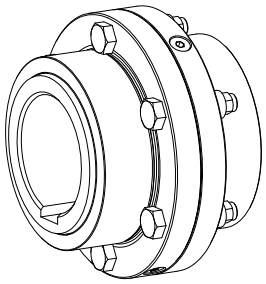
GEARex®

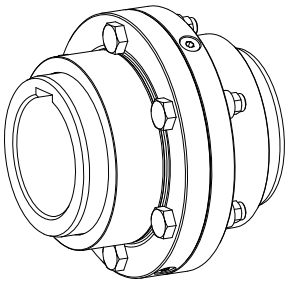
All-steel gear couplings type:

FA, FB, FAB, DA, DB and DAB along with combinations

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



Type FA



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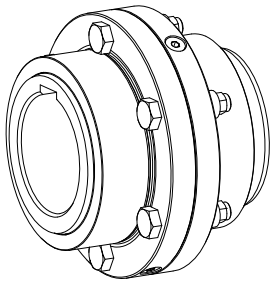
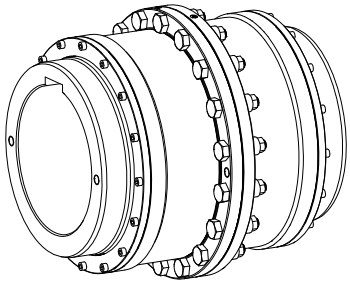


Type FAB



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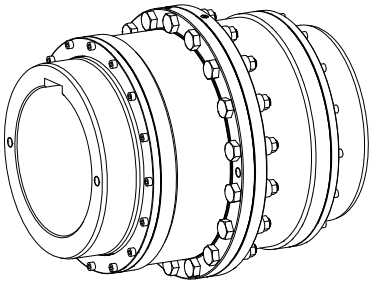
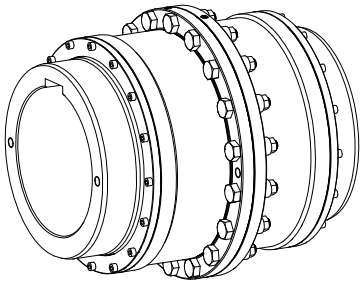


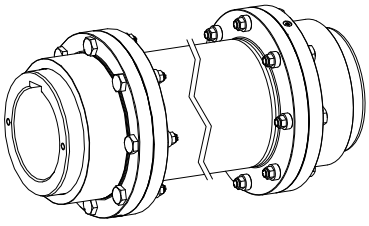
Type DB



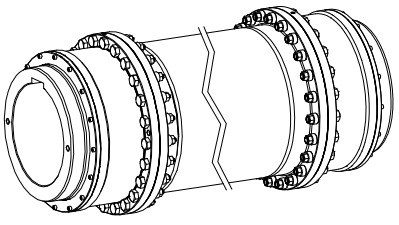
Type DAB

FH, DH, FR and DR along with combinations

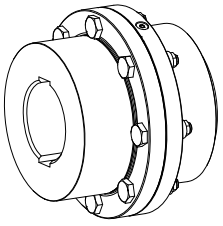
for finish bored, pilot bored and unbored couplings



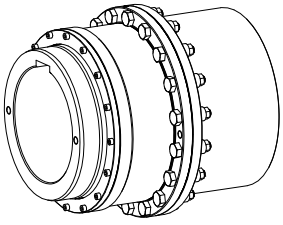
Type FH



Type DH



Type FR



Type DR

GEARex® all-steel gear couplings are flexible shaft connections. They are able to compensate for shaft misalignment, for example caused by manufacturing inaccuracies, thermal expansion, etc.

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1 Technical data

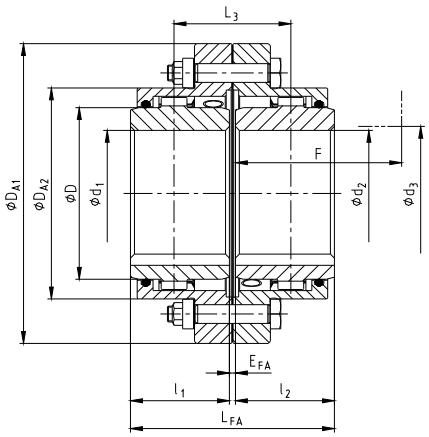


Illustration 1: Type FA

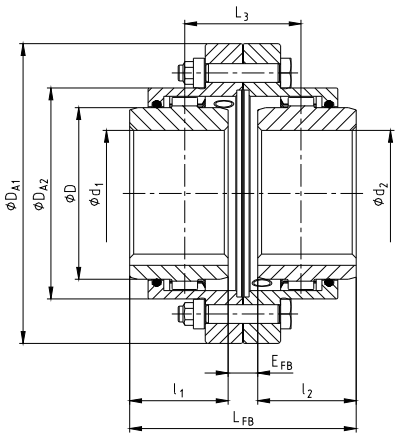


Illustration 2: Type FB

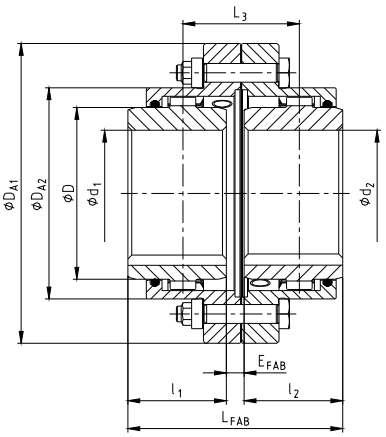


Illustration 3: Type FAB

Table 1: Dimensions – FA, FB and FAB

Size	Pilot bore	Max. finish bore d_1, d_2	Dimensions [mm]														Grease feeding [2] [dm³]
			l_1, l_2	l_1, l_2 [3]	E_{FA}	E_{FB}	E_{FAB}	L_{FA}	L_{FB}	L_{FAB}	L_3	D	D_{A1}	D_{A2}	F [1]	d_3 [1]	
10	26	50	43	105	3	21	12	89	107	98	55	67	111	84	74	52	0.02
15	26	64	50	115	3	15	9	103	115	109	59	87	152	107	84	68	0.04
20	31	80	62	130	3	31	17	127	155	141	79	108	178	130	104	85	0.08
25	38	98	76	150	5	29	17	157	181	169	93	130	213	158	123	110	0.12
30	44.5	112	90	170	5	33	19	185	213	199	109	153	240	182	148	130	0.18
35	46	133	105	185	6	40	23	216	250	233	128	180	280	214	172	150	0.22
40	52	158	120	215	6	42	24	246	282	264	144	214	318	250	192	175	0.35
45	80	172	135	245	8	50	29	278	320	299	164	233	347	274	216	190	0.45
50	80	192	150	295	8	56	32	308	356	332	182	260	390	309	241	220	0.70
55	90	210	175	300	8	70	39	358	420	389	214	283	425.5	334	275	250	0.90
60	100	232	190	305	8	84	46	388	464	426	236	312	457	365.5	316	265	1.15
70	100	276	220	310	10	76	43	450	516	483	263	371	527	425	360	300	1.50

Table 2: Technical data – FA, FB and FAB

Size	Torque [4] [Nm]		Max. speed [rpm]	Weight with max. bore [kg]			Mass moment of inertia with max. bore [kgm²]	Dowel screws (10.9)/Nuts		
	T_{KN}	T_{KN} (42 CrMo4)		Sleeve	Hub	Total		z	M	T_A [Nm]
10	930	1580	8500	0.75	0.55	2.73	0.00436	6	M6	15
15	2000	3300	7700	1.88	1.12	6.38	0.01894	8	M8	36
20	3500	6300	6900	2.60	2.09	9.94	0.04000	6	M10	72
25	6500	11000	6200	4.43	3.56	16.83	0.09749	6	M12	125
30	10000	17400	5800	5.83	6.18	25.21	0.18080	8	M12	125
35	17000	28800	5100	9.71	9.87	41.25	0.41419	8	M14	200
40	28500	48500	4500	11.88	16.07	58.14	0.75535	8	M14	200
45	37000	62000	4000	15.72	21.42	77.08	1.1759	10	M14	200
50	51000	86000	3750	25.66	29.59	114.40	2.24991	8	M18	430
55	65000	110000	3550	31.52	40.30	150.41	3.45102	14	M18	430
60	85000	145000	3400	32.82	52.96	177.44	4.16734	14	M18	430
70	135000	240000	3200	43.52	85.77	268.20	9.32429	16	M20	610

1) Space required to align the coupling and replace the sealing ring, respectively.
2) Grease feeding for each coupling half
3) Hub lengthened max. l_1, l_2
4) Maximum torque of the coupling $T_{Kmax.}$ = rated torque of the coupling $T_{K\ rated}$ x 2

