

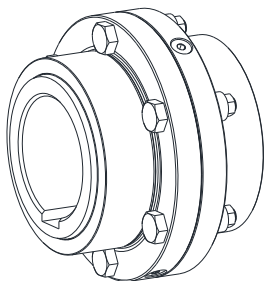


GEARex®

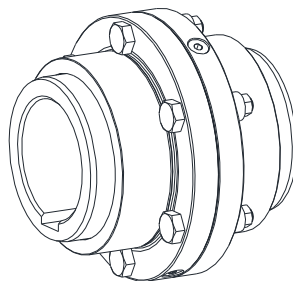
All-steel gear couplings type:

FA, FB, FAB, DA, DB, DAB, FH, DH, FR and DR along with their combinations

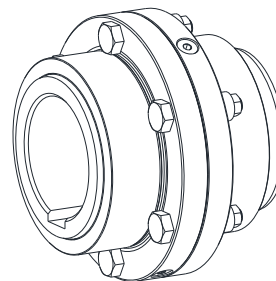
according to directive 2014/34/EU and UK directive SI 2016 No. 1107



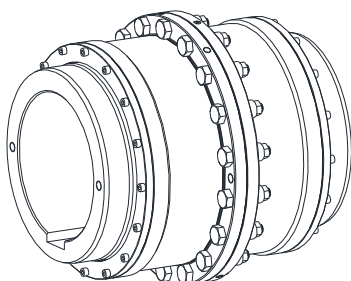
Type FA



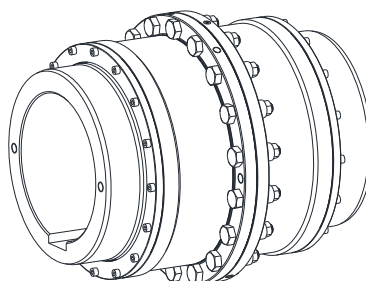
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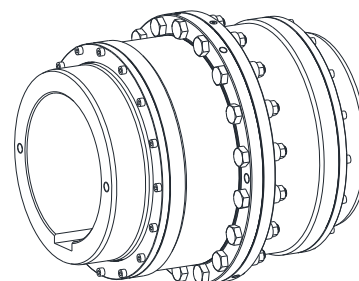
Type FAB



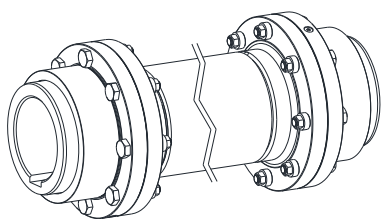
Type DA



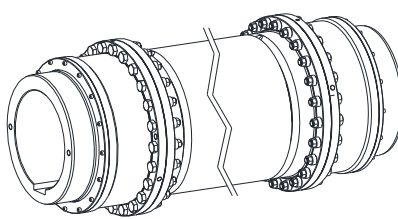
Type DB



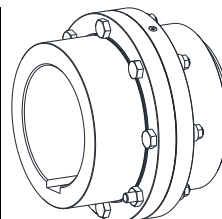
Type DAB



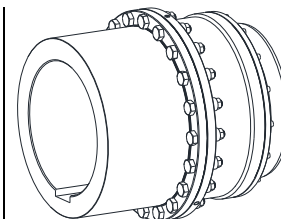
Type FH



Type DH



Type FR



Type DR



The GEARex® all-steel gear coupling is a flexible shaft connection. It is able to compensate for shaft misalignment, for example caused by manufacturing inaccuracies, thermal expansion, etc.

Table of contents

1	Technical data	4
2	Advice	8
2.1	General advice	8
2.2	Safety and advice symbols	8
2.3	General hazard warnings	8
2.4	Intended use	9
2.5	Coupling selection	9
2.6	Reference to EC Machinery Directive 2006/42/EG	9
3	Storage, transport and packaging	10
3.1	Storage of the coupling	10
3.2	Storage of O-rings	10
3.3	Transport and packaging	10
4	Assembly	10
4.1	Components of the couplings	11
4.2	Advice for finish bore	15
4.3	Assembly of the coupling (general)	16
4.4	Assembly of types FA, FB, FAB, FH and FR	17
4.5	Assembly of types DA, DB, DAB, DH and DR	19
4.6	Displacements - alignment of the couplings	22
5	Start-up and lubrication	24
5.1	Start-up of the coupling	24
5.2	Types of grease recommended	25
5.3	Grease feeding	26
5.4	Grease filling	27
6	Breakdowns, causes and elimination	28
7	Maintenance and service	30
7.1	Maintenance interval	30
7.2	Replacement of grease	31
7.3	Replacement of sealing elements	32
7.4	Standard values for circumferential backlash	33
7.5	Standard values of wear	34
7.6	Cleaning of the coupling	34
7.7	Replacement of coupling	34
7.8	Disassembly of the coupling	35
8	Disposal	36
9	Spares inventory, customer service addresses	36
9.1	Spare parts - Assemblykit	37

Table of contents

10	Enclosure A Advice and instructions regarding the use in  potentially explosive atmospheres	38
10.1	Intended use in  potentially explosive atmospheres	38
10.2	Inspection intervals for couplings in  potentially explosive atmospheres	39
10.3	 marking of coupling for potentially explosive atmospheres	40
10.4	EU Declaration of conformity	42
10.5	UK Declaration of conformity	43

1 Technical data

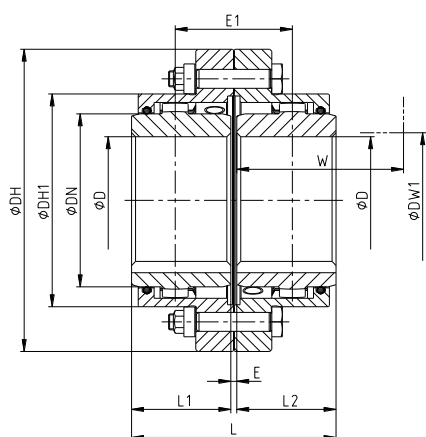


Illustration 1: Type FA

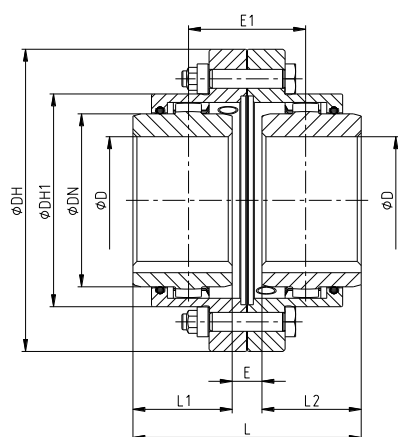


Illustration 2: Type FB

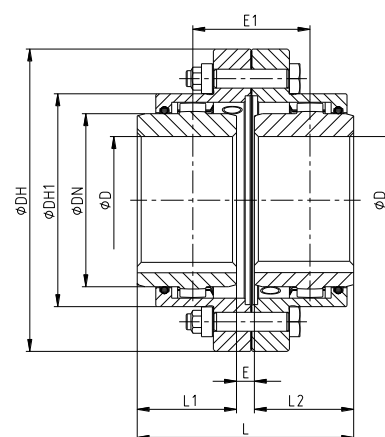


Illustration 3: Type FAB

Table 1: Dimensions - FA, FB and FAB

Size	Pilot bore	Max. finish bore ¹⁾ D	Dimensions in mm													
			L1, L2	L1, L2 ²⁾	E			L			E1	DN	DH	DH1	W ³⁾	DW1 ³⁾
					FA	FB	FAB	FA	FB	FAB						
10	26	50	43	105	3	21	12	89	107	98	55	67	111	83	74	52
15	26	65	50	115	3	15	9	103	115	109	59	87	142	106	84	68
20	31	82	62	130	3	31	17	127	155	141	79	108	174	129	107	85
25	38	100	76	150	5	29	17	157	181	169	93	130	213	157	126	105
30	44.5	115	90	170	5	33	19	185	213	199	109	153	240	181	148	125
35	46	135	105	185	6	40	23	216	250	233	128	180	280	213	172	150
40	52	160	120	215	6	42	24	246	282	264	144	214	318	249	192	175
45	80	175	135	245	8	50	29	278	320	299	164	233	347	273	216	190
50	80	195	150	295	8	56	32	308	356	332	182	260	390	308	241	220
55	90	215	175	300	8	70	39	358	420	389	214	283	425.5	333	279	250
60	100	240	190	305	8	84	46	388	464	426	236	312	457	364.5	316	265
70	100	285	220	310	10	76	43	450	516	483	263	371	527	424	360	300

Table 2: Technical data - FA, FB and FAB

Size	Torque ⁴⁾ in Nm		Max. speed in rpm	Weight with max. bore in kg			Mass moment of inertia with max. bore in kgm ²	Hexagon dowel screws / nuts		
	T _{KN}	T _{KN} (42CrMo4)		Sleeve	Hub	Total		Z	M	T _A in Nm
10	930	1580	8500	0.75	0.55	2.75	0.004	6	M6	15
15	2000	3300	6400	1.50	1.10	5.60	0.015	8	M8	36
20	3500	6300	5400	2.40	2.10	9.50	0.037	6	M10	72
25	6500	11000	4500	4.30	3.60	16.60	0.096	6	M12	125
30	10000	17400	4000	5.70	6.20	25.00	0.178	8	M12	125
35	17000	28800	3500	9.50	9.90	40.90	0.410	8	M14	200
40	28500	48500	3100	11.60	16.00	57.50	0.746	8	M14	200
45	37000	62000	3000	15.40	21.40	76.50	1.163	10	M14	200
50	51000	86000	2500	25.30	29.50	113.50	2.229	8	M18	430
55	65000	110000	2300	31.00	40.20	149.00	3.415	14	M18	430
60	85000	145000	2100	32.10	52.80	175.70	4.514	14	M18	430
70	135000	240000	1850	42.50	85.50	265.50	9.212	16	M20	610

- 1) Max. finish bore, feather keyway according to DIN 6885 sheet 1
- 2) Hub lengthened max. L1, L2
- 3) Mounting space required to align the coupling and replace the gasket
- 4) Maximum torque of coupling T_{K max.} = rated torque of coupling T_{KN} x 2



1 Technical data

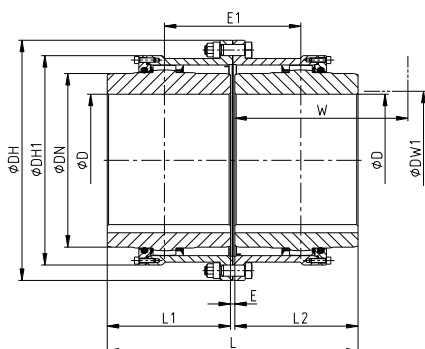


Illustration 4: Type DA

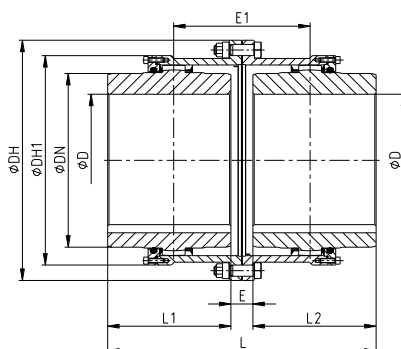


Illustration 5: Type DB

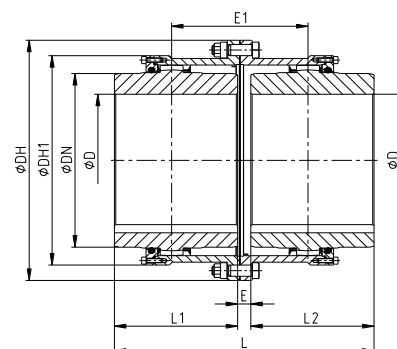


Illustration 6: Type DAB

Table 3: Dimensions - DA, DB and DAB

Size	Pilot bore	Max. finish bore ¹⁾ D	Dimensions in mm													
			L1, L2	L1, L2 ²⁾	E			L			E1	DN	DH	DH1	W ³⁾	DW1 ³⁾
					DA	DB	DAB	DA	DB	DAB						
20	31	82	62	130	3	31	17	127	155	144	79	108	187	146	107	85
25	38	100	76	150	5	29	17	157	181	169	93	130	220	172	126	105
30	44.5	115	90	170	5	33	19	185	213	199	109	153	248	194	140	125
35	46	135	105	185	6	40	23	216	250	233	128	180	285	228	155	155
40	52	160	120	215	6	42	24	246	282	264	144	214	335	270	180	180
45	80	175	135	245	8	50	29	278	320	299	164	233	358	294	195	200
50	80	195	150	295	8	56	32	388	356	332	182	260	390	322	210	230
55	90	215	175	300	8	70	39	358	420	389	214	283	425.5	354	235	250
60	100	240	190	305	8	84	46	388	464	426	236	312	457	380	270	275
70	100	285	220	310	10	76	43	450	516	483	263	371	527	445	300	335
80	140	300	280	-	10	50	30	570	610	590	310	394	545	475	360	358
85	160	325	292	-	13	53	33	597	637	617	325	430	585	515	372	395
90	180	350	305	-	13	83	48	623	693	658	353	464	640	560	385	428
100	220	390	330	-	13	93	53	673	753	713	383	512	690	612	410	465
110	220	420	350	-	20	296	158	720	996	858	508	560	765	665	440	515
120	260	450	420	-	25	421	223	864	1261	1063	643	608	825	720	510	560
130	300	500	440	-	25	415	220	905	1295	1100	660	684	980	805	540	628
140	380	550	460	-	20	430	225	940	1350	1145	685	750	1055	875	560	695
150	460	630	520	-	30	460	245	1070	1500	1285	765	850	1180	975	630	785

Table 4: Technical data - DA, DB and DAB

Size	Torque ⁴⁾ in Nm		Max. speed in rpm	Weight with max. bore in kg			Mass moment of inertia with max. bore in kgm ²	Hexagon dowel screws / nuts		
	T _{KN}	T _{KN} (42CrMo4)		Sleeve	Hub	Total		Z	M	T _A in Nm
20	3500	6300	5400	3.6	2.1	12.8	0.056	6	M10	72
25	6500	11000	4500	5.5	3.6	20.3	0.125	6	M12	125
30	10000	17400	4000	6.9	6.2	28.9	0.219	8	M12	125
35	17000	28800	3500	11.2	9.8	46.6	0.488	8	M14	200
40	28500	48500	3100	16.3	15.9	70.9	1.011	8	M14	200
45	37000	62000	3000	20.2	21.4	90.7	1.482	10	M14	200
50	51000	86000	2500	27.0	29.5	123.5	2.474	8	M18	430
55	65000	110000	2300	32.6	40.2	159.1	3.714	14	M18	430
60	85000	145000	2100	32.0	52.8	184.4	4.810	14	M18	430
70	135000	240000	1850	43.8	85.5	280	9.907	16	M20	610
80	175000	300000	1750	64	117	362	14.214	18	M20	610
85	225000	380000	1650	75	148	446	20.320	20	M20	610
90	-	500000	1550	101	183	568	31.036	20	M24	1000
100	-	650000	1500	117	232	698	45.358	24	M24	1000
110	-	820000	1250	140	295	940	73.880	20	M30	1700
120	-	1050000	1150	188	430	1312	118.40	24	M30	1700
130	-	1450000	1000	330	595	1965	235.431	20	M36	2800
140	-	1950000	950	391	751	2411	343.432	24	M36	2800
150	-	2750000	850	488	1057	3242	575.453	30	M36	2800

- 1) Max. finish bore, feather keyway according to DIN 6885 sheet 1
- 2) Hub lengthened max. L1, L2
- 3) Mounting space required to align the coupling and replace the gasket
- 4) Maximum torque of coupling T_{K max.} = rated torque of coupling T_{KN} × 2



1 Technical data

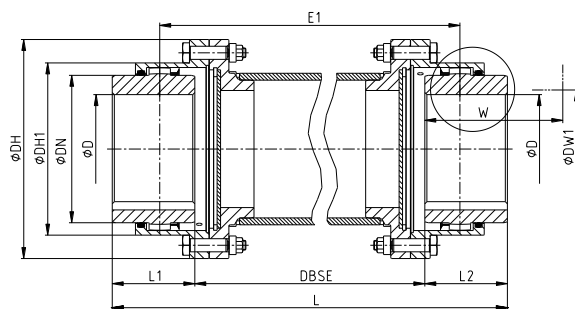


Illustration 7

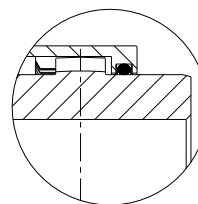
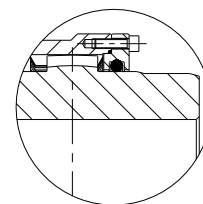
Type FH
(size 10 to 70)Type DH
(size 20 to 150)

Illustration 8: type FH / DH

Table 5: Dimensions - FH and DH

Size	Pilot bore	Max. finish bore ¹⁾ D	Dimensions in mm												
			L1, L2	L1, L2 ²⁾	DN	DH ³⁾	DH1 ³⁾	L	E1		DBSE	W ⁴⁾		DW1 ⁴⁾	
									FH	DH		FH	DH	FH	DH
10	26	50	43	105	67	Type F see table 1 type D see table 3	L = L1 + L2 + DBSE	According to customer specification	According to customer specification	According to customer specification	74	-	52	-	
15	26	65	50	115	87						84	-	68	-	
20	31	82	62	130	108						107	107	85	85	
25	38	100	76	150	130						126	126	105	105	
30	44.5	115	90	170	153						148	140	125	125	
35	46	135	105	185	180						172	155	150	155	
40	52	160	120	215	214						192	180	175	180	
45	80	175	135	245	233						216	195	190	200	
50	80	195	150	295	260						241	210	220	230	
55	90	215	175	300	283						279	235	250	250	
60	100	240	190	305	312						316	270	265	275	
70	100	285	220	310	371						360	300	300	335	
80	140	300	280	-	394						-	360	-	358	
85	160	325	292	-	430						-	372	-	395	
90	180	350	305	-	464						-	385	-	428	
100	220	390	330	-	512						-	410	-	465	
110	220	420	350	-	560						-	440	-	515	
120	260	450	420	-	608						-	510	-	560	
130	300	500	440	-	684						-	540	-	628	
140	380	550	460	-	750						-	560	-	695	
150	460	630	520	-	850						-	630	-	785	

Table 6: Technical data - FH and DH

Size	Torque ⁵⁾ in Nm		Hexagon dowel screws / nuts		
	T _{KN}	T _{KN} (42CrMo4)	Z	M	T _A in Nm
10	930	1580	12	M6	15
15	2000	3300	16	M8	36
20	3500	6300	12	M10	72
25	6500	11000	12	M12	125
30	10000	17400	16	M12	125
35	17000	28800	16	M14	200
40	28500	48500	16	M14	200
45	37000	62000	20	M14	200
50	51000	86000	16	M18	430
55	65000	110000	28	M18	430
60	85000	145000	28	M18	430
70	135000	240000	32	M20	610
80	175000	300000	36	M20	610
85	225000	380000	40	M20	610
90	-	500000	40	M24	1000
100	-	650000	48	M24	1000
110	-	820000	40	M30	1700
120	-	1050000	48	M30	1700
130	-	1450000	40	M36	2800
140	-	1950000	48	M36	2800
150	-	2750000	60	M36	2800

- 1) Max. finish bore, feather keyway according to DIN 6885 sheet 1
- 2) Hub lengthened max. L1, L2
- 3) For dimensions of type F see table 1; type D see table 3
- 4) Mounting space required to align the coupling and replace the gasket
- 5) Maximum torque of coupling T_{K max.} = rated torque of coupling T_{KN} x 2

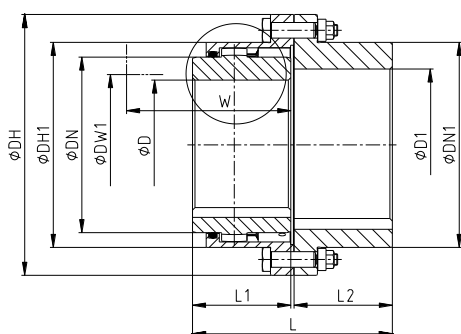
**1 Technical data**

Illustration 9

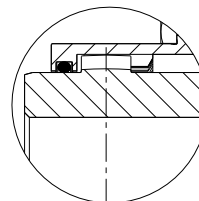
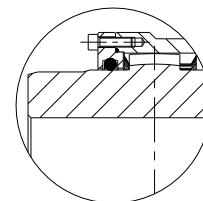
Type FR
(size 10 to 70)Type DR
(size. 20 to 150)

Illustration 10: Type FR / DR

Table 7: Dimensions - FR and DR

Size	Max. finish bore ¹⁾		Dimensions in mm										
	D	D1	L1, L2	L1, L2 ²⁾	DN	DH	DH1	DN1	L	W ³⁾		DW1 ³⁾	
										FH	DH	FH	DH
10	50	60	43	105	67	Type F see table 1 Type D see table 3		84	88	74	-	52	-
15	65	78	50	115	87			107	103	84	-	68	-
20	82	95	62	130	108			130	127	107	107	85	85
25	100	115	76	150	130			158	157	126	126	105	105
30	115	135	90	170	153			182	185	148	140	125	125
35	135	155	105	185	180			214	216	172	155	150	155
40	160	185	120	215	214			250	244	192	180	175	180
45	175	200	135	245	233			274	276	216	195	190	200
50	195	225	150	295	260			309	305	241	210	220	230
55	215	245	175	300	283			334	356	279	235	250	250
60	240	265	190	305	312			365.5	386	316	270	265	275
70	285	310	220	310	371			425	450	360	300	300	335
80	300	340	280	-	394			462	570	-	360	-	358
85	325	370	292	-	430			500	597	-	372	-	395
90	350	400	305	-	464			546	623	-	385	-	428
100	390	440	330	-	512			594	673	-	410	-	465
110	420	480	350	-	560			647	710	-	440	-	515
120	450	520	420	-	608			700	852	-	510	-	560
130	500	560	440	-	684			760	890	-	540	-	628
140	550	610	460	-	750			835	930	-	560	-	695
150	630	690	520	-	850			935	1055	-	630	-	785

Table 8: Technical data - FR and DR

Size	Torque ⁴⁾ in Nm		Hexagon dowel screws / nuts		
	T _{KN}	T _{KN} (42CrMo4)	Z	M	T _A in 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	-	500000	20	M24	1000
100	-	650000	24	M24	1000
110	-	820000	20	M30	1700
120	-	1050000	24	M30	1700
130	-	1450000	20	M36	2800
140	-	1950000	24	M36	2800
150	-	2750000	30	M36	2800

1) Max. finish bore, feather keyway according to DIN 6885 sheet 1

2) Hub lengthened max. L1, L2

3) Mounting space required to align the coupling and replace the gasket

4) Maximum torque of coupling T_{K max.} = rated torque of coupling T_{KN} × 2Please observe protection
note ISO 16016.Drawn: 2025-02-27 Fes/Ka
Verified: 2025-02-28 KaReplacing: KTR-N dated 2024-07-23
Replaced by:

2 Advice

2.1 General advice

Read carefully through these operating/assembly instructions before you start up the coupling.
Pay special attention to the safety instructions!



The **GEARex®** coupling is suitable and approved for use in potentially explosive atmospheres. When using the coupling in potentially explosive atmospheres, observe the special advice and instructions regarding safety in enclosure A.

The operating/assembly instructions are part of your product. Please store them carefully and close to the coupling. The copyright for these operating/assembly instructions remains with KTR.

2.2 Safety and advice symbols



Warning of potentially explosive atmospheres

This symbol indicates notes which may contribute to preventing bodily injuries or serious bodily injuries that may result in death caused by explosion.



Warning of personal injury

This symbol indicates notes which may contribute to preventing bodily injuries or serious bodily injuries that may result in death.



Warning of product damages

This symbol indicates notes which may contribute to preventing material or machine damage.



General advice

This symbol indicates notes which may contribute to preventing adverse results or conditions.



Warning of hot surfaces

This symbol indicates notes which may contribute to preventing burns with hot surfaces resulting in light to serious bodily injuries.

2.3 General hazard warnings



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. 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".
- Make sure to switch off the coupling and connected power packs 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 operating area of the coupling as long as it is in operation.
- Secure the coupling against accidental contact. Provide for the necessary protection devices and covers.

**2 Advice****2.4 Intended use**

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

- have carefully read through the operating/assembly instructions and understood them
- are technically qualified and specifically trained (e. g. safety, environment, logistics)
- are authorized by your company

The coupling may only be used in accordance with the technical data (see 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 operating/assembly instructions.

2.5 Coupling selection

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 catalogue drive technology "GEARex®").

If the operating conditions (performance, speed, modifications on engine and machine) change, the coupling selection must be reviewed.

The transmittable torque of the shaft-hub-connection must be reviewed by the customer and is subject to his responsibility.



If used in potentially explosive atmospheres clamping set connections and shrink fit connections (transverse interference fits) without feather key must be selected in that there is a minimum safety factor of $s = 2.0$ between the peak torque of the machine including all operating parameters and the frictional locking torque of the shaft-hub-connection. The responsibility for the shaft-hub-connection is subject to the customer. Please review the connection carefully.

For drives subjected 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 subjected 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.

2.6 Reference to EC Machinery Directive 2006/42/EG

The couplings supplied by KTR should be considered as components, not machines or partly completed machines according to EC Machinery Directive 2006/42/EC. Consequently KTR does not have to issue a declaration of incorporation. For details about safe assembly, start-up and safe operation refer to the present operating/assembly instructions considering the warnings.

**3 Storage, transport and packaging****3.1 Storage of the coupling**

Unless explicitly ordered differently, the coupling is supplied with preservation and may be stored in a dry and roofed place for a period of up to 3 months.

In case of a longer intended storage period consult with KTR.

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 numerous 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 +15 °C to +25 °C and a humidity below 70 %.



The O-rings (component 8) must not be stored mounted to the hubs (component 1).



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

3.3 Transport and packaging

In order to avoid any injuries and any kind of damage always make use of proper transport and lifting equipment.

The couplings are packed differently each depending on size, number and kind of transport. Unless otherwise contractually agreed, packaging will follow the in-house packaging specifications of KTR.

4 Assembly

Observe the manufacturer's instructions regarding the use of solvents.



Drive components falling down may cause injury to persons or damage on the machine. Secure the drive components with assembly resp. disassembly.

**4 Assembly**

The coupling is generally supplied in individual parts. Before assembly the coupling must 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	Hexagon dowel screws - 10.9
4	see table 2	Nut
5	1	Flat gasket
6	4	Washers DIN 7603
7	4	Screw plugs DIN 908 ¹⁾
8	2	O-ring - material 70 NBR

1) With size 10 cap screws DIN 7984 - 8.8

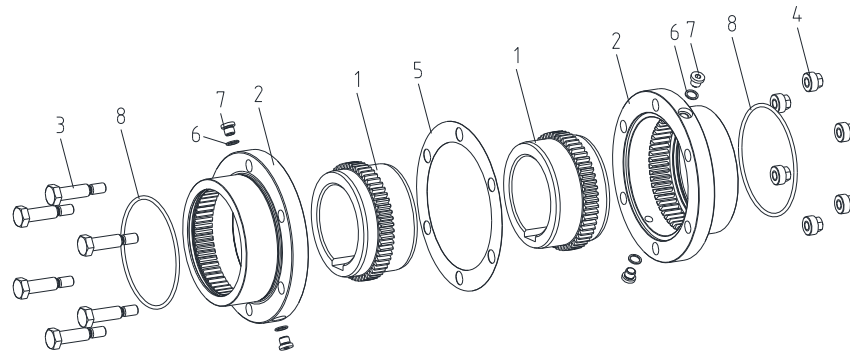


Illustration 11: GEARex® type FA

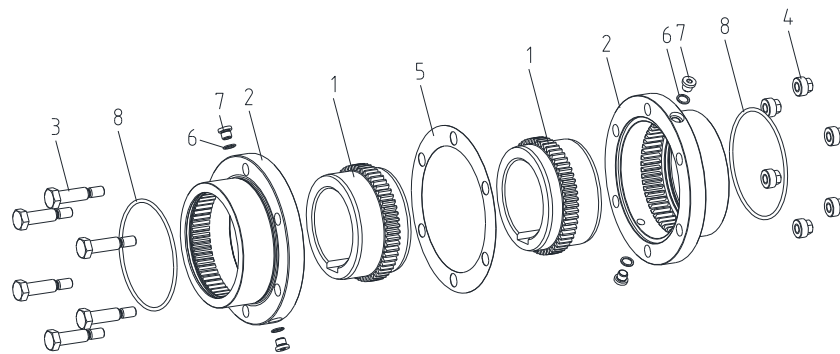


Illustration 12: GEARex® type FB

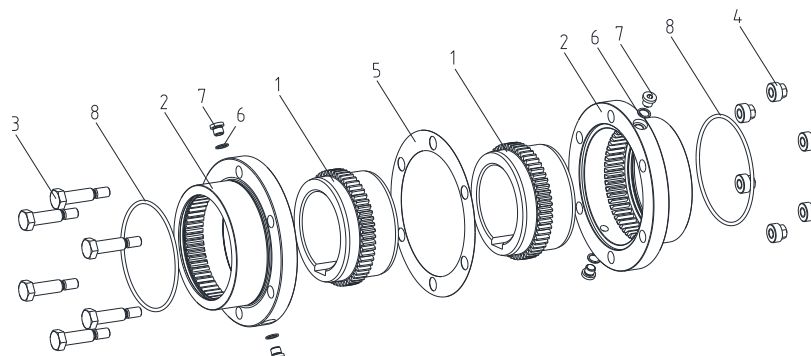


Illustration 13: GEARex® type FAB

**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	Hexagon dowel screws - 10.9
4	see table 4	Nut
5	1	Flat gasket
6	4	Washers DIN 7603
7	4	Screw plugs 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

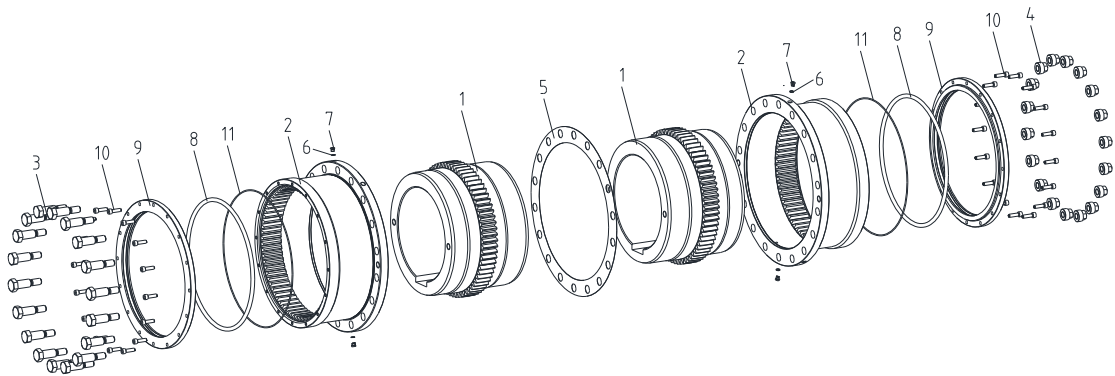


Illustration 14: GEARex® type DA

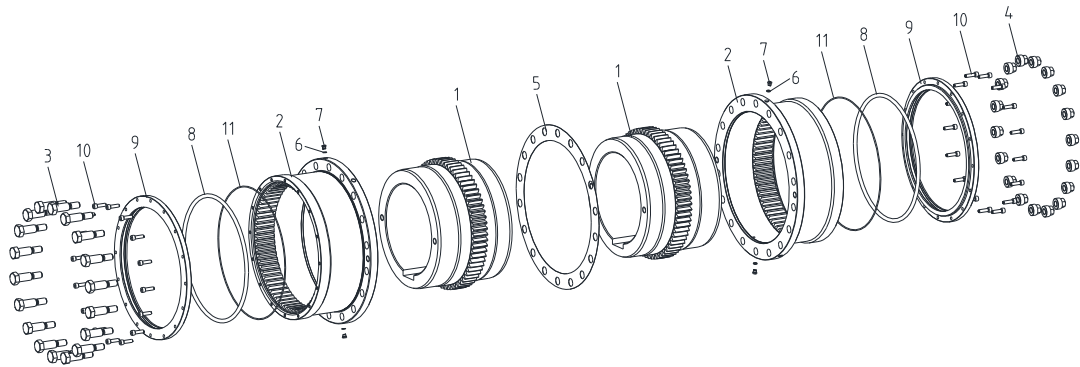


Illustration 15: GEARex® type DB

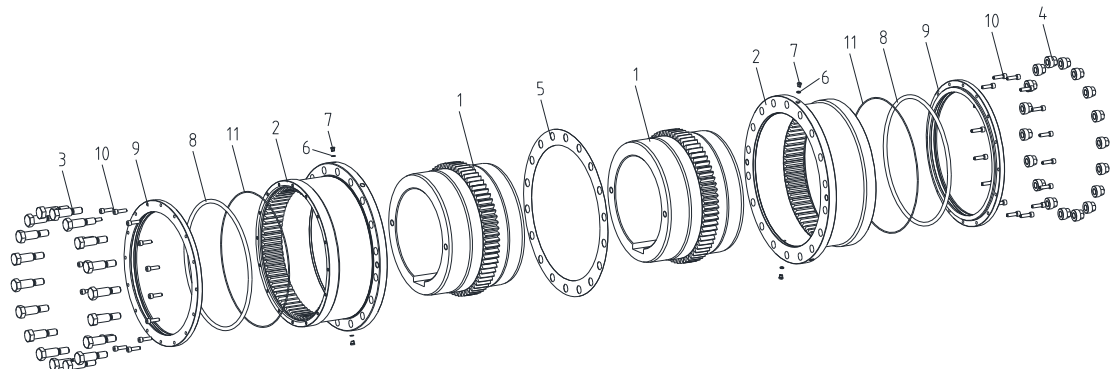


Illustration 16: GEARex® type DAB

**4 Assembly****4.1 Components of the couplings****Type FH**

Component	Quantity	Description
1	2	Hub
2	2	Sleeve
3	see table 6	Hexagon dowel screws - 10.9
4	see table 6	Nut
5	2	Flat gasket
6	4	Washers DIN 7603
7	4	Screw plugs DIN 908 ¹⁾
8	2	O-ring - material 70 NBR
13	1	Spacer

1) With size 10 cap screws DIN 7984 - 8.8

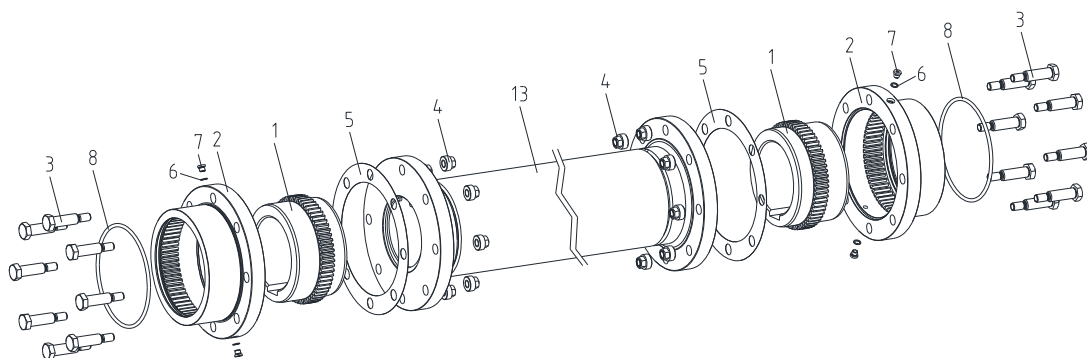


Illustration 17: GEARex® type FH

Type DH

Component	Quantity	Description
1	2	Hub
2	2	Sleeve
3	see table 6	Hexagon dowel screws - 10.9
4	see table 6	Nut
5	2	Flat gasket
6	4	Washers DIN 7603
7	4	Screw plugs 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

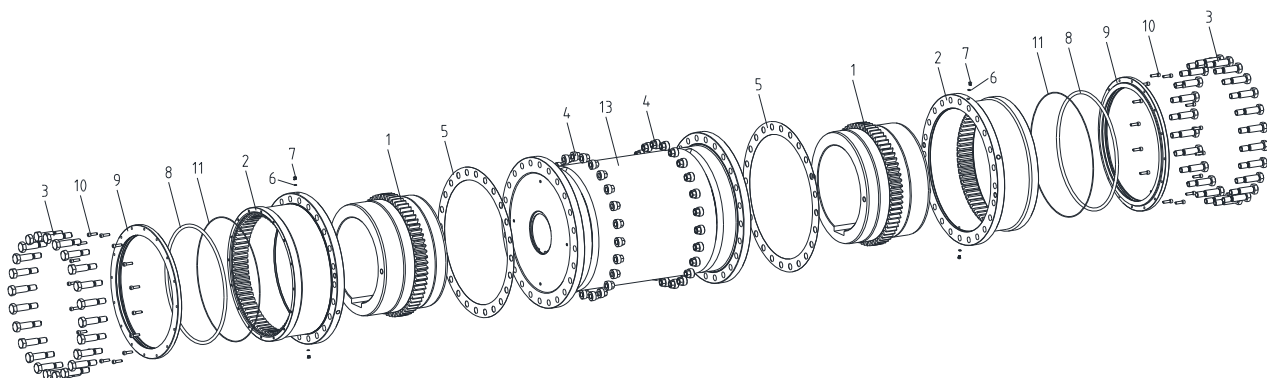


Illustration 18: GEARex® type DH

**4 Assembly****4.1 Components of the couplings****Type FR**

Component	Quantity	Description
1	1	Hub
2	1	Sleeve
3	see table 8	Hexagon dowel screws - 10.9
4	see table 8	Nut
5	1	Flat gasket
6	2	Washers DIN 7603
7	2	Screw plugs DIN 908 ¹⁾
8	1	O-ring - material 70 NBR
12	1	Flange hub

1) With size 10 cap screws DIN 7984 - 8.8

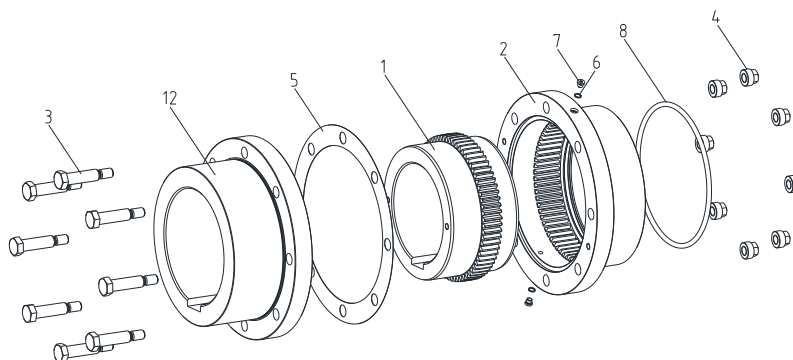


Illustration 19: GEARex® type FR

Type DR

Component	Quantity	Description
1	1	Hub
2	1	Sleeve
3	see table 8	Hexagon dowel screws - 10.9
4	see table 8	Nut
5	1	Flat gasket
6	2	Washers DIN 7603
7	2	Screw plugs 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

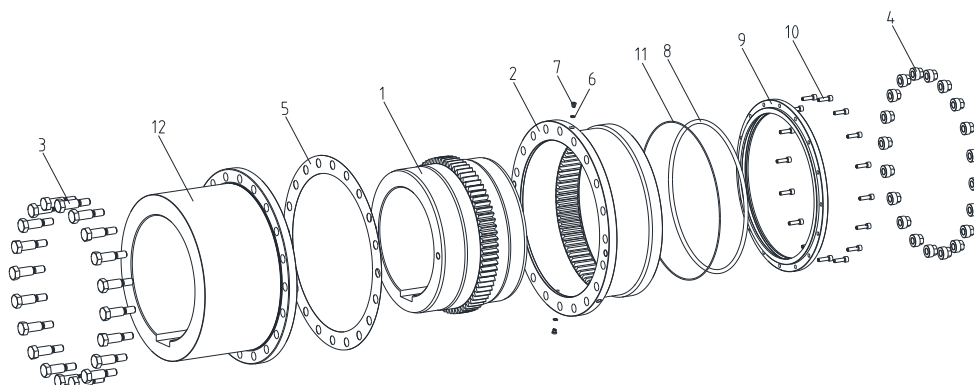


Illustration 20: GEARex® type DR

Please observe protection
note ISO 16016.

Drawn: 2025-02-27 Fes/Ka
Verified: 2025-02-28 Ka

Replacing: KTR-N dated 2024-07-23
Replaced by:

**4 Assembly****4.2 Advice for finish bore**

The maximum permissible bore diameters D (see chapter 1 - technical data) must not be exceeded. If these figures are disregarded, the coupling may tear. Rotating particles may cause danger to life.



Never clamp on the sealing surface!

- Hub bores machined by the customer have to observe concentricity resp. axial runout (see illustration 21 to 25).
- Make absolutely sure to observe the figures for $\varnothing D$ (see chapter 1).
- Carefully align the hubs when the finish bores are drilled.
- Provide for a setscrew according to DIN EN ISO 4029 with a cup point, an end plate or shrink fit to fasten the hubs axially (see illustration 21 to 25 and table 9 and 10).
- If any other shaft-hub-connections (e. g. clamping elements, spline, taper bores, etc.) are to be used, please consult with KTR.

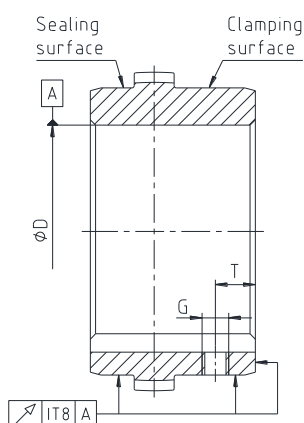


Illustration 21: Clamping/sealing surfaces of size 10 to 70
Hub type A

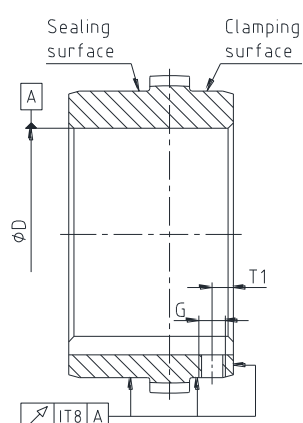


Illustration 22: Clamping/sealing surfaces of size 10 to 70
Hub type B

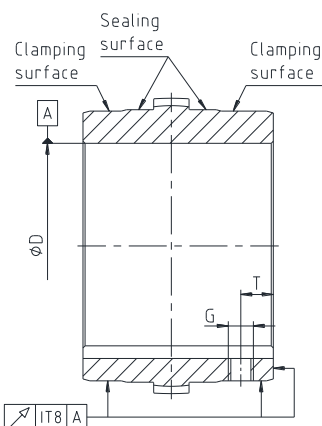


Illustration 23: Clamping/sealing surfaces of size 80 to 120
Hub type A

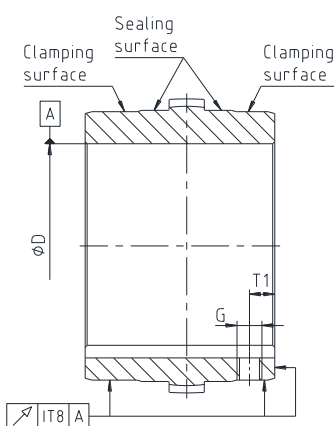


Illustration 24: Clamping/sealing surfaces of size 80 to 120
Hub type B

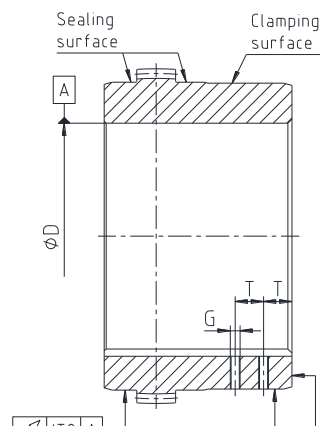


Illustration 25: Clamping/sealing surfaces of size 130 to 150

**4 Assembly****4.2 Advice for finish bore**

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.



KTR supplies unbored or pilot bored coupling components and spare parts only upon explicit request of the customer. These parts are additionally marked with the symbol .

Reference to unbored resp. pilot bored coupling components with explosion protection marking:

Basically the company KTR Systems GmbH supplies couplings resp. coupling hubs with explosion protection marking as an unbored or pilot bored type only on explicit request of the customer. The prerequisite is a declaration of exemption submitted by the customer assuming any responsibility and liability for respective remachining performed on the product of KTR Systems GmbH. According to the ATEX directives §47 and §48 unbored resp. pilot bored coupling hubs are classified as component(s). That is why KTR Systems GmbH is not in a position to provide for a CE symbol for the said components. Having drilled the coupling hubs, the customer has to perform a conformity assessment procedure.

4.3 Assembly of the coupling (general)

In case if a dimensional drawing was prepared for the coupling, the dimensions specified have to be primarily observed.
The operator of the machine must be provided with the dimensional drawing.



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.



Pay attention to the ignition risk in potentially explosive atmospheres!



Touching the heated components causes burns.
Please wear safety gloves.



With the assembly make sure that the distance dimension E resp. DBSE (see table 1, 3, 5 and 7) is observed to allow for axial clearance of the sleeve while in operation.
Disregarding this advice may cause damage to the coupling.



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



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 specified by means of the table „Breakdowns“ and, if possible, be eliminated according to the proposals. The potential breakdowns specified can be hints only. To find out the cause all operating factors and machine components must be considered.

**4 Assembly****4.4 Assembly of types FA, FB, FAB, FH and FR**

- Clean all components and shaft ends carefully (see chapter 7.6). The O-rings (component 8) must not get in touch with polar 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. Make sure the O-rings (component 8) are not damaged.

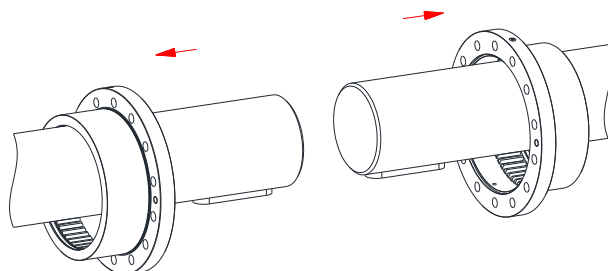


Illustration 26



To facilitate the assembly, 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 burner.

- Push the hubs (component 1) resp. flange hub (component 12) on the shaft of the driving and driven side so that the front faces of the hub are flush with the shaft ends. When the hubs are heated, any contact with the O-rings (component 8) should be avoided.

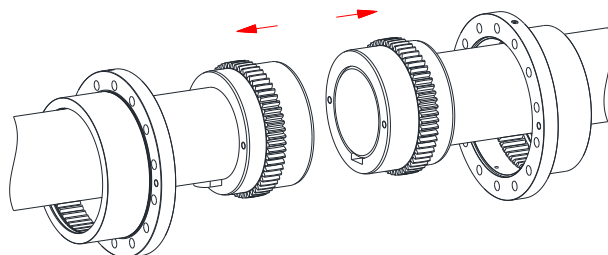


Illustration 27



Make sure with the assembly that the shaft ends do not protrude over the front faces of the hub.

- **Valid with coupling hubs with feather keyway and setscrew only:**
Before filling the coupling with grease, prevent escaping of lubricant in the area of the feather key. Let heated hubs cool down. Afterwards fill the tapping for axial fastening with sealing compound for 2/3.
- 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 shrink fit.



Basically make sure with the assembly that the shaft-hub-connection is sealed such that grease cannot escape from the coupling.

**4 Assembly****4.4 Assembly of types FA, FB, FAB, FH and FR**

- Shift the power packs in axial direction until the dimension E resp. DBSE is achieved (see table 1, 5 and 7).
- Align both shafts and inspect the permissible displacement figures as per chapter 4.6.

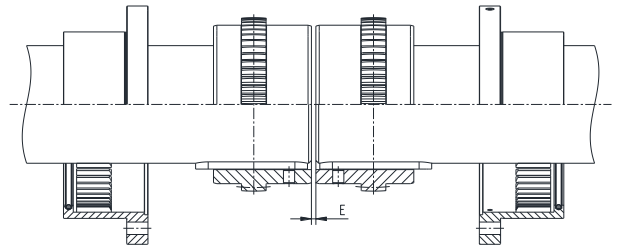


Illustration 28

- Grease the spline of the hubs (component 1) and sleeves (component 2), afterwards pull the sleeves over the spline of the hubs and keep them in place.
- Align the fitting hole of the sleeves (component 2) or flange hub (component 12) flush. Make sure that the lubrication holes on both sleeves have an angle of 90° to each other.

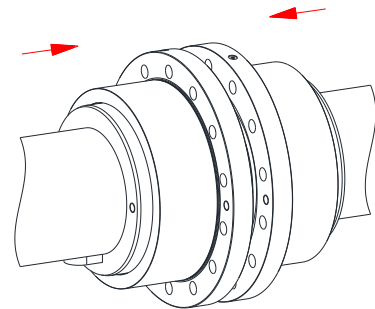


Illustration 29

- **Applying for type FH only:**
Push the spacer (component 13) between the two sleeves and align the fitting holes to be flush with the sleeves (see illustration 30).

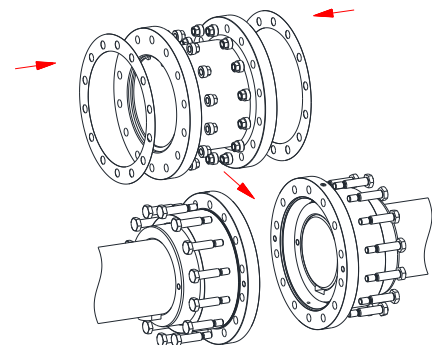


Illustration 30

- Please insert the flat gasket (component 5) and screw the sleeves or sleeve and flange hub, respectively, by means of the hexagon dowel screws (component 3) and nuts (component 4), observing the tightening torques indicated (see table 9) (see illustration 31).

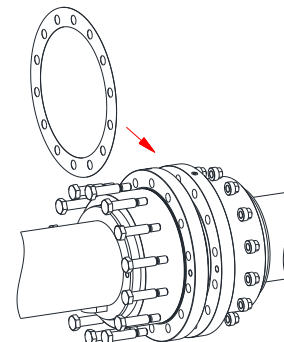


Illustration 31

- Fill the coupling via the screw plugs (component 9) with one of the recommended types of grease (grease capacity see table 12).
Observe the instructions specified in chapter "start-up and lubrication" (see chapter 5).



With each reassembly of the coupling we recommend to replace the flat gasket (component 5) and the O-rings (component 8) as well as hexagon dowel screws (component 3) and nuts (component 4).

**4 Assembly****4.4 Assembly of types FA, FB, FAB, FH and FR**

Table 9:

Size	Setscrew DIN EN ISO 4029 in mm				Hexagon dowel screws (10.9) Screw connection of sleeves			
	G	T ¹⁾	T1 ¹⁾	T _A in Nm	Number Z	Number Z (type FH)	M	T _A in 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

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

- Clean all components and shaft ends carefully (see chapter 7.6). The O-rings (component 8 and 11) must not get in touch with solvents and detergents.
- **Valid with split cover only:**
 - Apply a sealing agent on the contact surfaces of the split cover.
 - Push the split cover together.
 - Screw the split cover halves together with the cap screws. Learn the tightening torque from the dimensional drawing attached.
- Lightly grease the O-rings (component 8) and insert in the corresponding keyway of the cover (component 9).
- Lightly grease the sealing surfaces on the face of the sleeves (component 2).

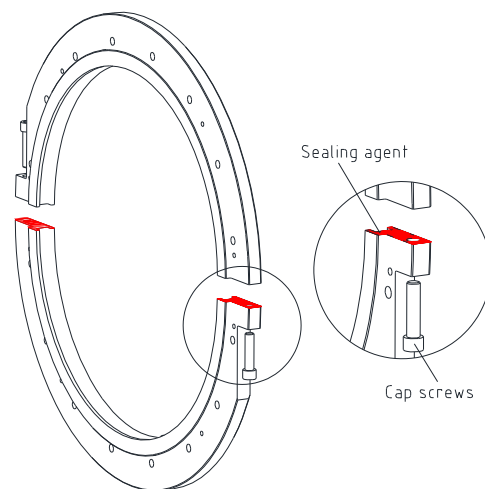


Illustration 32: Assembly of the split cover

- Put the O-rings (component 11) on the pilot of the cover (component 9).
- Put the cover (component 9) onto the shaft of driving and driven side. Please make sure that the O-rings (component 8 and 11) are not damaged (see illustration 33).

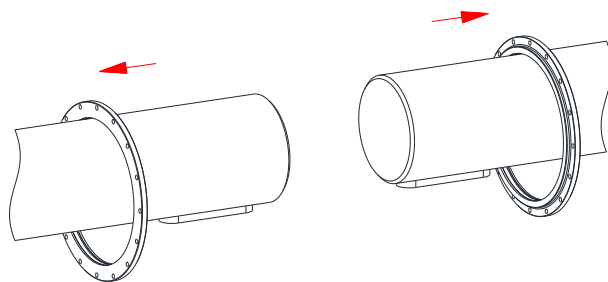


Illustration 33



To facilitate the assembly, heat the hubs (component 1) evenly by inductive heating (approx. 80 °C), either in the furnace or by means of a burner.

4 Assembly

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

- Push the hubs (component 1) resp. flange hub (component 12) on the shafts of the driving and driven side so that the front faces of the hub are flush with the shaft ends. When the hubs are heated, any contact with the O-rings (component 8 and 11) should be avoided.

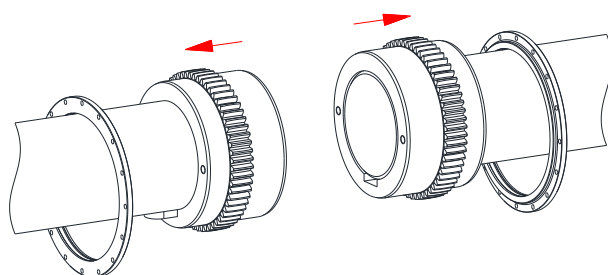


Illustration 34



Make sure with the assembly that the shaft ends do not protrude over the front faces of the hub.

- **Valid with coupling hubs with feather keyway and setscrew only:**
Before filling the coupling with grease, prevent escaping of lubricant in the area of the feather key. Let heated hubs cool down. Afterwards fill the tapping for axial fastening with sealing compound for 2/3.
- 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 shrink fit.



Basically make sure with the assembly that the shaft-hub-connection is sealed such that grease cannot escape from the coupling.

- Grease the spline of the hubs (component 1) and sleeves (component 2).
- Push the sleeves far over the hub and put it onto the shaft ends (see illustration 35).
- Screw the covers (component 10) and the sleeves (component 2) with the cap screws (component 11) (for tightening torque T_A see table 10). Make sure the O-rings (component 8 and 11) are not damaged.

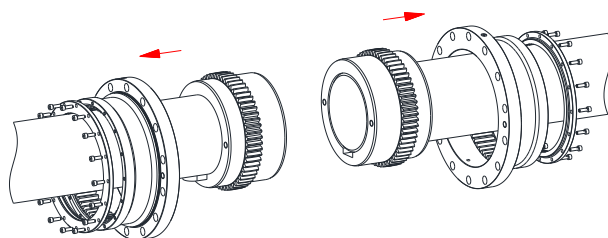


Illustration 35

- Shift the power packs in axial direction until the distance dimension E is achieved (see table 1 and 3) (see illustration 36).
- Align both shafts and inspect the permissible displacement figures as per chapter 4.6.

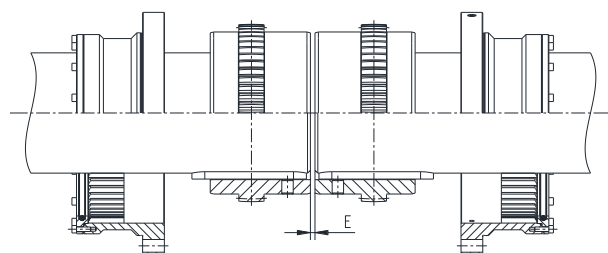


Illustration 36

**4 Assembly****4.5 Assembly of types DA, DB, DAB, DH and DR**

- Shift the sleeves with cover (component 2 and 10) onto the spline of the hubs (component 1) (see illustration 37).
- Align the fitting holes of the sleeves (component 2) flush. Make sure that the lubrication holes on both sleeves have an angle of 90° to each other.

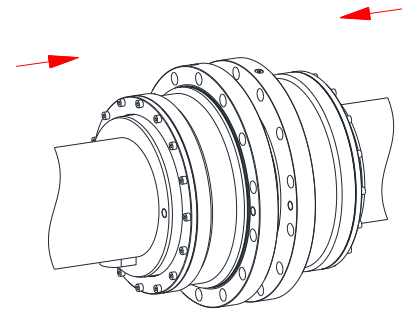


Illustration 37

- **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 (see illustration 38).

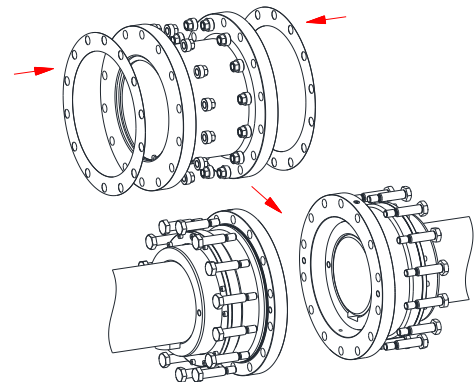


Illustration 38

- Please insert the flat gasket (component 5) and screw the sleeves by means of hexagon dowel screws (component 3) and nuts (component 4), observing the tightening torques indicated (see table 6) (see illustration 39).

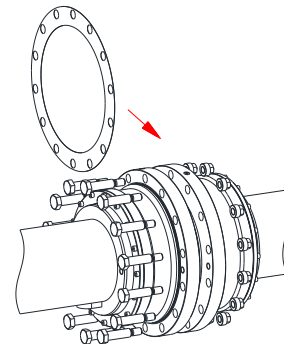


Illustration 39

- Fill the coupling via the screw plugs (component 10) with one of the recommended types of grease (grease capacity see table 12).
Observe the instructions specified in chapter "start-up and lubrication" (see chapter 5).



With each reassembly of the coupling we recommend to replace the flat gasket (component 5) and the O-rings (component 8 and 11) as well as hexagon dowel screws (component 3) and nuts (component 4).

**4 Assembly****4.5 Assembly of types DA, DB, DAB, DH and DR**

Table 10:

Size	Setscrew DIN EN ISO 4029 in mm				Hexagon dowel screws (10.9) screw connection of sleeves				Screw connection of cover with sleeves		
	G	T ¹⁾	T1 ¹⁾	T _A in Nm	Number Z	Number Z (type DH)	M	T _A in Nm	Number Z	M	T _A in 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
130	M24	70	-	240	20	40	M36	2800	48	M12	120
140	M24	80	-	240	24	48	M36	2800	48	M12	120
150	M24	90	-	240	30	60	M36	2800	48	M12	120

1) See illustration 23 to 25

4.6 Displacements - alignment of the couplings

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



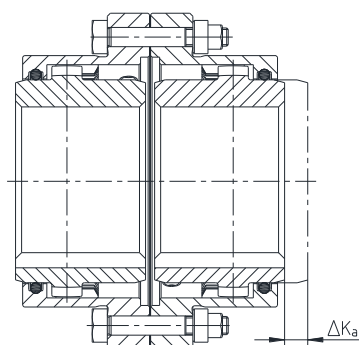
For a long service life of the coupling good lubrication is essential, observe correct alignment of the shafts.

Make sure to set a minimum of displacement, since this supports the lubricant distribution inside the spline and increases the service life.

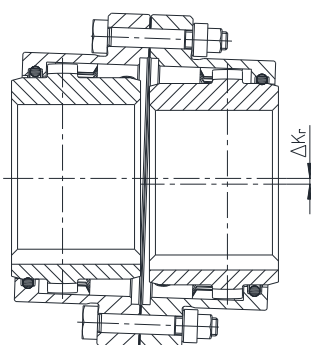
To achieve this the coupling must be aligned with a minimum displacement of 20 % of the maximum permitted angular resp. radial displacement with operation (see table 11).



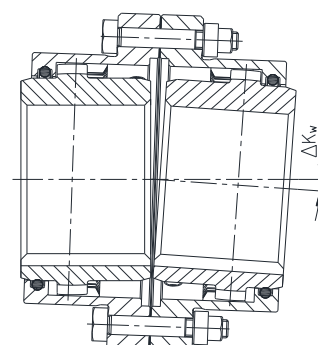
Prevent thermal expansion to offset the minimum displacement, for example by lateral displacement of the shafts or angular displacement of 0.1 ° per displacement level.



Axial displacements



Radial displacements



Angular displacements

Illustration 40: Displacements

**4 Assembly****4.6 Displacements - alignment of the coupling**

The displacement figures specified in table 11 are maximum figures which must not arise in parallel. If axial, radial and angular displacement arises at the same time, these values must be reduced (see illustration 41).

Examples of the displacement combinations specified in illustration 41:

Example 1:

$\Delta K_r = 30 \%$

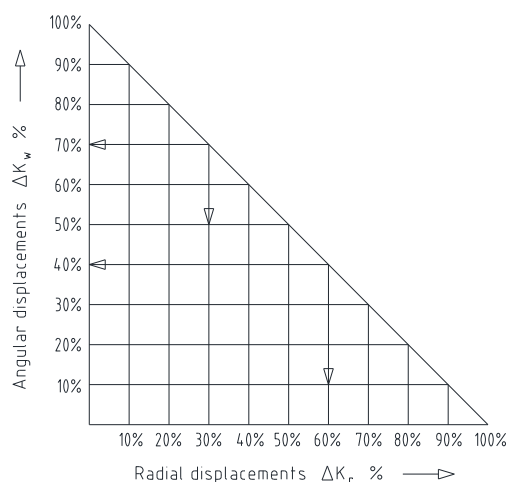
$\Delta K_w = 70 \%$

Example 2:

$\Delta K_r = 60 \%$

$\Delta K_w = 40 \%$

Illustration 41: Combinations of displacement



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

Table 11: Displacement figures

Size	Max. axial displacement ΔK_a in mm	Max. permissible displacements in mm		
		ΔK_r ¹⁾		ΔK_w ¹⁾ in °
		Type FA, FB, FAB, DA, DB and DAB	Type FH and DH	
10	± 1.0	0.4	$\Delta K_r = \tan 0.5^\circ \times E1$	0.5° each hub
15		0.5		
20		0.6		
25		0.8		
30		1.0		
35	± 1.5	1.0		
40		1.2		
45		1.4		
50		1.6		
55		1.8		
60	± 2.0	2.0		
70		2.2		
80		2.5		
85		2.8		
90		3.0		
100	± 2.5	3.2		
110		4.4		
120		5.5		
130		5.7		
140		6.0		
150		6.6		

1) Make absolutely sure to adhere to the dimension E resp. DBSE specified for the various types, specifically with radial and angular displacement (see tables 1, 3, 5 and 7).

**5 Start-up and lubrication****5.1 Start-up of the coupling**

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



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

Finally the coupling protection against accidental contact must be fitted. It is required in accordance with DIN EN ISO 12100 (Safety of Machinery) and directives 2014/34/EU and SI 2016 No. 1107 and must protect against

- access with a little finger
- falling down of solid foreign objects.

The coupling protection is not part of KTR's scope of delivery and is the customer's responsibility. It must have sufficient distance to the rotating components to safely avoid contact. Depending on the outside diameter DH of the coupling, we recommend the following minimum distance:

ØDH to 120 mm = 10 mm, ØDH from 120 mm = 15 mm.

Please check whether a proper enclosure (ignition protection, coupling protection, contact protection) has been mounted and the operation of the coupling is not affected by the enclosure. The same applies for test runs and rotational direction inspections.

The cover may provide for openings intended for necessary heat dissipation. These openings have to comply with DIN EN ISO 13857.



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 must 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 with use as equipment of equipment group II.

During operation of the coupling, pay attention to

- different operating noise
- vibrations occurring.



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 specified by means of the table „Breakdowns“ and, if possible, be eliminated according to the proposals. The potential breakdowns specified can be hints only. To find out the cause all operating factors and machine components must be considered.

**5 Start-up and lubrication****5.1 Start-up of the coupling**Coating of coupling:

If coated (priming, paintings, etc.) couplings are used in potentially explosive atmospheres, the requirements on conductivity and coating thickness must be considered. With paintings up to 200 µm electrostatic load does not have to be expected. If thicker paintings resp. coatings up to a layer thickness of a maximum of 2.0 mm are applied, the couplings are not permissible for gases and vapours of category IIC in potentially explosive areas, but only for gases and vapours of category IIA and IIB.

This also applies for multiple coatings exceeding an overall thickness of 200 µm. Make sure with painting or coating that the coupling components are conductively connected with the device/devices to be connected so that the equipotential bonding is not impeded by the paint or coat applied. Basically painting of the splines of sleeve and hub are not admitted to ensure an equipotential bonding.

In addition, make sure that the marking of the coupling remains legible.

5.2 Types of grease recommended

Only those greases recommended by KTR may be used.

Claims to warranty caused by the use of unrecommended greases are disregarded by KTR.

Manufacturer of grease	ExxonMobil	KLÜBER LUBRICATION	
Product description ^{1) 2)}	Mobilux EP 004	Klüberplex GE 11-680	Tribol GR 100 PD 00
Manufacturer of grease			
Product description ^{1) 2)}	Gadus S2 V220 00	RENOLIT GFW 00	

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

Klüberplex GE 11-680 suitable for operating temperatures from 0 °C to +140 °C.

Make sure to use special O-rings with temperatures > +80 °C!

2) The lubricants are suitable for a speed n of ≥ 2 rpm and a circumferential speed v of ≥ 1 m/s.

With differing speeds and circumferential speeds please consult with KTR.

$$v = \frac{\pi \cdot DH1 \cdot n}{60000}$$

v = circumferential speed in m/s
 n = speed in rpm
 $DH1$ = diameter of sleeve in mm



Observe the manufacturer's instructions on handling greases.

**5 Start-up and lubrication****5.3 Grease feeding**

The grease feeding always has to correspond to the quantities specified!
By falling below the volume specified the coupling can become a source of ignition.

Table 12: Grease feeding

Size	Grease feeding ¹⁾ in dm ³ (kg)			Size	Grease feeding ¹⁾ in dm ³ (kg)		
	Type FA, DA, FR and DR	Type FB, DB, FH and DH	Type FAB and DAB		Type DA and DR	Type DB and DH	Type DAB
10	0.01	0.03	0.02	80	1.55	2.70	2.00
15	0.02	0.04	0.03	85	1.90	3.10	2.50
20	0.04	0.10	0.07	90	2.70	5.10	3.90
25	0.07	0.15	0.12	100	3.50	6.50	5.00
30	0.10	0.20	0.15	110	5.70	19.00	12.00
35	0.17	0.35	0.26	120	8.50	31.00	20.00
40	0.25	0.50	0.37	130	²⁾	²⁾	²⁾
45	0.32	0.70	0.50	140	²⁾	²⁾	²⁾
50	0.45	0.95	0.70	150	²⁾	²⁾	²⁾
55	0.60	1.35	1.00				
60	0.75	1.90	1.30				
70	1.10	2.50	1.80				

1) Grease filling per coupling half, only valid for dimensions acc. to chapter 1

2) Grease filling on consultation with KTR.



With the vertical type or standard types with special dimensions see dimensional drawing for grease filling or consult with KTR.
The upper coupling half must be fully filled with grease.



In case if a dimensional drawing was prepared for the coupling, the dimensions specified have to be primarily observed.
The operator of the machine must be provided with the dimensional drawing.

**5 Start-up and lubrication****5.4 Grease filling**

Greases of various types and manufacturers must not be mixed!

Procedure of grease filling:

- Rotate the coupling so that the screw plugs (component 7) are in horizontal position (see illustration 42).
- Remove the screw plugs (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 screw plugs (component 7) and the gaskets (component 6) again and prove for tightness.
- Repeat this process with the other coupling half.

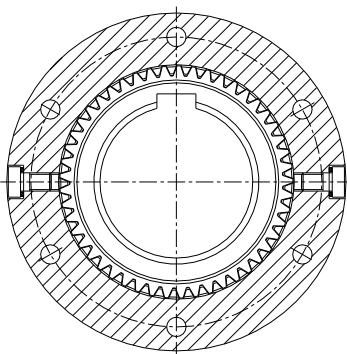


Illustration 42: Horizontal position of screw plugs

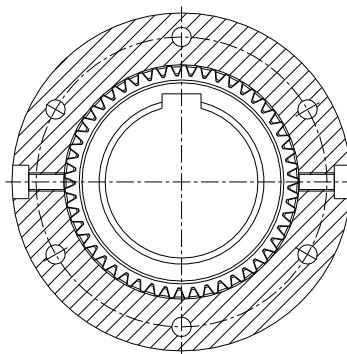


Illustration 43: Removing the screw plugs and sealing washers



**Both screw plugs (component 7) have to be removed.
One hole serves as a filler hole, the other one as venting hole.**



With each reassembly of the coupling we recommend to replace the flat gasket (component 5) and the O-rings (component 8 and 11) as well as hexagon dowel screws (component 3) and nuts (component 4).



In order to ensure a long service life of the coupling and avoid damages on the coupling, make sure to adhere to the quantities of grease specified for the different coupling sides.



Grease which has flown over has to be collected completely and disposed of according to the regulations that apply.

**6 Breakdowns, causes and elimination**

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



The coupling can become a source of ignition with improper use.
Directive 2014/34/EU and UK directive SI 2016 No. 1107 require special care by the manufacturer and the user.

General failures with improper use:

- Important data for the coupling selection are not forwarded.
- The calculation of the shaft-hub-connection is 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 excessively heated/damaged.
- The clearance of the components to be assembled is not coordinated with one another.
- Tightening torques are fallen below/exceeded.
- Components are mixed up by mistake/assembled incorrectly.
- No original **KTR** components (purchased parts) are used.
- Old/already worn out coupling components stored for too long are used.
- Maintenance intervals are not observed.
- No lubricants recommended by **KTR** are used.
- Operating temperatures are exceeded.
- Axial fastening of hubs is not available or working loose.
- Insufficient or inappropriate lubrication.
- Operating conditions were modified inappropriately.

Breakdowns	Causes	Hazard notes for potentially explosive atmospheres	Elimination
Different operating noise and/or vibrations occurring	Misalignment/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, fracture of the engine mount, heat expansion of unit components, modification of the installation dimension E resp. DBSE of the coupling) 3) Inspection of wear 4) Re-align the coupling
	Axial fastening 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 working loose
	Lack of grease		1) Set the unit out of operation 2) Inspection of wear 3) Grease has to be replaced 4) Inspect the gaskets and replace gaskets, if necessary
Excessive wear of spline	Vibrations of drive	Ignition risk due to hot surfaces and sparking	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 have been damaged 4) Find out the reason for vibrations 5) Assemble new coupling components 6) Inspect alignment and adjust, if necessary

**6 Breakdowns, causes and elimination**

Breakdowns	Causes	Hazard notes for potentially explosive atmospheres	Elimination
Excessive wear of spline	Misalignment/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, fracture of the engine mount, heat expansion of unit components, modification of the installation dimension E resp. DBSE 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) Grease has to be replaced 4) Inspect the gaskets and replace gaskets, 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 gaskets 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) Make sure proper storage of the O-rings or correct errors in assembly, respectively 6) Filling of lubricating grease
	O-rings are in contact with aggressive liquids/oils, impact of ozone, too high ambient temperatures		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
Fracture of spline/fracture of sleeve	Fracture of spline/sleeve subject to high dynamic energy/overload	Ignition risk due to hot surfaces and sparking	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 have been damaged 5) Insert sleeve, assemble coupling components
	Operating parameters do not meet with 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 have been damaged 4) Insert sleeve, assemble coupling components 5) Instruct and train the service staff

**6 Breakdowns, causes and elimination**

Breakdowns	Causes	Hazard notes for potentially explosive atmospheres	Elimination
Fracture of spline/fracture of sleeve	Lack of grease	Ignition risk due to hot surfaces and sparking	1) Set the unit out of operation 2) Disassemble the coupling and remove the residues of fracture 3) Inspect the gaskets and coupling components and replace, if necessary 4) Assemble, align and lubricate the new coupling components/gaskets as per GEARex® operating/mounting instructions
	Misalignment/missible 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, fracture of the engine mount, heat expansion of unit components, modification of the installation dimension E resp. DBSE of the coupling) 4) Assemble, align and lubricate the new coupling components as per GEARex® operating/mounting instructions

7 Maintenance and service**7.1 Maintenance interval**

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 fit of the protective device for rotating parts has to be inspected.

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

Grease:	grease capacity, replacement of grease (see chapter 5.3 and 7.2)
Sealing elements:	leakages, replacing of sealing elements (see chapter 7.3)
Shaft displacements:	re-aligning the coupling (see chapter 4.6)
Spline:	wear, inspection of circumferential backlash (see chapter 7.5 and 7.4)

Maintenance intervals in potentially explosive atmospheres:

If the coupling is used in potentially explosive atmospheres, 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.

**7 Maintenance and service****7.2 Replacement of grease**

In order to ensure a long service life of the coupling and avoid damages on the coupling, the quantities of grease specified for the different coupling sides and the intervals of replacement of lubricant absolutely have to be observed!



Grease has to be collected completely and disposed of according to the regulations that apply.



Observe the manufacturer's instructions on handling greases.

The replacement of grease depends on various operating conditions such as load, ambient temperature, speed, shaft displacements and operating period. Anyway, a 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.

Make sure that the remaining quantities in the coupling should be kept as small as possible when you replace the grease.

Please have the manufacturer confirm the compatibility of the new grease with remainders of the former grease.



If the coupling is used in potentially explosive atmospheres, 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.



Greases of various types and manufacturers must not be mixed!

Procedure for the replacement of grease:

- Inspect tightness and replace the sealing elements, if necessary.
- Turn the coupling until the screw plugs are in vertical position (see illustration 44).
- Remove the screw plugs (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 oil.



Please check the compatibility of the oil with the grease!

- Perform grease filling as per chapter 5.4.
- Repeat this process with the other coupling half.

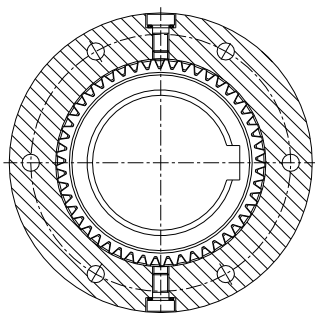


Illustration 44: Vertical position of screw plugs

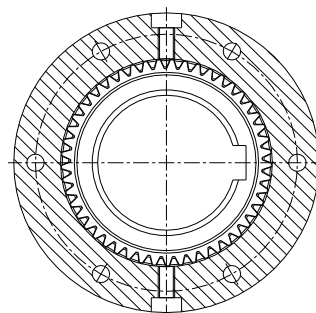


Illustration 45: Removing the screw plugs and sealing washers

**7 Maintenance and service****7.3 Replacement of sealing elements**

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 gasket (component 5):

If the flat gasket (component 5) is defective/untight, it has to be replaced immediately. Furthermore we would recommend with each reassembly of the coupling to replace the flat gasket (component 5) and the hexagon dowel screws (component 3) as well as nuts (component 4).

- Drain the grease as per chapter 7.2.
- Unscrew and remove the screwing (components 3 and 4) of the sleeves (component 2).
- Shift the sleeve (component 2) axially backwards until the flat gasket (component 5) can be disassembled and replaced.
- Lightly grease the sealing surfaces and insert new flat gasket (component 5). Afterwards inspect the alignment and, if necessary, re-align and assemble.
- Perform grease filling as per chapter 5.4.

Replacement of O-rings (component 8):

The O-rings (component 8) can be replaced with no need to shift the power packs to be connected, provided that the shaft shoulder is not bigger than the disassembly diameter DW1 (see illustration 1, 4, 7 and 9).

- Drain the grease as per chapter 7.2.
- 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 peripheral length.
- Fit the O-ring (component 8) around the shaft and afterwards bond 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.



If O-rings 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 7.8.



Protect O-rings (component 8) and flat gaskets (component 5) on the driving and driven side against damages and heat.



Observe the manufacturer's instructions regarding the use of adhesives.

**7 Maintenance and service****7.4 Standard values for circumferential backlash**

To inspect the torsional backlash the power pack switched off needs to be secured against accidental switch-on.

Driving side

- Rotate the hub opposite the direction of drive.



Here the sleeve must not be axially displaced from its position of wear.

- Mark sleeve (component 2) and hub (component 1) (see illustration 46).
- Turn the hub (component 1) in the direction of drive and measure the circumferential backlash $\Delta S_{\max}$.
- When reaching the torsional backlash $\Delta S_{\max}$ the coupling must be replaced.

Driven side

- Rotate the hub in the direction of the drive.



Here the sleeve must not be axially displaced from its position of wear.

- Mark sleeve (component 2) and hub (component 1) (see illustration 46).
- Turn the hub (component 1) opposite the direction of drive and measure the circumferential backlash $\Delta S_{\max}$.
- When reaching the torsional backlash $\Delta S_{\max}$ the coupling must be replaced.

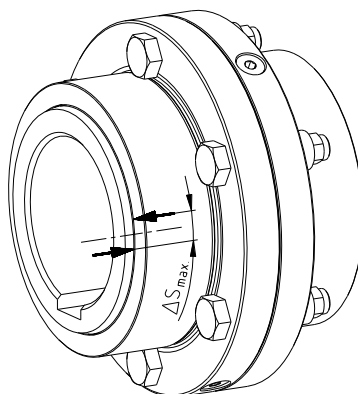


Illustration 46: Marking of hub and sleeve

**7 Maintenance and service****7.5 Standard values of wear**

With a torsional backlash of $\geq \Delta S_{\max}$ in mm, the coupling must be replaced.

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



In order to ensure a long service life of the coupling and avoid hazards with the use in potentially explosive atmospheres, the shaft ends must be accurately aligned. Absolutely observe the displacement figures specified (see table 11). If the figures are exceeded, the coupling will be damaged.

Table 13: Values of wear

Size	Torsional backlash $\Delta S_{\max}$ in mm (limits of wear for each hub)	Size	Torsional backlash $\Delta S_{\max}$ in mm (limits of wear for each hub)
10	1.0	70	2.5
15	1.0	80	3.0
20	1.0	85	3.0
25	1.5	90	4.0
30	1.5	100	4.0
35	1.5	110	4.5
40	2.0	120	4.5
45	2.0	130	4.5
50	2.0	140	5.4
55	2.5	150	5.4
60	2.5		

7.6 Cleaning of the coupling

Ensure sufficient ventilation and follow the detergent manufacturers' notes regarding the handling of solvents and detergents. Avoid any kind of ignition sources.

With assembly/disassembly of the coupling, 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 start-up (chapter 5) has to be ensured.

7.7 Replacement of coupling

If the maximum standard values of wear as per chapters 7.4 and 7.5 are achieved, the coupling half has to be completely replaced.

Replacement may only be made in pairs (hub (component 1) and sleeve (component 2)) for each coupling half! Disassembly has to be performed as per chapter 7.8.



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 drive and the overall machine. Rotating particles may cause danger to life.

**7 Maintenance and service****7.8 Disassembly of the coupling**

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.



In case if a dimensional drawing was prepared for the coupling, the dimensions specified have to be primarily observed.
The operator of the machine must 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, disassembly is necessary to replace the sealing elements.

- Drain the grease as per chapter 7.2.
- Unscrew the dowel screw connection and push the sleeves (component 2) axially backwards until the spline is no longer engaged.
- Mark the spline of the sleeves (component 2) to the hubs (component 1).
- Move the power packs apart.
- Clean the coupling (see chapter 7.6) and inspect the coupling components, sealing surfaces and spline.
- Replace damaged components.
- Reassembly has to be performed as per chapters 4 and 5.



Components that are damaged or worn off have to be replaced!



With each reassembly of the coupling we recommend to replace the flat gasket (component 5) and the O-rings (component 8 and 11) as well as hexagon dowel screws (component 3) and nuts (component 4).



Heating the coupling components results in a higher danger of ignition.
A non-hazardous environment has to be assured.

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 burner 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.

Reassembly has to be performed as per the instructions in chapter 4 and 5.



Never use the sleeves (component 2) to pull off the hubs (component 1)!



Make use of proper pullers. The shaft bearing must not be loaded.

**8 Disposal**

In respect of environmental protection we would ask you to dispose of the packaging resp. products on termination of their service life in accordance with the legal regulations and standards that apply.

- **Metal**
Any metal components have to be cleaned and disposed of by scrap metal.
- **Gaskets**
Gaskets can be disposed of by residual waste.
- **Lubricants**
Lubricants have to be collected in suitable containers and disposed of by a waste disposal company.

9 Spares inventory, customer service addresses

We recommend to store major spare parts on site to ensure the readiness for use of the machine in case if a coupling fails.

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 specified when ordering spare parts:

- Original order number
- Material number
- Description and number



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.

KTR Systems GmbH
Carl-Zeiss-Str. 25
D-48432 Rheine
Phone: +49 5971 798-0
E-mail: mail@ktr.com

**9 Spares inventory, customer service addresses****9.1 Spare parts - Assemblykit**

Components of assembly kit:

Component	Description
3	Hexagon dowel screw
4	Hexagon nut
5	Flat gasket
6	Disk
7	Screw plug
8	O-ring

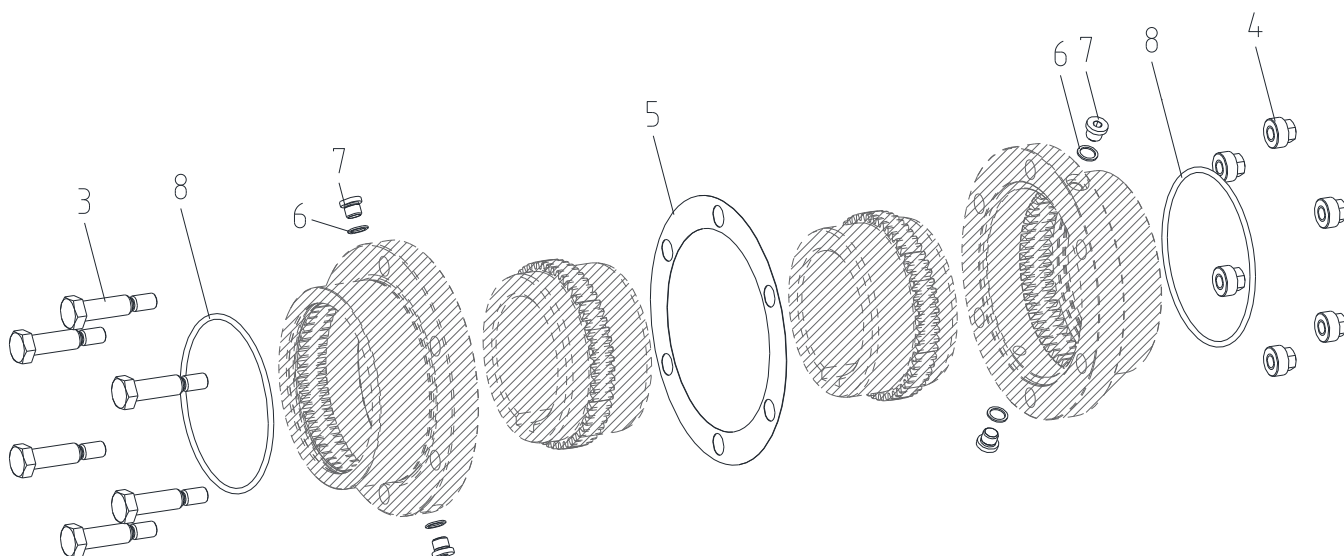


Illustration 47: Example type FA

Material number of assembly kits:

Size	Material number
10	030100990099
15	030150990099
20	030200990099
25	030250990099
30	030300990099
35	030350990099
40	030400990099
45	030450990099
50	030500990099
55	030550990099
60	030600990099
70	030700990099



Illustration 48



The assembly kits listed can only be used for type F!
Two assembly kits are required for type FH.

**10 Enclosure A**

Advice and instructions regarding the use in  potentially explosive atmospheres

Types available:

FA, FB, FAB, DA, DB, DAB, FH, DH, FR and DR

10.1 Intended use in potentially explosive atmospheres**Conditions of operation in potentially explosive atmospheres**

The **GEARex®** couplings are suitable for the use according to directives 2014/34/EU and SI 2016 No. 1107.

- Protection against hazards arising from lightning must follow the lightning protection concept of the machine or plant. The relevant regulations and policy for lightning protection must be observed.
- The equipotential bonding of the couplings is made by metal contact between coupling hub and shaft. This equipotential bonding must not be affected.

1. Industry (with the exception of mining)

- Equipment group II of category 2 and 3 (*coupling is not approved/not suitable for equipment group 1*)
- Substance group G (gases, fogs, vapours), zone 1 and 2 (*coupling is not approved/not suitable for zone 0*)
- Substance group D (dusts), zone 21 and 22 (*coupling is not approved/not suitable for zone 20*)
- Explosion group IIC (gases, fogs, vapours) (explosion groups IIA and IIB are included in IIC) and explosion group IIIC (dusts) (explosion groups IIIA and IIIB are included in IIIC)

Temperature class:

Temperature class	Ambient or operating temperature T _a	Max. surface temperature ¹⁾
T4	-30 °C to +90 °C	+110 °C
T5	-30 °C to +75 °C	+95 °C
T6	-30 °C to +60 °C	+80 °C

Explanation:

The maximum surface temperatures each result from the maximum permissible ambient or operating temperature T_a plus the maximum temperature increase ΔT of 20 K to be considered. For the temperature class a safety margin subject to standard of 5 K is added.

1) The maximum surface temperature of +110 °C applies for the use in locations which are potentially subject to dust explosion.

In potentially explosive atmospheres

- the ignition temperature of dusts generated must at least be 1.5 times the surface temperature to be considered
- the glow temperature must at least be the surface temperature to be considered plus a safety distance of 75 K.
- the gases and vapours generated must amount to the temperature class specified.

2. Mining

Equipment group I of category M2 (*coupling is not approved/not suitable for equipment group M1*).

Permissible ambient temperature -30 °C to +90 °C.



10 Enclosure A

Advice and instructions regarding the use in  potentially explosive atmospheres

10.2 Inspection intervals for couplings in potentially explosive atmospheres

Explosion group	Inspection intervals
M2 2G 2D No gases and vapours of explosion group IIC	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, find out the cause according to the table „Breakdowns“, if possible. The maintenance intervals must be adjusted to the modified operating parameters without fail.
M2 2G 2D Gases and vapours of explosion group IIC	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, 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

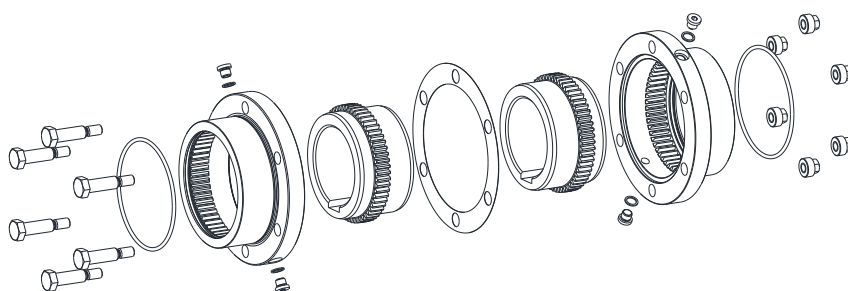


Illustration 49: GEARex® coupling

Here the backlash between 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 respective coupling half (hub and sleeve) must be replaced immediately, irrespective of the inspection intervals.

**10 Enclosure A**

Advice and instructions regarding the use in  potentially explosive atmospheres

10.3 marking of coupling for potentially explosive atmospheres

The explosion protection marking of the GEARex® all-steel gear coupling is applied on the front of the hub resp. on the outside diameter of the sleeve.

For the complete marking refer to the operating/assembly instructions and/or the delivery note/package.

The following marking applies for the products:

- Marking for unpainted res. coated or painted couplings with a layer thickness < 200 µm

  I M2 Ex h I Mb X
II 2G Ex h IIC T6 ... T4 Gb X
II 2D Ex h IIIC T80 °C ... T110 °C Db X
<Year> -30 °C ≤ T_a ≤ +60 °C ... +90 °C
KTR Systems GmbH, Carl-Zeiss-Str. 25, D-48432 Rheine

- Marking for painted couplings with a layer thickness of 0.2 mm to max. 2.0 mm

  I M2 Ex h I Mb X
II 2G Ex h IIB T6 ... T4 Gb X
II 2D Ex h IIIC T80 °C ... T110 °C Db X
<Year> -30 °C ≤ T_a ≤ +60 °C ... +90 °C
KTR Systems GmbH, Carl-Zeiss-Str. 25, D-48432 Rheine

Short marking:

(A short marking is only made if not possible differently for reason of space or functioning.)

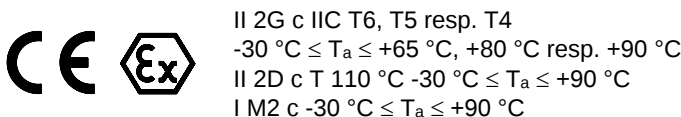
GEARex®
<Year>

**Deviating marking applied until 31st October 2019:**

Short marking:



Complete marking:



**10 Enclosure A**

Advice and instructions regarding the use in  potentially explosive atmospheres

10.3 marking of coupling for potentially explosive atmospheres**Comments on marking**

Equipment group I	Mining
Equipment group II	Non-mining
Equipment category 2G	Equipment ensuring a high level of safety, suitable for zone 1
Equipment category 2D	Equipment ensuring a high level of safety, suitable for zone 21
Equipment category M2	Equipment ensuring a high level of safety must be able to be switched off when an explosive atmosphere occurs
D	Dust
G	Gases and vapours
Ex h	Nonelectrical explosion protection
IIB	Gases and vapours of class IIB (including IIA)
IIC	Gases and vapours of class IIC (including IIA and IIB)
IIIC	Electrically conductive dusts of class IIIC (including IIIA and IIIB)
T6 ... T4	Temperature class to be considered, depending on the ambient temperature
T80 °C ... T110 °C	Maximum surface temperature to be considered, depending on the ambient temperature
-30 °C ≤ T _a ≤ +60 °C ... +90 °C or -30 °C ≤ T _a ≤ +90 °C	Permissible ambient temperature from -30 °C to +60 °C resp. -30 °C to +90 °C
Gb, Db, Mb	Equipment protection level, analogous to the equipment category
X	For a safe use of the couplings particular conditions apply

If the symbol  was punched in addition to marking , the coupling component was supplied by KTR as an un-bored or pilot bored version (see chapter 4.2 of the present operating/assembly instructions).



10 Enclosure A

Advice and instructions regarding the use in  potentially explosive atmospheres

10.4 EU Declaration of conformity

EU Declaration of Conformity resp. Certificate of Conformity

corresponding to EU directive 2014/34/EU dated 26 February 2014
and to the legal regulations adopted for its implementation

The manufacturer - KTR Systems GmbH, Carl-Zeiss-Str. 25, D-48432 Rheine - states that the

GEARex® All-steel gear couplings

in an explosion-proof design described in these assembly instructions are equipment resp. components corresponding to article 2, 1. of directive 2014/34/EU and comply with the general safety and health specifications according to enclosure II of directive 2014/34/EU.
This declaration of conformity resp. certificate of conformity is issued under the sole responsibility of the manufacturer KTR Systems GmbH.

The coupling described in here complies with the specifications of the following standards/rules:

EN ISO 80079-36:2016-12
EN ISO 80079-37:2016-12
EN ISO/IEC 80079-38:2017-10
CLC/TR 60079-32-1:2019-01

The GEARex® is in accordance with the specifications respectively the applicable requirements of directive 2014/34/EU.

The couplings marked with the symbol  are not equipment, but components as defined in the directive 2014/34/EU and are not marked with CE. These couplings are unbored or pilot bored only and must be subjected to a final conformity assessment after finish drilling. For the necessary information refer to the operating instructions.

According to article 13 (1) b) ii) of directive 2014/34/EU the technical documentation is deposited with the notified body (Project No.: IB-20-0169, IB-18-2-0020, IB-14-4-017/1, IB-11-4-017):

IBExU
Institut für Sicherheitstechnik GmbH
Identification number: 0637
Fuchsmühlenweg 7

09599 Freiberg

Rheine,
Place

2024-11-12
Date

ppa.


Dr. Norbert Partmann
Head of Engineering and
R&D

i. V.


Ansgar Silies
Product Manager



10 Enclosure A

Advice and instructions regarding the use in  potentially explosive atmospheres

10.5 UK Declaration of conformity

UK Declaration of Conformity resp. Certificate of Conformity

corresponding to UK directive SI 2016 No. 1107 dated 26 February 2014
and to the legal provisions adopted for its implementation

The manufacturer - KTR Systems GmbH, Carl-Zeiss-Str. 25, D-48432 Rheine - states that the

GEARex® All-steel gear couplings

in an explosion-proof design described in these assembly instructions are equipment resp. components corresponding to directive SI 2016 No. 1107 and comply with the general safety and health requirements according to directive SI 2016 No. 1107.

This declaration of conformity resp. certificate of conformity is issued under the sole responsibility of the manufacturer KTR Systems GmbH.

The coupling described in here complies with the specifications of the following standards/rules:

EN ISO 80079-36:2016-12
EN ISO 80079-37:2016-12
EN ISO/IEC 80079-38:2017-10
CLC/TR 60079-32-1:2019-01

The GEARex® is in accordance with the specifications respectively the applicable specifications of directive SI 2016 No. 1107.

The couplings marked with the symbol  are not equipment, but components as defined in the directive SI 2016 No. 1107 and are not marked with CE. These couplings are unbored or pilot bored only and must be subjected to a final conformity assessment after finish drilling. For the necessary information refer to the operating instructions.

According to directive SI 2016 No. 1107 the technical documentation is deposited with the notified body:

Eurofins CML
Identification number: 2503

Rheine,
Place

2024-11-12
Date

ppa.


Dr. Norbert Partmann
Head of Engineering and
R&D

i. V.


Ansgar Silies
Product Manager