



TOOLFLEX®

Backlash-free, torsionally stiff and maintenance-free coupling



Type S with setscrew



Type M with setscrew



Type S with clamping hubs



Type M with clamping hubs



Type PI

 KTR-Group	TOOLFLEX® Operating/Assembly instructions	KTR-N 45810 EN Sheet: 2 of 16 Edition: 9
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TOOLFLEX® is a backlash-free, torsionally stiff and maintenance-free metal bellow-type coupling designed to be used on machine tools, positioning systems, indexing tables as well as planetary and worm gears. It is able to compensate for shaft misalignment, for example caused by manufacturing inaccuracies, thermal expansion, etc.

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Please observe protection note ISO 16016.	Drawn: 2022-09-21 Ka/Hn Verified: 2023-11-30 Ka	Replacing: KTR-N dated 2019-07-18 Replaced by:
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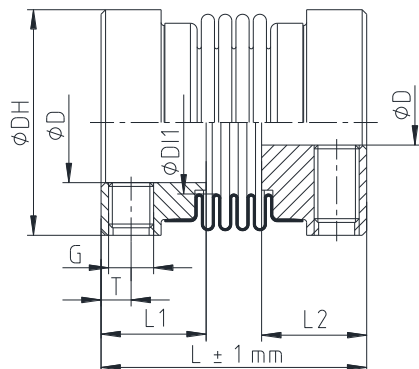

1 Technical data
Type S and M with setscrew


Illustration 1: TOOLFLEX® type S with setscrew (type 1.1)

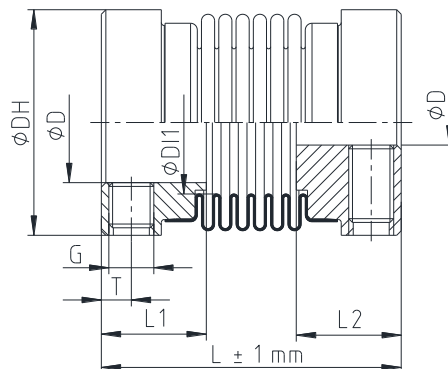


Illustration 2: TOOLFLEX® type M with setscrew (type 1.1)

Table 1: Dimensions - type S and M with setscrew (type 1.1)

Hub material: aluminium; bellow material: stainless steel														
Size	Type 1) 2)	Torque of bellow T _{KN} in Nm	Dimensions in mm										Torsion stiffness C _T in Nm/rad	Weight ⁵⁾ in kg
			Finish bore ³⁾ D		General				Setscrew					
			Min.	Max.	DH	DI1	L	L1, L2	G	T	Z No. ⁴⁾	T _A in Nm		
5	S	0.1	2	5	10	6	15 ¹⁾	6	M2	1.8	1	0.35	97	0.0027
	M						17 ²⁾						75	0.003
7	S	1.0	3	8	15	9	18 ¹⁾	7	M3	2.0	1	0.6	390	0.005
	M						20 ²⁾						300	0.006
9	S	1.5	4	10	20	12	21 ¹⁾	8	M3	2.2	2	0.6	750	0.010
	M						24 ²⁾						580	0.011
12	S	2.0	5	14	25	16	27.5 ¹⁾	11	M4	2.8	2	1.5	1270	0.017
	M						31 ²⁾						980	0.019
16	S	5.0	6	18	32	20	37 ¹⁾	13	M5	4.0	2	2	4500	0.046
	M						41 ²⁾						3050	0.049
20	S	15	6	25	40	27	42 ¹⁾	15	M5	5.0	2	2	9600	0.076
	M						49 ²⁾						6600	0.082

1) Type S = 4 layers

2) Type M = 6 layers

3) Bore F7

Keyway to DIN 6885 sheet 1 [JS9] from finish bore Ø6 mm on request.

4) Number each hub, from size 9: 2 x 120° offset.

5) Figures refer to the complete coupling with max. bore.

Circumferential speed v_{max.} = 25 m/s

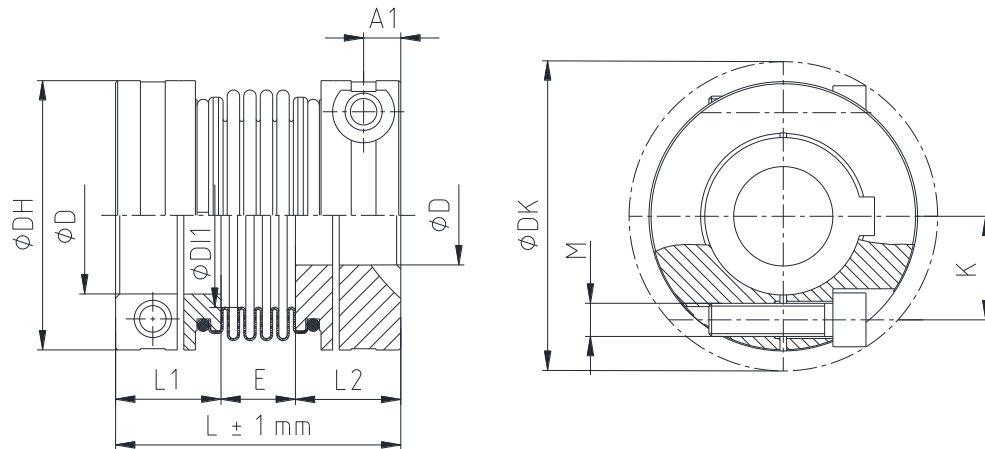

1 Technical data
Type S with clamping hubs


Illustration 3: TOOLFLEX® type S with clamping hubs

Table 2: Dimensions - type S (4 layers) with clamping hubs

Hub material: aluminium (hub size 55 and 65: steel); bellows material: stainless steel												
Size	Dimensions in mm											
	Finish bore D ⁴⁾		General					Clamping screws DIN EN ISO 4762				
	Min.	Max.	L	L1, L2	E	DH	DI1	M	DK	A1	K	T _A in Nm
7	3	7	24.0	9.0	6.0	15	9	M2	16.5	3.2	5.0	0.37
9	3	9	29.0	11.0	7.0	20	12	M2.5	21.5	3.5	7.1	0.76
12	4	12	34.5	13.0	8.5	25	16	M3	26.5	4	8.5	1.34
16	5	16	45.0	17.0	11.0	32	20	M4	35.0	5	12.0	2.9
20	8	20	55.0	21.5	12.0	40	27	M5	43.5	6	14.5	6
30	10	30	63.0	23.0	17.0	55	33	M6	58.0	7	19.0	10
38	12	38	69.0	25.5	18.0	65	42	M8	72.6	9	25.0	25
42	14	42	84.0	30.0	24.0	70	46	M8	76.1	9	27.0	25
45	14	45	86.5	32.0	22.5	83	58	M10	89.0	11	30.0	49
55 ³⁾	20	55	111.0	40.0	31.0	100	73	M12	106.0	14	37.0	120
65 ³⁾	30	65	126.0	45.0	36.0	125	95	M14	127.2	15	45	185

Table 3: Technical data - type S (4 layers) with clamping hubs

Hub material: aluminium							
Size	Torque of bellows T _{KN} in Nm	Speed n ¹⁾ in rpm	Moment of inertia ²⁾ in x10 ⁻⁶ kgm ²	Torsion stiffness C _T in Nm/rad	Axial spring stiffness in N/mm	Radial spring stiffness in N/mm	Weight ²⁾ in kg
7	1	31800	0.26	390	-	-	0.007
9	1.5	23800	0.97	750	-	-	0.014
12	2	19100	2.6	1270	-	-	0.025
16	5	14900	9	4500	43	138	0.06
20	15	11950	30	9600	63	189	0.12
30	35	8700	114	17800	97	233	0.24
38	65	7350	245	37400	108	318	0.35
42	95	6820	396	54700	120	499	0.49
45	170	5750	931	95800	132	738	0.8
55 ³⁾	340	4800	4996	144100	160	894	3.2
65 ³⁾	600	3850	13318	322740	212	1365	5.5

1) With v = 25 m/s

2) Figures refer to the complete coupling with max. bore.

3) Hubs made of steel welded with bellows.

4) Finish bore optionally with feather keyway according to DIN 6885 sheet 1.

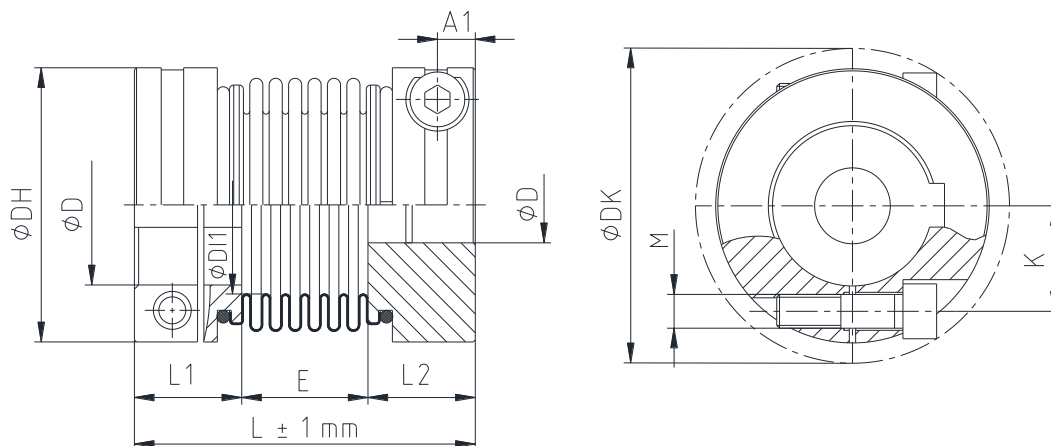

1 Technical data
Type M with clamping hubs


Illustration 4: TOOLFLEX® type M with clamping hubs

Table 4: Dimensions - type S (6 layers) with clamping hubs

Hub material: aluminium (hub size 55 and 65: steel); bellow material: stainless steel												
Size	Dimensions in mm											
	Finish bore D ⁴⁾		General					Clamping screws DIN EN ISO 4762				
	Min.	Max.	L	L1, L2	E	DH	DI1	M	DK	A1	K	T _A in Nm
7	3	7	26	9.0	8	15	9	M2	16.5	3.2	5.0	0.37
9	3	9	32	11.0	10	20	12	M2.5	21.5	3.5	7.1	0.76
12	4	12	38	13.0	12	25	16	M3	26.5	4	8.5	1.34
16	5	16	49	17.0	15	32	20	M4	35.0	5	12.0	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	19.0	10
38	12	38	81	25.5	30	65	42	M8	72.6	9	25.0	25
42	14	42	95	30.0	35	70	46	M8	76.1	9	27.0	25
45	14	45	103	32.0	39	83	58	M10	89.0	11	30.0	49
55 ³⁾	20	55	125	40.0	45	100	73	M12	106.0	14	37.0	120
65 ³⁾	30	65	142	45.0	52	125	95	M14	127.2	15	45	185

Table 5: Technical data - type S (4 layers) with clamping hubs

Hub material: aluminium							
Size	Torque of bellows T _{KN} in Nm	Speed n ¹⁾ in rpm	Moment of inertia ²⁾ in x10 ⁻⁶ kgm ²	Torsion stiffness C _T in Nm/rad	Axial spring stiffness in N/mm	Radial spring stiffness in N/mm	Weight ²⁾ in kg
7	1	31800	0.3	300	-	-	0.008
9	1.5	23800	1.0	580	-	-	0.015
12	2	19100	2.7	980	-	-	0.03
16	5	14900	10	3050	29	92	0.06
20	15	11950	32	6600	42	126	0.14
30	35	8700	123	14800	65	155	0.31
38	65	7350	262	24900	72	212	0.45
42	95	6820	427	36500	80	333	0.52
45	170	5750	1020	64000	88	492	1.13
55 ³⁾	340	4800	5118	96100	107	598	3.3
65 ³⁾	600	3850	13727	226550	135	910	5.6

1) With v = 25 m/s

2) Figures refer to the complete coupling with max. bore.

3) Hubs made of steel welded with bellows.

4) Finish bore optionally with feather keyway according to DIN 6885 sheet 1.

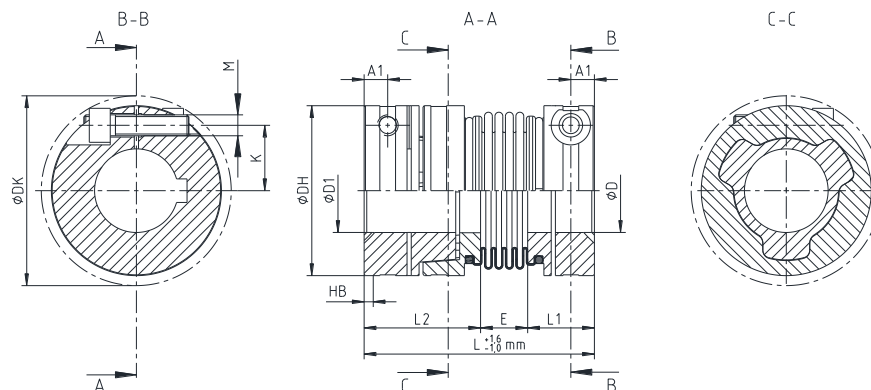

1 Technical data
Type S-PI and M-PI


Illustration 5: TOOLFLEX® type PI - example of drawing: type S-PI

Table 6: Dimensions - type S-PI and M-PI

Hub material: aluminium; bellow material: stainless steel															
Size	Type ¹⁾ ₂₎	Dimensions in mm													
		Finish bore ⁶⁾			General						Clamping screws				
		min. D, D1	max. D	max. D1	L ³⁾	L1	L2	E	DH	HB	M	DK	K	A1	T _A in Nm
20	S	8	20	20	67.0 ¹⁾	21.5	33.5	12 ¹⁾	40	0.5 - 1.0	M5	43.5	14.5	6	6
	M				74.0 ²⁾			19 ²⁾							
30	S	10	30	28	73.5 ¹⁾	23.0	33.5	17 ¹⁾	55	0.5 - 1.0	M6	58.0	19.0	7	10
	M				82.5 ²⁾			26 ²⁾							
38	S	12	38	32	87.5 ¹⁾	25.5	44.0	18 ¹⁾	65	0.5 - 1.0	M8	72.6	25.0	9	25
	M				99.5 ²⁾			30 ²⁾							
42	S	14	42	35	93.0 ¹⁾	30.0	39.0	24 ¹⁾	70	0.5 - 1.0	M8	76.1	25.0	9	25
	M				104.0 ²⁾			35 ²⁾							
45	S	14	45	42	96.0 ¹⁾	32.0	41.5	22.5 ¹⁾	83	0.5 - 1.0	M10	89.0	30.0	11	49
	M				112.5 ²⁾			39 ²⁾							
55	S	20	55	55	136.0 ¹⁾	40.0	58.5	31 ¹⁾	100	0.5 - 1.0	M12	106.0	37.0	14	120
	M				143.5 ²⁾			45.0 ²⁾							

Table 7: Technical data - type S-PI and M-PI

Hub material: aluminium; bellow material: stainless steel								
Size	Type ¹⁾ ₂₎	Torque of bellow T _{KN} in Nm	Speed n ⁵⁾ in rpm	Moment of inertia ⁴⁾ in x10 ⁻⁶ kgm ²	Torsion stiffness C _T in Nm/rad	Axial spring stiffness in N/mm	Radial spring stiffness in N/mm	Weight ⁴⁾ in kg
20	S	15	11950	37	6600	63	189	0.15
	M			38	4900	42	126	0.16
30	S	35	8700	140	11500	97	233	0.29
	M			145	10200	65	155	0.31
38	S	65	7350	329	21500	108	318	0.50
	M			346	15100	72	212	0.52
42	S	95	6820	396	31500	120	499	0.49
	M			427	22000	80	333	0.52
45	S	170	5750	1031	55000	132	738	0.93
	M			1127	41000	88	492	1.00
55	S	340	4800	6150	144100	160	894	3.80
	M			6270	96100	107	598	3.90

1) Type S = 4 layers

2) Type M = 6 layers

3) When being plugged in

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

5) With v = 25 m/s

6) Finish bore optionally with feather keyway according to DIN 6885 sheet 1

Transmittable friction torques of clamping hub - for type PI see table 13.

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	Verified:	2023-11-30 Ka	Replaced by:	

1 Technical data



With the assembly of the coupling onto hollow shafts it is necessary to check the permissible tensions and deformation (see chapter 4.5).

Table 8: Transmittable friction torque of the clamping hub - type PI

Size	Bore range D and the corresponding transmittable friction torque T_R in Nm																		
	Ø8	Ø9	Ø10	Ø11	Ø12	Ø14	Ø15	Ø16	Ø18	Ø19	Ø20	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40
20	17.6	18.1	18.6	19.1	19.5	20.5	21.0	21.4	22.4	22.9	23.3								
30			32.4	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						145	147	149	153	155	157	165	167	173	177	181	187	193	197
55												397	401	413	421	429	442	454	462

The transmittable friction torques of the clamping connection consider the max. fitting tolerance with shaft clearance H7/k6 bore. The friction torque is reduced with bigger clearance.

2 Advice

2.1 General advice

Please read through these operating/assembly instructions carefully before you start up the coupling.

Please pay special attention to the safety instructions!

The operating/assembly instructions are part of your product. Please store them carefully and close to the coupling.

The copyright for these operating/assembly instructions remains with KTR.

2.2 Safety and advice symbols



Warning of personal injury

This symbol indicates notes which may contribute to preventing bodily injuries or serious bodily injuries that may result in death.



Warning of product damages

This symbol indicates notes which may contribute to preventing material or machine damage.



General advice

This symbol indicates notes which may contribute to preventing adverse results or conditions.



Warning of hot surfaces

This symbol indicates notes which may contribute to preventing burns with hot surfaces resulting in light to serious bodily injuries.

2 Advice

2.3 General hazard warnings



With assembly, operation and maintenance of the coupling it has to be made sure that the entire drive train is secured against accidental switch-on. You may be seriously hurt by rotating parts. Make absolutely sure to read through and observe the following safety indications.

- All operations on and with the coupling have to be performed taking into account "safety first".
- Make sure to switch off the power pack before you perform your work on the coupling.
- Secure the power pack against accidental switch-on, e. g. by providing warning signs at the place of switch-on or removing the fuse for current supply.
- Do not reach into the operating area of the coupling as long as it is in operation.
- Secure the coupling against accidental contact. Provide for the necessary protection devices and covers.

2.4 Intended use

You may only assemble, operate and maintain the coupling if you

- have carefully read through the operating/assembly instructions and understood them
- had technical training
- are authorized by your company

The coupling may only be used in accordance with the technical data (see chapter 1). Unauthorized modifications on the coupling design are not admissible. We will not assume liability for any damage that may arise. In the interest of further development we reserve the right for technical modifications.

The **TOOLFLEX®** described in here corresponds to the technical status at the time of printing of these operating/assembly instructions.

2.5 Coupling selection



To ensure a permanently smooth operation of the coupling a corresponding operating factor (see catalogue drive technology "TOOLFLEX®") has to be taken into consideration with dimensioning, depending on the application.

If the operating conditions (performance, speed, modifications on engine and machine) change, the coupling selection must be reviewed.

The transmittable torque of the shaft-hub-connection must be reviewed by the customer and is subject to his responsibility.

**3 Storage, transport and packaging****3.1 Storage**

Coupling components made of steel (e. g. hubs) are supplied in preserved condition and can be stored at a dry and covered place for 6 - 9 months. Couplings with aluminium components (e. g. hubs) and bellows from stainless steel are supplied in preserved condition.



Humid storage rooms are not suitable.

Make sure that condensation is not generated. The best relative air humidity is less than 65 %.

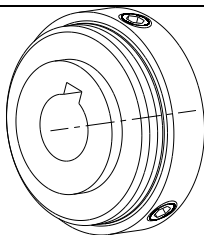
3.2 Transport and packaging

In order to avoid any injuries and any kind of damage always make use of proper transport and lifting equipment.

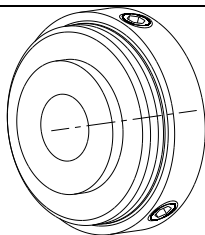
The couplings are packed differently each depending on size, number and kind of transport. Unless otherwise contractually agreed, packaging will follow the in-house packaging specifications of KTR.

4 Assembly

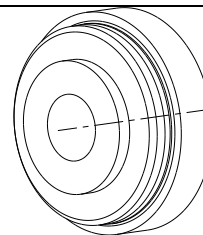
The coupling is supplied in assembled condition, including clamping screws or setscrews assembled. Before assembly the coupling has to be inspected for completeness.

4.1 Types of hubs

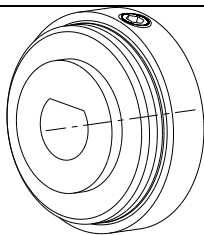
Type 1.0
with feather keyway and setscrew



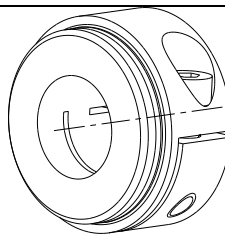
Type 1.1
without feather keyway, with setscrew



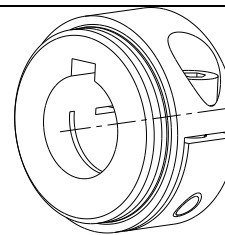
Type 1.2
without feather keyway, without setscrew



Type 1.3
with spline bore



Type 2.5
clamping hub, double slotted, without
feather keyway



Type 2.6
clamping hub, double slotted, with feather
keyway



4 Assembly

4.2 Components of the couplings

Components of TOOLFLEX®, type S and M with setscrew (type 1.1)

Component	Quantity	Description
1	1	Bellow with 2 hubs glued/bordered
4	1 ¹⁾	Setscrews DIN EN ISO 4029

1) Number each hub, from size 9: 2 x 120° offset.

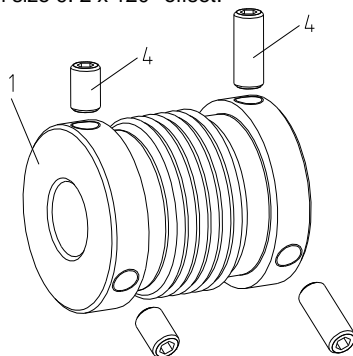


Illustration 6:
TOOLFLEX® type S and M (type 1.1)

Components of TOOLFLEX®, type S and M with clamping hubs (type 2.5)

Component	Quantity	Description
1	1	Bellow with 2 clamping hubs glued/bordered/welded
3	1 ¹⁾	Clamping screws DIN EN ISO 4762

1) Number each clamping hub

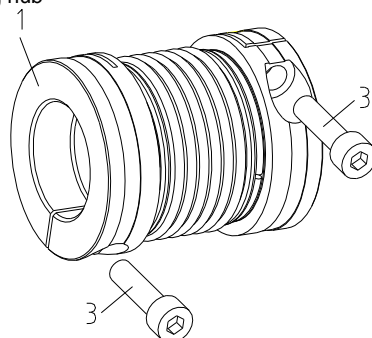


Illustration 7:
TOOLFLEX® type S and M (type 2.5)

Components of TOOLFLEX®, type S-PI and M-PI

Component	Quantity	Description
1	1	Bellow with 1 clamping hub and 1 PI-plug-in hub (part 1) bordered
2	1	Clamping hub PI (component 2)
3	1 ¹⁾	Clamping screw DIN EN ISO 4762

1) Number each clamping hub

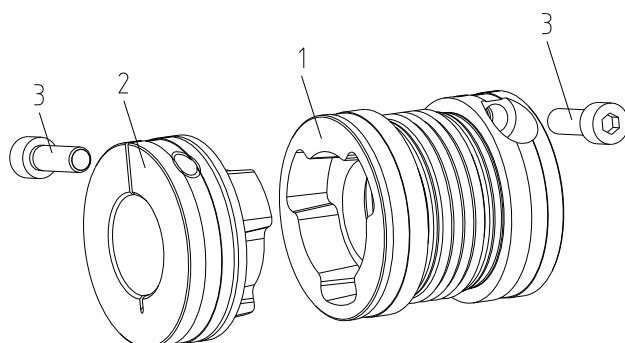


Illustration 8:
TOOLFLEX® type S-PI and M-PI

4 Assembly

4.3 Advice on remachining



The customer bears the sole responsibility for all machining processes performed subsequently on unbored or pilot bored as well as finish machined coupling components and spare parts. KTR does not assume any warranty claims resulting from insufficient remachining.

4.4 Assembly types of hubs 1.0, 1.1, 1.2, 1.3, 2.5 and 2.6



We recommend to inspect bores, shaft, keyway and feather key for dimensional accuracy before assembly. In addition we recommend to review the total length of the coupling. This dimension is necessary to align the coupling and may slightly deviate from the figures specified in the tables subject to production tolerances.



Before starting with the assembly preserving agents have to be removed from the bores. Moreover, the shaft ends have to be cleaned carefully, too.



Please note the manufacturer's instructions regarding the use of detergents.

- Lightly oil the shafts before assembly (e. g. with Castrol 4 in 1, Klüber Quietsch-Ex or WD 40). Oils and greases with lubricants (e. g. MoS₂) must not be used.
- Unscrew the setscrews or clamping screws.
- Insert the shaft ends of driving and driven machine into the TOOLFLEX® coupling. Please make sure that the shafts covers the overall length of the hub (dimension L1, L2 from table 1, 2 or 4).
- Shift the power packs in axial direction until the distance dimension E is achieved. If the power packs are already firmly assembled, shifting the coupling axially on the shafts allows for setting the distance dimension E.
- Secure the hubs by tightening the setscrews or clamping screws, respectively, at the tightening torques T_A mentioned in tables 1, 2, 4 or 6.



Please make sure with the assembly of the coupling that the metal bellow is neither twisted, compressed nor damaged otherwise. If this remark is not respected, the coupling may be damaged and fail at an early stage. The clearance fit of the shaft-hub-connection should be between 0.01 mm and 0.05 mm.



The tightening torque T_A (depending on the coupling type see table 1, 2, 4 or 6) must not be exceeded during the assembly. During the assembly or disassembly, respectively, the metal bellow may be deformed two times the figure of the displacement figures mentioned in tables 9 and 10 at the maximum. If this remark is not respected, the coupling may be damaged and fail at an early stage.



The transmittable friction torques of the clamping hubs (see table 6) depend on the bore diameter.



4 Assembly

4.5 Assembly of type PI



Before assembly the mounting dimension of the coupling needs to be specified to make sure that the pre-load HB (table 9) is achieved after assembly of the coupling (see illustration 9).

- Stick the coupling together without backlash and without axial pressure.

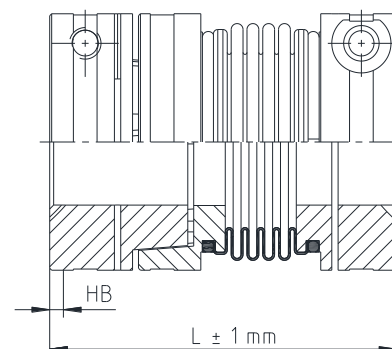


Illustration 9

- Measure the length L (see illustration 10) connected of the coupling and determine the mounting dimension ($L - HB =$ mounting dimension).
- Push the bellow along with the clamping hub and PI plug-in hub (component 1) onto the shaft on the gear side and the PI clamping hub (component 2) onto the shaft on the motor side.
- Secure the clamping hub by tightening the clamping screws by means of a torque key at the tightening torques T_A specified in table 9.
- Push the PI clamping hub in the PI plug-in hub to the mounting dimension determined before.

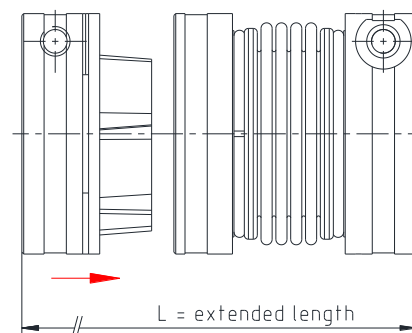


Illustration 10



The prestress HB of the bellow specified before the assembly needs to be clearly perceptible. In this way we will realize the backlash-free torque transmission. The maximum permissible displacement figures are not reduced by the prestress.

4.6 Displacements - alignment of the coupling

The TOOLFLEX® compensates for displacements generated by the shafts to be combined as shown in table 9 or 10. Excessive misalignment may be generated by inaccurate alignment, production tolerances, thermal expansion, shaft deflection, twisting of machine frames, etc.



In order to ensure a long service life of the coupling, the shaft ends have to be accurately aligned. Please absolutely observe the displacement figures specified (see table 9 or 10). If the figures are exceeded, the coupling will be damaged. The more accurate the alignment of the coupling, the longer is its service life.

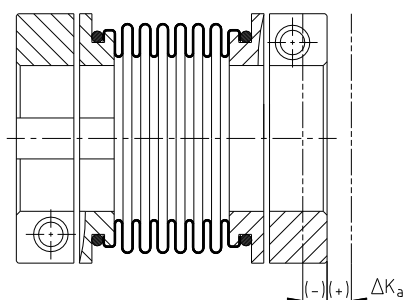
Please note:

- The displacement figures specified in table 9 or 10 are maximum figures which must not arise in parallel. If radial and angular displacement occurs at the same time, the sum of the displacement figures must not exceed ΔK_r or ΔK_w .
- Please inspect with a dial gauge, ruler or feeler whether the permissible displacement figures specified in table 9 or 10 are observed.



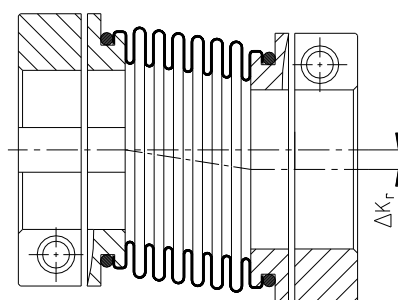
4 Assembly

4.6 Displacements - alignment of the coupling



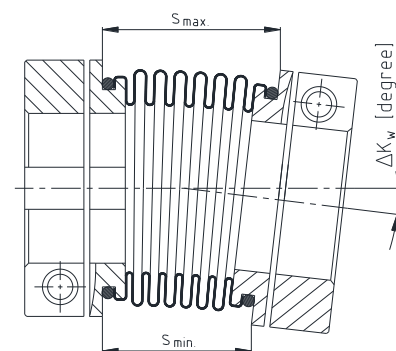
Axial displacements

$$L_{adm.} = L + \Delta K_a \text{ in mm}$$



Radial displacements

Illustration 11: Displacements



Angular displacements

$$\Delta K_w = S_{max.} - S_{min.} \text{ in mm}$$

Examples of the displacement combinations specified in illustration 12:

Example 1:

$$\Delta K_r = 30\%$$

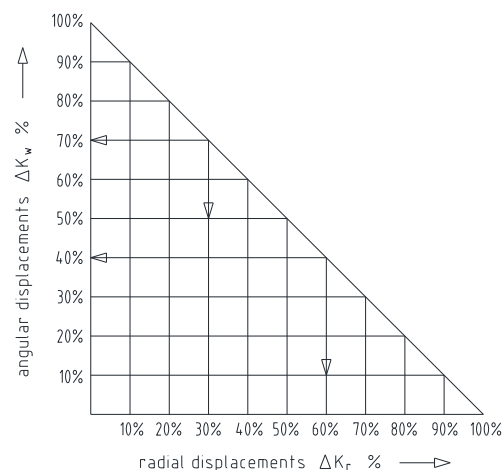
$$\Delta K_w = 70\%$$

Example 2:

$$\Delta K_r = 60\%$$

$$\Delta K_w = 40\%$$

Illustration 12:
Combinations of displacement



$$\Delta K_{total} = \Delta K_r + \Delta K_w \leq 100 \%$$

Table 9: Displacement figures - type with 4 layers

Size	5	7	9	12	16	20	30	38	42	45	55	65
Max. axial displacement ¹⁾ ΔK_a in mm	± 0.30	± 0.30	± 0.35	± 0.40	± 0.30	± 0.40	± 0.50	± 0.60	± 0.60	± 0.90	± 1.00	± 1.00
Max. radial displacement ΔK_r in mm	0.10	0.10	0.15	0.15	0.15	0.15	0.20	0.20	0.20	0.20	0.25	0.30
Max. angular displacement ΔK_w in degree	0.70	0.70	1.00	1.00	1.00	1.00	1.50	1.50	1.50	1.50	1.50	1.50
Max. angular displacement ΔK_w in mm	0.12	0.18	0.30	0.40	0.50	0.70	1.40	1.70	1.80	1.80	2.60	3.20

**4 Assembly****4.6 Displacements - alignment of the coupling****Table 10: Displacement figures - type with 6 layers**

Size	5	7	9	12	16	20	30	38	42	45	55	65
Max. axial displacement ¹⁾ ΔK_a in mm	± 0.40	± 0.40	± 0.50	± 0.60	± 0.50	± 0.60	± 0.80	± 0.80	± 0.80	± 1.00	± 1.00	± 2.00
Max. radial displacement ΔK_r in mm	0.15	0.15	0.20	0.20	0.20	0.20	0.25	0.25	0.25	0.25	0.30	0.35
Max. angular displacement ΔK_w in degree	1.00	1.00	1.50	1.50	1.50	1.50	2.00	2.00	2.00	2.00	2.00	2.00
Max. angular displacement ΔK_w in mm	0.17	0.25	0.50	0.60	0.80	1.00	1.90	2.20	2.40	2.90	3.40	4.30

1) Does not apply for type PI

5 Start-up

Before start-up of the coupling, inspect the tightening of the clamping screws in the hubs, the alignment and the total length L and adjust, if necessary, and also inspect all screw connections - depending on the type of coupling for the tightening torques specified.



If you note any irregularities with the coupling during operation, the drive unit must be switched off immediately. The cause of the breakdown must be specified by means of the table „Breakdowns“ and, if possible, be eliminated according to the proposals. The potential breakdowns specified can be hints only. To find out the cause all operating factors and machine components must be considered.



6 Breakdowns, causes and elimination

The below-mentioned failures can lead to a use of the **TOOLFLEX®** coupling other than intended. In addition to the specifications given in these operating/assembly instructions make sure to avoid such failures. The errors listed can only be clues to search for the failures. When searching for the failure the adjacent components must generally be considered.

General failures with use other than intended

- Important data for the coupling selection were not forwarded.
- The calculation of the shaft-hub-connection was disregarded.
- Coupling components with damage occurred during transport are assembled.
- The clearance of the components to be assembled is not coordinated with one another.
- Tightening torques are fallen below/exceeded.
- No original **KTR** components (purchased parts) are used.
- Maintenance intervals are not observed.

Breakdowns	Causes	Elimination
Different operating noise and/or vibrations occurring	Misalignment	1) Set the unit out of operation 2) Eliminate the reason for the misalignment (e. g. loose foundation bolts/housing screws, break of the engine fixing, heat expansion of unit components → change of the assembly dimension S of the coupling, missing or improper centering of housing)
	Screws for axial fastening of hubs working loose	1) Set the unit out of operation 2) Inspect alignment of coupling 3) Tighten the screws to fasten the hubs and secure against working loose
Fracture of the bellow and/or the hub	Operating parameters do not meet with the performance of the coupling	1) Set the unit out of operation 2) Review the operating parameters and select a bigger coupling (consider mounting space) 3) Assemble new coupling size 4) Inspect alignment
	Operating error of the unit	1) Set the unit out of operation 2) Replace complete coupling 3) Inspect alignment 4) Instruct and train the service staff

7 Disposal

In respect of environmental protection we would ask you to dispose of the packaging resp. products on termination of their service life in accordance with the legal regulations resp. standards that apply.

• Metal

Any metal components have to be cleaned and disposed of by scrap metal.

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8 Maintenance and service

TOOLFLEX® is a maintenance-free coupling. We recommend to perform a visual inspection on the coupling **at least once a year**. Please pay special attention to the condition of the bellow of the coupling.

- Since the flexible machine bearings of the driving and driven side settle during the course of load, inspect the alignment of the coupling and re-align the coupling, if necessary.
- The coupling components have to be inspected for damages.
- The screw connections have to be inspected visually.

9 Spares inventory, customer service addresses

A basic requirement to ensure the readiness for use of the coupling is a stock of the most important spare parts on site.

Contact addresses of the KTR partners for spare parts and orders can be obtained from the KTR homepage at www.ktr.com.



KTR does not assume any liability or warranty for the use of spare parts and accessories which are not provided by KTR and for the damages which may incur as a result.

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Please observe protection note ISO 16016.	Drawn: 2022-09-21 Ka/Hn Verified: 2023-11-30 Ka	Replacing: KTR-N dated 2019-07-18 Replaced by:
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