1 Technical data

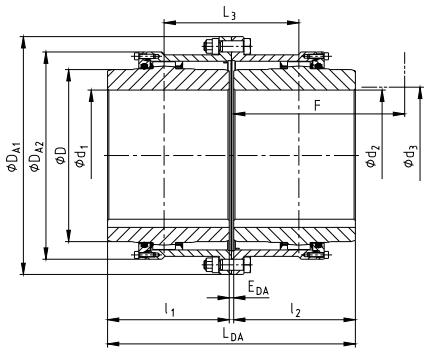


Illustration 4: Type DA

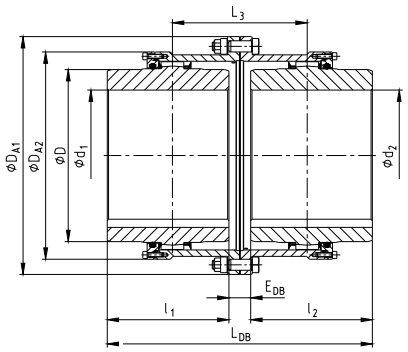


Illustration 5: Type DB

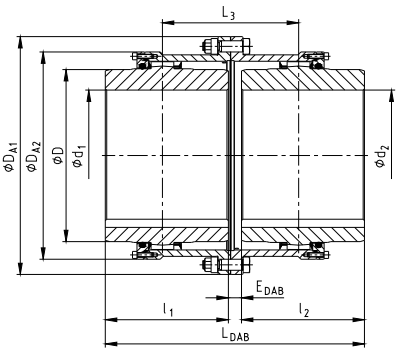


Illustration 6: Type DAB

Table 3: Dimensions – DA, DB and DAB

Size	Pilot bore	Max. finish bore d_1, d_2	Dimensions [mm]													Grease feeding [2] [dm³]
			l_1, l_2	E_{DA}	E_{DB}	E_{DAB}	L_{DA}	L_{DB}	L_{DAB}	L_3	D	D_{A1}	D_{A2}	F [1]	d_3 [1]	
20	31	80	62	3	31	17	133	155	144	79	108	187	146	105	85	0.08
25	38	98	76	5	29	17	157	181	169	93	130	220	172	115	105	0.12
30	44.5	112	90	5	33	19	185	213	199	109	153	248	182	140	120	0.18
35	46	133	105	6	40	23	216	250	233	128	180	285	214	165	145	0.22
40	52	158	120	6	42	24	246	282	264	144	214	335	250	180	160	0.35
45	80	172	135	8	50	29	278	320	299	164	233	358	294	195	185	0.45
50	80	192	150	8	56	32	388	356	332	182	260	390	309	215	205	0.70
55	90	210	175	8	70	39	358	420	389	214	283	425.5	348	240	220	0.90
60	100	232	190	8	84	46	388	464	426	236	312	457	380	260	245	1.15
70	100	276	220	10	76	43	450	516	483	263	371	527	445	300	290	1.50
80	140	300	280	10	50	30	570	610	590	310	394	545	475	340	310	2.50
85	160	325	292	13	53	33	597	637	617	325	430	585	515	352	330	3.00
90	180	350	305	13	83	48	623	693	658	353	464	640	560	365	360	4.00
100	220	390	330	13	93	53	673	753	713	383	512	690	612	390	400	5.00
110	220	420	350	20	296	158	720	996	858	508	560	765	665	410	420	6.00
120	260	450	420	25	421	223	864	1261	1063	643	608	825	720	480	470	7.50

Table 4: Technical data – DA, DB and DAB

Size	Torque [3] [Nm]		Max. speed [rpm]	Weight with max. bore [kg]			Mass moment of inertia with max. bore [kgm²]	Dowel screws (10.9)/Nuts		
	T_{KN}	T_{KN} (42 CrMo4)		Sleeve	Hub	Total		z	M	T_A [Nm]
20	3500	6300	6900	3.6	2.1	12.8	0.056	6	M10	72
25	6500	11000	6200	5.5	3.5	20.3	0.125	6	M12	125
30	10000	17400	5800	6.8	6.2	28.9	0.22	8	M12	125
35	17000	28800	5100	11.2	9.8	46.6	0.488	8	M14	200
40	28500	48500	4500	16.3	15.9	70.9	1.011	8	M14	200
45	37000	62000	4000	20.2	21.4	90.7	1.482	10	M14	200
50	51000	86000	3750	27.2	29.5	124	2.474	8	M18	430
55	65000	110000	3550	40	40	175	4.047	14	M18	430
60	85000	145000	3400	32	53	185	4.81	14	M18	430
70	135000	240000	3200	44	85	280	9.907	16	M20	610
80	175000	300000	1900	64	117	362	14.214	18	M20	610
85	225000	380000	1900	75	148	446	20.32	20	M20	610
90	290000	500000	1700	101	183	568	31.036	20	M24	1000
100	380000	650000	1600	117	232	698	45.358	24	M24	1000
110	480000	820000	1450	140	295	940	73.88	20	M30	1700
120	620000	1050000	1350	188	430	1312	118.40	24	M30	1700

1) Space required to align the coupling and replace the sealing ring, respectively.
2) Grease feeding for each coupling half
3) Maximum torque of the coupling $T_{Kmax.}$ = rated torque of the coupling $T_{K\ rated}$ x 2

1 Technical data

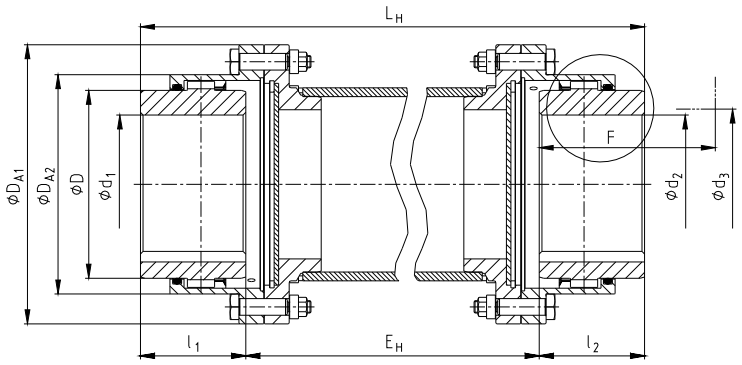
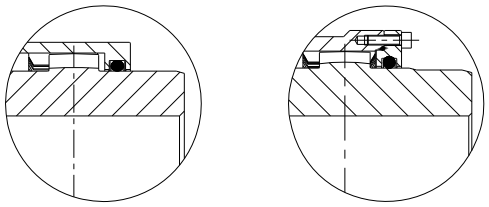


Illustration 7



Type FH (size 10 to 70) Type DH (size. 80 to 120)

Illustration 8: type FH / DH

Table 5: Dimensions – FH and DH

Size	Pilot bore	Max. finish bore d_1, d_2	Dimensions [mm]									Grease feeding [2] [dm³]
			l_1, l_2	Hub lengthened max. l_1, l_2	D	D_{A1} [3]	D_{A2} [3]	L_H	E_H	F [1]	d_3 [1]	
10	26	50	43	105	67	111	84	$L_H = E_H + l_1 + l_2$	According to customer specification	74	52	0.02
15	26	64	50	115	87	152	107			84	68	0.04
20	31	80	62	130	108	178	130			104	85	0.08
25	38	98	76	150	130	213	158			123	110	0.12
30	44.5	112	90	170	153	240	182			148	130	0.18
35	46	133	105	185	180	280	214			172	150	0.22
40	52	158	120	215	214	318	250			192	175	0.35
45	80	172	135	245	233	347	274			216	190	0.45
50	80	192	150	295	260	390	309			241	220	0.70
55	90	210	175	300	283	425.5	334			275	250	0.90
60	100	232	190	305	312	457	365.5			316	265	1.15
70	100	276	220	310	371	527	425			360	300	1.50
80	140	300	280	-	394	545	475			340	310	2.50
85	160	325	292	-	430	585	515			352	330	3.00
90	180	350	305	-	464	640	560			365	360	4.00
100	220	390	330	-	512	690	612			390	400	5.00
110	220	420	350	-	560	765	665			410	420	6.00
120	260	450	420	-	608	825	720			480	470	7.50

Table 6: Technical data – FH and DH

Size	Torque [4] [Nm]		Dowel screws (10.9)/Nuts		
	T_{KN}	T_{KN} (42 CrMo4)	z [5]	M	T_A [Nm]
10	930	1580	6	M6	15
15	2000	3300	8	M8	36
20	3500	6300	6	M10	72
25	6500	11000	6	M12	125
30	10000	17400	8	M12	125
35	17000	28800	8	M14	200
40	28500	48500	8	M14	200
45	37000	62000	10	M14	200
50	51000	86000	8	M18	430
55	65000	110000	14	M18	430
60	85000	145000	14	M18	430
70	135000	240000	16	M20	610
80	175000	300000	18	M20	610
85	225000	380000	20	M20	610
90	290000	500000	20	M24	1000
100	380000	650000	24	M24	1000
110	480000	820000	20	M30	1700
120	620000	1050000	24	M30	1700

1) Space required to align the coupling and replace the sealing ring, respectively.
2) Grease feeding for each coupling half
3) Dimensions type F see table 1; type D see table 3
4) Maximum torque of the coupling $T_{Kmax.}$ = rated torque of the coupling $T_{K\ rated}$ x 2
5) Number for each coupling half

1 Technical data

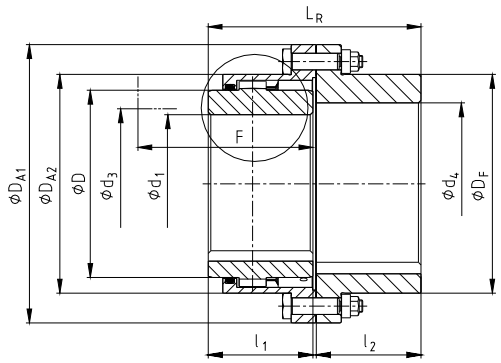
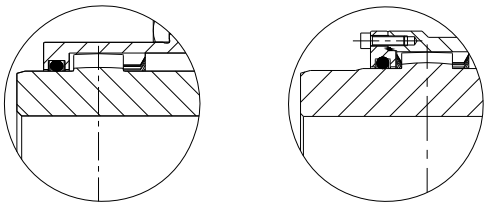


Illustration 9



Type FR (size 10 to 70)

Type DR (size. 80 to 120)

Illustration 10: Type FR / DR

Table 7: Dimensions – FR and DR

Size	Max. finish bore		Dimensions [mm]									Grease feeding [2] [dm³]
	d_1	d_4	l_1, l_2	Hub lengthened max. l_1, l_2	D	D_{A1}	D_{A2}	D_F	L_R	F [1]	d_3 [1]	
10	50	60	43	105	67	111	84	84	88	74	52	0.02
15	64	78	50	115	87	152	107	107	103	84	68	0.04
20	80	95	62	130	108	178	130	130	127	104	85	0.08
25	98	115	76	150	130	213	158	158	157	123	110	0.12
30	112	135	90	170	153	240	182	182	185	148	130	0.18
35	133	155	105	185	180	280	214	214	216	172	150	0.22
40	158	185	120	215	214	318	250	250	244	192	175	0.35
45	172	200	135	245	233	347	274	274	276	216	190	0.45
50	192	225	150	295	260	390	309	309	305	241	220	0.70
55	210	245	175	300	283	425.5	334	334	356	275	250	0.90
60	232	265	190	305	312	457	365.5	365.5	386	316	265	1.15
70	276	310	220	310	371	527	425	425	450	360	300	1.50
80	300	340	280	-	394	545	475	462	570	340	310	2.50
85	325	370	292	-	430	585	515	500	597	352	330	3.00
90	350	400	305	-	464	640	560	546	623	365	360	4.00
100	390	440	330	-	512	690	612	594	673	390	400	5.00
110	420	480	350	-	560	765	665	647	710	410	420	6.00
120	450	520	420	-	608	825	720	700	852	480	470	7.50

Table 8: Technical data – FR and DR

Size	Torque [3] [Nm]		Dowel screws (10.9)/Nuts		
	T_{KN}	T_{KN} (42 CrMo4)	z	M	T_A [Nm]
10	930	1580	6	M6	15
15	2000	3300	8	M8	36
20	3500	6300	6	M10	72
25	6500	11000	6	M12	125
30	10000	17400	8	M12	125
35	17000	28800	8	M14	200
40	28500	48500	8	M14	200
45	37000	62000	10	M14	200
50	51000	86000	8	M18	430
55	65000	110000	14	M18	430
60	85000	145000	14	M18	430
70	135000	240000	16	M20	610
80	175000	300000	18	M20	610
85	225000	380000	20	M20	610
90	290000	500000	20	M24	1000
100	380000	650000	24	M24	1000
110	480000	820000	20	M30	1700
120	620000	1050000	24	M30	1700

1) Space required to align the coupling and replace the sealing ring, respectively.
2) Grease feeding for each coupling half
3) Maximum torque of the coupling $T_{Kmax.}$ = rated torque of the coupling $T_{K\ rated}$ x 2

2 Advice

2.1 Coupling selection

For drives subject to torsional vibrations (drives with cyclic stress due to torsional vibrations) it is necessary to perform a torsional vibration calculation to ensure a reliable selection. Typical drives subject to torsional vibrations are e. g. drives with piston pumps, piston compressors etc. If requested, KTR will perform the coupling selection and the torsional vibration calculation.

C A U T I O N !
For a long-lasting and failure-free operation of the coupling it must be selected according to the selection instructions for the particular application (see GEARex® catalogue).
If the operating conditions (performance, speed, modifications on engine and machine) change, the coupling selection must be reviewed again.
The transmittable torque of the shaft/hub connection must be reviewed by the customer and is subject to his responsibility.

2.2 General advice

Please read through these assembly instructions carefully before you start up the coupling.
Please pay special attention to the safety instructions!

The **GEARex®** coupling is suitable and approved for the use in hazardous locations. When using the coupling in hazardous locations please observe the special advice and instructions regarding safety in enclosure A.

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

2.3 Safety and advice symbols

STOP	**D A N G E R !**	**Danger of injury to persons.**
!	**C A U T I O N !**	**Damages on the machine possible.**
☞	**A T T E N T I O N !**	**Pointing to important items.**
Ex	**W A R N I N G !**	**Hints concerning explosion protection.**

2.4 General hazard warnings

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

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

2 Advice

2.5 Intended use

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

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

The coupling may only be used in accordance with the technical data (see table 1 to 8 in chapter 1). Unauthorized modifications on the coupling design are not admissible. We will not assume liability for any damage that may arise. In the interest of further development we reserve the right for technical modifications.
The **GEARex®** described in here corresponds to the technical status at the time of printing of these assembly instructions.

3 Storage

3.1 Storage of the coupling

Unless explicitly ordered differently, the coupling is supplied with preservation and may be stored in a dry place with roof cover up to 3 months.
In case of a longer storage period please consult with **KTR** Kupplungstechnik GmbH.

3.2 Storage of O-rings

Proper storage conditions increase the service life of O-rings. For the storage of O-rings basically DIN 7716 (standards for storage, maintenance and cleaning of rubber products) or ISO 2230 (rubber products - standards for storage) applies.
The physical characteristics and period of operation may be subject to negative influences like, as an example, light, heat, moisture, oxygen, ozone, etc.
In general the optimum storage condition is said to be welded in polyethylene bags with temperatures between + 5 °C to + 20 °C.

C A U T I O N !
The O-rings (component 8) must not be stored being mounted to the hubs (component 1).

A T T E N T I O N !
The storage space should be dry and free from dust. The O-rings (component 8) must not be stored together with chemicals, solvents, fuels, acids, etc.

4 Assembly

A T T E N T I O N !
Please note the manufacturer's instructions regarding the use of solvents.

D A N G E R !
Components falling down may lead to personal injury or damage on the machine.
Secure the driving components during assembly or disassembly.

4 Assembly

Generally the coupling is supplied in individual parts. Before assembly the coupling has to be inspected for completeness.

4.1 Components of the couplings

Type FA, FB and FAB

Component	Quantity	Description
1	2	Hub
2	2	Sleeve
3	see table 2	Setscrews
4	see table 2	Nut
5	1	Flat seal
6	4	Washers DIN 7603
7	4	Locking screws DIN 908 [1)]
8	2	O-ring - material 70 NBR

1) With size 10 cap screws DIN 7984 - 8.8

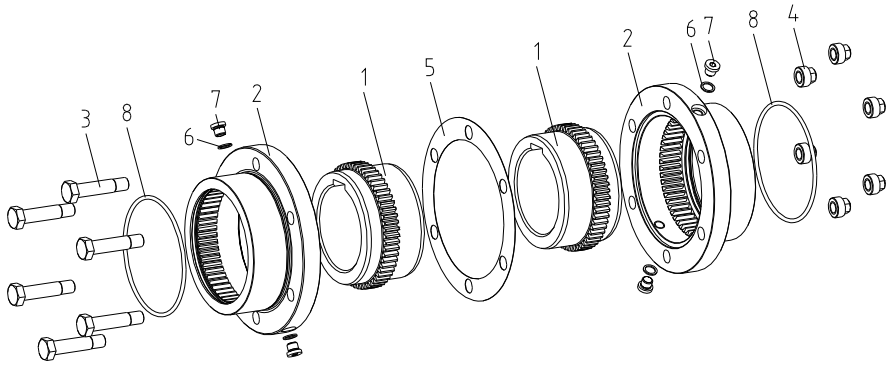


Illustration 11: GEARex®, type FA

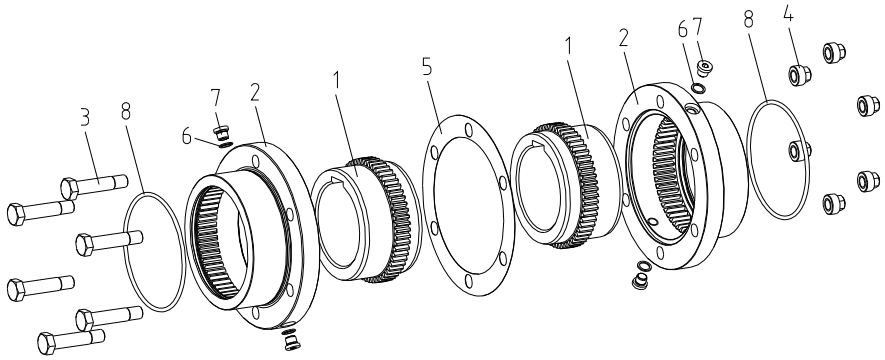


Illustration 12: GEARex®, type FB

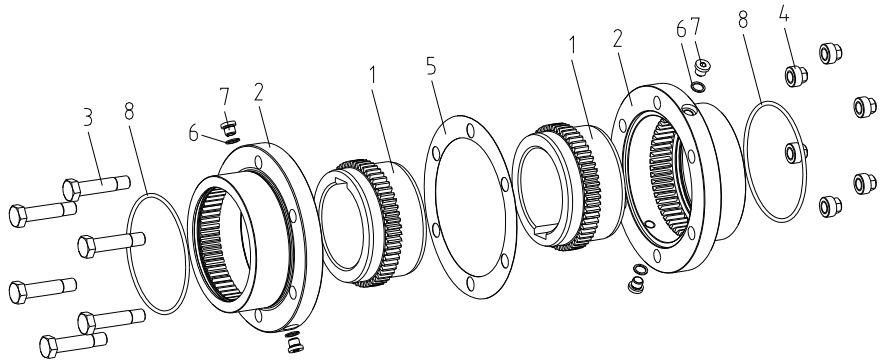


Illustration 13: GEARex®, type FAB

4 Assembly

4.1 Components of the couplings

Type DA, DB and DAB

Component	Quantity	Description
1	2	Hub
2	2	Sleeve
3	see table 4	Setscrews
4	see table 4	Nut
5	1	Flat seal
6	4	Washer DIN 7603
7	4	Locking screws DIN 908
8	2	O-ring - material 70 NBR
9	2	Cover
10	see table 10	Cap screws DIN EN ISO 4762
11	2	O-ring - material 70 NBR

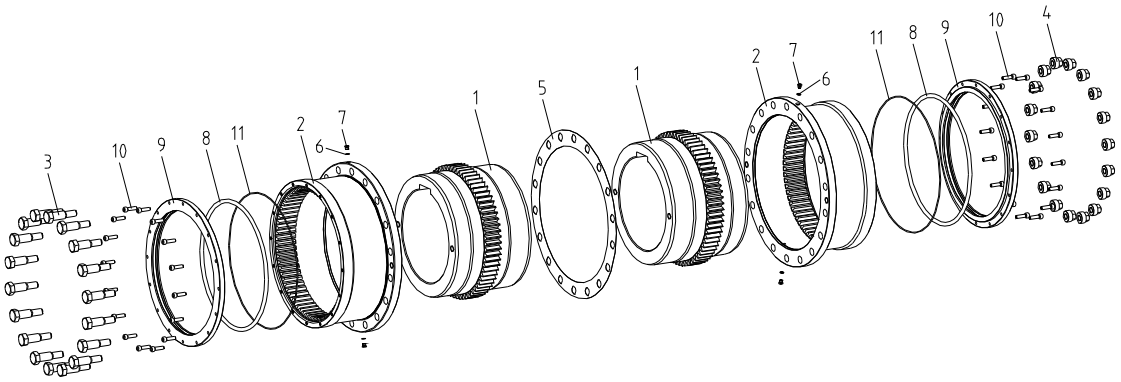


Illustration 14: GEARex®, type DA

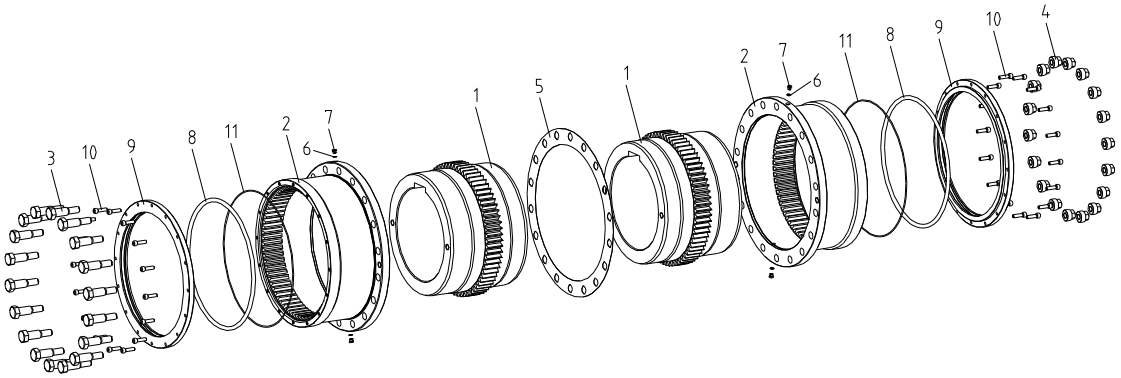


Illustration 15: GEARex®, type DB

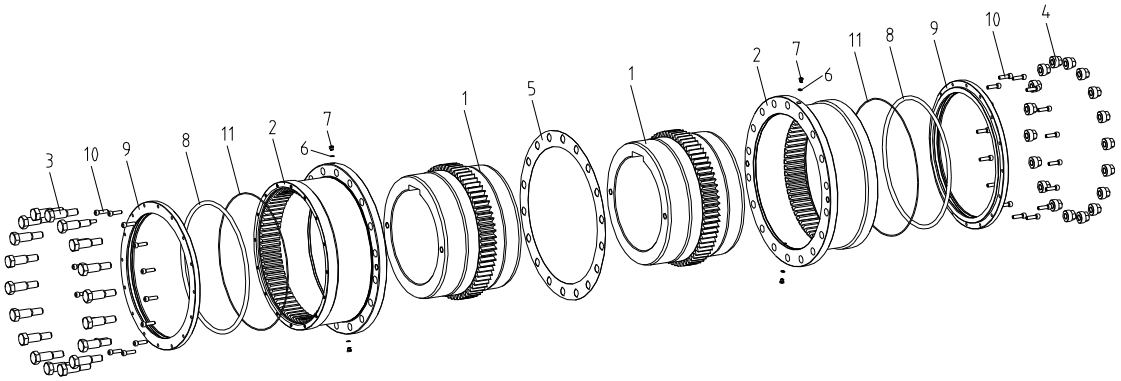


Illustration 16: GEARex®, type DAB

4 Assembly

4.1 Components of the couplings

Type FH

Component	Quantity	Description
1	2	Hub
2	2	Sleeve
3	see table 6	Setscrews
4	see table 6	Nut
5	2	Flat seal
6	4	Washers DIN 7603
7	4	Locking screws DIN 908 [1)]
8	2	O-ring - material 70 NBR
13	1	Spacer

1) With size 10 cap screws DIN 7984 - 8.8

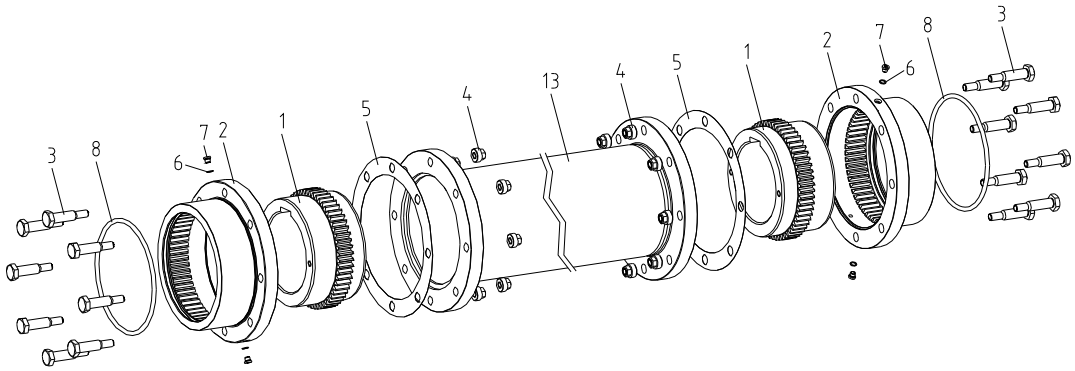


Illustration 17: GEARex®, type FH

Type DH

Component	Quantity	Description
1	2	Hub
2	2	Sleeve
3	see table 6	Setscrews
4	see table 6	Nut
5	2	Flat seal
6	4	Washer DIN 7603
7	4	Locking screws DIN 908
8	2	O-ring - material 70 NBR
9	2	Cover
10	see table 10	Cap screws DIN EN ISO 4762
11	2	O-ring - material 70 NBR
13	1	Spacer

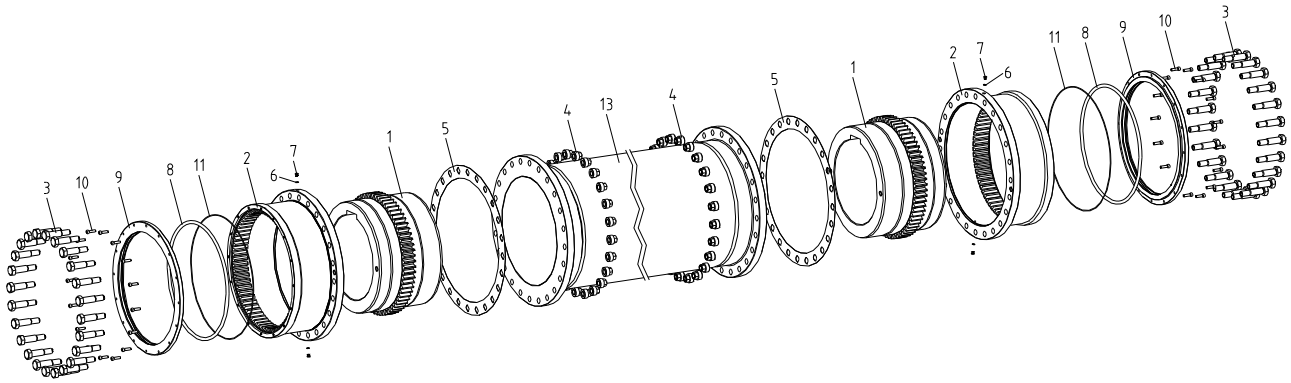


Illustration 18: GEARex®, type DH

4 Assembly

4.1 Components of the couplings

Type FR

Component	Quantity	Description
1	1	Hub
2	1	Sleeve
3	see table 8	Setscrews
4	see table 8	Nut
5	1	Flat seal
6	2	Washers DIN 7603
7	2	Locking screws DIN 908 [1)]
8	1	O-ring - material 70 NBR
12	1	Flange hub

1) With size 10 cap screws DIN 7984 - 8.8

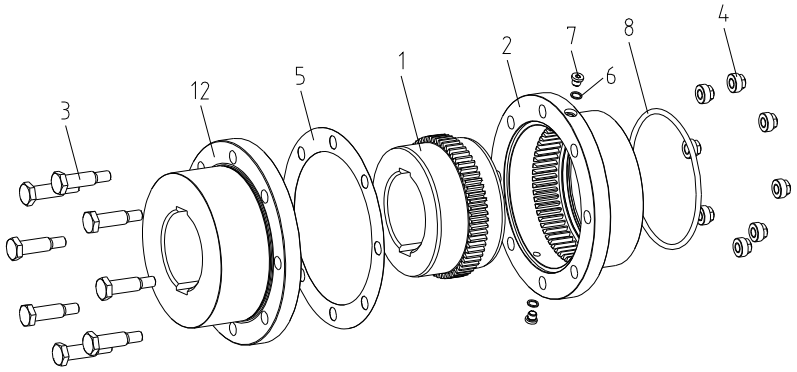


Illustration 19: GEARex®, type FR

Type DR

Component	Quantity	Description
1	1	Hub
2	1	Sleeve
3	see table 8	Setscrews
4	see table 8	Nut
5	1	Flat seal
6	2	Washers DIN 7603
7	2	Locking screws DIN 908
8	1	O-ring - material 70 NBR
9	2	Cover
10	see table 10	Cap screws DIN EN ISO 4762
11	2	O-ring - material 70 NBR
12	1	Flange hub

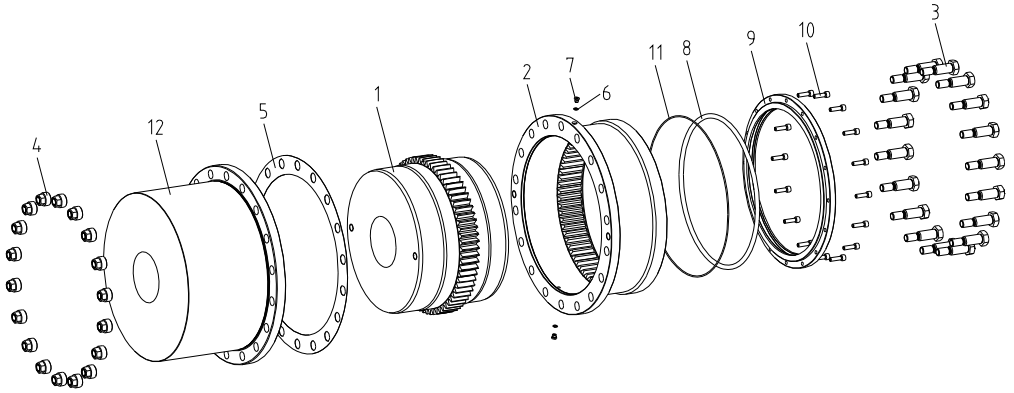


Illustration 20: GEARex®, type DR

4 Assembly

4.2 Advice for finish bore

D A N G E R !
The maximum permissible bore diameters d (see table 1, 3, 5 and 7 - technical data) must not be exceeded. If these figures are disregarded, the coupling may tear. Rotating particles may cause danger to life.

C A U T I O N !
Do not clamp on the sealing surface at any time!

- Hub bores machined by the customer have to observe concentricity or axial runout, respectively (see illustration 21 to 24).
- Please make absolutely sure to observe the figures for Ø $d_{max.}$ (see table 1, 3, 5 and 7).
- Carefully align the hubs when the finish bores are drilled.
- Please provide for a setscrew according to DIN EN ISO 4029 with a cup point, an end plate or shrinking to fasten the hubs axially (see illustration 21 to 24 and table 9 and 10).
- If other shaft-hub-connections (e. g. clamping elements, spline, taper bores, etc.) are to be used, please consult with **KTR** Kupplungstechnik GmbH.

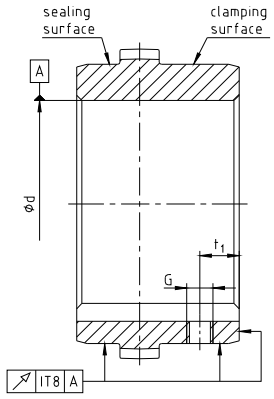


Illustration 21:
Clamping/sealing surfaces of types: FA, FAB and FR

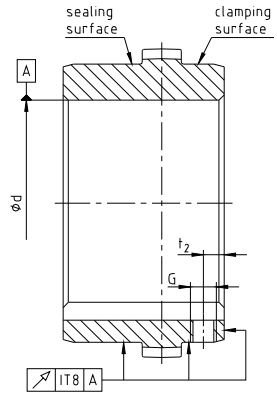


Illustration 22:
Clamping/sealing surfaces of types: FB, FAB and FH

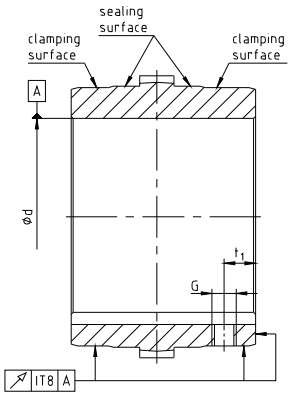


Illustration 23:
Clamping/sealing surfaces of types: DA, DAB and DR

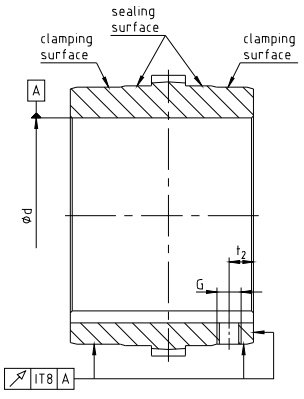


Illustration 24:
Clamping/sealing surfaces of types: DB, DAB and DH

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

W A R N I N G !
KTR supplies unbored or pilot bored coupling components and spare parts only upon explicit request of the customer. These parts are additionally labelled with the symbol Ⓤ.

4 Assembly

4.3 Assembly of the coupling (general)

C A U T I O N !
In case that a dimensional drawing has been prepared for the coupling, the dimensions shown have to be respected primarily.
The operator of the machine should be provided with the dimensional drawing.

A T T E N T I O N !
We recommend to inspect bores, shaft, keyway and feather key for dimensional accuracy before assembly.

Heating the hubs lightly (approx. 80 °C) allows for an easier mounting on the shaft.

W A R N I N G !
Please pay attention to the ignition risk in hazardous locations!

D A N G E R !
Touching the heated components causes burns.
Please wear safety gloves.

C A U T I O N !
With the assembly please make sure that the distance dimension E (see table 1, 3, 5 and 7) is observed to allow for axial clearance of the sleeve while being in operation.
Disregarding this advice may cause damage to the coupling.

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

4 Assembly

4.4 Assembly of the types FA, FB, FAB, FH and FR

- Clean all components and shaft ends carefully (see chapter 6.7). The O-rings (component 8) must not get in touch with solvents and detergents.
- Lightly grease the O-rings (component 8) and insert in the corresponding keyway of the sleeves (component 2).
- Lightly grease the sealing surfaces on the face of the sleeves (component 2) and push them over the shaft ends. Please make sure that the O-rings (component 8) are not damaged.
- To facilitate the assembly, please heat the hubs (component 1) or flange hub (component 12) evenly by inductive heating (approx. 80 °C), either in the furnace or by means of a torch.
- Push the hubs (component 1) or flange hub (component 12) onto the shaft of the driving and driven side until the hub surfaces on the face are flush with the shaft ends. When the hubs are heated, any contact with the O-rings (component 8) should be avoided.
- Secure the hubs (component 1) or flange hub (component 12) axially by tightening the setscrews DIN EN ISO 4029 by means of a cup point (tightening torque T_A see table 9), an end plate or by shrinking.
- Shift the power packs in axial direction until the distance dimension E is achieved (see table 1, 5 and 7).
- Align both shafts and inspect the permissible displacement figures as per chapter 4.6.
- Grease the spline of the hubs (component 1) (quantity of grease see table 12), afterwards push the sleeves (component 2) over the spline of the hubs (component 1) and keep them in place.
- Align the fitting hole of the sleeves (component 2) or flange hub (component 12) flush. Please make sure that the lubrication holes on both sleeves have an angle of 90° versus each other.
- **Applying for type FH only:**
  Push the spacer (component 13) between the two sleeves and align the fitting holes flush with the sleeves.
- Please insert the flat seal (component 5) and screw the sleeves or sleeve and flange hub, respectively, by means of the dowel screws (component 3) and nuts (component 4), observing the tightening torques indicated (see table 9).
- Please observe the instructions mentioned in chapter start-up and lubrication (see chapter 5).

☞ **A T T E N T I O N !**
For each re-assembly of the coupling we would recommend to replace the flat seal (component 5) and the dowel screws (component 3) as well as nuts (component 4).

Table 9:

Size	Setscrews DIN EN ISO 4029 [mm]				Screw connections of sleeves dowel screws (10.9)			
	G	t_1 1)	t_2 1)	T_A [Nm]	Quantity z	Quantity z (type FH)	M	T_A [Nm]
10	M8	10	6	10	6	12	M6	15
15	M8	10	6	10	8	16	M8	36
20	M10	15	8	17	6	12	M10	72
25	M10	15	8	17	6	12	M12	125
30	M12	20	12	40	8	16	M12	125
35	M12	24	15	40	8	16	M14	200
40	M16	25	18	80	8	16	M14	200
45	M16	30	18	80	10	20	M14	200
50	M20	35	22	140	8	16	M18	430
55	M20	40	25	140	14	24	M18	430
60	M20	45	25	140	14	24	M18	430
70	M24	50	35	240	16	32	M20	610

1) See illustration 21 and 22

4 Assembly

4.5 Assembly of the types DA, DB, DAB, DH and DR

- Clean all components and shaft ends carefully (see chapter 6.7). The O-rings (component 8 and 11) must not get in touch with solvents and detergents.
- Lightly grease the O-rings (component 8) and insert in the corresponding keyway of the covers (component 9).
- Lightly grease the sealing surfaces on the face of the sleeves (component 2).
- Push the cover (component 9) and the O-rings (component 11) over the shaft ends. Please make sure that the O-rings (component 8 and 11) are not damaged.
- To facilitate the assembly, please heat the hubs (component 1) evenly by inductive heating (approx. 80 °C), either in the furnace or by means of a torch.
- Push the hubs (component 1) onto the shaft of the driving and driven side until the hub surfaces on the face are flush with the shaft ends. When the hubs are heated, any contact with the O-rings (component 8 and 11) should be avoided.
- Secure the hubs (component 1) axially by tightening the setscrews DIN EN ISO 4029 by means of a cup point (tightening torque T_A see table 10), an end plate or by shrinking.
- Shift the power packs in axial direction until the distance dimension E is achieved (see table 3, 5 and 7).
- Align both shafts and inspect the permissible displacement figures as per chapter 4.6.
- Put the O-rings (component 11) onto the pilot of the cover (component 9).
- Afterwards push the sleeves (component 2) onto the hubs (component 1).
- Screw the covers (component 9) and the sleeves (component 2) with the cap screws (component 10) (for tightening torque T_A see table 10).
- Push the sleeve along with the cover far over the hub and put it onto the shaft ends. Please make sure that the O-rings (component 8) are not damaged.
- Grease the spline of the hubs (component 1) (quantity of grease see table 12), afterwards push the sleeves (component 2) over the spline of the hubs (component 1) and keep them in place.
- Align the fitting holes of the sleeves (component 2) flush. Please make sure that the lubrication holes on both sleeves have an angle of 90° versus each other.
- **Applying for type DH only:**
  Push the spacer (component 13) between the two sleeves and align the fitting holes to be flush with the sleeves.
- Please insert the flat seal (component 5) and screw the sleeves by means of dowel screws (component 3) and nuts (component 4), observing the tightening torques indicated (see table 10).
- Please observe the instructions mentioned in chapter start-up and lubrication (see chapter 5).

☞ **A T T E N T I O N !**
For each re-assembly of the coupling we would recommend to replace the flat seal (component 5) and the dowel screws (component 3) as well as nuts (component 4).

4 Assembly

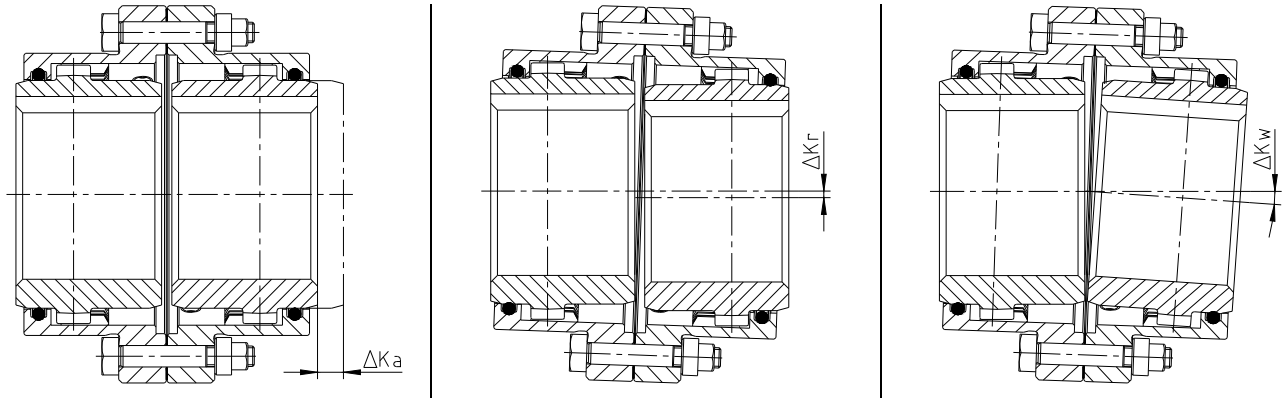
4.5 Assembly of the types DA, DB, DAB, DH and DR

Table 10:

Size	Setscrews DIN EN ISO 4029 [mm]				Screw connections of sleeves dowel screws (10.9)				Screw connections of cover with sleeves		
	G	t_1 1)	t_2 1)	T_A [Nm]	Quantity z	Quantity z (type DH)	M	T_A [Nm]	Quantity z	M	T_A [Nm]
20	M10	15	8	17	6	12	M10	72	24	M6	14
25	M10	15	8	17	6	12	M12	125	24	M6	14
30	M12	20	12	40	8	16	M12	125	32	M6	14
35	M12	24	15	40	8	16	M14	200	24	M8	35
40	M16	25	18	80	8	16	M14	200	24	M8	35
45	M16	30	18	80	10	20	M14	200	24	M8	35
50	M20	35	22	140	8	16	M18	430	24	M8	35
55	M20	40	25	140	14	28	M18	430	32	M8	35
60	M20	45	25	140	14	28	M18	430	24	M10	69
70	M24	50	35	240	16	32	M20	610	24	M10	69
80	M24	60	40	240	18	36	M20	610	32	M10	69
85	M24	60	40	240	20	40	M20	610	32	M10	69
90	M24	65	30	240	20	40	M24	1000	32	M10	69
100	M24	80	40	240	24	48	M24	1000	32	M10	69
110	M24	80	40	240	20	40	M30	1700	24	M12	120
120	M24	80	40	240	24	48	M30	1700	32	M12	120

1) See illustration 23 and 24

4.6 Displacements - alignment of the couplings



Axial displacements | Radial displacements | Angular displacements

Illustration 25: Displacements

4 Assembly

4.6 Displacements - alignment of the couplings

Table 11: Displacement figures

Size	Max. axial displacement ΔK_a [mm]	Max. permissible displacements [mm]		
		ΔK_r 1)		ΔK_w 1) [°]
		Type FA, FB, FAB, DA, DB and DAB	Type FH and DH	
10	± 1.0	0.4	$\Delta K_r = \tan 0.5° \times L_{3FH}$ or $\Delta K_r = \tan 0.5° \times L_{3DH}$	0.5° each hub
15		0.5		
20		0.6		
25		0.8		
30		1.0		
35		1.0		
40	± 1.5	1.2		
45		1.4		
50		1.6		
55		1.8		
60		2.0		
70		2.2		
80	± 2.0	2.5		
85		2.8		
90		3.0		
100		3.2		
110		4.4		
120		5.5		

1) Please make absolutely sure to adhere to the distance dimension E indicated for the various types, specifically with radial and angular displacement (see tables 1, 3, 5 and 7).

Misalignment of the coupling components to each other may have been generated by incorrect alignment during assembly or the operation of the machine (thermal expansion, shafts bending, elastic machine mounts, etc.).

The displacement figures mentioned in table 11 are maximum figures which must not arise in parallel.
If radial and angular displacement arises at the same time, these values must be reduced (see illustration 26).

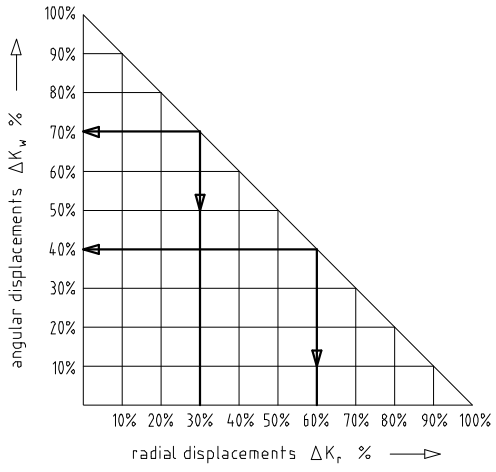
Examples for the displacement combinations given in illustration 26:

Example 1:
ΔK_r = 30 %
ΔK_w = 70 %

Example 2:
ΔK_r = 60 %
ΔK_w = 40 %

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

Illustration 26: Combinations of displacement



C A U T I O N !
In order to ensure a long service life of the coupling, the shaft ends have to be accurately aligned. Please absolutely observe the displacement figures indicated (see table 11). If the figures are exceeded, the coupling will be damaged.

5 Start-up and lubrication

5.1 Start-up of the coupling

Before start-up of the coupling, please inspect the tightening of the setscrews in the hubs, the alignment and the distance dimension E and adjust, if necessary, and also inspect all screw connections for the tightening torques specified, dependent on the type of coupling.

If used in hazardous locations the setscrews to fasten the hubs as well as all screw connections must be secured against working loose additionally, e. g. conglutinating with Loctite (average strength).

Finally, the coupling protection against accidental contact must be fitted.

The cover must be electrically conductive and included in the equipotential bonding. The cover may only be taken off after having stopped the unit.

During operation of the coupling, please pay attention to

- different operating noise
- vibrations occurring.

If the couplings are used in locations subject to dust explosion and in mining the user must make sure that there is no accumulation of dust in a dangerous volume between the cover and the coupling. The coupling must not operate in an accumulation of dust.

For covers with unlocked openings on the top face no light metals may be used if the couplings are used as equipment of equipment group II (*if possible, from stainless steel*).
If the couplings are used in mining (equipment group I M2), the cover must not be made of light metal. In addition, it must be resistant to higher mechanical loads than if it is used as equipment of equipment group II.

The minimum distance „Sr“ between the protection device and the rotating parts must at least correspond to the figures mentioned below.

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:

Openings	Cover [mm]		
	Top side	Lateral components	Distance „Sr“
Circular - max. diameter	4	8	≥ 10
Rectangular - max. lateral length	4	8	≥ 10
Straight or curved slot - max. lateral length/height	not permissible	8	≥ 20

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

Coupling coating:

If coated (priming, painting etc.) couplings are used in hazardous locations, the requirements on conductibility and coating thickness must be considered. In case of paintings up to 200 µm electrostatic load does not have to be expected. Multiple coatings that are thicker than 200 µm are prohibited for explosion group IIC.

5 Start-up and lubrication

5.2 Types of grease recommended

C A U T I O N !
Only those greases recommended by KTR may be used.
Claims to warranty caused by the use of non-recommended greases are disregarded by KTR.

Manufacturer of grease	KLÜBER LUBRICATION	bp	Castrol
Product description [1]	Klüberplex GE 11-680	Energrease LS-EP 00	Tribol 3020/100-00 Longtime PD 00
Manufacturer of grease	ARAL	Mobil	
Product description [1]	Aralub liquid grease An 0	Mobilux EP 004	Gadus S2 V220 00

1) The lubricants mentioned above are suitable for operating temperatures from - 20 °C to + 80 °C.

C A U T I O N !
Please observe the manufacturer's instructions on handling lubricants.

5.3 Grease capacity

W A R N I N G !
The grease capacity always has to correspond to the quantities indicated!
By falling below the volume indicated the coupling can become a source of ignition.

Table 12: Grease capacity

Size	Grease capacity [1] [dm³]	Size	Grease capacity [1] [dm³]	Size	Grease capacity [1] [dm³]
10	0.02	40	0.35	80	2.50
15	0.04	45	0.45	85	3.00
20	0.08	50	0.70	90	4.00
25	0.12	55	0.90	100	5.00
30	0.18	60	1.15	110	6.00
35	0.22	70	1.50	120	7.50

1) Grease feeding for each coupling half

5 Start-up and lubrication

5.4 Grease feeding

A T T E N T I O N !
Lubricants of various types and manufacturers must not be mixed!

Procedure of grease feeding:

- Turn the coupling until the locking screws (component 7) are in horizontal position (see illustration 27).
- Remove the locking screws (component 7) along with the sealing washers (component 6) and fill in the grease, e. g. by means of a grease injector.
- Afterwards screw in the locking screws (component 7) and the sealing washers (component 6) again and prove for tightness.
- Please repeat this procedure with the other coupling half.

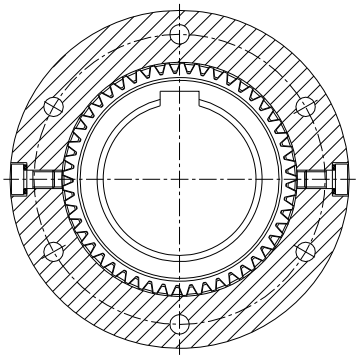


Illustration 27: Horizontal position of locking screws

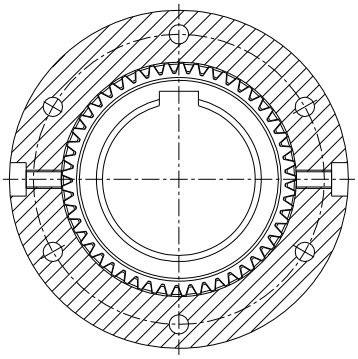


Illustration 28: Removing the locking screws and sealing washers

A T T E N T I O N !
Both locking screws (component 7) have to be removed.
One hole serves as a filler hole, the other one as venting hole.

A T T E N T I O N !
For each re-assembly of the coupling we would recommend to replace the flat seal (component 5) and the dowel screws (component 3) as well as nuts (component 4).

C A U T I O N !
In order to ensure a long service life of the coupling and avoid damages on the coupling, please make sure to adhere to the quantities of grease indicated in the different coupling sides.

W A R N I N G !
Grease which has flown over has to be collected completely and disposed of according to the regulations that apply.

6 Maintenance and service

6.1 Intervals of maintenance

The coupling has to be regularly inspected for leakages/grease capacity, unregulated heating and modifications of the running noise. The inspection has to be performed during the general maintenance intervals, at least every quarter of a year.
Moreover, the correct position of the safeguard for rotating parts has to be inspected.

The following items of inspection are the main components of maintenance work:

Grease:	quantity of grease feeding, replacement of grease (see chapter 5.2 and 6.3)
Sealing elements:	leakages, replacing of sealing elements (see chapter 6.4)
Shaft displacements:	re-aligning the coupling (see chapter 4.6)
Spline:	wear, inspection of circumferential backlash (see chapter 6.5 and 6.6)

Maintenance intervals in hazardous areas:

W A R N I N G !
If the coupling is used in hazardous areas, considerably shorter maintenance intervals have to be observed!
The coupling has to be inspected after approx. 200 operating hours or every month at the maximum.

6.2 Breakdowns, causes and elimination

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

If used other than intended the coupling can become a source of ignition.
EC directive 94/9/EC requires special care from the manufacturer and the user.

C A U T I O N !
Disregarding the hints and inappropriate use may cause damages to the coupling.
The failure on the coupling may cause standstill of the operation and the overall machine.

General failures with use other than intended:

- Important data for the coupling selection were not forwarded.
- The calculation of the shaft/hub connection was not considered.
- Coupling components with damage occurred during transport are assembled.
- If the heated hubs are assembled, the permissible temperature is exceeded.
- If mounted in heated condition, the O-rings are heated excessively/damaged.
- The clearance of the components to be assembled is not coordinated with each other.
- Tightening torques have been fallen below/exceeded.
- Components are exchanged by mistake/assembled incorrectly.
- No original **KTR** parts (purchased parts) are used.
- Old/already worn out coupling parts stored for too long are used.
- The coupling used/the coupling protection used is not suitable for the operation in hazardous areas and does not correspond to EC directive 94/9/EC, respectively.
- Maintenance intervals are not observed.
- No lubricants recommended by **KTR** are used.
- Operating temperatures are exceeded.
- Axial fastening of hubs not available or working loose.

6 Maintenance and service

6.2 Breakdowns, causes and elimination

Continuation:

- Insufficient or inappropriate lubrication.
- Operating conditions were modified inappropriately.

Breakdowns	Causes	Hazard notes for hazardous locations	Elimination
Different operating noise and/or vibrations occurring	Misalignment/the permissible displacement figures are exceeded	Ignition risk due to hot surfaces and sparking	1) Set the unit out of operation 2) Eliminate the reason for the misalignment (e. g. loose foundation bolts, breaking of the engine mount, heat expansion of unit components, modification of the mounting dimension E of the coupling) 3) Inspection of wear 4) Re-align the coupling
	Axial securing of hub working loose		1) Set the unit out of operation 2) Inspect alignment of coupling 3) Inspection of wear 4) Secure the hubs axially and against self-loosening
	Lack of grease		1) Set the unit out of operation 2) Inspection of wear 3) Lubricant has to be replaced 4) Inspect the seals and replace seals, if necessary
Excessive wear of toothing	Vibrations of drive		1) Set the unit out of operation 2) Disassemble the coupling and remove residues of wear 3) Inspect coupling components and replace coupling components that are damaged 4) Find out the reason for the vibrations 5) Assemble new coupling parts 6) Inspect alignment, adjust if necessary
	Misalignment/the permissible displacement figures are exceeded		1) Set the unit out of operation 2) Eliminate the reason for the misalignment (e. g. loose foundation bolts, breaking of the engine mount, heat expansion of unit components, modification of the mounting dimension E of the coupling) 3) Inspection of wear 4) Re-align the coupling
	Lack of grease		1) Set the unit out of operation 2) Inspection of wear 3) Lubricant has to be replaced 4) Inspect the seals and replace seals, if necessary
Leakages/ escape of grease	O-rings have worn off		1) Set the unit out of operation 2) Inspection of wear 3) Drain lubricating grease 4) Replace seals 5) Filling of lubricating grease
	O-rings have been damaged subject to incorrect storage or during the assembly		1) Set the unit out of operation 2) Inspection of wear 3) Drain lubricating grease 4) Replace O-rings 5) Please make sure proper storage of the O-rings or correct errors in assembly, respectively 6) Filling of lubricating grease

6 Maintenance and service

6.2 Breakdowns, causes and elimination

Breakdowns	Causes	Hazard notes for hazardous locations	Elimination
Leakages/ escape of grease	O-rings are in contact with aggressive liquids/oils, influence of ozone, too high ambient temperatures	Ignition risk due to hot surfaces and sparking	1) Set the unit out of operation 2) Inspection of wear 3) Drain lubricating grease 4) Eliminate negative influences on the O-rings 5) Replace O-rings 6) Filling of lubricating grease
Breaking of spline/breaking of sleeve	Breaking of spline/sleeve subject to high dynamic energy/overload		1) Set the unit out of operation 2) Disassemble the coupling and remove the residues of fracture 3) Find out the reason for overload 4) Inspect coupling components and replace coupling components that are damaged 5) Insert sleeve, assemble coupling components
	Operating parameters do not correspond to the performance of the coupling		1) Set the unit out of operation 2) Disassemble the coupling and remove the residues of fracture 3) Review the operating parameters and select a bigger coupling (consider mounting space) 4) Assemble, align and lubricate the new coupling size according to the GEARex® operating/mounting instructions
	Operating error of the unit		1) Set the unit out of operation 2) Disassemble the coupling and remove the residues of fracture 3) Inspect coupling components and replace coupling components that are damaged 4) Insert sleeve, assemble coupling components 5) Instruct and train the service staff
	Lack of grease		1) Set the unit out of operation 2) Disassemble the coupling and remove the residues of fracture 3) Inspect the seals and coupling components and replace, if necessary 4) Assemble, align and lubricate the new coupling components/seals as per GEARex® operating/mounting instructions
	Misalignment/the permissible displacement figures are exceeded		1) Set the unit out of operation 2) Disassemble the coupling and remove the residues of fracture 3) Eliminate the reason for the misalignment (e. g. loose foundation bolts, breaking of the engine mount, heat expansion of unit components, modification of the mounting dimension E of the coupling) 4) Assemble, align and lubricate the new coupling components as per GEARex® operating/mounting instructions

6 Maintenance and service

6.3 Replacement of grease

C A U T I O N !
In order to ensure a long service life of the coupling and avoid damages on the coupling, the quantities of grease indicated for the different coupling sides and the intervals of replacement of grease absolutely have to be observed!

W A R N I N G !
Grease has to be collected completely and disposed of according to the regulations that apply.

D A N G E R !
Please observe the manufacturer's instructions on handling lubricants.

The replacement of grease depends on various operating conditions such as load, ambient temperature, speed, shaft displacements and operating period. Anyway, the replacement of grease is recommended for an operation up to 70 °C after about 8,000 hours of operation, a maximum of 2 years and for an operation exceeding 70 °C after about 3,000 hours of operation, a maximum of 1 year.

Please note that when you replace the grease the remaining quantities in the coupling should be kept as small as possible.
Please have the manufacturer confirm the compatibility of the new lubricant by remainders of the former lubricant.

W A R N I N G !
If the coupling is used in hazardous areas, considerably shorter maintenance intervals have to be observed!
The coupling has to be inspected after approx. 200 operating hours or every month at the maximum.

A T T E N T I O N !
Lubricants of various types and manufacturers must not be mixed!

Procedure for the replacement of grease:

- Inspect the tightness and replace the sealing elements, if necessary.
- Turn the coupling until the locking screws are in vertical position (see illustration 29).
- Remove the locking screws (component 7) along with the sealing washers (component 6) and afterwards drain the grease into a suitable tank. To facilitate the replacement you may add thin-fluid oil.

A T T E N T I O N !
Please check the compatibility of the oil with the grease!

- Perform grease feeding as per chapter 5.4.
- Please repeat this procedure with the other coupling half.

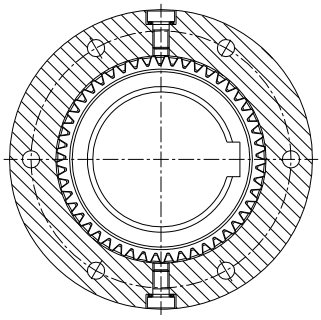


Illustration 29: Vertical position of locking screws

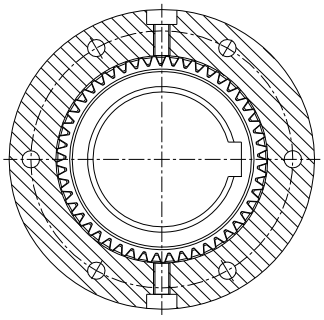


Illustration 30: Removing the locking screws and sealing washers

6 Maintenance and service

6.4 Replacement of sealing elements

C A U T I O N !
In case of leakages (escape of grease) defective sealing elements have to be replaced immediately!
The coupling may be damaged if these hints are disregarded.
The grease escaped has to be fully collected and disposed of according to the regulations that apply.

Replacement of flat seal (component 5):

If the flat seal (component 5) is defective/untight, it has to be replaced immediately. Furthermore with each re-assembly of the coupling we would recommend to replace the flat seal (component 5) and the dowel pins (component 3) as well as nuts (component 4).

- Drain the grease as per chapter 6.3.
- Unscrew and remove the screwing (components 3 and 4) of the sleeves (component 2).
- Shift the sleeve (component 2) axially backwards until the flat seal (component 5) may be disassembled and replaced.
- Lightly grease the sealing surfaces and insert new flat seals (component 5). Afterwards inspect the alignment and, if necessary, re-align and assemble.
- Perform grease feeding as per chapter 5.4.

Replacement of O-rings (component 8):

The O-rings (component 8) can be replaced with no need to shift power packs to be connected, provided that the shaft shoulder is not bigger than the outside diameter D of the hubs (component 1).

- Drain the grease as per chapter 6.3.
- Unscrew and remove the screwing (components 3 and 4) of the sleeves (component 2).
- Shift the sleeves (component 2) from the spline and the hub (component 1) until the O-ring (component 8) can be removed.
- Cut a new O-ring (component 8) radially in one position or cut the O-ring to periphery.
- Put the O-ring (component 8) around the shaft and afterwards glue the separation line, e. g. with Loctite 401.
- Insert the O-ring (component 8) into the keyway of the sleeve (component 2).
- Assemble the sleeves as per chapter 4 and 5 and start with the operation.

A T T E N T I O N !
If O-rings (component 8) only are to be used, the power packs to be combined have to be shifted and the coupling has to be disassembled as per chapter 6.9.

C A U T I O N !
Protect O-rings (component 8) and flat seals (component 5) on the driving and driven side against damages and heat.

C A U T I O N !
Please note the manufacturer's instructions regarding the use of adhesives.

6 Maintenance and service

6.5 Standard values for circumferential backlash

C A U T I O N !
To check the torsional backlash the power pack which is switched off needs to be secured against accidental switch-on.

Driving side

- Turn the hub opposite the direction of drive.

C A U T I O N !
Here the sleeve must not be axially displaced from its position of wear.

- Mark sleeve (component 2) and hub (component 1) (see illustration 31).
- Turn the hub (component 1) in the direction of drive and measure the torsional backlash ΔS_{max}.
- When reaching the torsional backlash ΔS_{max} the coupling must be replaced.

Driven side

- Turn the hub in the direction of drive.

C A U T I O N !
Here the sleeve must not be axially displaced from its position of wear.

- Mark sleeve (component 2) and hub (component 1) (see illustration 31).
- Turn the hub (component 1) in opposite direction to the direction of drive and measure the torsional backlash ΔS_{max}.
- When reaching the torsional backlash ΔS_{max} the coupling must be replaced.

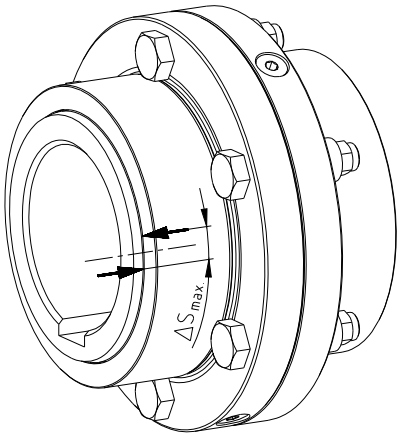


Illustration 31: Marking of the hub and the sleeve

6 Maintenance and service

6.6 Standard values of wear

In case of a torsional backlash of ≥ $\triangle S_{max}$ [mm], the coupling must be replaced.

Reaching the limits for replacing depends on the operating conditions and the existing operating parameters.

C A U T I O N !
In order to ensure a long service life of the coupling and avoid dangers with the use in hazardous locations, the shaft ends must be accurately aligned.
Please absolutely observe the displacement figures indicated (see table 11). If the figures are exceeded, the coupling will be damaged.

Table 13: Values of wear

GEARex® size	Torsional backlash $\triangle S_{max.}$ [mm] (limits of wear for each hub)	GEARex® size	Torsional backlash $\triangle S_{max.}$ [mm] (limits of wear for each hub)
10	1.0	55	2.5
15	1.0	60	2.5
20	1.0	70	2.5
25	1.5	80	3.0
30	1.5	85	3.0
35	1.5	90	4.0
40	2.0	100	4.0
45	2.0	110	4.5
50	2.0	120	4.5

6.7 Cleaning of the coupling

W A R N I N G !
Please ensure sufficient ventilation and follow the manufacturers' hints regarding the handling of solvents and detergents.
Avoid any kinds of ignition sources.

When the coupling is assembled/disassembled, the coupling components should be subject to careful cleaning. Specifically the sealing surfaces and the area of the spline should be free from dirt, wear and old grease.
A subsequent correct assembly (chapter 4) and startup (chapter 5) has to be ensured.

6 Maintenance and service

6.8 Replacement of coupling

If the maximum standard values of wear as per chapters 6.5 and 6.6 are achieved, the coupling has to be replaced completely.
Replacement may only be effected in pairs (hub (component 1) and sleeve (component 2)) for each coupling half!
Disassembly has to be effected as per chapter 6.9.

C A U T I O N !
If the advice is disregarded and the limit of wear is exceeded, the coupling may be damaged.
The failure on the coupling may cause standstill of the operation and the overall machine.
Rotating particles may cause danger to life.

6.9 Disassembly of the coupling

D A N G E R !
With disassembly, operation and maintenance of the coupling it has to be made sure that the entire drive train is secured against accidental switch-on.

C A U T I O N !
In case that a dimensional drawing has been prepared for the coupling, the dimensions shown have to be respected primarily.
The operator of the machine should be provided with the dimensional drawing.

It is necessary to disassemble the coupling if coupling components have to be inspected for damages or have to be replaced. Moreover, a disassembly is necessary to replace the sealing elements.

- Drain the grease as per chapter 6.3.
- Unscrew the dowel screws and shift the sleeves (component 2) axially backwards until the spline is no longer engaged.
- Mark the spline of the sleeves (component 2) versus the hubs (component 1).
- Move the power packs apart.
- Clean the coupling (see chapter 6.7) and inspect the coupling components, sealing surfaces and spline.
- Replace damaged components.
- A re-assembly has to be performed as per chapters 4 and 5.

C A U T I O N !
Components that are damaged or worn off have to be replaced!

C A U T I O N !
For each re-assembly of the coupling we would recommend to replace the flat seal (component 5) and the dowel pins (component 3) as well as nuts (component 4).

W A R N I N G !
Heating the coupling components produces a higher danger of ignition.
A non-hazardous environment has to be assured.

6 Maintenance and service

6.9 Disassembly of the coupling

If the coupling hubs (component 1) have to be disassembled, the axial fixing of the hubs has to be removed first. With constant heating (approx. 80 °C) of the coupling hubs (component 1) by means of a torch and a puller, the hubs (component 1) can be pulled from the shafts of the power packs.
The sealing surfaces, the spline, the hub bore and the shaft have to be inspected for damages.
A re-assembly has to be performed as per the instructions in chapter 4 and 5.

C A U T I O N !
Never use the sleeves (component 2) to pull-off the hubs (component 1)!

C A U T I O N !
Please make use of proper pullers. The shaft bearing must not be loaded.

6.10 Spares inventory, customer service addresses

A basic requirement to ensure 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 at www.ktr.com.

The following details should be mentioned when ordering spare parts:

- Original order number
- Material number
- Description and quantity

C A U T I O N !
KTR does not assume any liability or warranty for the use of spare parts and accessories which are not provided by KTR and for the damages which may incur as a result.

7 Enclosure A

Advice and instructions regarding the use in Ex hazardous locations

Type FA, FB, FAB: hub / sleeve / hub
Type DA, DB, DAB: hub / sleeve / hub

7.1 Intended use in Ex hazardous locations

Conditions of operation in Ex hazardous locations

GEARex® couplings are suitable for the use according to EC directive 94/9/EC.

1. Industry (with the exception of mining)

- Equipment group II of category 2 and 3 (*coupling is not approved for equipment group 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 group IIC (*explosion class IIA and IIB are included in IIC*)

Temperature class:

Temperature class	Ambient or operating temperature T_a	Max. surface temperature
T4, T3, T2, T1	- 30 °C to + 90 °C [1)]	+ 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 + 80 °C due to the permissible permanent operating temperature of the GEARex® 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

Equipment group I of category M2 (coupling is not approved for equipment group M1).
Permissible ambient temperature - 30 °C to + 90 °C.

7.2 Ex marking of coupling for hazardous locations

The marking with ATEX of the GEARex® all-steel gear coupling is effected on the front of the hub or on the outside diameter of the sleeve, respectively.

Short labelling: (standard) — Ex II 2G c IIC T X/II 2D c T X/I M2 c X

Complete labelling: Ex
II 2G c IIC T6, T5 resp. T4
- 30 °C ≤ T_a ≤ + 65 °C, + 80 °C resp. + 90 °C
II 2D c T 110 °C - 30 °C ≤ T_a ≤ + 90 °C
I M2 c - 30 °C ≤ T_a ≤ + 90 °C

The labelling with explosion group IIC includes the explosion group IIB.

If the symbol Ex was stamped in addition to U, the coupling component was supplied unbored or pilot bored by KTR.

7 Enclosure A

Advice and instructions regarding the use in Ex hazardous locations

7.3 Inspection intervals for couplings in Ex hazardous locations

Explosion group	Inspection 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 ignition risk analysis the couplings are free from any ignition source. Merely the temperature increase produced by self-heating and depending on the coupling type has to be considered: for GEARex®: $\Delta T = 20$ K
II 2G c IIB II 2D c T1, T2, T3, T4, T5, T6	An inspection of the circumferential backlash and a visual inspection of the components must be performed after 2,000 operating hours for the first time, at the latest after 6 months after start-up of the coupling. If you note insignificant or no wear on the components upon this initial inspection, further inspections can each be performed after 4,000 operating hours or at the latest after 18 months, provided that the operating parameters remain the same. If you note significant wear during the initial inspection so that it would be recommendable to replace the components, please find out the cause according to the table „Breakdowns“, if possible. The maintenance intervals must be adjusted to the modified operating parameters without fail.
II 2G c IIC II 2D c T1, T2, T3, T4, T5, T6	An inspection of the circumferential backlash and a visual inspection of the components must be performed after 1,000 operating hours for the first time, at the latest after 3 months after start-up of the coupling. If you note insignificant or no wear on the components upon this initial inspection, further inspections can each be performed after 2,000 operating hours or at the latest after 12 months, provided that the operating parameters remain the same. If you note significant wear during the initial inspection so that it would be recommendable to replace the components, please find out the cause according to the table „Breakdowns“, if possible. The maintenance intervals must be adjusted to the modified operating parameters without fail.

GEARex® coupling

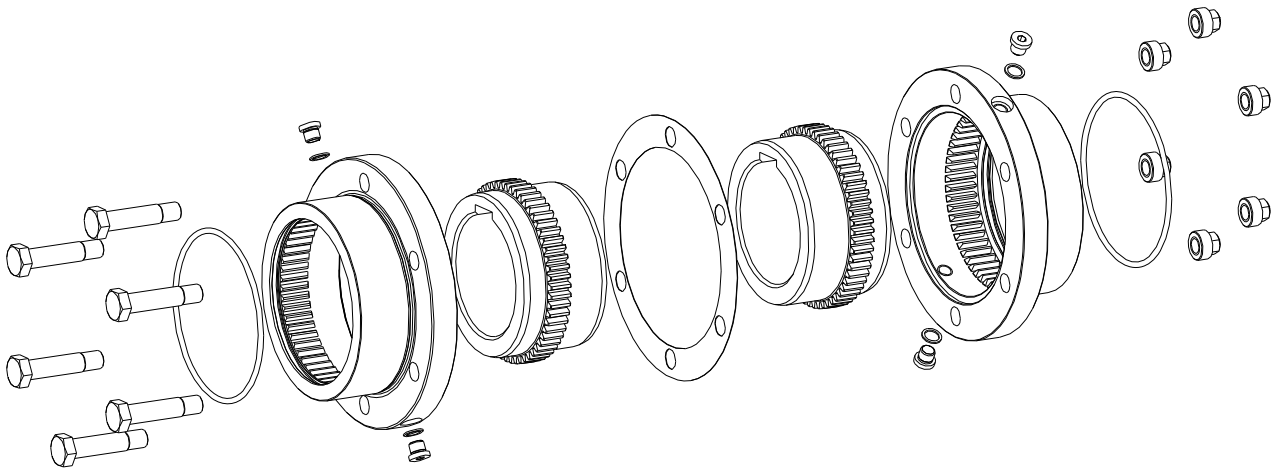


Illustration 32: GEARex® coupling

Here the backlash between the the spline of the hub and the sleeve must be inspected via torsional backlash, each separately from the driving and the driven side.
When reaching the torsional backlash $\Delta S_{max.}$, the sleeve must be replaced immediately, irrespective of the inspection intervals.

7 Enclosure A

Advice and instructions regarding the use in Ex hazardous locations

7.4 EC Certificate of conformity

EC Certificate of conformity

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

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

GEARex® All-steel gear couplings

in an explosion-proof design described in these assembly instructions correspond to article 1 (3) b) of directive 94/9/EC and comply with the general safety and health requirements according to enclosure II of directive 94/9/EC.

The GEARex® all-steel gear coupling is in accordance with the specifications of the directive 94/9/EC. One or several directives mentioned in the corresponding EC type examination certificate IBExU11ATEXB016 X were in part replaced by updated versions.
KTR Kupplungstechnik GmbH being the manufacturer confirms that the product mentioned above is in accordance with the specifications of the new directives, too.

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

IBExU
Institut für Sicherheitstechnik GmbH
Fuchsmühlenweg 7

09599 Freiberg

Rheine,	2013-04-08	i. V.	i. A.
Place	Date	Reinhard Wibbeling Head of Engineering	Ansgar Silies Product Manager