

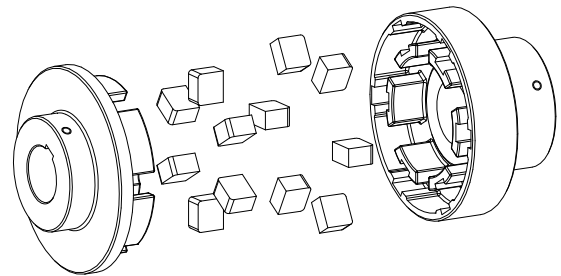


POLY

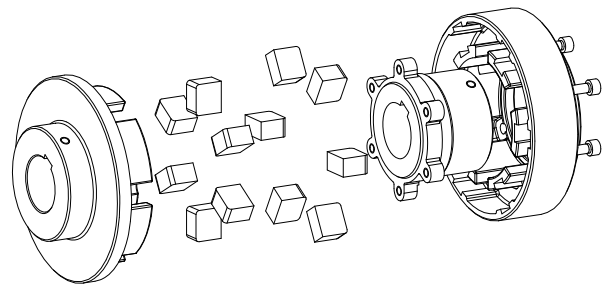
Torsionally flexible couplings types,
not failsafe

PKZ, PKD, PKA,
and their combinations

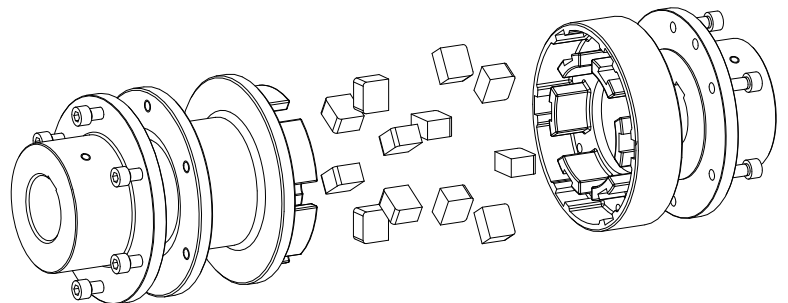
according to Standard 94/9/EC
(ATEX 95) for finish bored, pilot
bored and unbored couplings



Type PKZ



Type PKD



Type PKA

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 11.03.10 Pz/Bru	Ersatz für: KTR-N vom 25.04.07
	Geprüft: 16.03.10 Pz	Ersetzt durch:



The **POLY** is a torsionally elastic claw coupling. It is able to compensate offset of shafts, e. g. caused by manufacturing inaccuracies, thermal expansion etc., in case of low shaft distance dimension.

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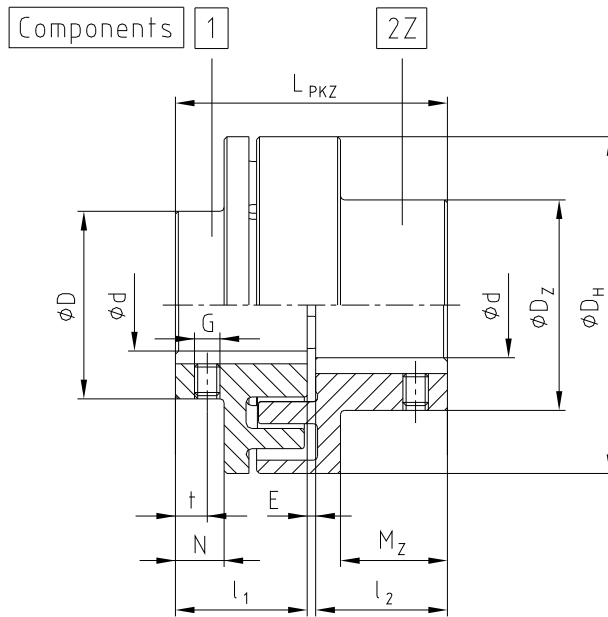
5 Enclosure A

Hints and Instructions Regarding the Use in Hazardous Areas

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1 Technical Data



Components:

- 1 cam section
- 2Z pocket section (to be preferably used drive-sided)

picture 1: POLY, type PKZ

Table 1: dimensions - type PKZ

POLY size	finish bore ¹⁾		dimensions [mm]											weight ²⁾ [kg]
	d _{max.} [mm]		general								thread for setscrews			
	component 1	component 2Z	D _H	D	D _Z	l ₁ , l ₂	M _Z	N	E	L _{PKZ}	G	t	T _A [Nm]	
8	20	28	86	43	50	35	26	3	3	73	M5	18	2	1,47
9	28	38	97	55	65	40,5	30	7	3	84	M8	23	10	2,22
10	32	42	107	60	70	45	35	10	4	94	M8	27	10	2,86
12	35	48	131	70	80	55	43	11	4	114	M8	30	10	4,80
14	44	55	142	80	93	60	46	17	4	124	M8	10	10	6,26
15	50	60	157	90	100	65	52	21	4	134	M8	15	10	7,97
17	60	65	176	100	110	70	56	26	4	144	M8	15	10	10,43
19	75	75	195	125	125	75	63	27	4	154	M8	15	10	14,02
20	65	75	205	115	127	80	65	22	4	164	M8	15	10	17,17
22	85	85	224	140	140	90	75	38	4	184	M10	20	17	21,23
25	90	90	257	150	150	100	84	43	5	205	M12	20	40	29,19
28	100	100	288	165	165	110	90	44	5	225	M12	20	40	42,29
30	110	110	308	180	180	130	108	58	5	265	M16	20	80	54,70

- 1) bore H7 with keyway DIN 6885 sheet 1 [JS9] and threads for setscrews on the keyway
- 2) weights apply for max. bore diameters with feather key according to DIN 6885 sheet 1

Table 2: torques and speeds

POLY size		8	9	10	12	14	15	17	19	20	22
torque [Nm]	T _{KN}	42	72	100	170	210	320	400	660	820	1100
	T _{Kmax.}	84	144	200	340	420	640	800	1320	1640	2200
max. speed ¹⁾ n [rpm]		5000	5000	5000	5000	4800	4300	3800	3500	3300	3000

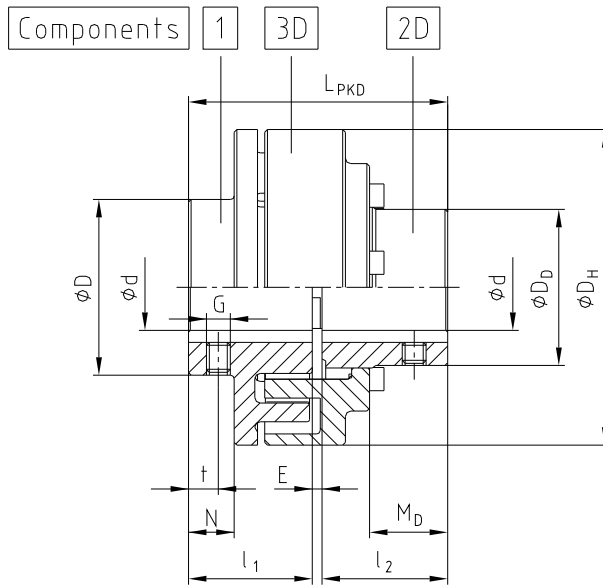
POLY size		25	28	30	35	40	45	50	55	60	65
torque [Nm]	T _{KN}	1600	2500	3950	6100	9000	14300	21500	27000	34000	46000
	T _{Kmax.}	3200	5000	7900	12200	18000	28600	43000	54000	68000	92000
max. speed ¹⁾ n [rpm]		2700	2350	2200	1850	1600	1400	1300	1150	1050	980

- 1) For peripheral speeds of more than v=30 m/sec a dynamical balancing is necessary.

