

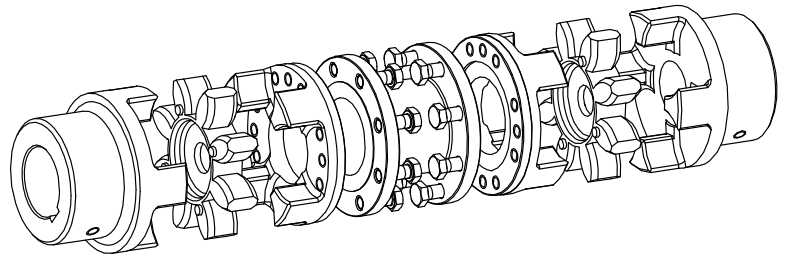


ROTEX®

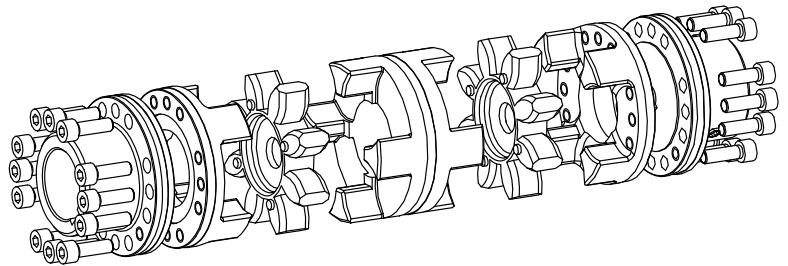
Torsionally flexible jaw-type
couplings types

ZS-DKM,
ZS-DKM-H
and their combinations

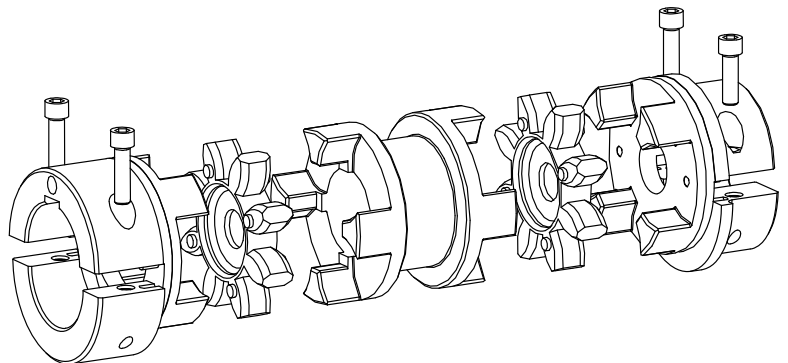
according to Standard 94/9/EC
(ATEX 95) for finish bored, pilot
bored and unbored couplings



design ZS-DKM1



design ZS-DKM3



design ZS-DKM-H

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 14.07.06 Sha/At	Ersatz für:
	Geprüft: 07.08.06 Sha	Ersetzt durch:



ROTEX® is a torsionally flexible jaw coupling. It is able to compensate for shaft displacement caused by, as an example, inaccuracies in production, heat expansion, etc.
The **ROTEX®** design ZS-DKM and ZS-DKM-H is suitable for a larger radial misalignment due to its double cardanic type. The standard type can only be used for the horizontal assembly.

Table of Contents

1 Technical Data

2 Hints

- 2.1 Coupling Selection
- 2.2 General Hints
- 2.3 Safety and Advice Hints
- 2.4 General Hints to Danger
- 2.5 Proper Use





3 Storage

4 Assembly

- 4.1 Components of the Couplings
- 4.2 Hint Regarding the Finish Bore
- 4.3 Assembly of the Hubs
- 4.4 Assembly of the Design ZS-DKM1
- 4.5 Assembly of the Design ZS-DKM3
- 4.6 Assembly of the Design ZS-DKM-H
- 4.7 Displacements - Alignment of the Couplings
- 4.8 Spares Inventory, Customer Service Addresses

5 Enclosure A

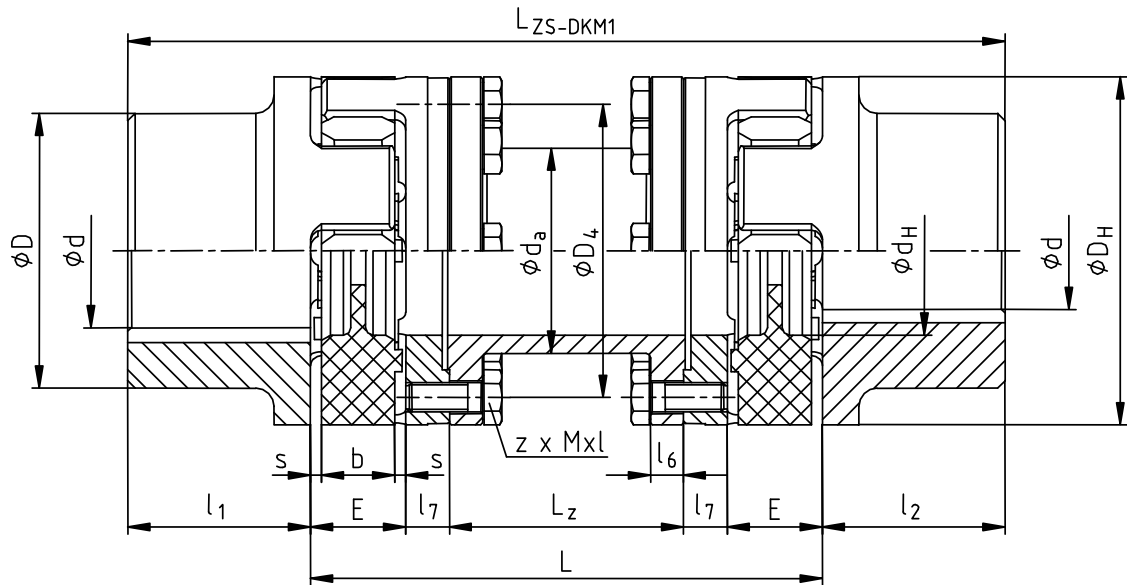
Hints and Instructions Regarding the Use in Hazardous Areas

- 5.1 Use in  Hazardous Areas According to the Regulations
- 5.2 Control Intervals for Couplings in  Hazardous Areas
- 5.3 Approximate Values of Wear
- 5.4 Permissible Coupling Materials in the  Hazardous Area
- 5.5  Marking of Coupling for the Hazardous Area
- 5.6 Starting
- 5.7 Breakdowns, Causes and Elimination
- 5.8 EC Certificate of Conformity according to the EC Standards 94/9/EC dated 23 March 1994



1 Technical Data

Design ZS-DKM1



picture 1: ROTEX®, design ZS-DKM1

Table 1: dimensions – design ZS-DKM1

size	finish bore d_{max} [mm]	spider component 2 ¹⁾ T_{KN} [Nm]	dimensions [mm]									
			D_H	D	d_H	$l_1; l_2$	E	s	b	l_7	l_6 2)	D_4
24	35	35	55	-	27	30	18	2	14	8	6/9	45
28	40	95	65	-	30	35	20	2,5	15	10 ³⁾	6/9	54
38	48	190	80	66	38	45	24	3	18	10	4/9	66
42	55	265	95	75	46	50	26	3	20	12	6/9	80
48	62	310	105	85	51	56	28	3,5	21	12	6/9	90
55	74	410	120	98	60	65	30	4	22	16	6/9	102
65	80	625	135	115	68	75	35	4,5	26	16	9	116
75	95	1280	160	135	80	85	40	5	30	19	9	136
90	110	2400	200	160	100	100	45	5,5	34	20	10	172
100	115	3300	225	180	105	110	50	6	38	25	15	195

size	dimensions [mm]		L_z – dimension for shaft distance dimension L [mm]							hexagon head cap screws DIN EN ISO 4017 – 10.9		
	d_a	$L_{ZS-DKM1}$	100	120	140	160	180	200	250	Mxl	z 4)	T_A [Nm]
24	30	L+60	48	68	88	108	128	148	198	M5x14 ⁵⁾	8	6
28	38	L+70	40	60	80	100	120	140 ³⁾	190 ³⁾	M6x16	8	14
38	44	L+90	32	52	72	92	112	132	182	M8x18 ⁶⁾	8	35
42	56	L+100	-	44	64	84	104	124	174	M8x18	8	35
48	62	L+112	-	40	60	80	100	120	170	M8x18	8	35
55	68	L+130	-	-	48	68	88	108	158	M10x20	8	69
65	91	L+150	-	-	-	58	78	98	148	M10x25	8	69
75	102	L+170	-	-	-	-	62	82	132	M12x25	10	120
90	132	L+200	-	-	-	-	-	70	120	M16x30	10	295
100	140	L+220	-	-	-	-	-	-	100	M16x40	10	295

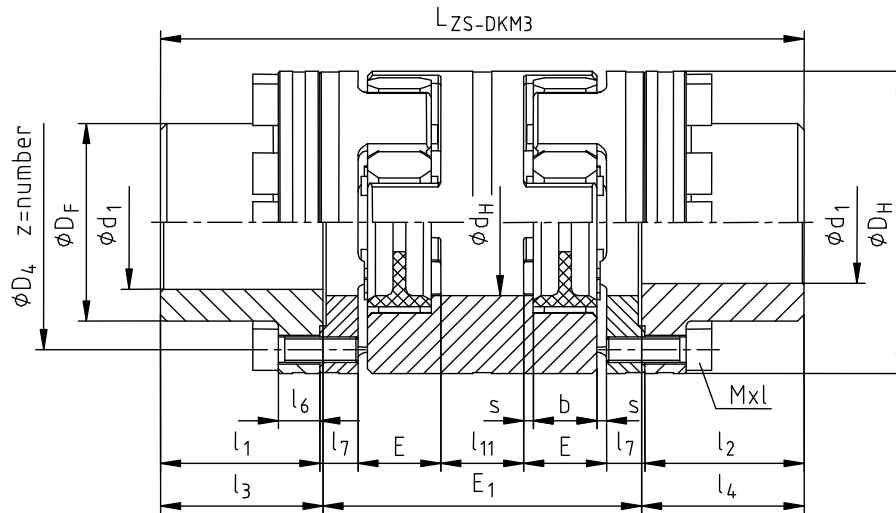
- 1) maximum torque of the coupling T_{Kmax} = rated torque of the coupling $T_{KN} \times 2$
size 24 to size 75 – spider type 95/98 Sh A-GS; from size 90 on – spider type 95 Sh A with internal ring transmittable torque according to 92 Sh A-GS
- 2) narrow width of flange l_6 with min. L_z -dimension
- 3) when dimension $L = 200$ mm and $L = 250$ mm dimension l_7 is 30 mm
- 4) each flange connection
- 5) property class 8.8
- 6) M8x12 for $L_z = 100$

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 14.07.06 Sha/At	Ersatz für:
	Geprüft: 07.08.06 Sha	Ersetzt durch:



1 Technical Data

Design ZS-DKM3



picture 2: ROTEX®, design ZS-DKM3

Tabelle 2: dimensions – design ZS-DKM3

size	finish bore d_{1max} [mm]	spider component 2 ¹⁾ T_{KN} [Nm]	dimensions [mm]							
			D_H	D_F	D_4	d_H	$l_1; l_2$	$l_3; l_4$	l_6	l_7
24	24	35	55	36	45	27	30	30,5	10	8
28	28	95	65	42	54	30	35	35,5	12	10
38	38	190	80	52	66	38	45	45,5	12	10
42	42	265	95	62	80	46	50	51,0	13	12
48	48	310	105	70	90	51	56	57,0	13	12
55	55	410	120	80	102	60	65	66,0	15	16
65	65	625	135	94	116	68	75	76,0	15	16
75	75	1280	160	108	136	80	85	86,5	20	19
90	100	2400	200	142	172	100	100	101,5	20	20

size	dimensions [mm]				l_{11} – dimension for shaft distance dimension E_1 [mm]				cap screws DIN EN ISO 4762 – 12.9		
	s	b	E	$L_{ZS-DKM3}$	100	140	180	250	MxL	z ²⁾	T_A [Nm]
24	2,0	14	18	E_1+61	49	-	-	-	M5x16	8	10
28	2,5	15	20	E_1+71	41	81	-	-	M6x20	8	17
38	3,0	18	24	E_1+91	33	73	-	-	M8x22	8	41
42	3,0	20	26	E_1+102	26	66	-	-	M8x25	12	41
48	3,5	21	28	E_1+114	22	62	-	-	M8x25	12	41
55	4,0	22	30	E_1+132	10	50	90	-	M10x30	8	83
65	4,5	26	35	E_1+152	-	40	80	-	M10x30	12	83
75	5,0	30	40	E_1+173	-	25	65	135	M12x40	15	120
90	5,5	34	45	E_1+203	-	-	53	123	M16x40	15	295

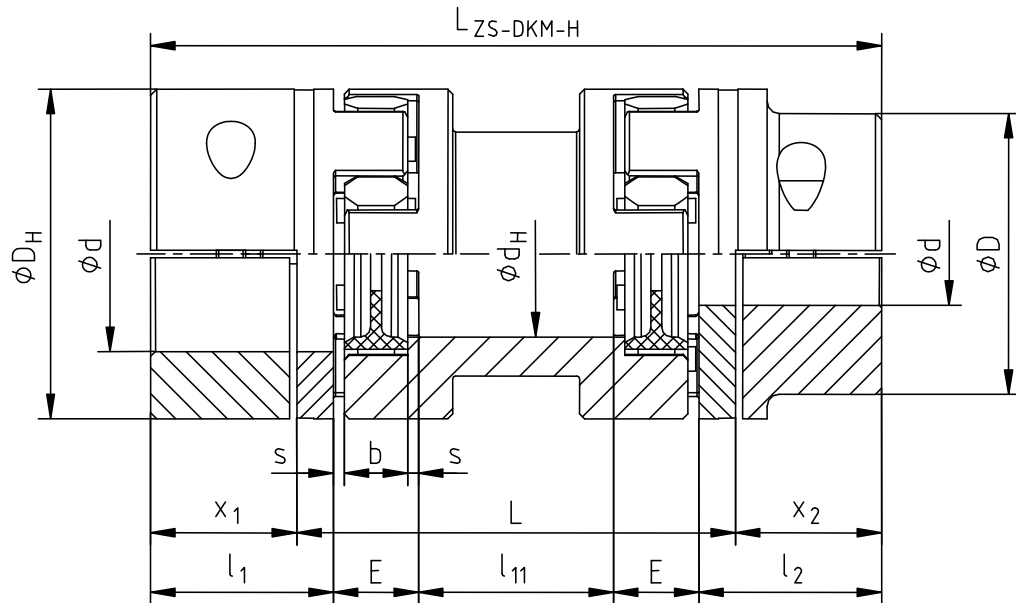
- 1) maximum torque of the coupling T_{Kmax} = rated torque of the coupling $T_{KN} \times 2$
size 24 to size 75 – spider type 95/98 Sh A-GS; from size 90 on – spider type 95 Sh A with internal ring
transmittable torque according to 92 Sh A-GS
- 2) each flange connection

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 14.07.06 Sha/At	Ersatz für:
	Geprüft: 07.08.06 Sha	Ersetzt durch:



1 Technical Data

Design ZS-DKM-H



picture 3: ROTEX®, design ZS-DKM-H

Table 3: dimensions – design ZS-DKM-H

size	finish bore d _{max.} [mm]	spider component 2 ¹⁾ T _{KN} [Nm]	dimensions [mm]							
			D _H	D	d _H	l ₁ ; l ₂	x ₁ ; x ₂	s	b	E
24	28	35	55	-	27	30	22,5	2,0	14	18
28	38	95	65	-	30	35	25,5	2,5	15	20
38	45	190	80	-	38	45	35,5	3,0	18	24
42	55	265	95	85	46	50	39,0	3,0	20	26
48	60	310	105	95	51	56	45,0	3,5	21	28
55	70	410	120	110	60	65	50,0	4,0	22	30
65	80	625	135	115	68	75	60,0	4,5	26	35
75	90	1280	160	135	80	85	67,5	5,0	30	40
90	110	2400	200	160	100	100	81,5	5,5	34	45

size	dimensions [mm]	l ₁₁ – dimension for shaft distance dimension L [mm]				cap screws DIN EN ISO 4762 – 12.9			weight ³⁾ for shaft distance dimension L [kg]			
	L _{ZS-DKM-H}	100	140	180	250	MxI	z ²⁾	T _A [Nm]	100	140	180	250
24	L+45	49	89	-	-	M6x20	2	14	1,40	1,60	-	-
28	L+51	41	81	-	-	M8x25	2	35	1,90	2,20	-	-
38	L+71	33	73	-	-	M8x30	2	35	3,90	4,10	-	-
42	L+78	26	66	-	-	M10x30	2	69	5,10	5,70	-	-
48	L+90	22	62	-	-	M12x35	2	120	7,10	7,90	-	-
55	L+100	10	50	90	-	M12x40	2	120	9,50	11,20	12,30	-
65	L+120	-	40	80	-	M12x40	2	120	-	16,10	16,80	-
75	L+135	-	25	65	135	M16x50	2	295	-	23,60	26,00	29,50
90	L+163	-	-	53	123	M20x60	2	580	-	-	48,90	52,60

- 1) maximum torque of the coupling T_{Kmax.} = rated torque of the coupling T_{KN} x 2
size 24 to size 75 – spider type 95/98 Sh A-GS; from size 90 on – spider type 95 Sh A with internal ring
transmittable torque according to 92 Sh A-GS
- 2) each clamping hub type DH
- 3) refer to max. bore



**ROTEX® 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.**

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 14.07.06 Sha/At	Ersatz für:
	Geprüft: 07.08.06 Sha	Ersetzt durch:



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 ROTEX® 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 spider. 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 ROTEX® 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.

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 14.07.06 Sha/At	Ersatz für:
	Geprüft: 07.08.06 Sha	Ersetzt durch:



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

- 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 3 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 **ROTEX® ZS-DKM** and **ZS-DKM-H** 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 coupling spiders (elastomers) 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%.

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 14.07.06 Sha/At	Ersatz für:
	Geprüft: 07.08.06 Sha	Ersetzt durch:



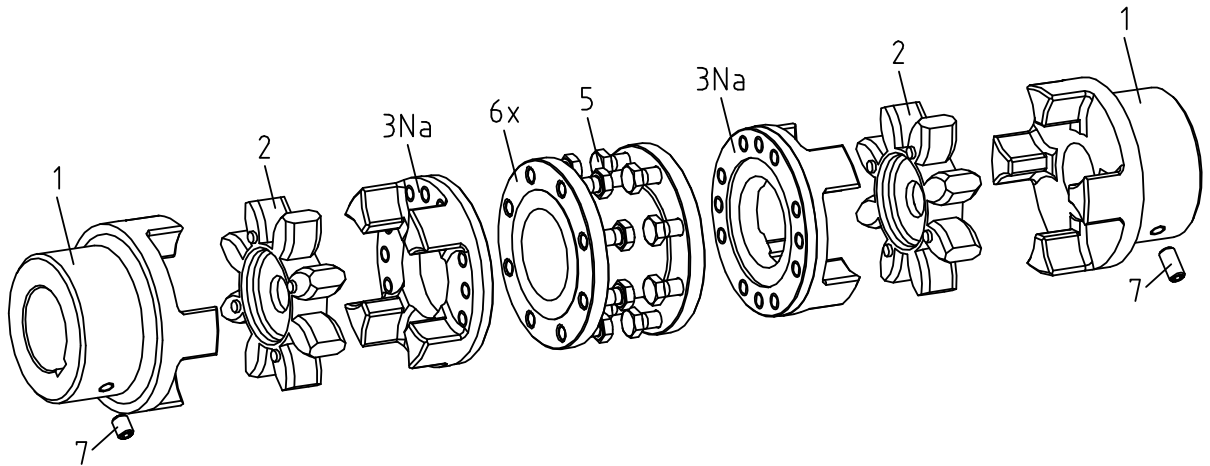
4 Assembly

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 ZS-DKM1

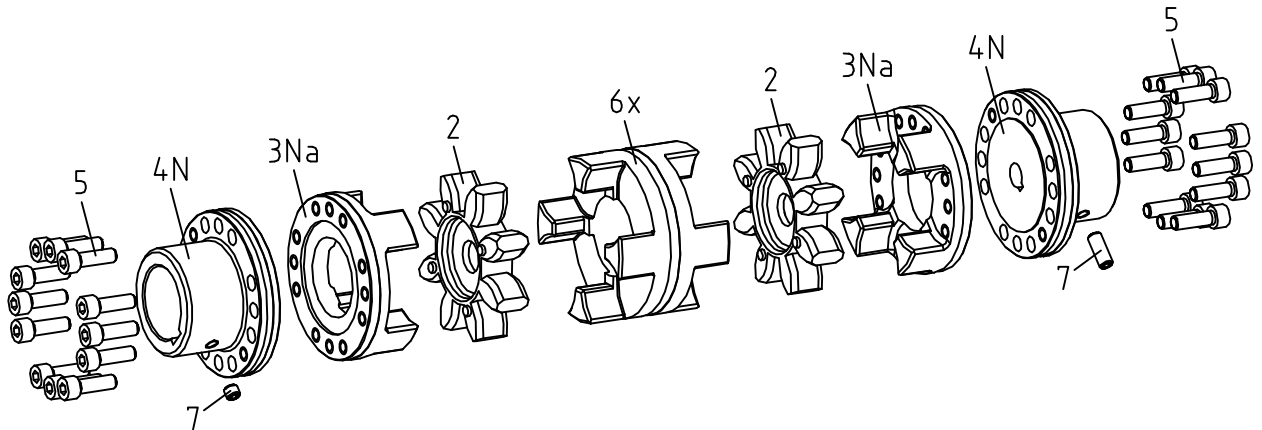
component	quantity	designation	component	quantity	designation
1	2	hub	5	s. table 1	hexagon head cap screw DIN EN ISO 4017
2	2	spider	6x	1	ZS-DKM-spacer
3Na	2	driving flange N design A	7	2	setscrew DIN EN ISO 4029



picture 4: ROTEX®, design ZS-DKM1

Components of ZS-DKM3

component	quantity	designation	component	quantity	designation
2	2	spider	5	s. table 2	cap screws DIN EN ISO 4762
3Na	2	driving flange N design A	6x	1	DKM-middle piece spec.
4N	2	coupling flange N	7	2	setscrew DIN EN ISO 4029



picture 5: ROTEX®, design ZS-DKM3



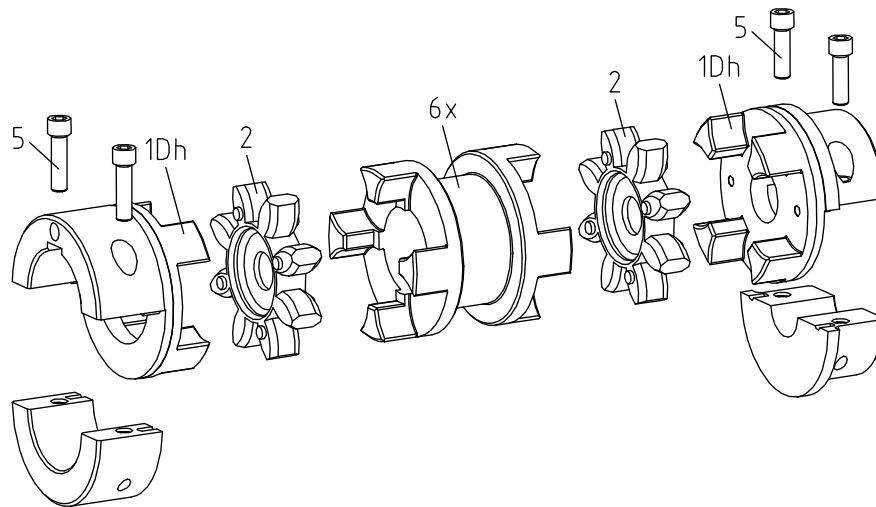
4 Assembly

4.1 Components of Couplings

Components of ZS-DKM-H

component	quantity	designation	component	quantity	designation
1Dh	2	clamping hub DH with half length taper-grooved dowel pin DIN EN ISO 874 (2 pieces)	5	2 ¹⁾	cap screws DIN EN ISO 4762
2	2	spider	6x	2	DKM-H-middle piece

1) each clamping hub DH



picture 6: ROTEX®, design ZS-DKM-H

Features of the standard spiders

spider hardness (Shore)	marking (colour)
95/98 Sh A	red

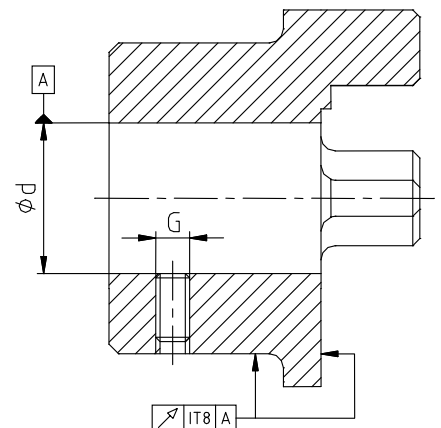
4.2 Hint Regarding the Finish Bore



DANGER!

The maximum permissible bore diameters d (see table 1 to 3 in chapter 1 - Technical Data) must not be exceeded. If these figures are disregarded, the coupling may tear. Rotating particles may cause serious danger.

- Hub bores machined by the customer have to observe concentric running or axial running, respectively (see picture 7).
- Please make absolutely sure to observe the figures for d_{max} .
- Carefully align the hubs when the finish bores are brought in.
- **Only applying with design ZS-DKM1 and ZS-DKM3:** Please use a set screw or an end plate to axially fasten the hubs.



picture 7: concentric running and axial running

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 14.07.06 Sha/At Geprüft: 07.08.06 Sha	Ersatz für: Ersetzt durch:
--------------------------------------	--	-------------------------------



4 Assembly

4.2 Hint Regarding the Finish Bore

Continuation:



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.


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

Table 4: setscrew – DIN EN ISO 4029

ROTEX® Größe	24	28	38	42	48	55	65	75	90	100
Maß G	M5	M8	M8	M8	M8	M10	M10	M10	M12	M12
tightening torque T _A [Nm]	2	10	10	10	10	17	17	17	40	40

4.3 Assembly of the Hubs



ATTENTION!

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

Heating the hubs slightly (approx. 80 °C) allows for an easier installation onto the shaft.
Not necessary with design ZS-DKM-H.



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!

For the assembly please make sure that the distance dimension L/E₁ (see table 1 to 3) is kept to ensure that the spider can be moved axially.
Disregarding this hint may cause damage on the coupling.

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 14.07.06 Sha/At	Ersatz für:
	Geprüft: 07.08.06 Sha	Ersetzt durch:

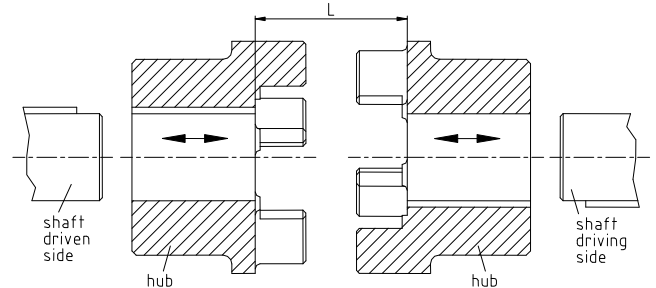


4 Assembly

4.3 Assembly of the Hubs

Only applying with design ZS-DKM1 and ZS-DKM3:

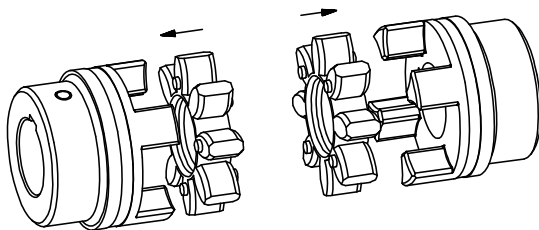
- Assemble the hubs/coupling flanges onto the shaft of driving and driven side (see picture 8).
- The internal sides of the hubs/coupling flanges must occlude flushly with the faces of the shafts.
- Move the power packs in axial direction until the dimension L/E_1 is achieved.
- Fasten the hubs by tightening the setscrews DIN EN ISO 4029 with cup point or by an end disk (tightening torque see table 4).



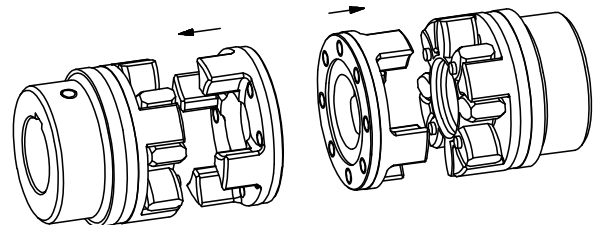
picture 8: assembly of the hubs

4.4 Assembly of the Design ZS-DKM1

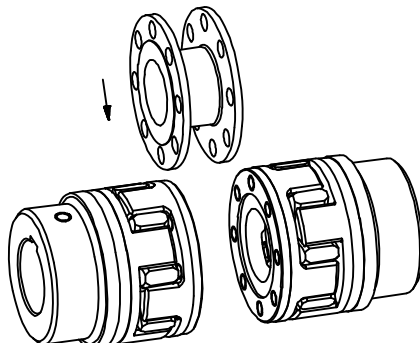
- Insert the spiders into the cam part of the hubs (see picture 9).
- Insert the driving flanges with the cams into the spider (see picture 10).
- Insert the ZS-DKM-spacer between the driving flanges (see picture 11).
- At first hand-screw the parts. The screws have to be tightened with a suitable torque wrench to the tightening torques T_A indicated in table 1.
- Center the spiders between the driving flange and the hub and check the dimension E and s (see picture 1 and table 1).



picture 9: assembly of the spiders



picture 10: assembly of the driving flange



picture 11: assembly of the ZS-DKM-spacer

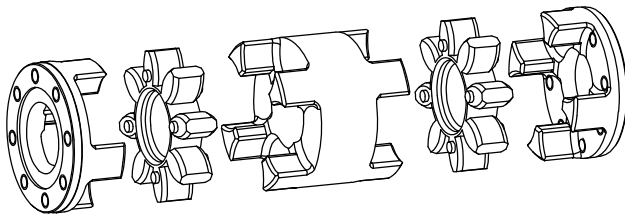
Schutzvermerk ISO 16016 beachten.	Gezeichnet: 14.07.06 Sha/At	Ersatz für:
	Geprüft: 07.08.06 Sha	Ersetzt durch:



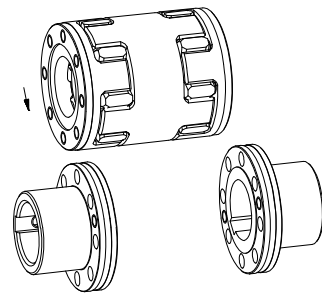
4 Assembly

4.5 Assembly of the Design ZS-DKM3

- Put the driving flanges, the spiders and the DKM-middle piece spec. together (see picture 12).
- Put the assembled part between the coupling flanges (see picture 13).
- At first hand-screw the parts. The screws have to be tightened with a suitable torque wrench to the tightening torques T_A indicated in table 2.
- Center the spiders between the driving flanges and the DKM-middle piece spec. and check the dimension E and s (see picture 2 and table 2).



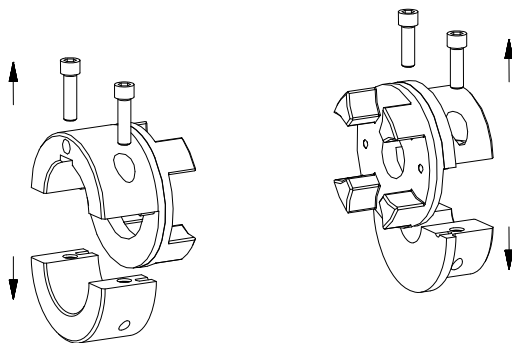
picture 12: assembly of the driving flanges, spiders and DKM-middle piece spec.



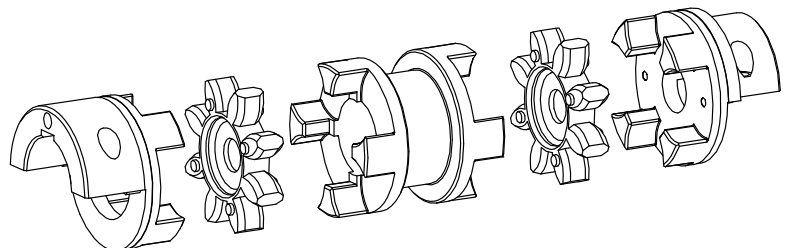
picture 13: assembly of subassembly

4.6 Assembly of the Design ZS-DKM-H

- Remove the shells from the hub body (see picture 14).
- Fit the hub body together with the spiders and the DKM-H-middle piece (see picture 15).
- Assemble the fitted unit with the shells and the clamping screws to the shaft ends of driving and driven machine (see picture 16).
- Initially screw up the parts finger-tight so that the hub bodies fit closely to the shaft with the shells.
- Shift the clamping hubs DH in axial direction until the dimension L mentioned in table 3 is realized.
- Secure the clamping hubs DH by tightening the clamping screws reciprocally. Tighten the screws to the tightening torques T_A mentioned in table 3 by means of a suitable dynamometric screwdriver.
- Center the spiders between the clamping hubs DH and the DKM-H-middle piece and check the dimension E and s (see picture 3 and table 3).



picture 14: disassembly of shells



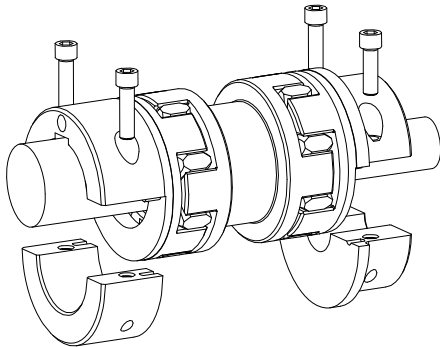
picture 15: assembly of hub bodies, spiders and DKM-H-middle piece

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 14.07.06 Sha/At	Ersatz für:
	Geprüft: 07.08.06 Sha	Ersetzt durch:



4 Assembly

4.6 Assembly of the Design ZS-DKM-H



picture 16: assembly the subassembly onto the shafts

4.7 Displacements - Alignment of the Couplings

The displacement figures shown in tables 5 and 6 offer sufficient safety to compensate for environmental influences like, for example, heat expansion.



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.



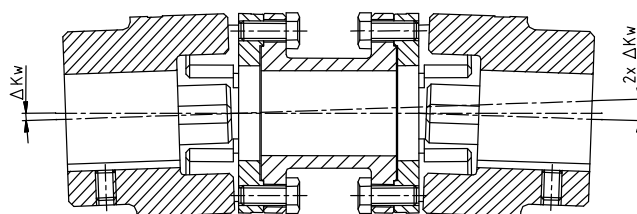
Please absolutely observe the displacement figures indicated (see tables 5 and 6). If the figures are exceeded, the coupling is damaged.

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

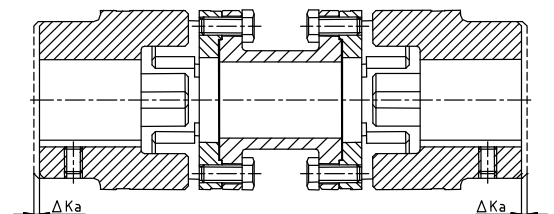
In case of a use in hazardous areas for the explosion group IIC (marking II 2GD c IIC T X), only the half displacement figures (see tables 5 and 6) are permissible.

Please note:

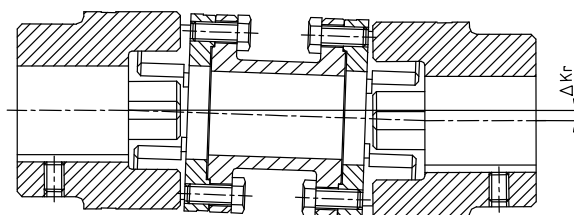
- The displacement figures mentioned in tables 5 and 6 are maximum figures which must not arise in parallel. If radial and angular displacement arises at the same time, the permissible displacement values may only be used in part (see picture 18).
- Please check with a dial gauge, ruler or feeler whether the permissible displacement figures of tables 5 and 6 can be observed.



angular displacements



axial displacements



radial displacements

picture 17: displacements

Example for displacements of the ZS-DKM1.

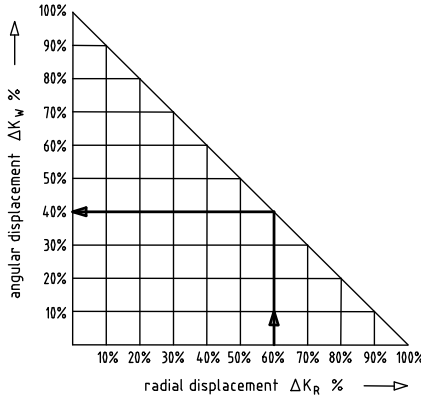
Schutzvermerk ISO 16016 beachten.	Gezeichnet: 14.07.06 Sha/At Geprüft: 07.08.06 Sha	Ersatz für: Ersetzt durch:
--------------------------------------	--	-------------------------------



4 Assembly

4.7 Displacements - Alignment of the Couplings

Continuation:



picture 18:
combinations of displacement

Example:

ROTEX 24 ZS-DKM 1,
speed 1500 1/min,
shaft distance dimension L = 160,
max. radial displacement $\Delta K_r = 2,48$ mm
max. angular displacement $\Delta K_w = 1^\circ$

with radial displacement of 1,5 mm = 60 % of the max. radial displacement 2,48 mm,
results in an allowable angular displacement of 40 % of the max. angular displacement $1^\circ = 0,4^\circ$

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

Table 5: displacement figures for design ZS-DKM1 (spider 98 Sh A-GS)

size	max. axial displacement ΔK_a [mm]	max. angular displacement ΔK_w [degree] with n =		max. radial displacement ΔK_r [mm] with shaft distance dimension L													
		1500 1/min	3000 1/min	1500 1/min						3000 1/min							
				100	120	140	160	180	200	250	100	120	140	160	180	200	250
24	1,4	1,0	0,75	1,43	1,78	2,13	2,48	2,83	3,18	4,05	1,07	1,34	1,60	1,86	2,12	2,38	3,04
28	1,5	1,0	0,75	1,40	1,75	2,09	2,44	2,79	3,14	4,01	1,05	1,31	1,57	1,83	2,09	2,36	3,01
38	1,8	1,0	0,75	1,33	1,68	2,02	2,37	2,72	3,07	3,94	0,99	1,26	1,52	1,78	2,04	2,30	2,96
42	2,0	1,0	0,75	-	1,64	1,99	2,34	2,69	3,04	3,91	-	1,23	1,49	1,75	2,02	2,28	2,93
48	2,1	1,0	0,75	-	1,61	1,95	2,30	2,65	3,00	3,87	-	1,20	1,46	1,73	1,99	2,25	2,91
55	2,2	1,0	0,75	-	-	1,92	2,27	2,62	2,97	3,84	-	-	1,44	1,70	1,96	2,23	2,88
65	2,6	1,0	0,75	-	-	-	2,18	2,53	2,88	3,75	-	-	-	1,63	1,90	2,16	2,81
75	3,0	1,0	0,75	-	-	-	-	2,44	2,79	3,67	-	-	-	-	1,83	2,09	2,75
90	3,4	1,0	0,75	-	-	-	-	-	2,70	3,58	-	-	-	-	-	2,03	2,68
100	3,8	1,0	0,75	-	-	-	-	-	-	3,49	-	-	-	-	-	-	2,62

Table 6: displacement figures for design ZS-DKM3 and ZS-DKM-H (spider 98 Sh A-GS)

size	max. axial displacement ΔK_a [mm]	max. angular displacement ΔK_w [degree] with n =		max. radial displacement ΔK_r [mm] with shaft distance dimension L							
		1500 1/min	3000 1/min	1500 1/min				3000 1/min			
				100	140	180	250	100	140	180	250
24	1,4	1,0	0,75	1,17	1,87 ¹⁾	-	-	0,87	1,40 ¹⁾	-	-
28	1,5	1,0	0,75	1,06	1,76	-	-	0,80	1,32	-	-
38	1,8	1,0	0,75	0,99	1,69	-	-	0,74	1,27	-	-
42	2,0	1,0	0,75	0,91	1,60	-	-	0,68	1,20	-	-
48	2,1	1,0	0,75	0,87	1,57	-	-	0,65	1,18	-	-
55	2,2	1,0	0,75	0,70	1,40	2,09	-	0,52	1,05	1,57	-
65	2,6	1,0	0,75	-	1,31	2,00	-	-	0,98	1,50	-
75	3,0	1,0	0,75	-	1,13	1,83	3,05	-	0,85	1,37	2,29
90	3,4	1,0	0,75	-	-	1,71	2,93	-	-	1,28	2,19

1) only design ZS-DKM-H available

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.

Schutzvermerk ISO 16016 beachten.	Gezeichnet:	14.07.06 Sha/At	Ersatz für:
	Geprüft:	07.08.06 Sha	Ersetzt durch:



5 Enclosure A

Hints and Instructions Regarding the Use in Hazardous Areas

Design ZS-DKM1: hub/spider/driving flange/ZS-DKM-spacer/driving flange/spider/hub
 Design ZS-DKM3: coupling flange/driving flange/spider/DKM-middle piece spec./spider/
 driving flange/coupling flange
 Design ZS-DKM-H: clamping hub DH/spider/ DKM-H-middle piece/spider/clamping hub DH



PRECAUTION!

ROTEX® ZS-DKM is only suitable and confirmed for the use in explosive areas up to size 90.

ROTEX® DKM and ROTEX® ZS-DKM only with spacer from steel or aluminium semifinished-products with a yield point of $R_{p0.2} \geq 250 \text{ N/mm}^2$.

5.1 Use in Hazardous Areas According to the Regulations

Conditions of operation in  hazardous locations

ROTEX® ZS-DKM 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 temperature T_a	max. surface temperature ¹⁾
T4, T3, T2, T1	- 30 °C to + 90 °C	110 °C ²⁾
T5	- 30 °C to + 80 °C	100 °C
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 + 90 °C due to the permissible permanent operating temperature of the elastomers used.

²⁾ The maximum surface temperature of 110 °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 + 90 °C.

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 14.07.06 Sha/At	Ersatz für:
	Geprüft: 07.08.06 Sha	Ersetzt durch:



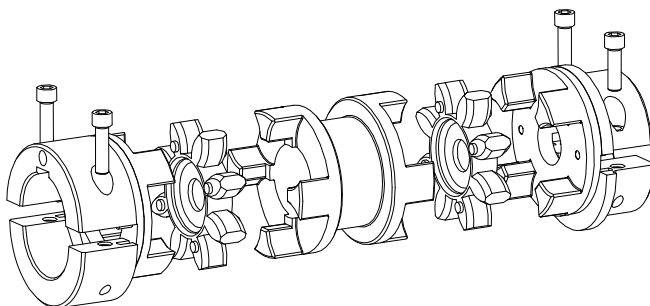
5 Enclosure A

Hints and Instructions Regarding the Use in  Hazardous Areas

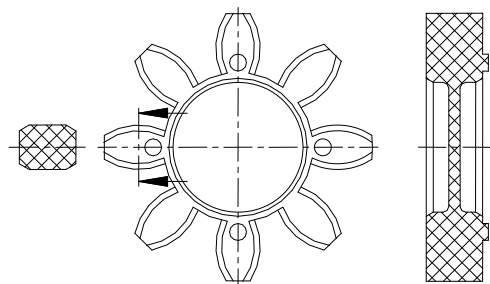
5.2 Control Intervals for Couplings in  Hazardous Areas

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 ROTEX® ZS-DKM: $\Delta T = 20 \text{ K}$
II 2GD c IIB T4, T5, T6	A checking of the circumferential backlash and a visual check of the flexible spider 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 spider 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 spider 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	A checking of the circumferential backlash and a visual check of the flexible spider 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 spider 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 spider 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.

ROTEX® ZS-DKM-H coupling



picture 19: ROTEX® ZS-DKM-H coupling




picture 20: ROTEX® GS spider

Here the backlash between coupling cams and the flexible spider must be checked by a feeler gauge. When reaching the limit of wear of max. friction, the spider must be exchanged immediately, independent of the inspection intervals.

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 14.07.06 Sha/At	Ersatz für:
	Geprüft: 07.08.06 Sha	Ersetzt durch:



5 Enclosure A

Hints and Instructions Regarding the Use in  Hazardous Areas

5.3 Approximate Values of Wear

In case of a backlash of more than X mm, the flexible spider must be exchanged.

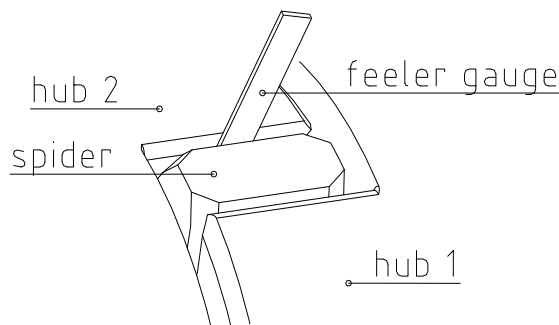
The reaching of the exchange values depends on the operating conditions and the existing operating parameters.



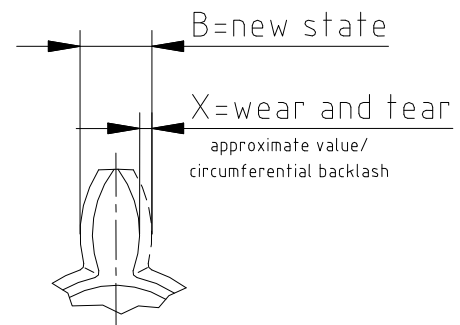
CAUTION!

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 tables 5 and 6). If the figures are exceeded, the coupling is damaged.



picture 21: checking of the limit of wear



picture 22: wear of spider

Table 7:

ROTEX® size	limits of wear (friction)		ROTEX® size	limits of wear (friction)	
	$X_{max.}$ [mm]			$X_{max.}$ [mm]	
24	3		55	5	
28	3		65	5	
38	3		75	6	
42	4		90	8	
48	4		100	9	

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.

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 14.07.06 Sha/At	Ersatz für:
	Geprüft: 07.08.06 Sha	Ersetzt durch:



KTR Kupplungstechnik
GmbH
D-48407 Rheine


**ROTEX® mounting
instructions
design ZS-DKM and ZS-DKM-H**

KTR-N 40224 E
sheet: 18
edition: 4

5 Enclosure A

Hints and Instructions Regarding the Use in  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 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 flexible spider is excluded.

Complete labelling:



II 2G c IIC T6, T5 bzw. T4 - $30\text{ °C} \leq T_a \leq +65\text{ °C}$, + 80 °C bzw. +90 °C
II 2D c T 110 °C/I M2 c - $30\text{ °C} \leq T_a \leq +90\text{ °C}$

Short labelling:



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

The former marking
remains valid:



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

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 hubs, 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.

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 no operate in an accumulation of dust.

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 14.07.06 Sha/At	Ersatz für:
	Geprüft: 07.08.06 Sha	Ersetzt durch:




KTR Kupplungstechnik
GmbH
D-48407 Rheine

**ROTEX® mounting
instructions
design ZS-DKM and ZS-DKM-H**

KTR-N 40224 E
sheet: 19
edition: 4

5 Enclosure A

Hints and Instructions Regarding the Use in  Hazardous Areas

5.6 Starting

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 5mm.

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.

5.7 Breakdowns, Causes and Elimination

The below-mentioned errors can lead to an incorrect use of the **ROTEX®** 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 spider is inserted into the coupling.

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 14.07.06 Sha/At Geprüft: 07.08.06 Sha	Ersatz für: Ersetzt durch:
--------------------------------------	--	-------------------------------



5 Enclosure A

Hints and Instructions Regarding the Use in  Hazardous Areas

5.7 Breakdowns, Causes and Elimination

Continuation:


- No original KTR parts (purchased parts) are used.
- Old spiders/already worn out spiders or superposed spiders 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	increased temperature the the spider surface; danger of ignition by hot surfaces	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) checking of wear see under point Control
	wear of spider, short-term torque transmission due to metal contact	danger of ignition due to sparking	1) put the unit out of operation 2) disassemble the coupling and remove rests of the spider 3) check coupling parts and exchange damaged coupling parts 4) insert spider, assemble coupling parts 5) check alignment, correct if necessary
	loose screws for axial securement of hubs	danger of ignition due to hot surfaces and sparking	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) checking of wear see under point Control
break of cam	wear of spider, torque transmission due to metal contact	danger of ignition due to sparking	1) put the unit out of operation 2) change complete coupling 3) check alignment
	break of the cams due to high shock energy/overload	danger of ignition due to sparking	1) put the unit out of operation 2) change complete coupling 3) check alignment 4) find out the reason of overload
	operating parameters do not correspond to the performance of the coupling	danger of ignition due to sparking	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	danger of ignition due to sparking	1) put the unit out of operation 2) change complete coupling 3) check alignment 4) instruct and train the service staff

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 14.07.06 Sha/At	Ersatz für:
	Geprüft: 07.08.06 Sha	Ersetzt durch:



5 Enclosure A

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 spider	misalignment	increased temperature the the spider surface; danger of ignition by hot surfaces	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) checking of wear see under point Control
	e. g. contact with aggressive liquids/oils, ozone-influence, too high/low ambient temperatures etc. effecting a physical change of the spider	danger of ignition due to sparking in case of metallic contact of the cams	1) put the unit out of operation 2) disassemble the coupling and remove rests of the spider 3) check coupling parts and exchange damaged coupling parts 4) insert spider, assemble coupling parts 5) check alignment, correct if necessary 6) make sure that further physical changes of the spider are excluded
	ambient/contact temperatures which are too high for the spider, max. permissible e. g. T4 = - 30 °C/+ 90 °C	danger of ignition due to sparking in case of metallic contact of the cams	1) put the unit out of operation 2) disassemble the coupling and remove rests of the spider 3) check coupling parts and exchange damaged coupling parts 4) insert spider, assemble coupling parts 5) check alignment, correct if necessary 6) check and regulate ambient/contact temperature (eventually even elimination by using other spider materials)
premature wear of spider (liquefaction of material inside the spider cam)	drive vibrations	danger of ignition due to sparking in case of metallic contact of the cams	1) put the unit out of operation 2) disassemble the coupling and remove rests of the spider 3) check coupling parts and exchange damaged coupling parts 4) insert spider, assemble coupling parts 5) check alignment, correct if necessary 6) find out the reason for the vibrations (eventually elimination by spider with lower or higher shore hardness)



If you operate with a worn spider (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: 14.07.06 Sha/At	Ersatz für:
	Geprüft: 07.08.06 Sha	Ersetzt durch:




KTR Kupplungstechnik
GmbH
D-48407 Rheine

**ROTEX® mounting
instructions
design ZS-DKM and ZS-DKM-H**

KTR-N 40224 E
sheet: 22
edition: 4

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

flexible ROTEX® 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.


The couplings are certified according to Type Examination Certificate IBExU02ATEXB001_05 X vor.

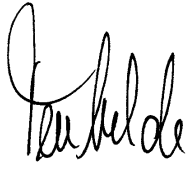
According to article 8 (1) of Standard 94/9/EC the technical documentation is deposited with the:

IBExU
Institut für Sicherheitstechnik GmbH
Fuchsmühlenweg 7

09599 Freiberg

Rheine, 19.05.06
Date

ppa. 
Dr. Norbert Partmann
Engineering Manager

i. V. 
Bernd Tenfelde
Product Manager

Schutzvermerk
ISO 16016 beachten.

Gezeichnet: 14.07.06 Sha/At
Geprüft: 07.08.06 Sha

Ersatz für:
Ersetzt durch: