitable for high temperatures due to flanged insert connection
- Well-resistant to corrosion due to bellow made from stainless steel and aluminium clamping hubs
- Optionally type M (6 section bellows)
 - higher perm. displacements
- or Type S (4 section bellows, short design)
 - higher stiffness of torsion spring
 - lower mass moment of inertia



TOOLFLEX® PI-S

Plug in metal bellow-type coupling type PI Hub material aluminium / bellow material stainless steel															
Size	Design	Dimensions [mm]										Clamping screws			
		min. d ₁ /d ₂	max. d ₁	max. d ₂	L ¹⁾	I ₁	I ₂	E	D _H	H	M ₁ /M ₂	D ₃	e	t ₁ /t ₂	T _A [Nm]
20	S	8	20	20	67,0	21,5	33,5	12,0	40	0,5 - 1	M5	43,5	14,5	6	6
	M				74,0			19,0							
30	S	10	30	28	73,5	23,0	33,5	17,0	55	0,5 - 1	M6	58,0	19,0	7	10
	M				82,5			26,0							
38	S	12	38	32	87,5	25,5	44,0	18,0	65	0,5 - 1,5	M8	72,6	25,0	9	25
	M				99,5			30,0							
42	S	14	42	35	93,0	30	39,0	24,0	70	0,5 - 1,5	M8	76,1	25,0	9	25
	M				104,0			35,0							
45	S	14	45	42	96,0	32,0	41,5	22,5	83	0,5 - 1,5	M10	89,0	30,0	11	49
	M				112,5			39,0							

Technical data										
Size	Design	Bellow torque T _{KN} ²⁾ [Nm]	Speed n ³⁾ [min ⁻¹]	Moment of inertia I ⁴⁾ [x10 ⁻⁶ kgm ²]	Torsional stiffness C _T [Nm/rad]	Axial spring stiffness [N/mm]	Radial spring stiffness [N/mm]	Perm. displacements		Mass [x10 ⁻³ kg]
								Radial [mm]	Angular [degrees]	
20	S	15	11950	37	6600	63	189	0,15	1,0	0,15
	M			38	4900	42	126	0,20	1,5	0,16
30	S	35	8700	140	11500	97	233	0,20	1,5	0,29
	M			145	10200	65	155	0,25	2,0	0,31
38	S	65	7350	329	21500	108	318	0,20	1,5	0,50
	M			346	15100	72	212	0,25	2,0	0,52
42	S	95	6820	396	31500	120	499	0,20	1,5	0,49
	M			427	22000	80	333	0,25	2,0	0,52
45	S	150	5750	1031	55000	132	738	0,25	1,5	0,93
	M			1127	41000	88	492	0,30	2,0	1,00

Transmittable friction torque T _R [Nm] of clamping hubs without keyway type 2.5 for Ød ₁ /Ød ₂																				
Size	Ø8	Ø9	Ø10	Ø11	Ø12	Ø14	Ø15	Ø16	Ø18	Ø19	Ø20	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42
20	17,6	18,1	18,6	19,1	19,5	20,5	21,0	21,4	22,4	22,9	23,3									
30				33,1	33,8	35,1	35,8	36,5	37,8	38,5	39,2	41,9	42,5	44,6	45,9					
38						79,2	80,4	81,7	84,2	85,4	86,6	91,6	92,8	96,5	99,0	102				
42						79,2	80,4	81,7	84,2	85,4	86,6	91,6	92,8	96,5	99,0	102	105			
45											157	165	167	173	177	181	187	193	197	200

¹⁾ When being plugged in

²⁾ Selection please see page 160

³⁾ With v = 25 m/s

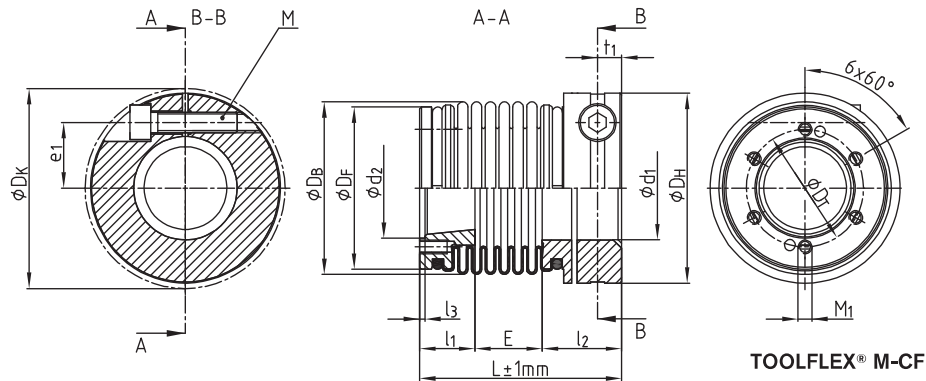
⁴⁾ Figures refer to the complete coupling with max. bores

Order form:	TOOLFLEX®30 PI-S	d ₁ - Ø22	d ₂ - Ø18
	Coupling size	Finish bore	Finish bore

Type CF



- Backlash-free, torsionally stiff
- Maintenance-free
- Non-positive bellow-hub connection
- Suitable for high temperatures due to flanged insert connection (max. 200 °C)
- Available as type M (6 section bellows) and S (4 section bellows)
- Available as special design with 1, 2 or 3 section bellows



TOOLFLEX® Type M-CF and S-CF Hub material aluminium/bellow material stainless steel																			
Size	Finish bore		Dimensions [mm]										Clamping screw					Flange	
	min. d1	max. d1	D _H	D _B	D _F	d ₂ H7	l ₃	l ₁	l ₂	E	L	D _K	e ₁	t ₁	M	T _A	D _T	M ₁	
30	10	20	55	50	47	25	1,5	16	23,0	17,0 ¹⁾	56,0 ¹⁾	58,0	19	7	M6	10	30	M4	
						29				26,0 ²⁾	65,0 ²⁾						34		
38	14	38	65	60,5	55,75	29	1,5	18	25,5	18,0 ¹⁾	61,5 ¹⁾	72,6	25	9	M8	25	35	M5	
						36				30,0 ²⁾	73,5 ²⁾						42		
42	14	42	70	66	62,95	36	1,5	21	30,0	24,0 ¹⁾	75,0 ¹⁾	76,1	27	9	M8	25	42	M5	
						43				35,0 ²⁾	86,0 ²⁾						49		
45	14	45	83	82	77	38	1,5	23	32,0	22,5 ¹⁾	77,5 ¹⁾	89,0	30	11	M10	49	45	M6	
						49				39,0 ²⁾	94,0 ²⁾						56		
55 ⁴⁾	20	55	100	97	95	51	1,5	28	40,0	31,0 ¹⁾	99,0 ¹⁾	106,0	37	14	M12	120	60	M8	
						68				45,0 ²⁾	113,0 ²⁾						78		

Technical data									
Size	Design	Torque T _{KN} ³⁾ [Nm]	Speed ⁴⁾ [rpm]	Torsional stiffness C _T [Nm/rad]	Axial spring stiffness [N/mm]	Radial spring stiffness [N/mm]	Perm. displacements		
							Axial [mm]	Radial [mm]	Angular [degrees]
30	S	35	8700	14800	97	233	±0,5	0,20	1,5
	M						±0,8	0,25	2,0
38	S	65	7350	24900	108	318	±0,6	0,20	1,5
	M						±0,8	0,25	2,0
42	S	95	6820	36500	120	499	±0,6	0,20	1,5
	M						±0,8	0,25	2,0
45	S	150	5750	64000	132	738	±0,9	0,25	1,5
	M						±1,0	0,30	2,0
55 ⁴⁾	S	340	4800	96100	160	894	±1,0	0,25	1,5
	M						±1,0	0,30	2,0

Transmittable friction torque T _R [Nm] of the clamping hub without keyway type 2.5																					
Size	Ø10	Ø11	Ø12	Ø14	Ø15	Ø16	Ø18	Ø19	Ø20	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø55	
30		33,1	33,8	35,1	35,8	36,5	37,8	38,5	39,2	41,9	42,5	44,6	45,9								
38							84,2	85,4	86,6	91,6	92,8	96,5	99,0	102	105	109					
42				84,2	85,4	86,6	89,1	90,3	91,6	96,5	97,8	102	104	106	110	114	116	119			
45									157	165	167	173	177	181	187	193	197	200	206		
55 ⁴⁾										397	401	413	421	429	442	454	462	470	482	502	523

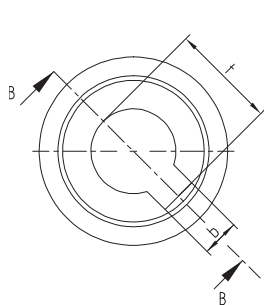
¹⁾ Design S = 4 section bellows ²⁾ Design M = 6 section bellows ³⁾ Selection please see page 160 ⁴⁾ Hubs from steel welded with bellow
⁵⁾ With v = 25m/s

Order form:	TOOLFLEX® 38 M-CF	Ø15	Ø29 - Ø35 - 6xM5

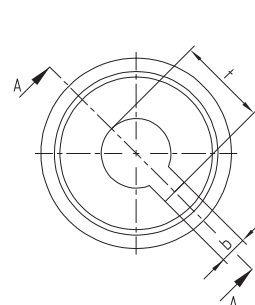
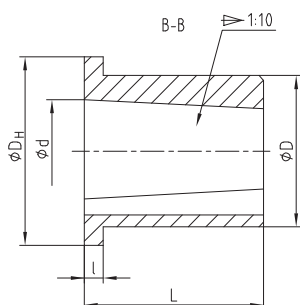
Basic programme

Basic programme TOOLFLEX® miniature (Finish bore [mm] according to ISO fit F7)																
Size	Hub design	Ø2	Ø3	Ø4	Ø5	Ø6	Ø6,35	Ø7	Ø8	Ø9	Ø9,52	Ø10	Ø11	Ø12	Ø14	Ø16
5	1.1	●	●	●	●											
7	1.1		●	●	●	●		●	●							
	2.5		●	●	●	●	●	●								
9	1.1			●	●	●		●	●	●		●				
	2.5		●	●	●	●	●	●	●	●	●					
12	1.1				●	●		●	●	●		●		●	●	
	2.5			●	●	●	●	●	●	●		●	●	●	●	
16	1.1					●			●			●	●	●	●	
20	1.1					●			●			●	●	●	●	●

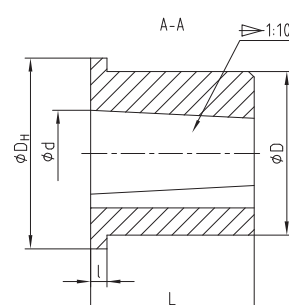
Basic programme TOOLFLEX® type M and S (Finish bore [mm] according to ISO fit F7)																														
Size		Ø5	Ø6	Ø6,35	Ø7	Ø8	Ø9	Ø10	Ø11	Ø12	Ø14	Ø15	Ø16	Ø18	Ø19	Ø20	Ø22	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø48	Ø50	Ø55
16	■	●	●	●	●	●	●	●	●	●	●	●	●																	
20	■							●	●	●	●	●	●	●	●	●														
30	■										●	●	●	●	●	●	●	●	●	●	●	●	●	●	●					
38	■																●	●	●	●	●	●	●	●	●	●	●	●	●	
42	■																●	●	●	●	●	●	●	●	●	●	●	●	●	
45	■																●		●	●	●	●	●	●	●	●	●	●	●	
55	■																						●	●	●	●	●	●	●	●



Size 1



Size 2



Type M and S sleeve dimensions [mm] for FANUC engines									
Sleeve size	L	l	D _H	D	d ^{+0,05}	b ^{S9}	f ^{+0,1}	Taper	Notice
1	16	2	20	16	10,9	4	12,2	1:10	For TOOLFLEX® size 16-20
2	30	3	35	30	15,8	5	17,9	1:10	For TOOLFLEX® size 30-45

Basic programme TOOLFLEX® type KN (Finish bore [mm] according to ISO fit F7)																			
Size		Ø14	Ø15	Ø16	Ø18	Ø19	Ø20	Ø22	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø48
30	■	●	●	●	●	●	●	●											
38	■	●	●	●	●	●	●	●	●	●	●								
42	■				●	●	●	●	●	●	●	●	●	●					
45	■				●	●	●	●	●	●	●	●	●	●	●				
55	■										●	●	●	●	●	●	●	●	●

■ Pilot bore
Further dimensions on request