

KTR-N 49611 E sheet: 1 edition: 4

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.

The **POLY** type PKA enables a change of the elastomer package / spacer without having to disassemble the drive or driven machine.

POLY type PKA connects norm lengths of the pump industry.

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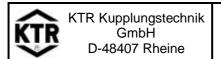
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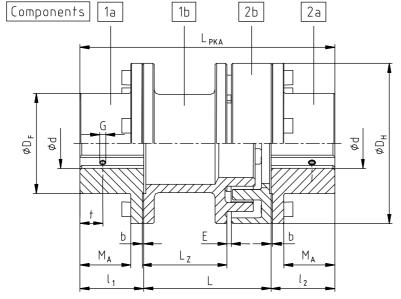
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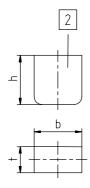
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1 Technical Data



picture 1: POLY design PKA



picture 2: Poly - elastomer packages NBR (buna N) 92 ShA

Components:

1a / 2a coupling flange

1b spacer

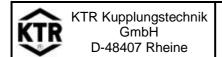
2b driving flange

Part 1a and 1b preferably to be used at the driving end

Table 1: dimensions design PKA

	finish bore						dir	nensions	[mm]				
POLY	d _{max.} [mm]					general						thread o	f setscrews
size	component 1a/2a	D _H	D _F	l ₁ , l ₂	b	M _A	Е	L	L _{PKA}	Lz	G	t	tightening torque T _A [Nm]
8	38	86	55	35	1,5	25,5	3	100	170	49	M5	15	2
9	42	97	70	41	1,5	30,5	3	100	182	45	M8	15	10
9	42	31	70	41	1,5	30,3	3	140	222	85	IVIO	10	10
10	48	107	78	46	1,5	35,5	4	100	192	42	M8	20	10
10	10	107	70	70	1,0	00,0	-	140	232	82	1010	20	10
								100	210	32			
12	55	131	95	55	1,5	43	4	140	250	72	M8	20	10
								180	290	112			
								100	220	30			
14	60	142	105	60	1,5	48	4	140	260	70	M8	25	10
								180	300	110			
								100	230	29			
15	65	157	110	65	1,5	49,5	4	140	270	69	M8	25	10
.0	00	101	110		1,0	10,0	·	180	310	109	1110		
								250	380	179			
								100	240	27			
17	65	176	125	70	1,5	54,5	4	140	280	67	M8	25	10
					.,-	- 1,0	•	180	320	107			
								250	390	177			
								140	290	65			
19	75	195	135	75	1,5	59,5	4	180	330	105	M8	30	10
								250	400	175			
00	00	005	450			0.4		140	300	51		00	40
20	80	205	150	80	2	61	4	180	340	91	M8	30	10
								250	410	161			
00	05	004	160	00		74	4	140	320	59	N440	25	47
22	85	224	160	90	2	71	4	180	360	99	M10	35	17
-								250	430	169			
25	90	257	195	100	2	81	5	140	340 380	51	M12	40	40
25	90	251	195	100	-	01	5	180		91	IVI I Z	40	40
-								250	450	161			
28	110	288	215	110	2	91	_	140 180	360	38 78	M12	45	40
20	110	200	215	110	2	91	5		400		IVI I Z	45	40
								250	470	148			

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1 Technical Data

Table 2: torque and speed

POLY size		8	9	10	12	14	15	17	19	20	22	25	28
torque	T_{KN}	42	72	100	170	210	320	400	660	820	1100	1600	2500
[Nm]	T _{Kmax.}	84	144	200	340	420	640	800	1320	1640	2200	3200	5000
max. speed n [1/	/min.]	5000	5000	5000	5000	4800	4300	3800	3500	3300	300	2700	2350

Table 3: dimensions elastomer packages

coupling size	ze	8	9	10	12	14	15	17	19	20	22	25	28
quantity of pack	ages 1)	8	10	10	10	10	12	12	12	12	16	16	16
package siz	ze		1		2	2	3	3	3a	4	3b	4	5
dimension	h		18,9		23	3,9	24	l,6	26,8	34,6	29,6	34,6	40,6
dimension	b		18,4		24	l,9	27	' ,2	27,7	34,9	29,6	34,9	40,0
[mm]	t		10,0		15	5,3	16	6,1	18,4	19,6	18,4	19,6	22,2

¹⁾ Quantity for the complete coupling.

Table 4: cap screws DIN 912

coupling size	8	9	10	12	14	15	17	19	20	22	25	28
quantity cap screws DIN 912 2)	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 TA [Nm]	10	10	10	25	25	49	49	49	49	49	49	86

²⁾ each coupling flange



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.

2 Hints

2.1 General Hints

Please read through these mounting instructions carefully before you set the coupling into operation.



The POLY coupling is 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.

Please pay special attention to the safety instructions!

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.

2.2 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.

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2 Hints

2.3 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.

2.4 Proper Use

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

- 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 4 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**[®] **coupling** 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 packages 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%.

4 Assembly

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

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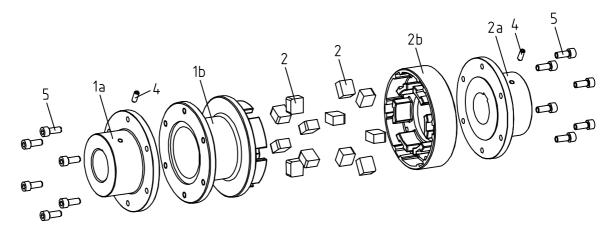
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4 Assembly

4.1 Components of the Couplings

Components of POLY design PKA

Component	Quantity	Designation	Material	Balancing Condition
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 5	elastomer packages	NBR (buna N) 92 ShA	
2b	1	driving flange	EN-GJL-250	generally balanced
4	2	setscrew DIN 916	steel	
5	see table 5	cap screw DIN 912	steel	



picture 3: POLY design PKA

Table 5:

coupling size	8	9	10	12	14	15	17	19	20	22	25	28
quantity of packages 1)	8	10	10	10	10	12	12	12	12	16	16	16
package size		1		12	2	~>	3	3a	4	3b	4	5
quantity of cap screws DIN 912 ²⁾	4	5	5	5	5	6	6	6	6	8	8	8

¹⁾ Quantity for the complete coupling (dimensions see tabel 3).

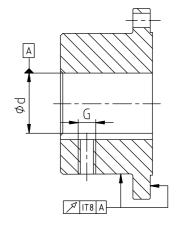
4.2 Hint regarding the finish bore



DANGER!

The maximum permissible bore diameters d (see table 1 in chapter 1 - Technical Data) must not be exceeded. If these figures are disregarded, the coupling may tear. Rotating particles may cause serious danger.

- Coupling flange bores machined by the customer have to observe concentric running or axial running, respectively (see picture 4).
- Please make absolutely sure to observe the figures for d_{max}.
- Carefully align the coupling flanges when the finish bores are brought in.
- Please provide for a setscrew or an end plate for the axial fastening of the hubs.



picture 4: concentric running and axial running

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²⁾ each coupling flange



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4 Assembly

4.3 Assembly of the Hubs



ATTENTION!

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

Heating the 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!

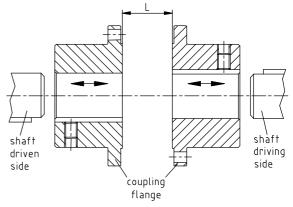
Touching the heated coupling flanges causes burns. We would recommend to wear safety gloves.



CAUTION!

During the assembly please make sure that the L dimension (see table 1) is observed, so that the spacer and the driving flange do not conact each other during the operation. Disregarding this hint may cause damage on the coupling.

- Assemble the coupling flanges onto the shaft of the drive and the driven side (see picture 5).
- 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 1).
- Fasten the coupling flanges by tightening the setscrews DIN 916 with cup point (see table 1).



picture 5: assembly of the coupling flanges



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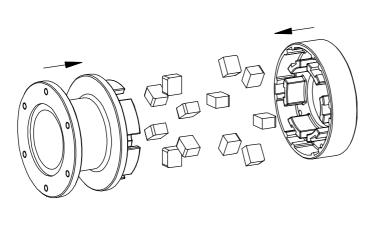
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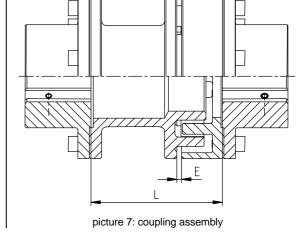
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4 Assembly

4.4 Assembly of the Spacer, Driving Flange and Elastomer Packages

- Please plug the driving flanges, spacer and the elastomer packages together (see picture 6).
- Put the assembled parts between the coupling flanges.
- · At first hand-screw the parts.
- Tighten the screws with a suitable torque key to the tightening torque T_A shown in table 4.
- Please check the L or the E dimension (see picture 7 and table 1).





picture 6: assembly the driving flange, spacer and elastomer packages

4.5 Displacements - Alignment of the Couplings

The displacement figures shown in table 6 offer sufficient safety to compensate for environmental influences like, for example, heat expansion or lowering of foundation.



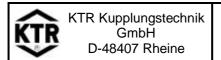
CAUTION!

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 6). If the figures are exceeded, the coupling is damaged.

In case of a use in hazardous areas for the explosion group IIC (marking II 2G/2D EEx c IIC T4/T 110 °C / I M2 $\,$ -20 °C \pounds Ta \pounds +80 °C), only the half displacement figures (see table 6) are permissible.



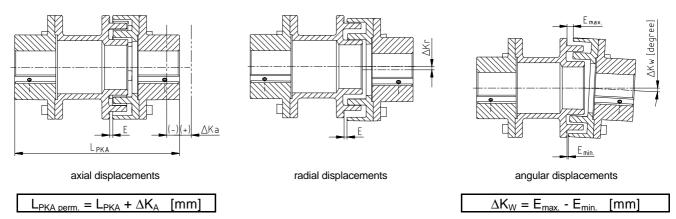
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4 Assembly

4.5 Displacements - Alignment of the Couplings

Please note:

 Please check with a dial gauge, ruler or feeler whether the permissible displacement figures of table 6 can be observed.



picture 8: displacements

The radial and angular displacements can occur simultaneously. The sum $V = \Delta Kr + (E_{max.} - E_{min.})$ shall not exceed the values in table 6.

Example for the misalignment combinations given in picture 9:

Example 1:

 $\Delta K_R = 30\%$

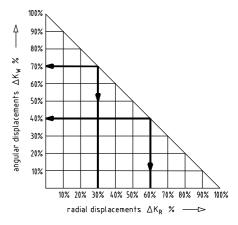
 $\Delta K_W = 70\%$

Example 2:

 $\Delta K_R = 60\%$

 $\Delta K_W = 40\%$

$$\Delta K_{total} = \Delta K_R + \Delta K_W \le 100 \%$$



picture 9: combinations of displacement

Table 6: displacement figures

coupling size	ze	8	9	10	12	14	15	17	19	20	22	25	28
max. axial displacemen	nt ∆Ka [mm]	±1	±1	±1	+1 -3	+1 -3	+1 -3	+1 -3	+1 -3	0 -4	0 -4	+1 -4	+1 -4
max. radial displace- ment ∆Kr [mm]	n= bis 750 1/min	0,8	0,8	0,8	0,8	0,8	1,0	1,0	1,0	1,0	1,0	1,0	1,0
or max. angular displace-	n=1000 1/min	0,7	0,7	0,7	0,7	0,7	0,9	0,9	0,9	0,9	0,9	0,9	0,9
ment ∆Kw [mm]	n=1500 1/min	0,5	0,5	0,5	0,5	0,5	0,7	0,7	0,7	0,7	0,7	0,7	0,7
or sum V	n=3000 1/min	0,3	0,3	0,3	0,3	0,3	0,5	0,5	0,5	0,5	0,5	0,5	0,5



CAUTION!

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

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5 Enclosure A

Hints and instructions regarding the use in kazardous areas

design PKA: coupling flange / driving flange / elastomer packages / spacer / coupling flange POLY design PKA only with spacer by material EN-GJL-250 or EN-GJS-400-15.

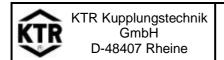
5.1 Selection of the Coupling Size

If the coupling is used in explosion proof areas, the size must be selected in a way that there is a minimum safety of s = 2.0 from the unit torque to the nominal torque of the coupling.

5.2 Control intervals for couplings in hazardous areas

explosion group	control intervals
II 2G EEx c IIB T4	The torsional backlash of the coupling (see chapter 5.3) according to Guideline 94/9/EG (ATEX 95) must only be controlled if a friction of the elastomer packages (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 packages must be effected after 3000 operating hours for the first time, after 6 months at the latest. If you note an unconsiderable or no wear at the elastomer packages after this first inspection, the further inspections can be effected, in case of the same operating parameters, respectively after 6000 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 packages 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 2G EEx c IIC T4	The torsional backlash of the coupling (see chapter 5.3) according to Guideline 94/9/EG (ATEX 95) must only be controlled if a friction of the elastomer packages (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 packages must be effected after 2000 operating hours for the first time, after 3 months at the latest. If you note an unconsiderable or no wear at the elastomer packages after this first inspection, the further inspections can be effected, in case of the same operating parameters, respectively after 4000 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 packages 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.

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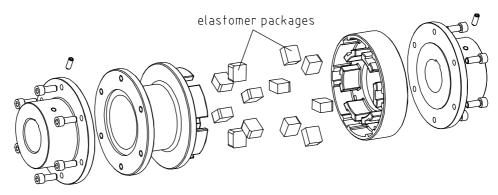


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5 Enclosure A

Hints and instructions regarding the use in hazardous areas





picture 10: POLY design PKA

Checking of torsional backlash

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

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 $\geq \Delta s_{\text{max.}}$ in mm, the elastomer packages must be exchanged. Friction of $\geq 20\%$ of the original thickness of the elastomer package - exchange necessary!



CAUTION!

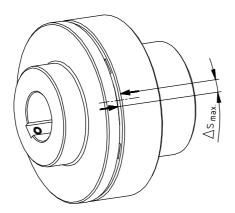
When changing the elastomer packages please do only use packages with the same Shore hardness.



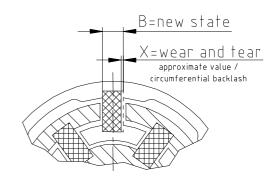
CAUTION!

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 6). If the figures are exceeded, the coupling is damaged.



picture 11: checking of the limit of wear



picture 12: wear of elastomer packages

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5 Enclosure A

Hints and instructions regarding the use in



5.3 Approximate values of wear

Table 7: limits of wear

DOLV	S	tandard design			with low backla elastomer pack	
POLY size	thickness of elastomer packages [mm]	friction X _{max.} [mm]	torsional backlash Δs _{max.} [mm]	thickness of elastomer packages [mm]	friction X _{max.} [mm]	torsional backlash ∆s _{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	-	-	ı
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



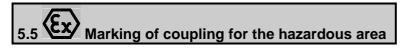
In the explosion groups **IIB** and **IIC** only the following material combinations may be used:

EN-GJL-250 - EN-GJL-250 (old designation GG 25) EN-GJS-400-15 - EN-GJS-400-15 (old designation GGG 40)

steel - steel

stainless steel - stainless steel

Aluminium as coupling material is generally excluded for the explosion area.



Couplings for the use in hazardous areas are marked for the respectively permissible conditions of use.

Explosion group IIC: II 2G/2D EEx c IIC T4/T 110 °C / I M2 -20 °C \leq T_a \leq +80 °C

In the marking II 2G/2D EEx c IIC T4/T 110 °C / I M2 -20 °C \leq T_a \leq +80 °C

the explosion group IIB is included.

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5 Enclosure A

Hints and instructions regarding the use in



5.6 Starting

Before putting the coupling into operation, check the tightness of the setscrews in the cam part 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 setscrews must be additionally secured against self-loosening to fix the cam part and pocket section, e. g. with Loctite (medium strength).

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



Coupling protection in the hazardous area.

Covering of the coupling

The couplings must be provided with firm coverings (*if possible, made from stainless steel*) protecting the couplings against falling objects. There can be regular openings in the coverings which may not exceed the following dimensions:

	circular openings diameter in mm	rectangular openings side length in mm
top surface of the covering	4	4
side parts of the covering	8	8

The distance between the cover and the rotating parts must be at least 5 mm.

The covering must be electrically conductive and included in the equipotential bonding. It must not consist of light metal. A removal of the covering is only allowed in case of standstill.

During operation, please pay attention to

- strange running noises
- · occurring vibrations.



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.

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Hints and instructions regarding the use in



5.7 Breakdowns, Causes and Elimination

breakdowns	causes	danger hints for hazardous areas	elimination
	misalignment	danger of ignition due to sparking	put the unit out of operation 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) check coupling parts and exchange damaged coupling parts checking of wear see under point Control
change of the running noises and / or occurring vibrations	wear of elastomer package, low / no torque transmission since coupling cams slip through	danger of ignition due to hot surfaces	 put the unit out of operation disassemble the coupling and remove rests of the elastomer packages check coupling parts and exchange damaged coupling parts insert elastomer packages, assemble coupling parts check alignment, correct if necessary
	loose screws for axial securement of hubs	danger of ignition due to sparking	 put the unit out of operation check alignment of coupling tighten the screws to secure the hubs and secure against self-loosening check coupling parts and exchange damaged coupling parts checking of wear see under point Control
failure of the elastomer	break of the elastomer packages due to high shock energy / overload, coupling cams slip through	danger of ignition due to hot surfaces	 put the unit out of operation disassemble the coupling and remove rests of the elastomer packages check coupling parts and exchange damaged coupling parts insert elastomer packages, assemble coupling parts find out the reason of overload
packages	operating parameters do not correspond to the coupling performance / coupling cams slip through	danger of ignition due to hot surfaces	 put the unit out of operation check the operating parameters and select a larger coupling (consider installation space) assemble new coupling size check alignment

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Hints and instructions regarding the use in



5.7 Breakdowns, Causes and Elimination

breakdowns	causes	danger hints for hazardous areas	elimination
failure of the elastomer packages	mistake in service of the unit / coupling cams slip through	danger of ignition due to hot surfaces	 put the unit out of operation disassemble the coupling and remove rests of the elastomer packages check coupling parts and exchange damaged coupling parts insert elastomer packages, assemble coupling parts instruct and train the service staff
	misalignment		put the unit out of operation 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) check coupling parts and exchange damaged coupling parts checking of wear see under point Control
premature wear of elastomer packages	e. g. contact with aggressive liquids / oils, ozone-influence, too high ambient temperatures etc. effecting a physical change of the elastomer packages		 put the unit out of operation disassemble the coupling and remove rests of the elastomer packages check coupling parts and exchange damaged coupling parts insert elastomer packages, assemble coupling parts check alignment, correct if necessary make sure that further physical changes of the spider are excluded
	ambient / contact temperatures which are too high for the elastomer packages, max. permissible -20 °C / +80 °C	danger of ignition due to hot surfaces	 put the unit out of operation disassemble the coupling and remove rests of the elastomer packages check coupling parts and exchange damaged coupling parts insert elastomer packages, assemble coupling parts check alignment, correct if necessary check and regulate ambient / contact temperature

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5 Enclosure A

Hints and instructions regarding the use in



5.7 Breakdowns, Causes and Elimination

breakdowns	causes	danger hints for hazardous areas	elimination
premature wear of elastomer packages (liquefaction of material inside the elastomer packages cam)	drive vibrations	danger of ignition due to hot surfaces	 put the unit out of operation disassemble the coupling and remove rests of the elastomer packages check coupling parts and exchange damaged coupling parts insert elastomer packages, assemble coupling parts check alignment, correct if necessary find out the reason for the vibrations
break of cams or hubs	blockade due to destroyed elastomer packages	danger of ignition due to sparking	 put the unit out of operation change complete coupling check alignment determine the cause, remove the mistakes

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.

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Hints and instructions regarding the use in



hazardous areas

5.8 Certificate of Conformity

Certificate of Conformity

corresponding to EG Standard 94/9/EG 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/EG and comply with the general Safety and Health Requirements according to enclosure II of Standard 94/9/EG.

The couplings are certified according to Type Examination Certificate IBExU02ATEXB007 X.

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

IBExU

Institut für Sicherheitstechnik GmbH

Fuchsmühlenweg 7

09599 Freiberg

Rheine,

14.08.02

Date

opa. '

Dr. Norbert Partmann Engineering Manager

Bernd Tenfelde Product Manager

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