Schutzvermerk ISO 16016 beachten.	Gezeichnet:	11.03.10 Pz/Bru	Ersatz für:	KTR-N vom 25.04.07
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1 Technical Data



Components:

- 1 cam section
(to be preferably used
drive-sided)
- 2D flange hub
- 3D cam ring

picture 2: POLY, type PKD

Table 3: dimensions - type PKD

POLY size	pilot bore	finish bore ¹⁾		dimensions [mm]											weight ²⁾ [kg]
		d _{max.} [mm]		general								thread for setscrews			
		component 1	component 2D	D _H	D	D _D	l ₁ , l ₂	M _D	N	E	L _{PKD}	G	t	T _A [Nm]	
15	-	50	45	157	90	75	65	35	21	4	134	M8	15	10	8,42
17	-	60	50	176	100	90	70	40	26	4	144	M8	15	10	10,37
19	-	75	65	195	125	107	75	45	27	4	154	M8	15	10	14,42
20	-	65	60	205	115	105	80	45	22	4	164	M8	15	10	17,18
22	-	85	75	224	140	129	90	59	38	4	184	M10	20	17	21,66
25	-	90	85	257	150	140	100	60	43	5	205	M12	20	40	29,75
28	-	100	95	288	165	160	110	65	44	5	225	M12	20	40	44,32
30	-	110	100	308	180	170	130	75	58	5	265	M16	20	80	55,64
35	60	130	130	373	210	210	160	95	70	5	325	M16	25	80	103,78
40	70	145	145	423	240	240	180	115	85	5	365	M16	25	80	146,66
45	80	160	160	473	270	270	180	110	74	6	366	M16	30	80	197,35
50	90	170	170	543	290	290	200	130	80	6	406	M16	30	80	287,36
55	100	180	180	580	310	310	200	120	74	8	408	M16	30	80	327,12
60	110	200	190	630	350	330	230	135	85	8	468	M16	30	80	446,05
65	120	210	200	685	360	340	250	150	90	10	510	M16	30	80	565,78

1) bore H7 with keyway DIN 6885 sheet 1 [JS9] and threads for setscrews on the keyway
2) weights apply for max. bore diameters with feather key according to DIN 6885 sheet 1

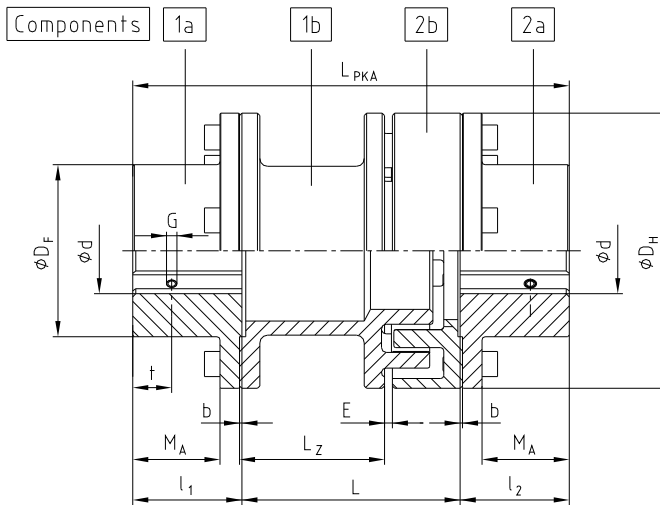
Table 4: cap screws DIN EN ISO 4762

coupling size	15	17	19	20	22	25	28	30	35	40	45	50	55	60	65
quantity for cap screws DIN EN ISO 4762 ¹⁾	6	6	6	6	8	8	8	8	10	10	10	10	10	10	10
screw size	M8	M8	M8	M10	M8	M10	M10	M12	M12	M16	M16	M16	M16	M16	M20
screw length	30	25	25	30	30	30	40	40	55	55	60	65	70	75	75
tightening torque T _A [Nm]	25	25	25	49	25	49	49	86	86	295	210	210	210	210	410

1) quantity for the complete coupling



1 Technical Data



Components:

- 1a / 2a coupling flange
- 1b spacer
- 2b driving flange

Component 1a with 1b to be preferably used drive-sided.

picture 3: POLY, type PKA

Table 5: dimensions - type PKA

POLY size	finish bore ¹⁾ d _{max.} [mm] component 1a/2a	dimensions [mm]											weight ²⁾ [kg]	
		general									thread for setscrews			
		D _H	D _F	l ₁ , l ₂	b	M _A	E	L	L _{PKA}	L _Z	G	t		T _A [Nm]
8	38	86	55	35	1,5	25,5	3	100	170	66	M5	15	2	3,04
9	45	97	70	41	1,5	30,5	3	100	182	63	M8	15	10	4,26
								140	222	103				
10	50	107	78	46	1,5	35,5	4	100	192	61	M8	20	10	5,42
								140	232	101				5,88
12	60	131	95	55	1,5	43,0	4	100	210	55	M8	20	10	9,49
								140	250	95				10,15
								180	290	135				10,86
14	70	142	105	60	1,5	48,0	4	100	220	54	M8	25	10	11,46
								140	260	94				12,16
								180	300	134				13,01
15	70	157	110	65	1,5	49,5	4	100	230	53	M8	25	10	14,77
								140	270	93				15,63
								180	310	133				16,50
								250	380	203				18,01
17	80	176	125	70	1,5	54,5	4	100	240	53	M8	25	10	18,79
								140	280	93				19,60
								180	320	133				20,41
								250	390	203				21,83
19	90	195	135	75	1,5	59,5	4	140	290	91	M8	30	10	24,63
								180	330	131				25,91
								250	400	201				28,15
20	100	205	150	80	2,0	61,0	4	140	300	81	M8	30	10	30,96
								180	340	121				32,18
								250	410	191				34,79
22	105	224	160	90	2,0	71,0	4	180	360	127	M10	35	17	37,79
								250	430	197				39,94
25	125	257	195	100	2,0	81,0	5	140	340	81	M12	40	40	54,73
								180	380	121				56,50
								250	450	191				59,60
28	140	288	215	110	2,0	91,0	5	140	360	74	M12	45	40	75,22
								180	400	114				77,84
								250	470	184				82,41

1) bore H7 with keyway DIN 6885 sheet 1 [JS9] and threads for setscrews on the keyway
2) weights apply for max. bore diameters with feather key according to DIN 6885 sheet 1

Table 6: cap screws DIN EN ISO 4762

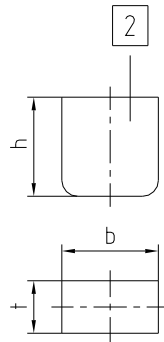
coupling size	8	9	10	12	14	15	17	19	20	22	25	28
quantity for cap screws DIN EN ISO 4762 ¹⁾	4	5	5	5	5	6	6	6	6	8	8	8
screw size	M6	M6	M6	M8	M8	M10	M10	M10	M10	M10	M10	M12
screw length	16	18	18	20	20	25	25	25	30	30	30	30
tightening torque T _A [Nm]	10	10	10	25	25	49	49	49	49	49	49	86

1) each coupling flange

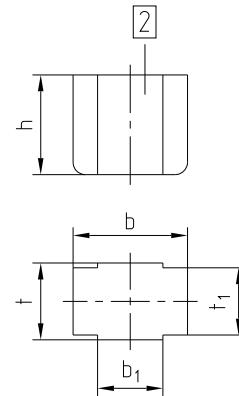
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1 Technical Data



picture 4: POLY, elastomer elements NBR (buna N) 90 ShA



picture 5: POLY, elastomer elements NBR (buna N) 90 ShA with excessive height

Table 7: dimensions of elastomer elements (see picture 4)

coupling size		8	9	10	12	14	15	17	19	20	22
quantity of elements ¹⁾		8	10	10	10	10	12	12	12	12	16
element size		1			2		3		3a	4	3b
dimensions [mm]	b	18,4			24,9		27,2		27,7	34,9	29,6
	t	10,0			15,3		16,1		18,4	19,6	18,4
	h	18,9			23,9		24,6		26,8	34,6	29,6

coupling size		25	28	30	35	40	45	50	55	60	65
quantity of elements ¹⁾		16	16	16	20	20	20	20	20	20	20
element size		4	5	6	7	8	9	10	11	12	13
dimensions [mm]	b	34,9	40,0	43,7	45,7	52,1	58,1	70,1	75,5	91,5	103,0
	t	19,6	22,2	23,7	21,8	28,6	29,3	36,3	41,3	44,3	48,5
	h	34,6	40,6	42,4	60,0	59,7	69,0	79,0	81,0	98,2	108,1

1) quantity for the complete coupling

Table 8: dimensions of elastomer elements with excessive height (see picture 5)

coupling size		8	9	10	12	14	15	17	20	25	28	30	35
quantity of elements ¹⁾		8	10	10	10	10	12	12	12	16	16	16	20
element size		1ü			2ü		3ü		4ü		5ü	6ü	7ü
dimensions [mm]	b	18,2			25,0		28,0		35,1		40,9	43,3	45,7
	b ₁	7,5			14,5		16,0		15,0		17,5	21,5	22,5
	t	10,5			11,7		16,4		20,4		22,7	24,8	25,0
	t ₁	11,8			17,5		18,7		22,9		23,9	28,6	21,8
	h	18,7			24,2		24,3		35,0		39,4	41,1	60,0

1) quantity for the complete coupling



POLY couplings with attached parts that can generate heat, sparks and static charging (e. g. combinations with brake drums, brake disks, overload systems like torque limiters, impellers etc.) are not allowed for the use in hazardous areas. A separate checking must be made.

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2 Hints

2.1 Coupling Selection



CAUTION!

For a continuous and troublefree operation of the coupling it must be designed according to the selection instructions (according to DIN 740 part 2) for the particular application (see POLY catalogue).

If the operating conditions (performance, speed, changes at engine and machine) change, the coupling selection must be checked again.

Please make sure that the technical data regarding torque only refers to the elastomer elements. The transmissible torque of the shaft/hub connection must be checked by the orderer, and he is responsible for the same.

For drives with endangered torsional vibration (drives with periodical load on torsional vibration) it is necessary to make a torsional vibration calculation to ensure a perfect selection. Typical drives with endangered torsional vibration are e. g. drives with diesel engines, piston pumps, piston compressors etc. On request KTR makes the coupling selection and the torsional vibration calculation.

2.2 General Hints

Please read through these mounting instructions carefully before you set the coupling into operation. Please pay special attention to the safety instructions!



The **POLY** coupling is suitable and approved for the use in hazardous areas. When using the coupling in hazardous areas please observe the special hints and instructions regarding safety in enclosure A.

The mounting instructions are part of your product. Please keep them carefully and close to the coupling. The copyright for these mounting instructions remains with **KTR** Kupplungstechnik GmbH.

2.3 Safety and Advice Hints



DANGER!

Danger of injury to persons.



CAUTION!

Damages on the machine possible.



ATTENTION!

Pointing to important items.



PRECAUTION!

Hints concerning explosion protection.



2 Hints

2.4 General Hints of Danger



DANGER!

With assembly, operation and maintenance of the coupling it has to be made sure that the entire drive train is protected against unintentional engagement. You can be seriously hurt by rotating parts. Please make absolutely sure to read through and observe the following safety instructions.

- All operations on and with the coupling have to be performed taking into account "safety first".
- Please make sure to disengage the power pack before you perform your work.
- Protect the power pack against unintentional engagement, e. g. by providing hints at the place of engagement or removing the fuse for current supply.
- Do not touch the operation area of the coupling as long as it is in operation.
- Please protect the coupling against unintentional touch. Please provide for the necessary protection devices and caps.

2.5 Proper Use

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

- have carefully read through the mounting instructions and understood them
- had technical training
- are authorized to do so by your company

The coupling may only be used in accordance with the technical data (see table 1 to 8 in chapter 1).

Unauthorized modifications on the coupling design are not admissible. We do not take any warranty for resulting damages. To further develop the product we reserve the right for technical modifications.

The **POLY** described in here corresponds to the technical status at the time of printing of these mounting instructions.

3 Storage

The coupling hubs are supplied in preserved condition and can be stored at a dry and roofed place for 6 - 9 months.

The features of the elastomer elements remain unchanged for up to 5 years in case of favourable stock conditions.



CAUTION!

The storage rooms may not include any ozone-generating devices, like e. g. fluorescent light sources, mercury-vapour lamps or electrical high-voltage appliances.

Humid storage rooms are not suitable.

Please make sure that there is no condensation. The best relative air humidity is under 65 %.

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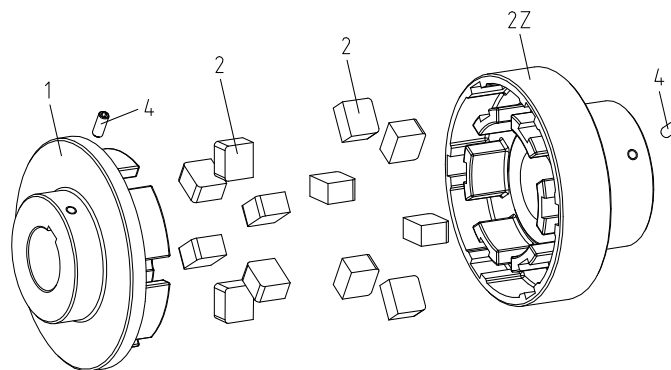
4 Assembly

Basically the coupling is supplied in individual parts. Before assembly the coupling has to be controlled for completeness.

4.1 Components of Couplings

Components of POLY, type PKZ

component	quantity	designation	material	balancing condition
1	1	cam section	EN-GJL-250	acc. to customers request
2	see table 9	elastomer elements	NBR (buna N) 90 ShA	
2Z	1	pocket section	EN-GJL-250	acc. to customers request
4	2	setscrew DIN EN ISO 4029	steel	

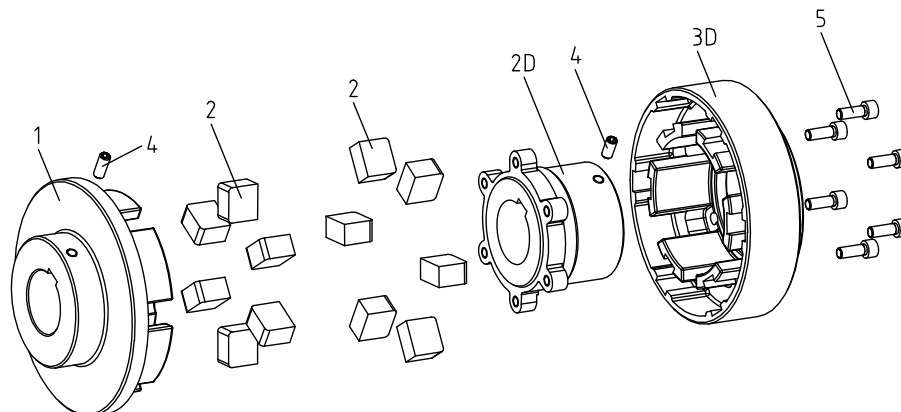


picture 6: POLY, type PKZ

Components of POLY, type PKD

component	quantity	designation	material	balancing condition ¹⁾
1	1	cam section	EN-GJL-250	acc. to customers request
2	see table 9	elastomer elements	NBR (buna N) 90 ShA	
2D	1	flange hub	EN-GJL-250/ EN-GJS-400-15	acc. to customers request
3D	1	cam ring	EN-GJL-250	acc. to customers request
4	2	setscrew DIN EN ISO 4029	steel	
5	see table 9	cap screw DIN EN ISO 4762	steel	

1) Component 2D, 3D and 5 is balanced in assembled condition.



picture 7: POLY, type PKD

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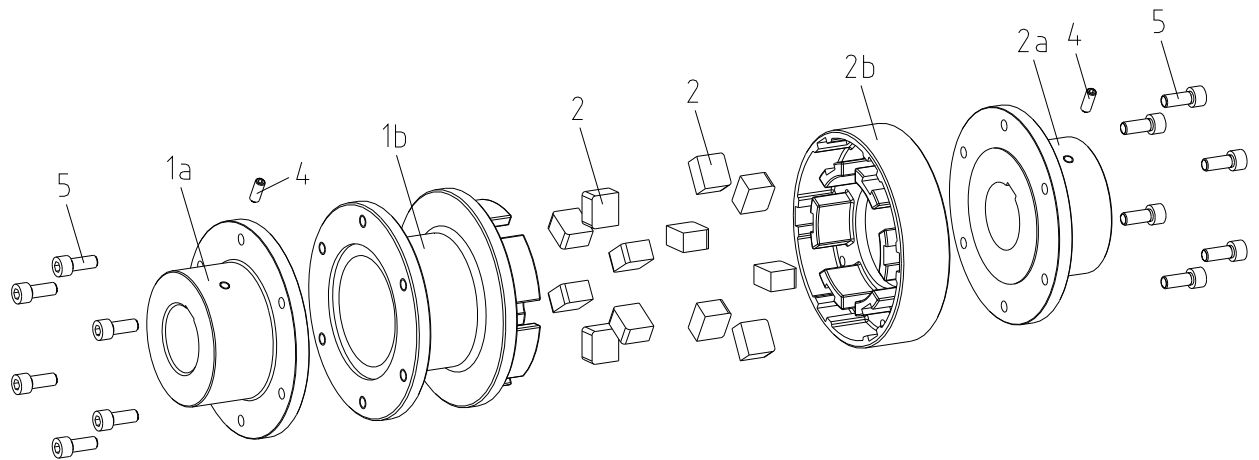


4 Assembly

4.1 Components of Couplings

Components of POLY, type PKA

component	quantity	designation	material	balancing condition ¹
1a/2a	2	coupling flange	EN-GJL-250/S355 J2G3	balanced on request
1b	1	spacer	EN-GJL-250	from length 100 mm on balanced
2	see table 9	elastomer elements	NBR (buna N) 90 ShA	
2b	1	driving flange	EN-GJL-250	generally balanced
4	2	setscrew DIN EN ISO 4029	steel	
5	see table 9	cap screw DIN EN ISO 4762	steel	



picture 8: POLY, type PKA

Table 9: quantity of elastomer elements and cap screws

coupling size	8	9	10	12	14	15	17	19	20	22
quantity of elements ¹⁾	8	10	10	10	10	12	12	12	12	16
element size	1			2		3		3a	4	3b
quantity of cap screws ²⁾ DIN EN ISO 4762	4	5	5	5	5	6	6	6	6	8

coupling size	25	28	30	35	40	45	50	55	60	65
quantity of elements ¹⁾	16	16	16	20	20	20	20	20	20	20
element size	4	5	6	7	8	9	10	11	12	13
quantity of cap screws ²⁾ DIN EN ISO 4762	8	8	8	10	10	10	10	10	10	10

1) for the complete coupling (dimension elastomer elements - see tables 7 and 8).
2) each coupling flange



4 Assembly

4.2 Assembly of the Coupling (General)



ATTENTION!

We recommend to check bores, shaft, keyway and feather key for dimensional accuracy before assembly.

Heating the hubs or coupling flanges slightly (approx. 80 °C) allows for an easier installation onto the shaft.



PRECAUTION!

Please pay attention to the danger of ignition in hazardous areas.



DANGER!

Touching the heated hubs causes burns.
We would recommend to wear safety gloves.

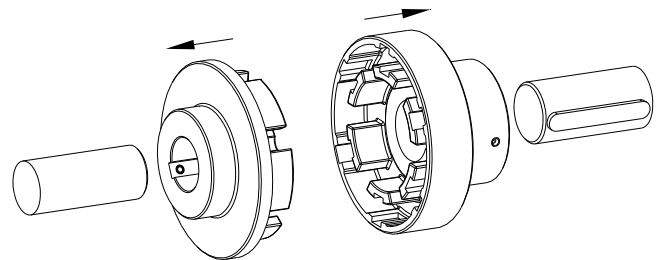


CAUTION!

During the assembly please make sure that the E or L dimension (see table 1, 3 and 5) is observed, so that the parts do not contact each other during the operation.
Disregarding this hint may cause damage on the coupling.

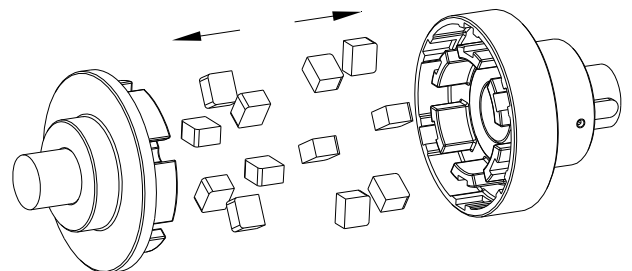
4.3 Assembly of the Type PKZ

- Assemble the cam and the pocket section onto the shaft of the drive and the driven side (see picture 9).



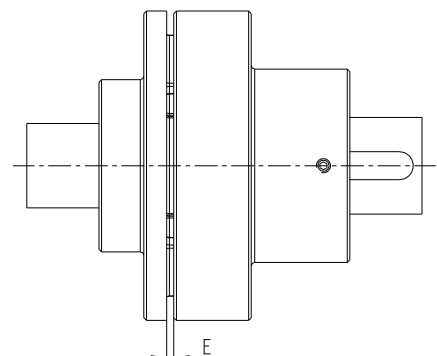
picture 9: assembly of the cam and pocket section

- Insert the elastomer elements into the cam and the pocket section (see picture 10).
- Only valid for the cam section size 8 to 12!**
Fasten the cam section by tightening the setscrews DIN EN ISO 4029 with cup point (tightening torque see table 1).



picture 10: assembly of the elastomer elements

- Move the power packs in axial direction until the dimension E is achieved (see picture 11).
- If the power packs are already firmly assembled, axial movement of the cam or the pocket section on the shafts allows for adjusting the dimension E (see picture 11).
- Fasten the cam or the pocket section by tightening the setscrews DIN EN ISO 4029 with cup point (tightening torque see table 1).



picture 11: coupling assembly

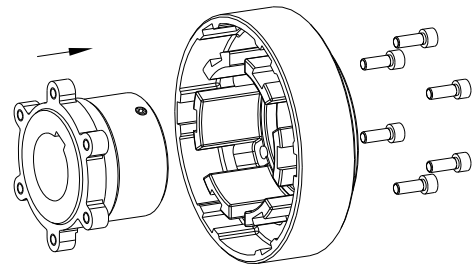
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4 Assembly

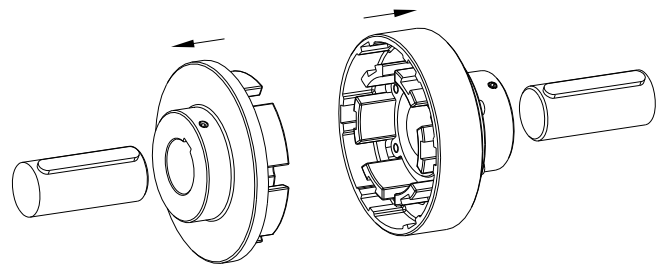
4.4 Assembly of the Type PKD

- Plug flange hub and cam ring together (see picture 12).
- Hand-screw the parts first of all.



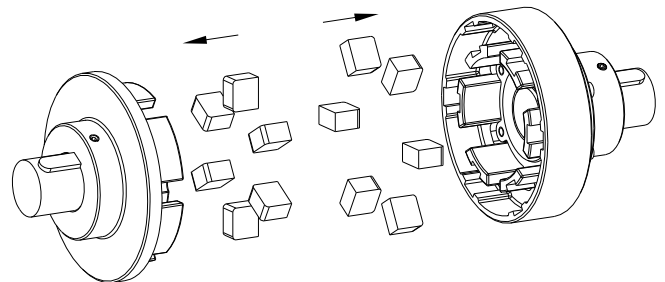
picture 12: assembly of the flange hub with cam ring

- Assemble the cam section and flange hub with cam ring to the shaft of the drive and driven side (see picture 13).
- Tighten the screws with a suitable torque key to the tightening torque T_A shown in table 4.



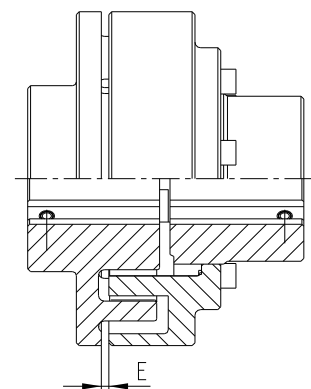
picture 13: assembly of cam section and flange hub with cam ring

- Insert the elastomer elements in the cam section or cam ring (see picture 14).



picture 14: assembly of the elastomer elements

- Move the power packs in axial direction until the dimension E is achieved (see picture 15).
- If the power packs are already firmly assembled, axial movement of the hubs on the shafts allows for adjusting the dimension E (see picture 15).
- Fasten the hubs by tightening the setscrews DIN EN ISO 4029 with cup point (tightening torque see table 3).



picture 15: coupling assembly



CAUTION!

Having set the coupling into operation, the tightening torque of the screws and wear of elastomer elements have to be inspected in usual maintenance intervals.

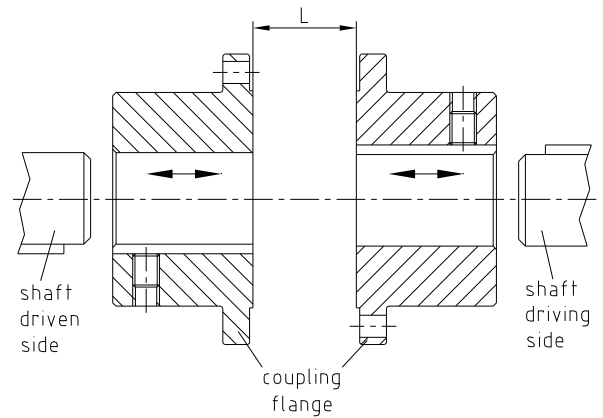
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4 Assembly

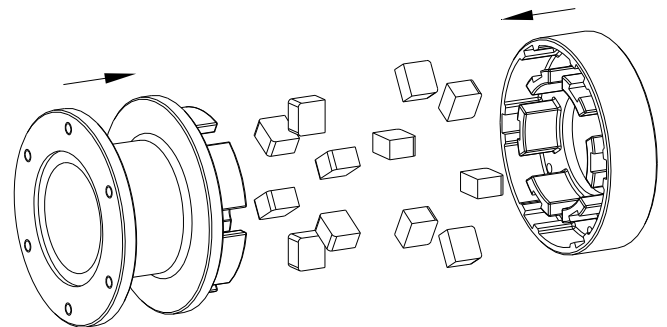
4.5 Assembly of the Type PKA

- Assemble the coupling flanges onto the shaft of the drive and the driven side (see picture 16).
- The inner side of the coupling flanges must end flushly with the front sides of the shafts.
- Move the power packs in axial direction until the dimension L is achieved (see table 5).
- Fasten the coupling flanges by tightening the setscrews DIN EN ISO 4029 with cup point (tightening torque see table 5).



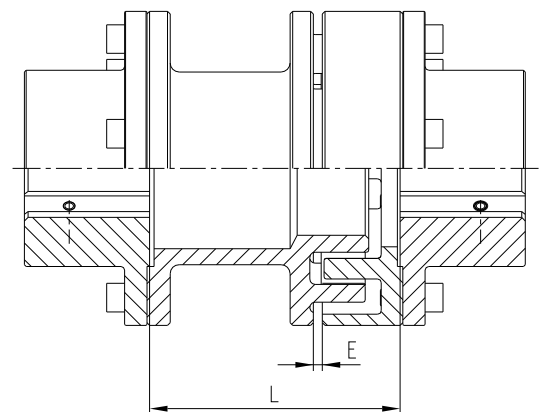
picture 16: assembly of the coupling flanges

- Please plug the driving flanges, spacer and the elastomer elements together (see picture 17).



picture 17: assembly of the driving flange, spacer and elastomer elements

- Put the assembled parts between the coupling flanges (see picture 18).
- At first hand-screw the parts.
- Tighten the screws with a suitable torque key to the tightening torque T_A shown in table 6.
- Please check the L or the E dimension (see picture 18 and table 5).



picture 18: coupling assembly



CAUTION!


Having set the coupling into operation, the tightening torque of the screws and wear of elastomer elements have to be inspected in usual maintenance intervals.

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4 Assembly

4.6 Hint Regarding the Finish Bore

KTR supplies unbored or pilot bored coupling parts and spare parts on explicit customer's request. These parts are additionally labelled with the symbol .



CAUTION!

The orderer is responsible for all subsequently made machinings to unbored or pilot bored and to finish machined coupling parts and spare parts. KTR does not assume any warranty claims resulting from insufficient refinish.



PRECAUTION!

Any mechanical rework to couplings that are used in hazardous areas require an explicit release by KTR.

The orderer must send a drawing to KTR acc. to which the manufacture must be made. KTR checks this drawing and returns it to the orderer with approval.

4.7 Displacements - Alignment of the Couplings

The **POLY** compensates for displacements produced by the shafts to be combined as shown in table 10. Excessive misalignment may be caused by inaccurate alignment, production tolerances, thermal expansion, shaft deflection, twisting of machine frames, etc.



CAUTION!

In order to ensure a long lifetime of the coupling and to avoid dangers regarding the use in hazardous areas, the shaft ends must be accurately aligned.



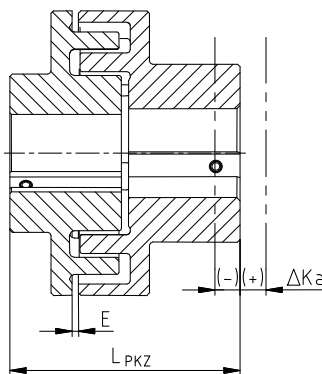
Please absolutely observe the displacement figures indicated (see table 10). If the figures are exceeded, the coupling is damaged.

The exacter the alignment of the coupling, the higher is its lifetime.

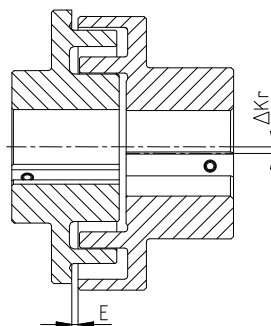
In case of a use in hazardous areas for the explosion group IIC (marking II 2GD c IIC T X), only the half displacement figures (see table 10) are permissible.

Please note:

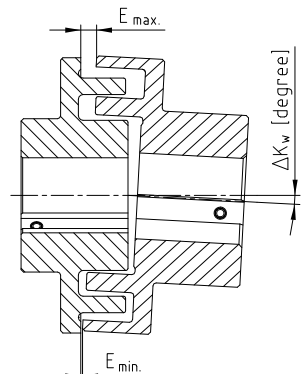
- The displacement values mentioned in table 10 are maximum values which may not occur at the same time. If the radial and the angular displacement occur at the same time, the sum of the displacements may not exceed ΔK_r or ΔK_w .
- Please check with a dial gauge, ruler or feeler whether the permissible displacement figures of table 10 can be observed.



axial displacements



radial displacements



angular displacements

$$L_{PKZ \text{ perm.}} = L_{PKZ} + \Delta K_a \quad [\text{mm}]$$

$$\Delta K_w = E_{\text{max.}} - E_{\text{min.}} \quad [\text{mm}]$$

picture 19: displacements

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4 Assembly

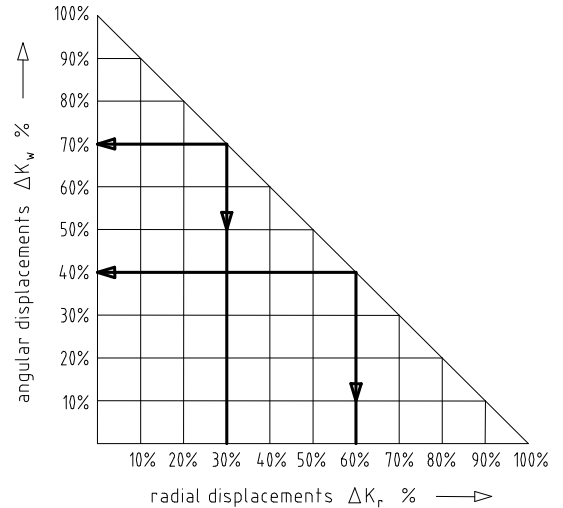
4.7 Displacements - Alignment of the Couplings

Continuation:

Example for the misalignment combinations given in picture 20:

Example 1:
 $\Delta K_r = 30\%$
 $\Delta K_w = 70\%$

Example 2:
 $\Delta K_r = 60\%$
 $\Delta K_w = 40\%$



picture 20: combinations of displacement

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

Table 10: displacement figures

coupling size		8	9	10	12	14	15	17	19	20	22
max. axial displacement ΔK_a [mm]		±1	±1	±1	±2	±2	±2	±2	±2	±2	±2
max. radial displacement ΔK_r [mm] or max. angular displacement ΔK_w [mm] or total V	n= up to 750 1/min	0,8	0,8	0,8	0,8	0,8	1,0	1,0	1,0	1,0	1,0
	n=1000 1/min	0,7	0,7	0,7	0,7	0,7	0,9	0,9	0,9	0,9	0,9
	n=1500 1/min	0,5	0,5	0,5	0,5	0,5	0,7	0,7	0,7	0,7	0,7
	n=3000 1/min	0,3	0,3	0,3	0,3	0,3	0,5	0,5	0,5	0,5	0,5

coupling size		25	28	30	35	40	45	50	55	60	65
max. axial displacement ΔK_a [mm]		±2	±2	±2	±3	±3	±3	±3	±4	±4	±4
max. radial displacement ΔK_r [mm] or max. angular displacement ΔK_w [mm] or total V	n= up to 750 1/min	1,0	1,0	1,0	1,2	1,2	1,2	1,2	1,2	1,2	1,2
	n=1000 1/min	0,9	0,9	0,9	1,1	1,1	1,1	1,1	1,1	1,1	1,1
	n=1500 1/min	0,7	0,7	0,7	0,9	0,9	0,9	0,9	0,9	0,9	0,9
	n=3000 1/min	0,5	0,5	0,5	-	-	-	-	-	-	-

4.8 Spares Inventory, Customer Service Addresses

A basic requirement to guarantee the operational readiness 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 under www.ktr.com.

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Hints and Instructions Regarding the Use in Hazardous Areas

Type PKZ: cam section/elastomer elements/pocket section
 Type PKD: flange hub/cam ring/ elastomer elements/pocket section
 Type PKA: coupling flange/driving flange/ elastomer elements/spacer/coupling flange
 (POLY type PKA only with spacer made from EN-GJL-250 or EN-GJS-400-15.)

5.1 Use in Hazardous Areas According to the Regulations

Conditions of operation in hazardous locations

POLY couplings are suitable for the use according to EC standard 94/9/EC.

1. Industry (with the exception of mining)

- device class II of category 2 and 3 (*coupling is not approved for device class 1*)
- media class G (*gases, fogs, steams*), zone 1 and 2 (*coupling is not approved for zone 0*)
- media class D (*dusts*), zone 21 and 22 (*coupling is not approved for zone 20*)
- explosion class IIC (*explosion class IIA and IIB are included in IIC*)

Temperature class:

temperature class	ambient or operating temperature T_a	max. surface temperature
T5, T4, T3, T2, T1	- 30 °C to + 80 °C ¹⁾	100 °C ²⁾
T6	- 30 °C to + 65 °C	85 °C

Explanation:

The maximum surface temperatures result from each the maximum permissible ambient or operating temperature T_a plus the maximum temperature increase ΔT of 20 K which has to be taken into account.

- 1) The ambient or operating temperature T_a is limited to + 80 °C due to the permissible permanent operating temperature of the elastomers used.
- 2) The maximum surface temperature of 100 °C applies for the use in locations which are potentially subject to dust explosion, too.

2. Mining


Device class I of category M2 (*coupling is not approved for device category M1*).
 Permissible ambient temperature - 30 °C to + 80 °C.

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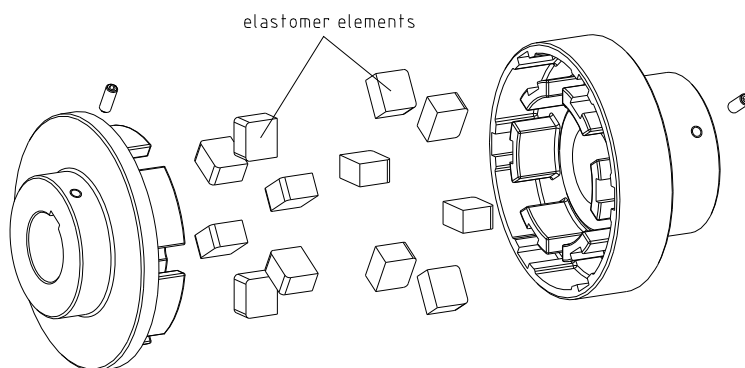


5 Enclosure A

Hints and Instructions Regarding the Use in  Hazardous Areas

5.2 Control Intervals for Couplings in  Hazardous Areas

explosion group	control intervals
3G 3D	For couplings which are classified in category 3G or 3D the operating and assembly instructions that are usual for standard operation apply. During the standard operation which has to be subject to the analysis of danger of ignition the couplings are free from any ignition source. Merely the temperature increase produced by proper heating and depending on the coupling type has to be considered: for POLY: $\Delta T = 20 \text{ K}$
II 2GD c IIB T4, T5, T6	The torsional backlash of the coupling (see chapter 5.3) according to Guideline 94/9/EC (ATEX 95) must only be controlled if a friction of the elastomer elements (part 2) and consequently a machine down-time of the drive leads to explosion hazard. A preventive checking of torsional backlash is recommended. A checking of the circumferential backlash and a visual check of the elastomer elements must be effected after 3,000 operating hours for the first time, after 6 months at the latest. Except for centered, stiff connecting flanges (e. g. bellhousings). If you note an unconsiderable or no wear at the elastomer elements after this first inspection, the further inspections can be effected, in case of the same operating parameters, respectively after 6,000 operating hours or after 18 months at the latest. If you note a considerable wear during the first inspection, so that a change of the elastomer elements would be recommended, please find out the cause according to the table „Breakdowns“, as far as possible. The maintenance intervals must be adjusted according to the changed operating parameters.
II 2GD c IIC T4, T5, T6	The torsional backlash of the coupling (see chapter 5.3) according to Guideline 94/9/EC (ATEX 95) must only be controlled if a friction of the elastomer elements (part 2) and consequently a machine down-time of the drive leads to explosion hazard. A preventive checking of torsional backlash is recommended. A checking of the circumferential backlash and a visual check of the elastomer elements must be effected after 2,000 operating hours for the first time, after 3 months at the latest. Except for centered, stiff connecting flanges (e. g. bellhousings). If you note an unconsiderable or no wear at the elastomer elements after this first inspection, the further inspections can be effected, in case of the same operating parameters, respectively after 4,000 operating hours or after 12 months at the latest. If you note a considerable wear during the first inspection, so that a change of the elastomer elements would be recommended, please find out the cause according to the table „Breakdowns“, as far as possible. The maintenance intervals must be adjusted according to the changed operating parameters.



picture 21: POLY type PKZ


Checking of torsional backlash

Here the backlash between coupling cams and the elastomer elements must be checked by reverse backlash. The friction/wear may be 20 % of the original thickness of the elastomer element before exchanging the elastomer elements. After having reached the limit of wear Δs_{max} , the elastomer elements must be exchanged immediately, irrespective of the inspection intervals.

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5.3 Approximate Values of Wear

The reaching of the exchange values depends on the operating conditions and the existing operating parameters. If the torsional backlash is $\geq \Delta s_{max}$ in mm, the elastomer elements must be exchanged. Friction of $\geq 20\%$ of the original thickness of the elastomer elements - exchange necessary!



CAUTION!

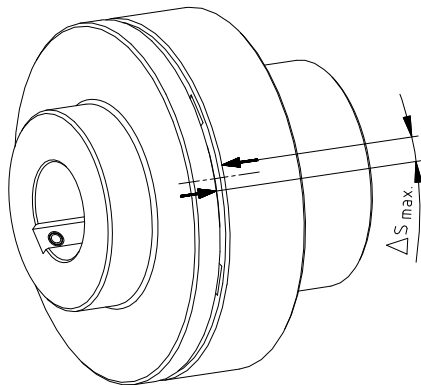
When changing the elastomer elements please do only use elements with the same Shore hardness.



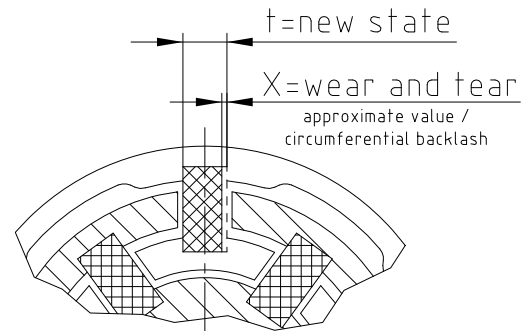
CAUTION!

In order to ensure a long lifetime of the coupling and to avoid dangers regarding the use in hazardous areas, the shaft ends must be accurately aligned.

Please absolutely observe the displacement figures indicated (see table 10). If the figures are exceeded, the coupling is damaged.



picture 22: checking of the limit of wear



picture 23: wear of elastomer elements

Table 11: limits of wear

POLY size	standard design			design with low backlash (enlarged elastomer elements)		
	thickness of elastomer elements t [mm]	friction X_{max} [mm]	torsional backlash Δs_{max} [mm]	thickness of elastomer elements t [mm]	friction X_{max} [mm]	torsional backlash Δs_{max} [mm]
8	10,0	2,0	5,0	11,8	2,4	3,6
9	10,0	2,0	5,1	11,8	2,4	3,5
10	10,0	2,0	5,3	11,8	2,4	3,5
12	15,3	3,0	7,5	17,5	3,5	5,2
14	15,3	3,0	7,7	17,5	3,5	5,2
15	16,1	3,0	8,2	18,7	3,8	5,5
17	16,1	3,0	8,7	18,7	3,8	5,5
19	18,4	3,5	9,7	-	-	-
20	19,6	4,0	10,3	22,9	4,6	6,7
22	18,4	3,5	10,3	-	-	-
25	19,6	4,0	9,4	22,9	4,6	6,8
28	22,2	4,0	10,6	23,9	4,8	7,3
30	23,7	4,5	11,3	28,6	5,7	8,4
35	21,8	4,0	9,4	24,8	4,8	7,8



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Hints and Instructions Regarding the Use in Hazardous Areas

5.4 Permissible Coupling Materials in the Hazardous Area


In the Explosion Groups **IIA, IIB** and **IIC** the following materials may be combined:

EN-GJL-250 (GG 25)
EN-GJS-400-15 (GGG 40)
steel
stainless steel

Semifinished products from aluminium with a magnesium part of up to 7,5 % and a yield point of $R_{p0,2} \geq 250 \text{ N/mm}^2$ are permitted for the use in hazardous areas.

Aluminium diecast is generally excluded for hazardous areas.

5.5 Marking of Coupling for the Hazardous Area

Couplings for the use in hazardous areas are marked on at least one component short or completely and on the remaining components at the outside diameter of the hub or on the front side with an  label for the respectively permitted conditions of use. The elastomer elements are excluded.

Complete labelling:



II 2G c IIC T6 bzw. T5 - $30 \text{ }^\circ\text{C} \leq T_a \leq + 65 \text{ }^\circ\text{C}$ bzw. $+ 80 \text{ }^\circ\text{C}$
II 2D c T $100 \text{ }^\circ\text{C} - 30 \text{ }^\circ\text{C} \leq T_a \leq + 80 \text{ }^\circ\text{C}$ / I M2 c - $30 \text{ }^\circ\text{C} \leq T_a \leq + 80 \text{ }^\circ\text{C}$

Short labelling:



II 2GD c IIC T X / I M2 c X

The former marking remains valid:



II 2G c IIC T4/T5/T6 - $30 \text{ }^\circ\text{C} \leq T_a \leq + 80/60/45 \text{ }^\circ\text{C}$
II 2D c T $110 \text{ }^\circ\text{C}/\text{I M2 c} - 30 \text{ }^\circ\text{C} \leq T_a \leq + 80 \text{ }^\circ\text{C}$

The labelling with Explosion Group IIC includes the Explosion Groups IIA and IIB.

If the coupling part is labelled with  in addition to , KTR supplied it unbored or pilot bored.



CAUTION!

Any mechanical rework to couplings that are used in hazardous areas require an explicit release by KTR.

The orderer must send a drawing to KTR acc. to which the manufacture must be made. KTR checks this drawing and returns it to the orderer with approval.

5.6 Starting

Before putting the coupling into operation, check the tightness of the setscrews in the cam section or pocket section, the alignment and the distance dimension E and correct, if necessary, and also check all screw connections regarding the stipulated tightening torques dependent on the type of coupling.



If used in hazardous areas the grub screws to fix the hub as well as all screw connections must be additionally secured against self-loosening, e. g. glue with Loctite (medium strength).

Last but not least, the coupling protection against unintended contact must be fixed.

The cover must be electrically conductive and be included in the equipotential bonding. Bell housings (magnesium part below 7,5 %) made from aluminium and damping rings (NBR) can be used as connecting element between pump and electro motor. The cover may only be taken off after having stopped the unit.

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5.6 Starting

During operation, please pay attention to

- strange running noises
- occurring vibrations.

If the couplings are used in dust explosive areas and in mining the user must make sure that there is no accumulation of dust in a critical quantity between the cover and the coupling. The coupling must not operate in an accumulation of dust.

For covers with unlocked openings on the upper side no light metals may be used if the couplings are used as appliances of appliance group II (*if possible, from stainless steel*).

If the couplings are used in mining (appliance group I M2), the cover must not be made from light metal. In addition, it must be resistant to higher mechanical loads than if it is used as appliance of appliance group II.

The minimum distance of the protection device to the rotating parts must be at least 5 mm.

If the protection device is used as cover, regular openings complying with the explosion protection demands can be made that must not exceed the following dimensions:

	form of the openings		
	circular openings diameter in mm	rectangular openings side length in mm	straight or bended slot distance of the side limit in mm
top surface of the covering	4	4	prohibited
side parts of the covering	8	8	8



CAUTION!

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

Coupling layer:



If coated (priming, painting etc.) couplings are used in hazardous areas, the requirements to conductability and layer thickness must be considered. In case of paintings up to 200 µm no electrostatic load can be expected. Multiple coatings that are thicker than 200 µm are prohibited for explosion group IIC.

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5.7 Breakdowns, Causes and Elimination

The below-mentioned errors can lead to an incorrect use of the **POLY** coupling. In addition to the stipulations in these operating and mounting instructions please make sure to avoid these errors. The errors listed can only be clues to search for the errors. When searching for the error the adjacent components must be generally included.



Due to incorrect use the coupling can become a source of ignition. EC Standard 94/9/EC requires a special care from the manufacturer and the user.

General errors incorrect use

- Important data for the coupling selection was not forwarded.
- The calculation of the shaft/hub connection was not considered.
- Coupling parts with damage occurred during transport are assembled.
- If the heated hubs are assembled, the permissible temperature is exceeded.
- The fits of the parts to be assembled are not coordinated with each other.
- Tightening torques are below/exceeded.
- Components are exchanged by mistake/put together incorrectly.
- A wrong or no elastomer elements is inserted into the coupling.
- No original KTR parts (purchased parts) are used.
- Old elastomer elements/already worn out elastomer elements or superposed elastomer elements are used.
- The coupling used/the coupling protection used is not suitable for the operation in hazardous areas and does not correspond to EC Standard 94/9/EC, respectively.
- Maintenance intervals are not observed.

breakdowns	causes	danger hints for hazardous areas	elimination
change of the running noises and/or occurring vibrations	misalignment	danger of ignition due to sparking	1) put the unit out of operation 2) eliminate the reason for the misalignment (e. g. loose foundation bolts, break of the engine fixing, heat expansion of unit components, change of the assembly dimension E of the coupling) 3) check coupling parts and exchange damaged coupling parts 4) checking of wear see under point Control
	wear of elastomer elements, low/no torque transmission because the cams of coupling slip	danger of ignition due to hot surfaces	1) put the unit out of operation 2) disassemble the coupling and remove rests of the elastomer elements 3) check coupling parts and exchange damaged coupling parts 4) insert elastomer elements, assemble coupling parts 5) check alignment, correct if necessary



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Hints and Instructions Regarding the Use in  Hazardous Areas

5.7 Breakdowns, Causes and Elimination

breakdowns	causes	danger hints for hazardous areas	elimination
change of the running noises and/or occurring vibrations	loose screws for axial securement of hubs	danger of ignition due to sparking	<ol style="list-style-type: none"> 1) put the unit out of operation 2) check alignment of coupling 3) tighten the screws to secure the hubs and secure against self-loosening 4) check coupling parts and exchange damaged coupling parts 5) checking of wear see under point Control
shearing of elastomer elements	break of the elastomer elements due to high shock energy/overload, cams of coupling slip	danger of ignition due to hot surfaces	<ol style="list-style-type: none"> 1) put the unit out of operation 2) disassemble the coupling and remove rests of the elastomer elements 3) check coupling parts and exchange damaged coupling parts 4) insert elastomer elements, assemble coupling parts 5) find out the reason of overload
	operating parameters do not correspond to the performance of the coupling/ cams of coupling slip	danger of ignition due to hot surfaces	<ol style="list-style-type: none"> 1) put the unit out of operation 2) check the operating parameters and select a larger coupling (consider installation space) 3) assemble new coupling size 4) check alignment
	mistake in service of the unit/ cams of coupling slip	danger of ignition due to hot surfaces	<ol style="list-style-type: none"> 1) put the unit out of operation 2) disassemble the coupling and remove rests of the elastomer elements 3) check coupling parts and exchange damaged coupling parts 4) insert elastomer elements, assemble coupling parts 5) instruct and train the service staff
premature wear of elastomer elements	misalignment		<ol style="list-style-type: none"> 1) put the unit out of operation 2) eliminate the reason for the misalignment (e. g. loose foundation bolts, break of the engine fixing, heat expansion of unit components, change of the assembly dimension E of the coupling) 3) check coupling parts and exchange damaged coupling parts 4) checking of wear see under point Control



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Hints and Instructions Regarding the Use in  Hazardous Areas

5.7 Breakdowns, Causes and Elimination

breakdowns	causes	danger hints for hazardous areas	elimination
premature wear of elastomer elements	e. g. contact with aggressive liquids/oils, ozone-influence, too high/low ambient temperatures etc. effecting a physical change of the elastomer elements		<ol style="list-style-type: none"> 1) put the unit out of operation 2) disassemble the coupling and remove rests of the elastomer elements 3) check coupling parts and exchange damaged coupling parts 4) insert elastomer elements, assemble coupling parts 5) check alignment, correct if necessary 6) make sure that further physical changes of the elastomer elements are excluded
	ambient/contact temperatures which are too high for the elastomer elements, max. permissible e. g. T4 = - 30 °C/+ 80 °C	danger of ignition due to hot surfaces	<ol style="list-style-type: none"> 1) put the unit out of operation 2) disassemble the coupling and remove rests of the elastomer elements 3) check coupling parts and exchange damaged coupling parts 4) insert elastomer elements, assemble coupling parts 5) check alignment, correct if necessary 6) check and regulate ambient/contact temperature
premature wear of elastomer elements (Hardening/ embrittlement of the elastomer elements)	drive vibrations	danger of ignition due to hot surfaces	<ol style="list-style-type: none"> 1) put the unit out of operation 2) disassemble the coupling and remove rests of the elastomer elements 3) check coupling parts and exchange damaged coupling parts 4) insert elastomer elements, assemble coupling parts 5) check alignment, correct if necessary 6) find out the reason for the vibrations
fracture of cams or hubs, respectively	locking by elastomer elements that have failed	danger of ignition due to sparking	<ol style="list-style-type: none"> 1) put the unit out of operation 2) change complete coupling 3) check alignment 4) finding out the reason, repairing the damage



If you operate with a worn elastomer elements (see item 5.2) and the subsequent contact of metal parts a due operation meeting the explosion protection requirements and acc. to Standard 94/9/EC is not ensured.



ATTENTION!

KTR does not assume any liabilities or guarantees regarding the use of spare parts and accessories which are not provided by KTR and for the damages resulting herefrom.

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 11.03.10 Pz/Bru	Ersatz für: KTR-N vom 25.04.07
	Geprüft: 16.03.10 Pz	Ersetzt durch:




KTR Kupplungstechnik
GmbH
D-48407 Rheine

POLY
Operating-/Assembly Instructions

KTR-N 49610 EN
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edition: 9

5 Enclosure A

Hints and Instructions Regarding the Use in  Hazardous Areas

5.8 EC Certificate of Conformity

EC Certificate of Conformity

corresponding to EC Standard 94/9/EC dated 23 March 1994
and to the legal regulations

The manufacturer - KTR Kupplungstechnik GmbH, D-48432 Rheine - states that the

POLY couplings

described in these mounting instructions and explosion-proof designed correspond to Article 1 (3) b) of Standard 94/9/EC and comply with the general Safety and Health Requirements according to enclosure II of Standard 94/9/EC.

According to article 8 (1) of Standard 94/9/EC the technical documentation is deposited with the:

IBExU
Institut für Sicherheitstechnik GmbH
Fuchsmühlenweg 7

09599 Freiberg

Rheine,

11.03.10
Date

i. V. 
Reinhard Wibbeling
Leiter TECHNIK

i. V. 
Michael Brüning
Product Manager

Schutzvermerk
ISO 16016 beachten.

Gezeichnet: 11.03.10 Pz/Bru
Geprüft: 16.03.10 Pz

Ersatz für: KTR-N vom 25.04.07
Ersetzt durch: