

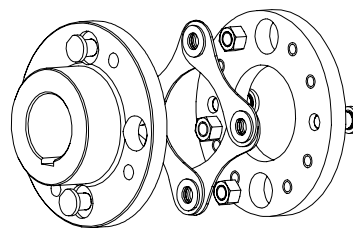


RIGIFLEX®

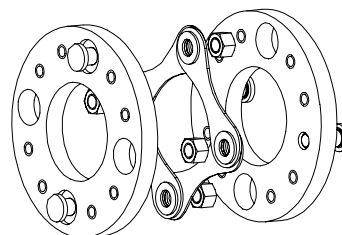
Torsionally stiff steel lamina
couplings types

01, 02, 03, 04, 05, 06
and their combinations

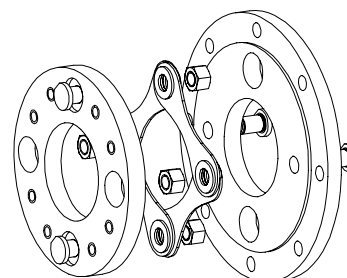
according to Standard 94/9/EC
(ATEX 95) for finish bored, pilot
bored and unbored couplings



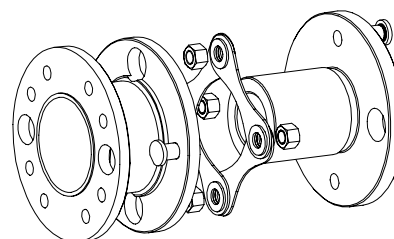
Type 01



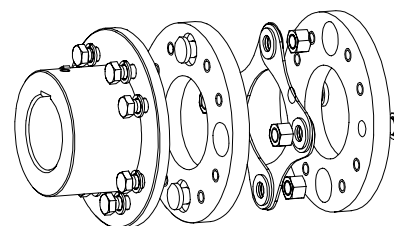
Type 02



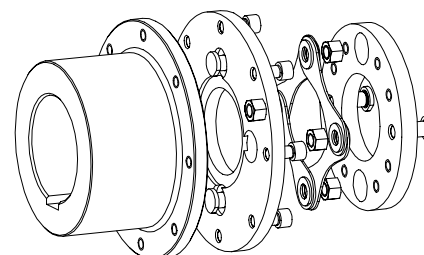
Type 03



Type 04



Type 05



Type 06

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 04.09.06 Sha/Heb	Ersatz für: KTR-N vom 18.10.04
	Geprüft: 04.09.06 Sha	Ersetzt durch:

 KTR Kupplungstechnik GmbH D-48407 Rheine	RIGIFLEX® Operating-/Assembly Instructions	KTR-N 47310 E sheet: 2 edition: 2
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The **RIGIFLEX®** is a backlash-free, torsionally rigid and maintenance-free steel lamina coupling. It is able to compensate for shaft displacements, e. g. caused by heat expansion.

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2 Hints

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- 4.4 Assembly of Coupling Halves
- 4.5 Assembly of Flange Hollow Shafts
- 4.6 Displacements - Alignment of the Couplings
- 4.7 Spares Inventory, Customer Service Addresses

5 Enclosure A

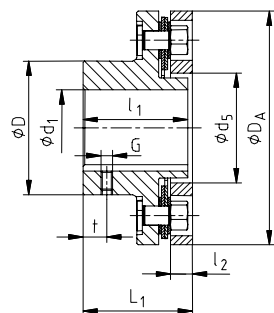
Hints and instructions regarding the use in  hazardous areas

- 5.1 Purposive use in  hazardous areas
- 5.2 Control intervals for couplings in  hazardous areas
- 5.3 Visual Check and Measures
- 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 Certificate of Conformity according to the EG Standards 94/9/EG dated 23 March 1994

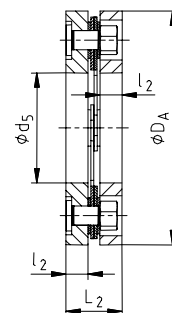
Schutzvermerk ISO 16016 beachten.	Gezeichnet: 04.09.06 Sha/Heb Geprüft: 04.09.06 Sha	Ersatz für: KTR-N vom 18.10.04 Ersetzt durch:
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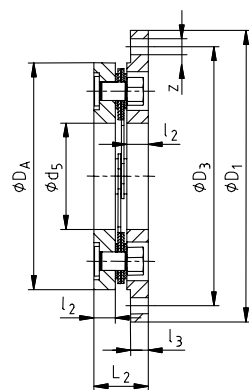
1 Technical Data



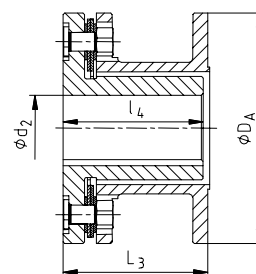
picture 1: RIGIFLEX®, type 01



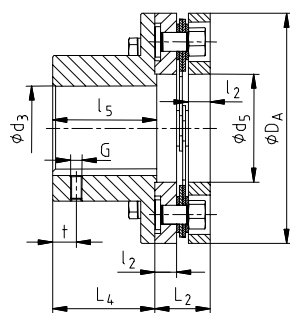
picture 2: RIGIFLEX®, type 02



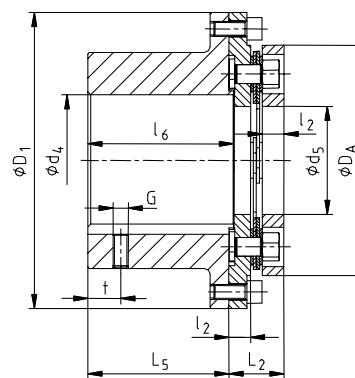
picture 3: RIGIFLEX®, type 03



picture 4: RIGIFLEX®, type 04



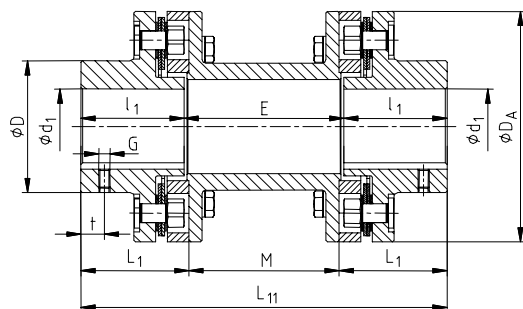
picture 5: RIGIFLEX®, type 05



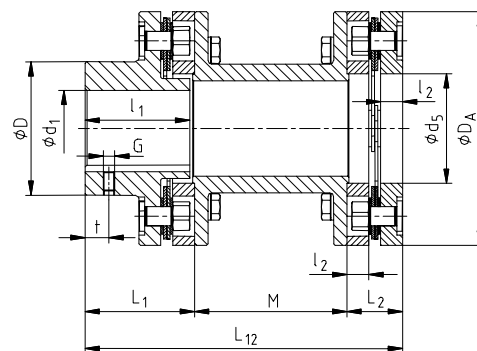
picture 6: RIGIFLEX®, type 06



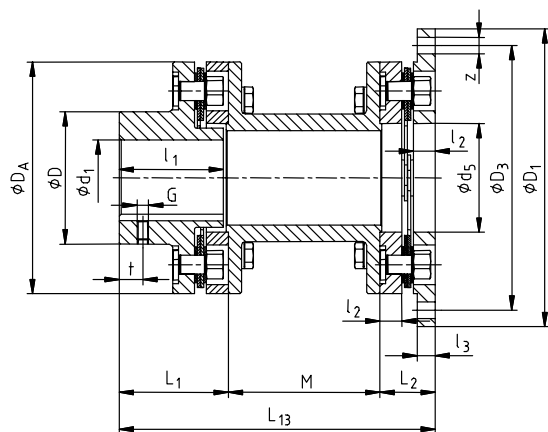
1 Technical Data



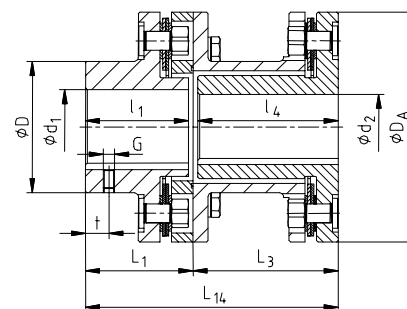
picture 7: RIGIFLEX®, type 11



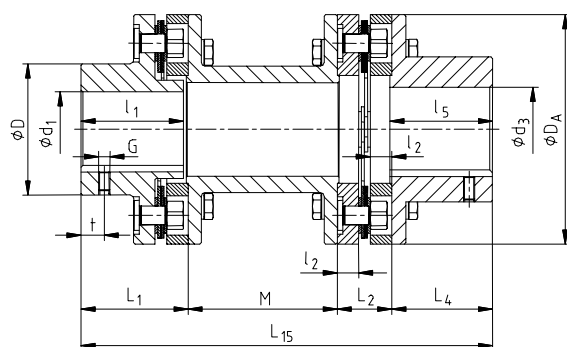
picture 8: RIGIFLEX®, type 12



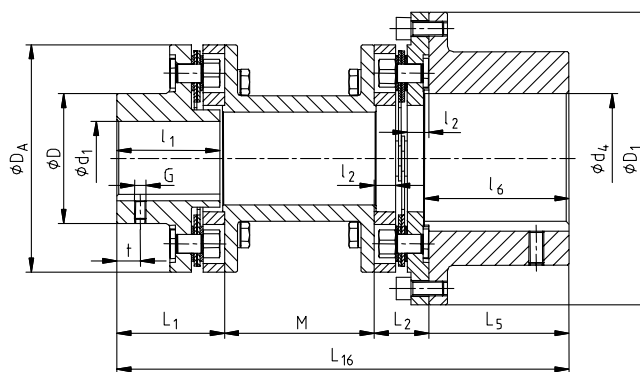
picture 9: RIGIFLEX®, type 13



picture 10: RIGIFLEX®, type 14



picture 11: RIGIFLEX®, type 15



picture 12: RIGIFLEX®, type 16



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1 Technical Data

Table 1:

size	max. finish bore [mm]				dimensions [mm]														
	d ₁	d ₂	d ₃	d ₄	general														
					D	D _A	D ₁	d ₅	l ₁	L ₁	l ₂	L ₂	l ₃	l ₄	L ₃	l ₅	L ₄	l ₆	L ₅
32	32	22	42	50	60	95	145	39	60	78,5	11	29,5	8	50	55	70	68	80	78
48	48	38	55	65	80	135	190	65	70	76	11	30,5	8	70	70	80	75	100	98
60	60	50	75	90	90	170	225	80	80	87	15	40,5	12	80	85	90	85	125	122
65	65	55	80	100	100	190	250	90	90	96	16	42,5	12	90	92,5	95	90	135	132
75	75	60	85	120	110	210	265	100	95	101	16	43,5	12	95	98,5	100	95	140	137
80	80	65	100	130	125	230	300	105	110	115	22	56,5	18	135	140	105	103	150	146
90	90	70	110	140	140	245	315	115	110	115	23	58,5	19	150	155	110	108	155	150
100	100	80	120	160	155	270	340	135	125	132	25	62,5	21	150	155	120	118	165	160
110	110	90	140	175	165	300	365	150	130	138	27	73,5	23	160	165	130	127,5	185	180
120	120	105	150	190	185	325	390	160	130	138	30	81,5	26	160	170	140	137,5	205	200
130	130	115	160	200	210	350	430	180	145	153	31	85,5	27	165	178	145	142	210	205
140	140	125	170	215	225	370	450	190	155	164	33	89,5	29	180	186	155	152	225	220
150	150	130	185	230	230	395	470	200	170	179	37	100,5	33	210	215	160	157	240	235
160	160	140	190	250	255	415	495	220	190	199	37	100,5	33	230	235	175	172	255	250
180	180	145	210	260	260	450	530	230	195	204,5	44	117,5	40	270	275	185	182	265	260
190	190	155	220	270	280	470	565	240	220	227	44	119,5	39	285	290	195	192	285	280
200	200	170	240	290	305	500	595	260	255	265	46	127,5	40	325	330	210	207	305	300
210	210	190	255	325	340	550	665	290	275	285	51	137,5	46	330	335	230	227	345	340
230	230	210	280	350	370	590	705	320	305	315	52	141,5	46	335	340	250	247	370	365
260	260	245	310	405	420	650	770	360	310	325	55	151,5	49	335	340	270	267	430	425
280	280	265	325	440	450	690	810	400	360	375	58	159,5	52	375	380	300	297	465	460
300	300	285	350	475	480	750	900	430	375	390	61	168,5	53	430	435	320	317	520	515
350	350	300	390	-	560	810	990	500	375	390	52	141,5	46	460	465	360	355	-	-
390	390	330	430	-	620	880	1060	550	395	410	55	151,5	49	520	525	400	395	-	-
420	420	355	460	-	680	945	1150	580	440	455	58	159,5	52	550	555	430	425	-	-
460	460	360	500	-	720	1010	1240	600	460	475	61	168,5	53	580	585	460	455	-	-
530	530	500	610	-	810	1180	1370	850	530	545	58	159,5	50	530	535	560	555	-	-
580	580	550	660	-	890	1290	1480	930	580	595	61	168,5	53	580	585	600	595	-	-

Dimensions for the thread for setscrews (dimensions G and t) are shown in table 2.

Table 2:

size	dimensions [mm]											
	general										thread for setscrews	
	M ¹	E ¹	L ₁₁	L ₁₂	L ₁₃	L ₁₄	L ₁₅	L ₁₆	D ₃	z	G	t
32	63	100	220	171,0	171,0	133,5	239,0	249,0	120	4 x 11	M6	15
48	80	92	232	186,5	186,5	146,0	261,5	284,5	160	4 x 14	M8	20
60	100	114	274	227,5	227,5	172,0	312,5	349,5	200	8 x 12	M8	20
65	110	122	302	248,5	248,5	188,5	338,5	380,5	220	8 x 14	M10	20
75	130	142	332	274,5	274,5	199,5	369,5	411,5	240	8 x 14	M10	20
80	140	150	370	311,5	311,5	255	414,5	457,5	265	8 x 18	M10	20
90	160	170	390	333,5	333,5	270	441,5	483,5	280	8 x 18	M12	25
100	170	184	434	364,5	364,5	287	482,5	524,5	305	12 x 18	M12	30
110	180	196	456	391,5	391,5	303	519,0	571,5	330	12 x 18	M12	30
120	190	206	466	409,5	409,5	308	547,0	609,5	360	12 x 18	M12	30
130	200	216	506	438,5	438,5	331	580,5	643,5	395	12 x 22	M20	35
140	210	228	538	463,5	463,5	350	615,5	683,5	410	12 x 22	M20	35
150	225	243	583	504,5	504,5	394	661,5	739,5	435	12 x 22	M20	40
160	240	258	638	539,5	539,5	434	711,5	789,5	455	12 x 26	M20	40
180	253	272	662	575,5	575,5	479	757,5	835,5	490	12 x 26	M20	40
190	268	282	722	614,5	614,5	517	806,5	894,5	520	12 x 26	M20	50
200	280	300	810	672,5	672,5	595	879,5	972,5	550	12 x 26	on request of customer	
210	300	320	870	722,5	722,5	620	949,5	1062,5	610	12 x 33		
230	310	330	940	766,5	766,5	655	1013,5	1131,5	650	12 x 33		
260	330	360	980	806,5	806,5	665	1073,5	1231,5	710	12 x 33		
280	360	390	1110	894,5	894,5	755	1191,5	1354,5	750	12 x 39		
300	420	450	1200	978,5	978,5	825	1295,5	1493,5	825	12 x 39		
350	400	430	1180	931,5	931,5	855	1286,5	-	900	18 x 39		
390	440	470	1260	1001,5	1001,5	935	1396,5	-	980	18 x 45		
420	460	490	1370	1074,5	1074,5	1010	1499,5	-	1050	18 x 45		
460	500	530	1450	1143,5	1143,5	1060	1598,5	-	1130	18 x 52		
530	550	580	1640	1254,5	1254,5	1080	1809,5	-	1280	24 x 45		
580	600	630	1790	1363,5	1363,5	1180	1958,5	-	1390	24 x 45		

¹deviating spacer length on request

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RIGIFLEX® Operating-/Assembly Instructions

KTR-N 47310 E
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1 Technical Data

Table 3: torque and speed

RIGIFLEX® size		32	48	60	65	75	80	90	100	110	120
torque [Nm]	T _{KN}	200	320	1.000	1.600	2.000	2.500	3.200	4.000	5.000	6.300
	T _{Kmax.}	300	480	1.500	2.400	3.000	6.250	8.000	10.000	18.000	22.500
max. speed n [1/min.]		20.000	14.000	11.200	10.000	9.000	8.300	7.700	7.000	6.300	5.800

RIGIFLEX® size		130	140	150	160	180	190	200	210	230
torque [Nm]	T _{KN}	8.000	10.000	12.500	16.000	20.000	25.000	32.000	40.000	50.000
	T _{Kmax.}	28.000	34.900	43.000	54.500	68.000	84.000	106.000	131.500	160.000
max. speed n [1/min.]		5.400	5.100	4.800	4.600	4.200	4.000	3.800	3.400	3.200

RIGIFLEX® size		260	280	300	350	390	420	460	530	580
torque [Nm]	T _{KN}	63.000	80.000	100.000	125.000	160.000	200.000	250.000	320.000	400.000
	T _{Kmax.}	205.000	254.000	314.000	376.000	490.000	606.000	750.000	870.000	1.145.000
max. speed n [1/min.]		2.900	2.700	2.500	2.350	2.170	2.020	1.890	1.600	1.480



**RIGIFLEX® 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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 KTR Kupplungstechnik GmbH D-48407 Rheine	RIGIFLEX® Operating-/Assembly Instructions	KTR-N 47310 E sheet: 7 edition: 2
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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 RIGIFLEX® 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 **RIGIFLEX®** 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.

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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 and 2 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 **RIGIFLEX®** described in here corresponds to the technical status at the time of printing of these mounting instructions.

3 Storage

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



CAUTION!

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

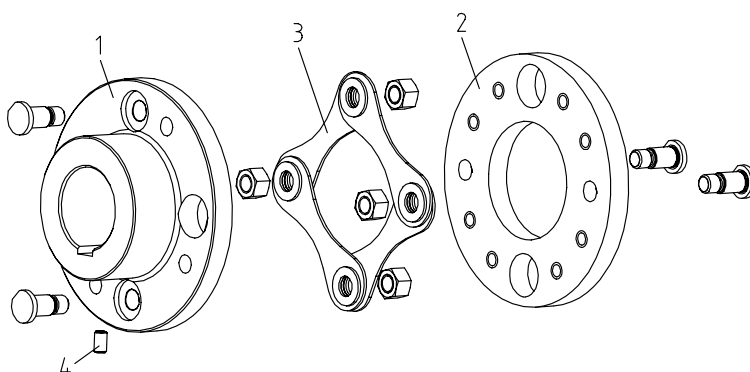
The coupling is generally supplied in pre-assembled assemblies (shell couplings). Hubs, laminae packings and flanges are assembled as unit and factory-made. The customer must assemble the flange hollow shafts. Before assembly the coupling has to be controlled for completeness.

4.1 Components of Couplings

Components of RIGIFLEX®-Coupling Halves

Type 01

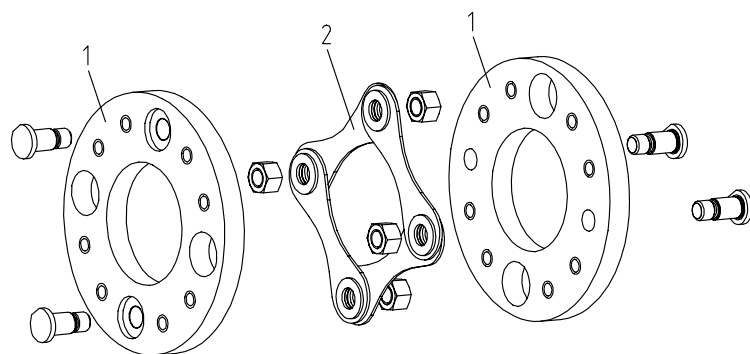
Component	Quantity	Designation
1	1	coupling hub
2	1	coupling flange
3	1	lamina package
4	1	setscrew



picture 13: RIGIFLEX®, type 01

Type 02

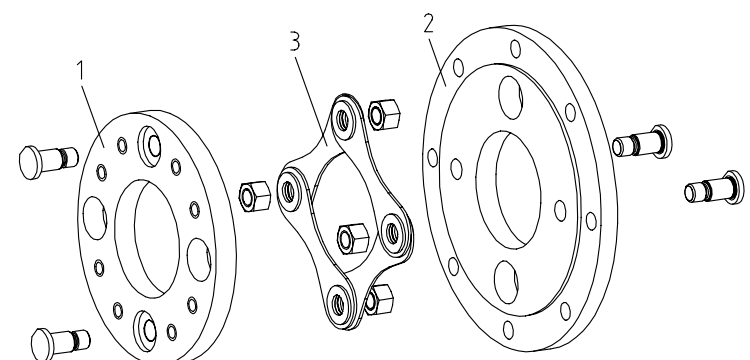
Component	Quantity	Designation
1	2	coupling flange
2	1	lamina package



picture 14: RIGIFLEX®, type 02

Type 03

Component	Quantity	Designation
1	1	coupling flange
2	1	coupling flange for 03
3	1	lamina package



picture 15: RIGIFLEX®, type 03



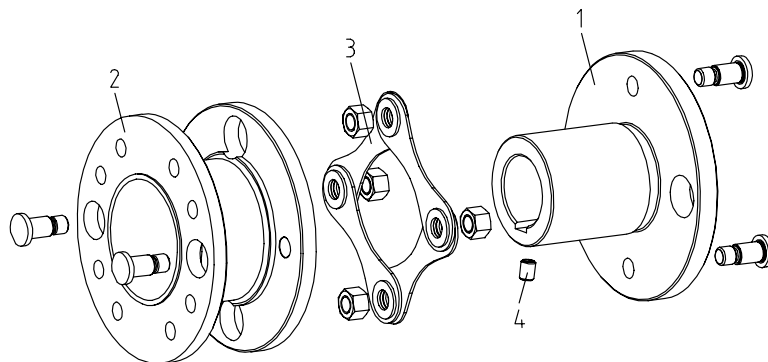
4 Assembly

4.1 Components of Couplings

Components of RIGIFLEX®-Coupling Halves

Type 04

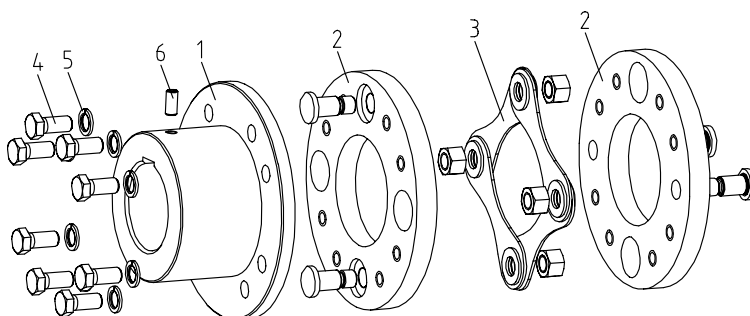
Component	Quantity	Designation
1	1	coupling hub inserted
2	1	coupling half
3	1	lamina package
4	1	setscrew



picture 16: RIGIFLEX®, type 04

Type 05

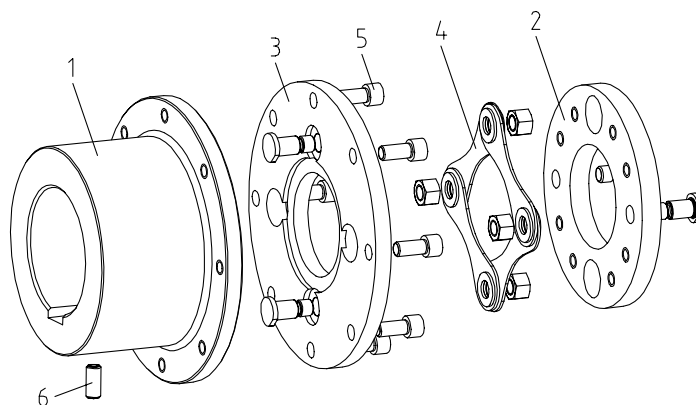
Component	Quantity	Designation
1	1	coupling hub large
2	2	coupling flange
3	1	lamina package
4	see Table 4	hexagon head screw
5	see Table 4	spring ring
6	1	setscrew



picture 17: RIGIFLEX®, type 05

Type 06

Component	Quantity	Designation
1	1	coupling hub jumbo
2	1	coupling flange
3	1	coupling flange for 03
4	1	lamina package
5	see Table 4	capscrew
6	1	setscrew



picture 18: RIGIFLEX®, type 06



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RIGIFLEX® **Operating-/Assembly** **Instructions**

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4 Assembly

4.1 Components of Couplings

Table 4:

coupling size	32	48	60	65	75	80	90	100	110	120
quantity of hexagon head screw	4	4	8	8	8	8	8	12	12	12
quantity of spring ring	4	4	8	8	8	8	8	12	12	12
quantity of capscrews	4	4	8	8	8	8	8	12	12	12

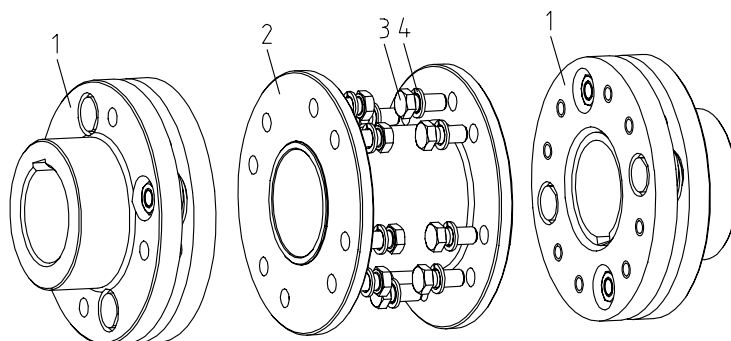
coupling size	130	140	150	160	180	190	200	210	230
quantity of hexagon head screw	12	12	12	12	12	12	12	12	12
quantity of spring ring	12	12	12	12	12	12	12	12	12
quantity of capscrews	12	12	12	12	12	12	12	12	12

coupling size	260	280	300	350	390	420	460	530	580
quantity of hexagon head screw	12	12	12	18	18	18	18	24	24
quantity of spring ring	12	12	12	18	18	18	18	24	24
quantity of capscrews	12	12	12	18	18	18	18	24	24

Components of RIGIFLEX®-Couplings

Type 11

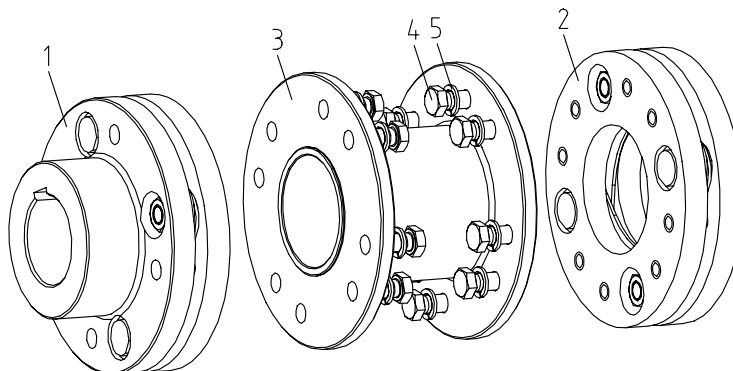
Compo- nent	Quantity	Designation
1	2	coupling half design 01
2	1	flange hollow shaft
3	see Table 5	hexagon head screw
4	see Table 5	spring ring



picture 19: RIGIFLEX®, type 11

Type 12

Compo- nent	Quantity	Designation
1	1	coupling half design 01
2	1	coupling half design 02
3	1	flange hollow shaft
4	see Table 5	hexagon head screw
5	see Table 5	spring ring



picture 20: RIGIFLEX®, type 12

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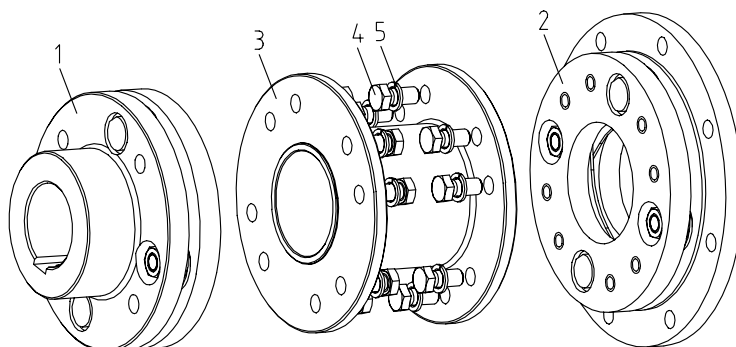
4 Assembly

4.1 Components of Couplings

Components of RIGIFLEX®-Couplings

Type 13

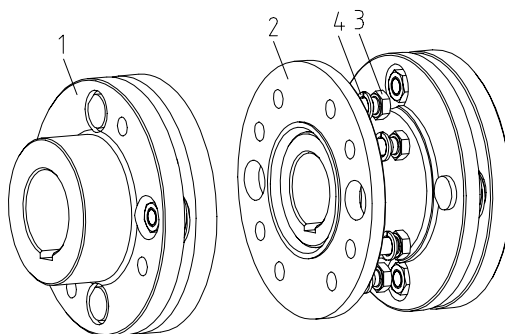
Component	Quantity	Designation
1	1	coupling half design 01
2	1	coupling half design 03
3	1	flange hollow shaft
4	see Table 5	hexagon head screw
5	see Table 5	spring ring



picture 21: RIGIFLEX®, type 13

Type 14

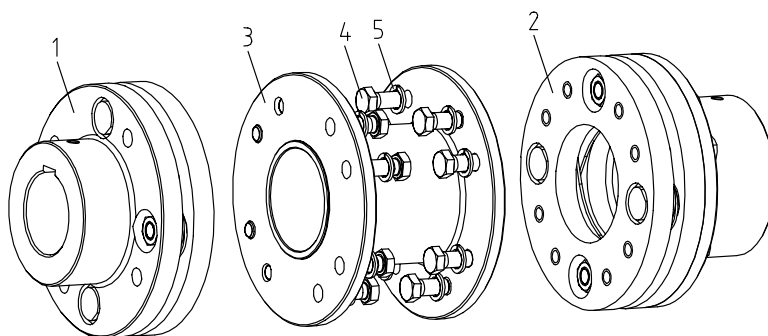
Component	Quantity	Designation
1	1	coupling half design 01
2	1	coupling half design 04
3	see Table 5	hexagon head screw
4	see Table 5	spring ring



picture 22: RIGIFLEX®, type 14

Type 15

Component	Quantity	Designation
1	1	coupling half design 01
2	1	coupling half design 05
3	1	flange hollow shaft
4	see Table 5	hexagon head screw
5	see Table 5	spring ring



picture 23: RIGIFLEX®, type 15



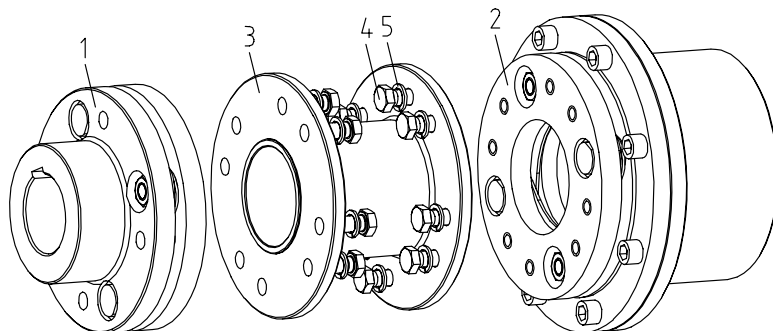
4 Assembly

4.1 Components of Couplings

Components of RIGIFLEX®-Couplings

Type 16

Component	Quantity	Designation
1	1	coupling half design 01
2	1	coupling half design 06
3	1	flange hollow shaft
4	see Table 5	hexagon head screw
5	see Table 5	spring ring



picture 24: RIGIFLEX®, type 16

Table 5:

coupling size	32	48	60	65	75	80	90	100	110	120
quantity of hexagon head screw	8	8	16	16	16	16	16	24	24	24
quantity of spring ring	8	8	16	16	16	16	16	24	24	24

coupling size	130	140	150	160	180	190	200	210	230
quantity of hexagon head screw	24	24	24	24	24	24	24	24	24
quantity of spring ring	24	24	24	24	24	24	24	24	24

coupling size	260	280	300	350	390	420	460	530	580
quantity of hexagon head screw	24	24	24	36	36	36	36	48	48
quantity of spring ring	24	24	24	36	36	36	36	48	48

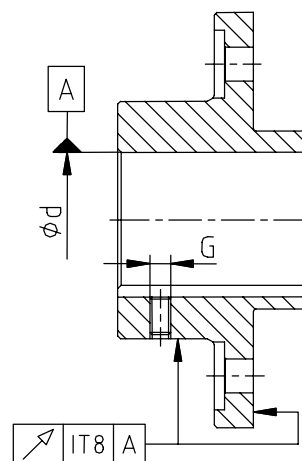
4.2 Hint Regarding the Finish Bore



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 hub bores machined by the customer have to observe concentric running or axial running, respectively (see picture 25).
- Please make absolutely sure to observe the figures for d_{max} .
- Carefully align the flange hubs when the finish bores are brought in.
- Use a setscrew according to DIN 916 with cup point or an end plate to axially secure the flange hubs.



picture 25: concentric running and axial running

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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 6: thread of setscrews DIN 916

coupling size	32	48	60	65	75	80	90	100	110	120
dimension G [mm]	M6	M8	M8	M10	M10	M10	M12	M12	M12	M12
tightening torque T _A [Nm]	4,8	10	10	17	17	17	40	40	40	40

coupling size	130	140	150	160	180	190	200	210	230
dimension G [mm]	M20	M20	M20	M20	M20	M20	on request of customer		
tightening torque T _A [Nm]	140	140	140	140	140	140			

coupling size	260	280	300	350	390	420	460	530	580
dimension G [mm]	on request of customer								
tightening torque T _A [Nm]									

4.3 Assembly (general)



ATTENTION!

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

Heating the coupling hubs 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 flange hubs causes burns.
We would recommend to wear safety gloves.



CAUTION!

During the assembly please make sure that the E dimension (see table 2) is observed, so that the coupling parts do not contact each other during the operation.

Disregarding this hint may cause damage on the coupling.

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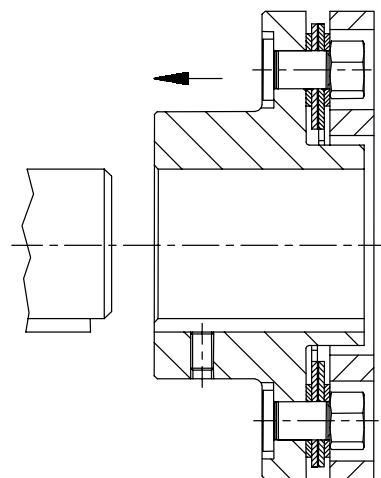


4 Assembly

4.4 Assembly of Coupling Halves

For the axial alignment of the coupling the dimensions E (see table 2) are decisive. In order to adjust the right dimension E you should proceed as follows:

- Assemble the coupling halves onto the shaft of the driving and driven side (picture 26).
- The inner side of the coupling hubs must end flushly with the front sides of the shafts.
- Move the power pack in axial direction until you have reached dimension E (see table 2).
- If the power packs are already firmly assembled, the dimension E has to be adjusted by moving the coupling halves axially on the shafts.
- Secure the coupling halves by tightening the grub screws DIN 916 with cup point (see table 6).



picture 26: assembly of coupling halves



CAUTION!

Having set the coupling into operation, the tightening torque of the hexagon head screws has to be investigated at regular maintenance intervals.

4.5 Assembly of Flange Hollow Shafts

With the restoring screw the flange hollow shaft can be used more easily, the coupling hub and the coupling flange are tightened.

Tighten the screws successively and in several revolutions until all hexagon head screws show the full tightening torque (shown in table 7).

Table 7: tightening torques of hexagon head screws with spring rings

coupling size	32	48	60	65	75	80	90	100	110	120
dimension M ₁ [mm]	M10	M12	M12	M12	M12	M16	M16	M16	M16	M16
tightening torque T _A [Nm]	69	120	120	120	120	295	295	295	295	295

coupling size	130	140	150	160	180	190	200	210	230
dimension M ₁ [mm]	M20	M20	M20	M24	M24	M30	M30	M30	M30
tightening torque T _A [Nm]	580	580	580	1000	1000	2000	2000	2000	2000

coupling size	260	280	300	350	390	420	460	530	580
dimension M ₁ [mm]	M30	M36	M42	M42	M42	M48	M48	M42	M42
tightening torque T _A [Nm]	2000	3400	5500	5500	5500	8200	8200	5500	5500



CAUTION!

Having set the coupling into operation, the tightening torque of the hexagon head screws has to be investigated at regular maintenance intervals.

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4 Assembly

4.6 Displacements - Alignment of the Couplings

The displacement figures shown in table 8 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.



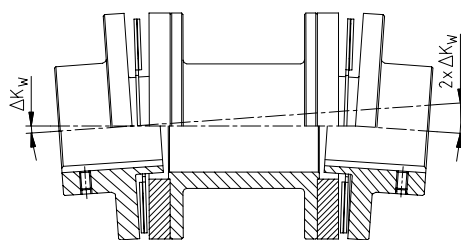
Please absolutely observe the displacement figures indicated (see table 8). If the figures are exceeded, the coupling is damaged.

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

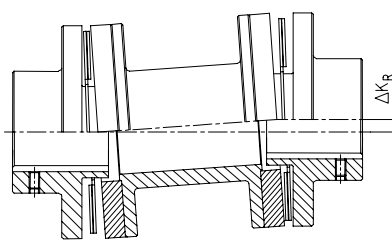
In case of a use in hazardous areas for the explosion group IIC (marking II 2G c IIC T4), only the half displacement figures (see table 8) are permissible.

Please note:

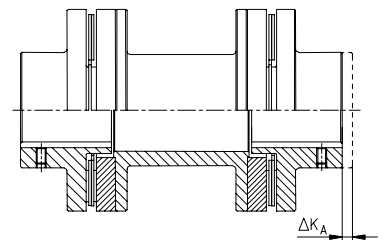
- The displacement figures mentioned in table 12 are maximum figures which must not arise in parallel. In case of a simultaneous radial, axial and angular displacement, these values must be reduced (see picture 28).
- Please check with a dial gauge, ruler or feeler whether the permissible displacement figures of table 8 can be observed.



angular displacements



radial displacements



axial displacements

picture 27: displacements

Example for the misalignment combinations given in picture 28:

Example 1:

$$\Delta K_R = 10 \%$$

$$\Delta K_W = 80 \%$$

$$\Delta K_A = 10 \%$$

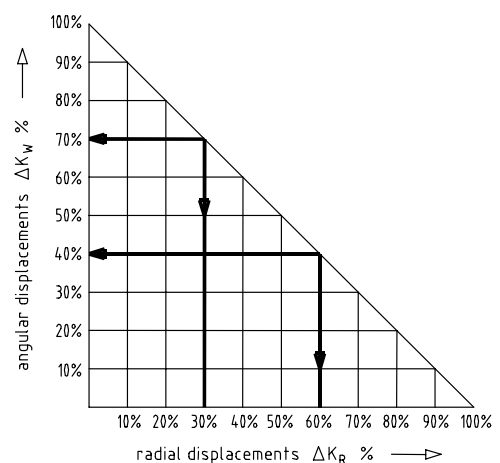
Example 2:

$$\Delta K_R = 30 \%$$

$$\Delta K_W = 30 \%$$

$$\Delta K_A = 40 \%$$

$$\Delta K_{\text{total}} = \Delta K_A + \Delta K_R + \Delta K_W \leq 100 \%$$



picture 28: combinations of displacement



4 Assembly

4.6 Displacements - Alignment of the Couplings

Table 8: Displacement figures

size	type coupling half ΔK_A [mm], (axial)	type with flange hollow shaft ΔK_A [mm], (axial)	type with flange hollow shaft ΔK_R [mm], (radial)	type with flange hollow shaft ΔK_W [°], (angular) ¹
32	1,25	2,5	1,3	1,0
48	1,75	3,5	1,5	1,0
60	1,50	3,0	2,5	1,0
65	1,75	3,5	2,5	1,0
75	2,0	4,0	3,0	1,0
80	1,0	2,0	3,0	1,0
90	1,0	2,0	3,0	1,0
100	1,5	3,0	4,0	1,0
110	2,0	4,0	4,0	1,0
120	2,5	5,0	5,0	1,0
130	3,0	6,0	5,0	1,0
140	3,0	6,0	5,0	1,0
150	3,0	6,0	6,0	1,0
160	3,0	6,0	6,0	1,0
180	4,0	8,0	6,5	1,0
190	4,0	8,0	7,0	1,0
200	4,0	8,0	7,0	1,0
210	4,0	8,0	7,5	1,0
230	4,0	8,0	8,0	1,0
260	5,0	10,0	8,5	1,0
280	5,0	10,0	9,0	1,0
300	5,0	10,0	10,0	1,0
350	4,0	8,0	7,0	0,75
390	5,0	10,0	7,5	0,75
420	5,0	10,0	8,0	0,75
460	5,0	10,0	8,5	0,75
530	5,0	10,0	6,0	0,75
580	5,0	10,0	6,5	0,75

¹each lamina package

4.7 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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5 Enclosure A

Hints and instructions regarding the use in  hazardous areas

Type 01:	coupling hub/lamina package/coupling flange
Type 02:	coupling flange/lamina package/coupling flange
Type 03:	coupling flange/lamina package/coupling flange for 03
Type 04:	coupling hub inserted/lamina package/coupling half
Type 05:	coupling hub large/coupling flange/lamina package/coupling flange
Type 06:	coupling hub jumbo/coupling flange for 03/lamina package/coupling flange
Type 11:	type 01/flange hollow shaft/type 01
Type 12:	type 01/flange hollow shaft/type 02
Type 13:	type 01/flange hollow shaft/type 03
Type 14:	type 01/type 04
Type 15:	type 01/flange hollow shaft/type 05
Type 16:	type 01/flange hollow shaft/type 06

RIGIFLEX® steel lamina coupling only for horizontal assemblies

5.1 Purposive use in hazardous areas

Conditions of use in  hazardous areas

The RIGIFLEX® couplings are suitable for the use according to EC Standard 94/9/EC.

Permissible revolutions per minute are shown in diagram 1.

1. Industry (except for mining)

- Appliance group II of category 2 and 3 (*coupling is not released for appliance category 1*)
- Material group G (*gases, mists, steams*), zone 1 and 2 (*coupling is not released for zone 0*)
- Material group D (*dusts*), zone 21 and 22 (*coupling is not released for zone 20*)
- Explosion group IIC (*explosion group IIA and IIB are included in IIC*)

Temperature class:

temperature class	ambient temperature	max. surface temperature ¹
T3	- 30 °C up to + 180 °C	195 °C
T4	- 30 °C up to + 115 °C	130 °C
T5	- 30 °C up to + 80 °C	95 °C
T6	- 30 °C up to + 65 °C	80 °C

¹Temperature measured on the surface (ambient temperature + intrinsic heating due to flexing work, friction + 5 K (Kelvin) safety incl.)

2. Mining

Appliance group I of category M2 (*coupling is not released for appliance category M1*).
Perm. ambient temperature - 30 °C up to + 80 °C.

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5 Enclosure A

Hints and instructions regarding the use in  hazardous areas

5.1 Purposive use in hazardous areas

dependency of the permissible revolutions on the outside diameter
with a max. outer circumferential speed of 80 m/s

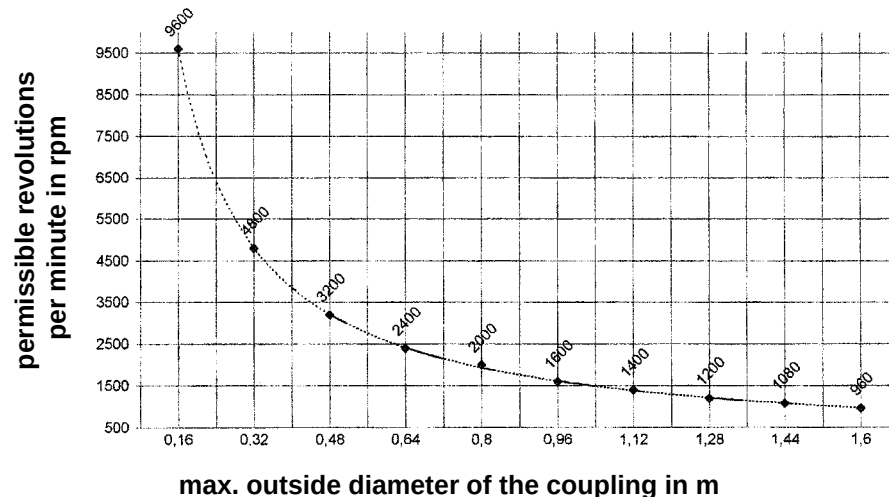


diagram 1

5.2 Control intervals for couplings in hazardous areas

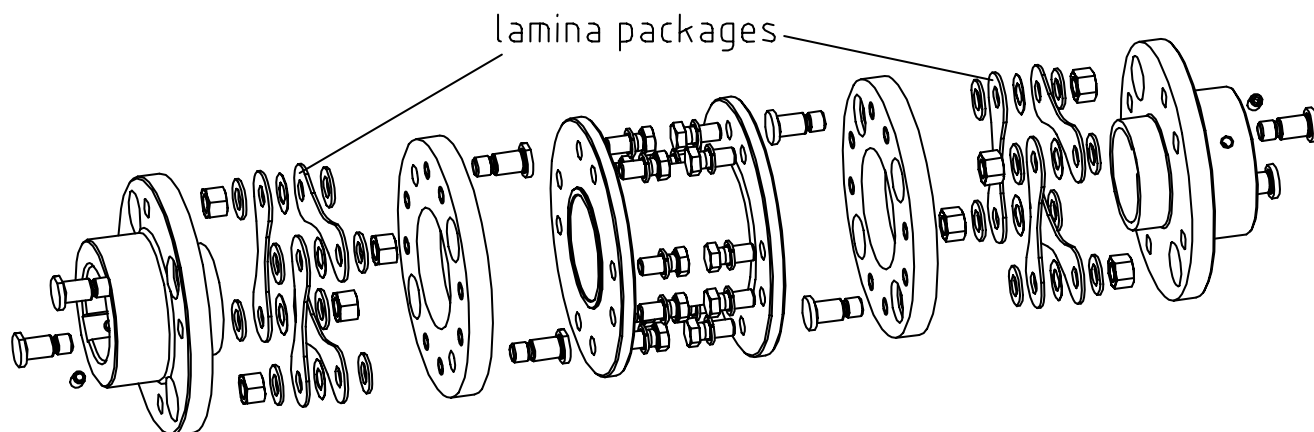
explosion group	control intervals
IIB II 2G c IIB T4, T5, T6	A checking of the circumferential backlash and a visual check of the lamina package must be effected after 3,000 operating hours for the first time, after 6 months at the latest. Except for centered, stiff connecting flanges (e. g. bell housings). If you note an unconsiderable or no wear at the lamina package 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 lamina package 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.
IIC II 2G c IIC T4, T5, T6	A checking of the circumferential backlash and a visual check of the lamina package 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. bell housings). If you note an unconsiderable or no wear at the lamina package 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 lamina package 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.



5 Enclosure A

Hints and instructions regarding the use in  hazardous areas

5.2 Control intervals for couplings in hazardous areas



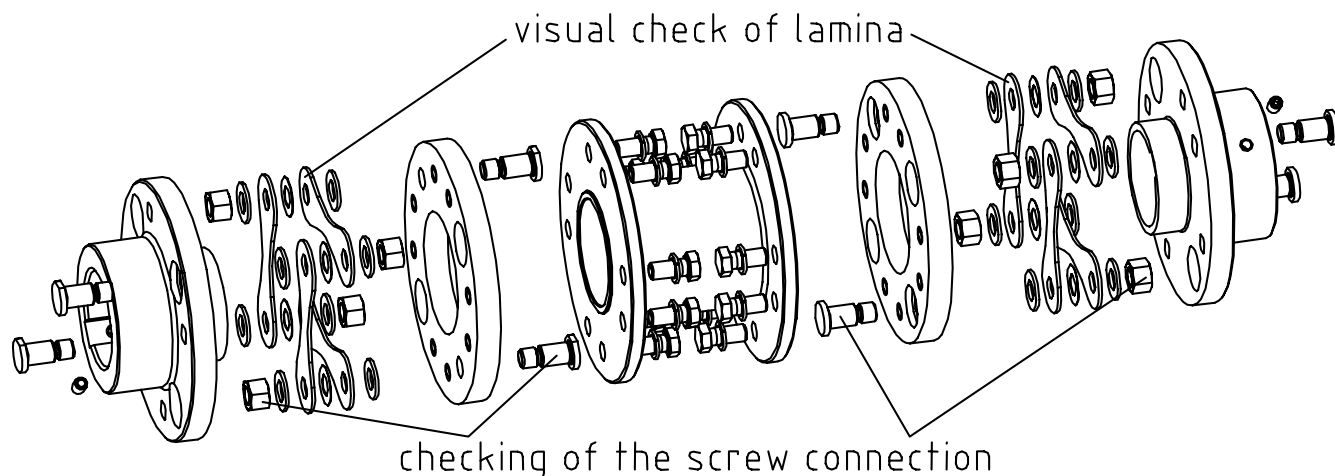
picture 29: RIGIFLEX®, type 11

5.3 Visual Check and Measures

During the visual control the laminae packages must be checked concerning cracks and detached hexagon head screws.

Detached hexagon head screws must be tightened with the screw tightening torque to be observed (see table 7). Hexagon head screws showing cracks must be replaced immediately, independent from the inspection intervals.

Lamina packages showing cracks must immediately be replaced by a new coupling half, independent from the inspection intervals.



picture 30: RIGIFLEX®, type 11



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

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5 Enclosure A

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:

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 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 lamina packages are excluded.

Complete labelling:



II 2G c IIC T3/T4/T5/T6 - $30^\circ\text{C} \leq T_a \leq +180/115/80/65^\circ\text{C}$
II 2D c T 110°C /I M2 c - $30^\circ\text{C} \leq T_a \leq +80^\circ\text{C}$

Short labelling:



II 2G c IIC TX/II 2D c TX/I M2 c TX

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 coupling 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 coupling hubs 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. Bellhousings (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.

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5 Enclosure A

Hints and instructions regarding the use in  hazardous areas

5.6 Starting

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.

5.7 Breakdowns, Causes and Elimination

The below-mentioned errors can lead to an incorrect use of the **RIGIFLEX®** 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.

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5 Enclosure A

Hints and instructions regarding the use in  hazardous areas

5.7 Breakdowns, Causes and Elimination

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.
- No original KTR parts (purchased parts) are used.
- Old/already worn out or superposed lamina packages 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	---	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
	loose hexagon head screws, low micro friction under the screw head and at the steel laminae package	danger of ignition due to hot surfaces	1) put the unit out of operation 2) check coupling parts and exchange damaged coupling parts 3) tighten the hexagon head screws until reaching the permissible tightening torque 4) check alignment, correct if necessary
	loose screws for axial securement of coupling hubs	---	1) put the unit out of operation 2) check alignment of coupling 3) tighten the screws to secure the coupling hubs and secure against self-loosening 4) checking of wear see under point Control
break of the steel laminae package	break of the steel laminae package due to high shock energy / overload	danger of ignition due to sparking	1) put the unit out of operation 2) disassemble the coupling and remove the rests of the steel laminae packages 3) check coupling parts and exchange damaged coupling parts 4) insert coupling halves, assemble coupling parts 5) find out the reason of overload

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
break of the steel laminae package	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) disassemble the coupling and remove the rests of the steel laminae packages 3) check coupling parts and exchange damaged coupling parts 4) insert coupling halves, assemble coupling parts 5) instruct and train the service staff
cracks in / break of the steel laminae packages / fixing screws	drive vibrations	danger of ignition due to sparking	1) put the unit out of operation 2) disassemble the coupling and remove the rests of the steel laminae packages 3) check coupling parts and exchange damaged coupling parts 4) insert coupling halves, assemble coupling parts 5) check alignment, correct if necessary 6) find out the reason for the vibrations



If you operate with a worn lamina package (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.



KTR Kupplungstechnik
GmbH
D-48407 Rheine

RIGIFLEX®
Operating-/Assembly
Instructions

KTR-N 47310 E
sheet: 25
edition: 2

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

RIGIFLEX® Steel Lamina 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 IBExU04ATEXB012 X.

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,

30.08.04
Date

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