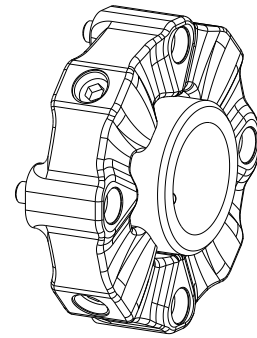


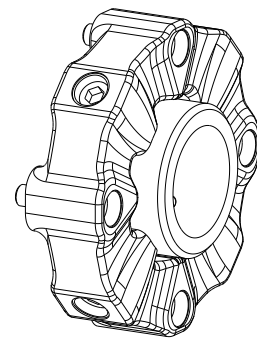


EVOLASTIC®

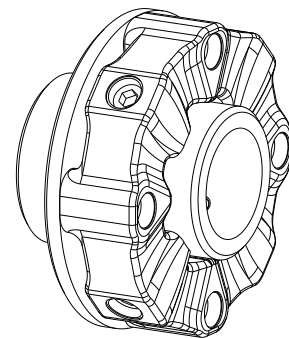
highly flexible coupling type
E, EH, E2H, EFH and their combinations



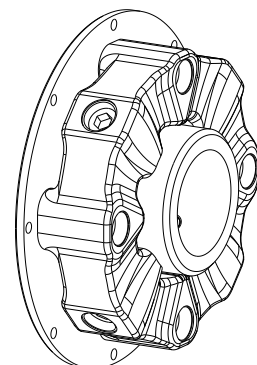
Type E




Type EH



Type E2H



Type EFH

	EVOLASTIC®		KTR-N 48610 EN
	Operating/Assembly instructions		Sheet: 2 of 23
	Type E, EH, E2H and EFH		Edition: 2

EVOLASTIC® type E, EH, E2H and EFH is a highly flexible, non-slip and backlash-free shaft and flange coupling. It dampens torsional vibrations and load shocks, reduces structure-borne noise transmission and compensates for axial, radial and angular displacements above average.

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1 Technical data

1.1 Coupling dimensions and technical data

Type E

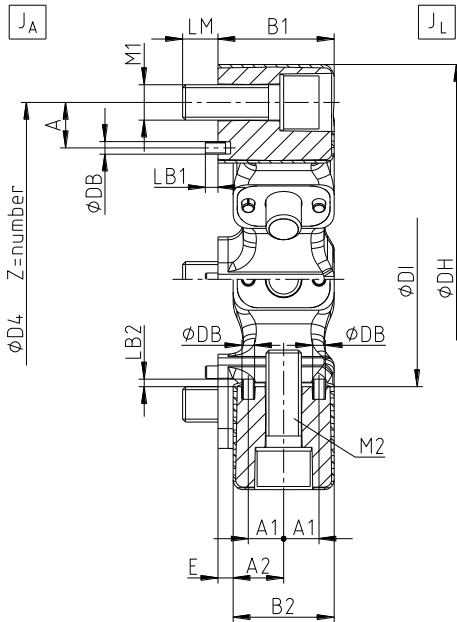


Illustration 1: EVOLASTIC® type E (size 12 to 280)

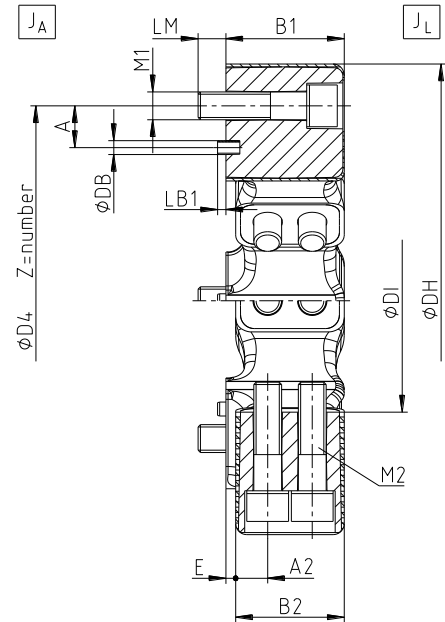


Illustration 2: EVOLASTIC® type E (size 360 and 560)

Table 1: Dimensions - type E

Size	Dimensions [mm]													Cap screws DIN EN ISO 4762		
	A	A1	A2	B1	B2	DB	DH	DI	D4	E	LB1	LB2	LM	M1	M2	Z x Pitch
12	12	10.0	14.0	32	28	4	122	60	100	4	-	-	10	M10	M10	3 x 120°
24	18	13.5	18.0	42	36	5	150	70	125	6	4	5	12	M12	M12	3 x 120°
48	18	14.0	20.0	46	40	5	170	85	140	6	5	5	14	M14	M14	4 x 90°
60	20	18.0	25.0	58	50	5	200	100	165	8	5	5	16	M16	M16	3 x 120°
86	20	18.0	25.0	58	50	5	200	100	165	8	5	5	16	M16	M16	4 x 90°
125	25	22.5	31.5	70	63	8	260	125	215	7	5	5	20	M20	M20	3 x 120°
200	25	22.5	31.5	70	63	8	260	125	215	7	5	5	20	M20	M20	4 x 90°
280	25	22.5	36.0	80	72	8	300	145	250	8	5	5	20	M20	M20	4 x 90°
360	30	-	23.0	85	78	10	340	160	280	7	6	-	20	M20	M20	4 x 90°
560	40	-	28.5	105	95	10	363	170	300	10	6	-	24	M24	M20	4 x 90°

Table 2: Technical data - type E

Size	Total weight with maximum bore of coupling [kg]	Mass moment of inertia with maximum bore of coupling [kgm ²]	
		JA	JL
12	0.50	0.0005	0.0005
24	0.93	0.001	0.001
48	1.55	0.004	0.003
60	2.28	0.007	0.007
86	2.76	0.009	0.008
125	4.74	0.024	0.022
200	5.79	0.030	0.028
280	7.89	0.055	0.050
360	11.50	0.096	0.095
560	15.38	0.151	0.145



In case if a dimensional drawing was prepared for the coupling, the dimensions specified have to be primarily observed.

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1 Technical data

1.1 Coupling dimensions and technical data

Type EH

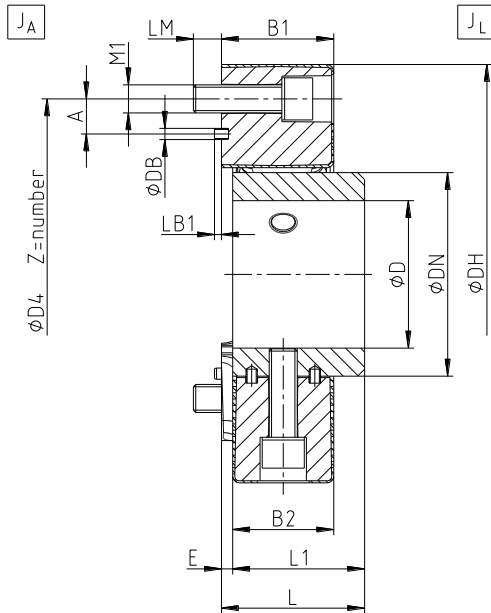


Illustration 3: EVOLASTIC® type EH (size 12 to 280)

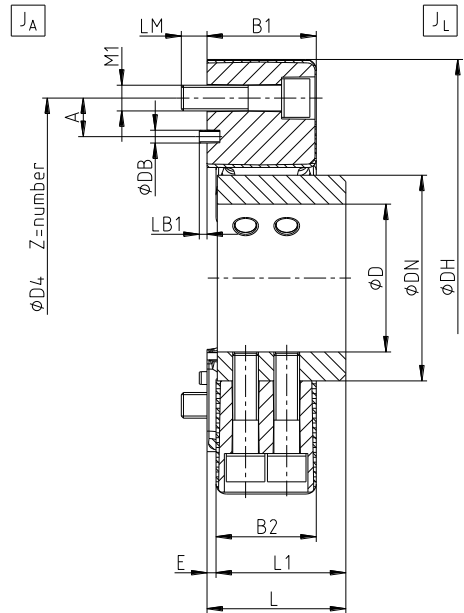


Illustration 4: EVOLASTIC® type EH (size 360 and 560)

Table 3: Dimensions - type EH

Size	Dimensions [mm]													Cap screws DIN EN ISO 4762	
	A	B1	B2	D _{max.}	DB	DH	DN	D4	E	L	L1	LB1	LM	M1	Z x Pitch
12	12	32	28	38	4	122	60	100	4	46	42	-	10	M10	3 x 120°
24	18	42	36	48	5	150	70	125	6	56	50	4	12	M12	3 x 120°
48	18	46	40	55	5	170	85	140	6	61	55	5	14	M14	4 x 90°
60	20	58	50	65	5	200	100	165	8	74	66	5	16	M16	3 x 120°
86	20	58	50	65	5	200	100	165	8	74	66	5	16	M16	4 x 90°
125	25	70	63	85	8	260	125	215	7	88	80	5	20	M20	3 x 120°
200	25	70	63	85	8	260	125	215	7	88	80	5	20	M20	4 x 90°
280	25	80	72	105	8	300	145	250	8	102	94	5	20	M20	4 x 90°
360	30	85	78	115	10	340	160	280	7	108	100	6	20	M20	4 x 90°
560	40	105	95	120	10	363	170	300	10	135	125	6	24	M24	4 x 90°

Table 4: Technical data - type EH

Size	Total weight with maximum bore of coupling [kg]	Mass moment of inertia with maximum bore of coupling [kgm ²]	
		JA	JL
12	1.04	0.0006	0.0009
24	1.70	0.002	0.002
48	2.90	0.004	0.005
60	4.55	0.007	0.011
86	5.03	0.009	0.012
125	8.77	0.024	0.034
200	9.80	0.030	0.040
280	13.54	0.056	0.073
360	18.85	0.096	0.132
560	26.34	0.153	0.208



In case if a dimensional drawing was prepared for the coupling, the dimensions specified have to be primarily observed.

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1 Technical data

1.1 Coupling dimensions and technical data

Type E2H

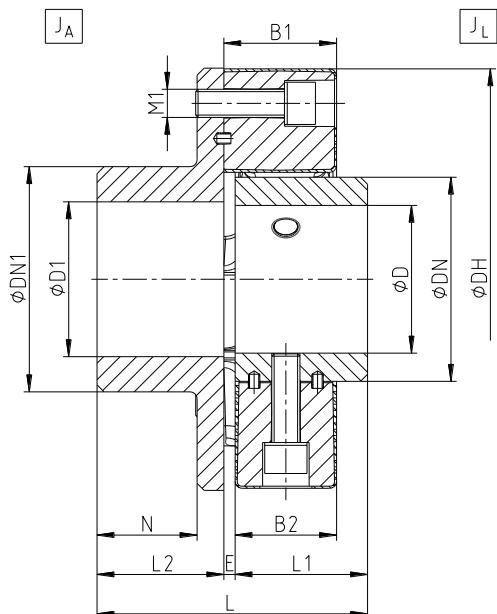


Illustration 5: EVOLASTIC® type E2H (size 12 to 280)

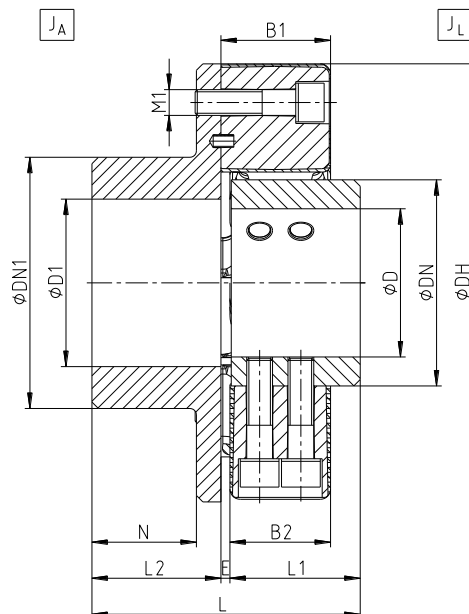


Illustration 6: EVOLASTIC® type E2H (size 360 and 560)

Table 5: Dimensions - type E2H

Size	Dimensions [mm]													Cap screws DIN EN ISO 4762	
	B1	B2	D _{max.}	DH	DN	DN1	D1 _{max.}	D4	E	L	L1	L2	N	M1	Z x Pitch
12	32	28	38	122	60	80	55	100	4	88	42	42	32	M10	3 x 120°
24	42	36	48	150	70	100	70	125	6	106	50	50	38	M12	3 x 120°
48	46	40	55	170	85	115	85	140	6	116	55	55	41	M14	4 x 90°
60	58	50	65	200	100	140	100	165	8	140	66	66	50	M16	3 x 120°
86	58	50	65	200	100	140	100	165	8	140	66	66	50	M16	4 x 90°
125	70	63	85	260	125	160	110	215	7	168	80	80	60	M20	3 x 120°
200	70	63	85	260	125	160	110	215	7	168	80	80	60	M20	4 x 90°
280	80	72	105	300	145	160	110	250	8	192	94	90	70	M20	4 x 90°
360	85	78	115	340	160	195	130	280	7	208	100	100	80	M20	4 x 90°
560	105	95	120	363	170	200	140	300	10	260	125	125	100	M24	4 x 90°

Table 6: Technical data - type E2H

Size	Total weight with maximum bore of coupling [kg]	Mass moment of inertia with maximum bore of coupling [kgm ²]	
		JA	JL
12	2.38	0.003	0.001
24	4.16	0.010	0.002
48	6.21	0.016	0.005
60	10.39	0.036	0.011
86	10.83	0.037	0.012
125	20.17	0.111	0.034
200	21.15	0.116	0.040
280	28.30	0.196	0.073
360	40.66	0.354	0.132
560	56.56	0.589	0.208



In case if a dimensional drawing was prepared for the coupling, the dimensions specified have to be primarily observed.

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1 Technical data

1.1 Coupling dimensions and technical data

Type EFH

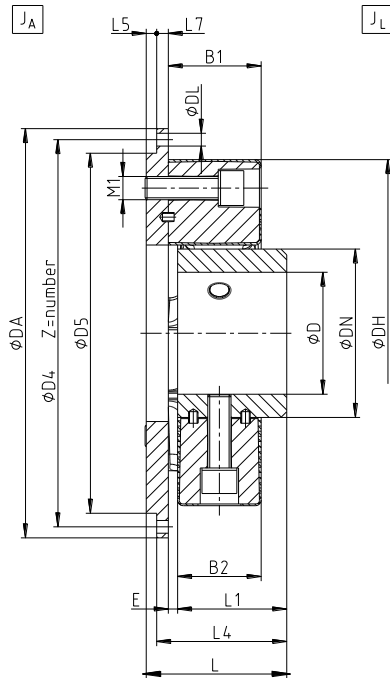


Illustration 7: EVOLASTIC® type EFH (size 12 to 280)

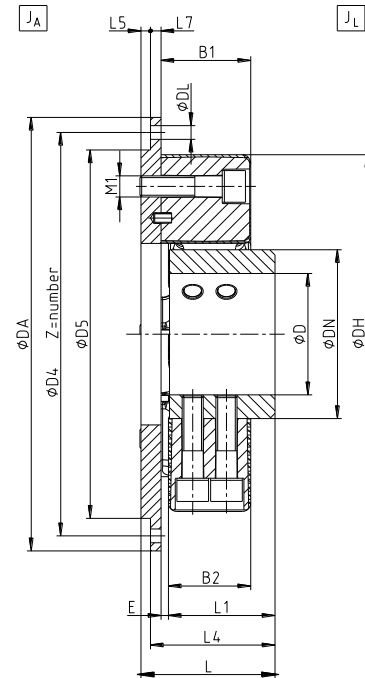


Illustration 8: EVOLASTIC® type EFH (size 360 and 560)

Table 7: Dimensions - type EFH

Size	Flange connection acc. to SAE - J620 / diameter ¹⁾	Dimensions ¹⁾ [mm]											Cap screws DIN EN ISO 4762	
		B1	B2	D _{max.}	DH	DN	D5	E	L	L1	L4	L5	L7	M1
12	6.5"	32	28	38	122	60	180	4	56	42	52	4	6	M10
	190													
24	6.5"	42	36	48	150	70	180	6	68	50	62	6	6	M12
	190													
48	7.5"	46	40	55	170	85	190	6	75	55	67	8	6	M14
	8"						200				71			
	10"						260				4			
60	10"	58	50	65	200	100	270	8	90	66	84	6	10	M16
	11.5"						310							
86	10"	58	50	65	200	100	270	8	90	66	84	6	10	M16
	11.5"						360							
125	10"	70	63	85	260	125	270	8	107	80	98	9	10	M20
	11.5"						310							
200	10"	70	63	85	260	125	270	8	107	80	98	9	10	M20
	11.5"						310							
	14"						405							
280	11.5"	80	72	105	300	145	310	8	121	94	112	9	10	M20
	14"						405							
360	14"	85	78	115	340	160	405	8	127	100	118	9	10	M20
	14"						405							
560	14"	105	95	120	363	170	405	10	160	125	145	15	25	M24

1) For dimensions of flange connection see table 9.



In case if a dimensional drawing was prepared for the coupling, the dimensions specified have to be primarily observed.

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1 Technical data

1.2 General dimensions and torques

Table 8: Technical data - type EFH

Size	Flange connection acc. to SAE - J620 / diameter ¹⁾	Total weight with maximum bore of coupling [kg]	Mass moment of inertia with maximum bore of coupling [kgm ²]	
			J _A	J _L
12	6.5"	3.26	0.013	0.001
	7.5"	3.78	0.020	0.001
24	6.5"	4.20	0.016	0.002
	7.5"	4.77	0.023	0.002
48	7.5"	6.03	0.026	0.005
	8"	6.62	0.034	0.005
	10"	9.91	0.091	0.005
60	10"	12.07	0.103	0.011
	11.5"	14.49	0.165	0.011
86	10"	12.52	0.105	0.012
	11.5"	14.94	0.166	0.012
125	10"	16.72	0.129	0.034
	11.5"	19.57	0.199	0.034
200	10"	17.64	0.135	0.039
	11.5"	20.50	0.205	0.039
	14"	30.01	0.572	0.039
280	11.5"	23.54	0.226	0.072
	14"	33.05	0.593	0.072
360	14"	37.55	0.628	0.130
560	14"	49.06	0.794	0.203

1) For dimensions of flange connection see table 9.

Table 9: Flange dimensions according to SAE J 620

Nominal size	Flange dimensions [mm]					
	6.5"	7.5"	8"	10"	11.5"	14"
Dimension DA	215.9	241.3	263.52	314.32	352.42	466.62
Dimension D4	200.02	222.25	244.47	295.27	333.37	438.15
Z x Pitch	6 x 60°	8 x 45°	6 x 60°	8 x 45°	8 x 45°	8 x 45°
Dimension DL	9	9	11	11	11	14

Table 10: Torques

Size	Type of elastomers	Torque [Nm]				Perm. operating speed [rpm]	
		T _{KN}	T _{K max}	T _{K max1}	T _{KW}	n	n _{max}
12	SN	100	200	300	40	4500	5000
	MN	120	240	360	45	5400	6000
24	SN	200	400	600	80	3780	4200
	MN	240	480	720	90	4500	5000
48	SN	420	840	1260	150	3780	4200
	MN	480	960	1440	170	4500	5000
60	SN	500	1000	1500	200	3240	3600
	MN	600	1200	1800	240	3600	4000
86	SN	760	1520	2280	300	3600	4000
	MN	860	1720	2580	350	4050	4500
125	SN	1100	2200	3300	500	2880	3200
	MN	1250	2500	3750	550	3240	3600
200	SN	1700	3400	5100	700	3060	3400
	MN	2000	4000	5250	800	3240	3600
280	WN	2400	4800	6100	1000	2700	3000
	MN	2800	5600	6100	1100	3060	3400
360	WN	3200	5400	9600	1300	2700	3000
	SN	3400	6800	10200	1500	3060	3400
	MN	3600	7200	10800	1680	3060	3400
560	WN	5000	10000	14000	2000	2250	2500
	SN	5200	10400	14000	2300	2520	2800
	MN	5600	11200	14000	2300	2700	3000



1 Technical data

1.2 General dimensions and torques

Maximum torque of coupling $T_{K\max}$ = rated torque of coupling T_{KN} x 2.0.

The maximum torque $T_{K\max}$ indicates short-term torque peaks (e.g. when passing through the resonance). $T_{K\max}$ may arise at the maximum 50,000 times as vibratory torque or 100,000 times as pulsating torque.

Triple torque of coupling $T_{K\max1}$ = rated torque of coupling T_{KN} x ~3.0.

The triple rated torque $T_{K\max1}$ is the torque that may arise only rarely, but only 1,000 times at the maximum. Exceeding the triple torque of $T_{K\max1}$ may cause impairment resp. damage of the coupling components.

2 Advice

2.1 General advice

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

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 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. 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 on the coupling.
- 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.
- Please secure the coupling against accidental contact. Please provide for the necessary protection devices and covers.

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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 **EVOLASTIC®** described in here corresponds to the technical status at the time of printing of these operating/assembly instructions.

2.5 Coupling selection



For a permanent and failure-free operation of the coupling it must be selected according to the selection instructions (according to DIN 740 part 2) for the particular application (see catalogue drive technology "EVOLASTIC®").

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

Please make sure that the technical data regarding torque refer to the elastomer part only.


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

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 diesel engines, 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/EC

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.

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3 Storage, transport and packaging

3.1 Storage

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

With favourable storage conditions the properties of the elastomer part remain unchanged for up to 5 years.



The storage rooms must not include any ozone-generating devices like e. g. fluorescent light sources, mercury-vapour lamps or electrical high-voltage appliances. Humid storage rooms are not suitable. Please make sure that condensation is not generated. The best relative air humidity is less than 65 %.



Please bear in mind that the elastomer part may be stored horizontally only.

3.2 Transport and packaging



In order to avoid any injuries and any kind of damage please 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.

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4 Assembly

The coupling is supplied in the following subassemblies and single parts. Before assembly the coupling has to be inspected for completeness.

4.1 Types of hubs

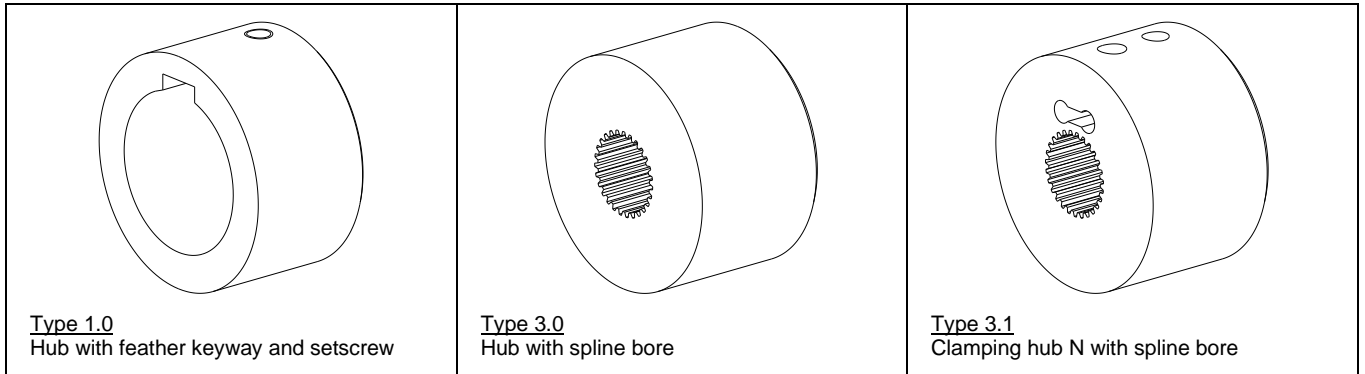


Illustration 9: Types of hubs

4.2 Components of the couplings

Components of type E

Component	Quantity	Description
1	1	Elastomer part E
5	see table 11	Cap screw DIN EN ISO 4762 - 12.9
6	see table 11	Ratchet washer
7	see table 11	Cap screw DIN EN ISO 4762 - 12.9
8	see table 11	Ratchet washer
9 ¹⁾	see table 11	Clamping sleeve DIN 7346
10 ¹⁾	see table 11	Clamping sleeve DIN 7346

1) Components 9 and 10 are omitted with size 12

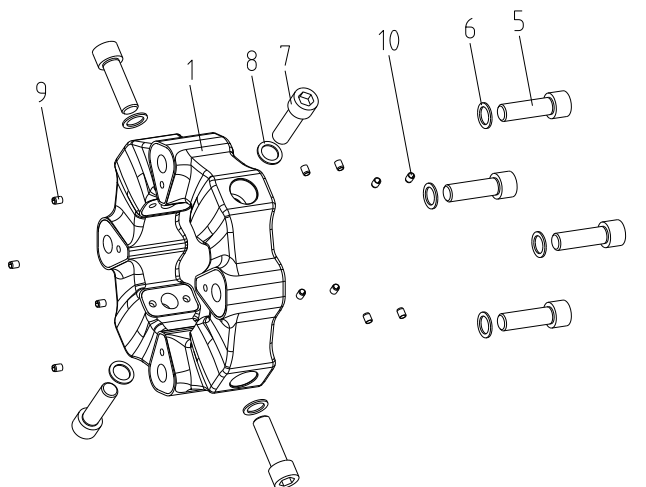


Illustration 10: EVOLASTIC® type E (size 12 to 280)

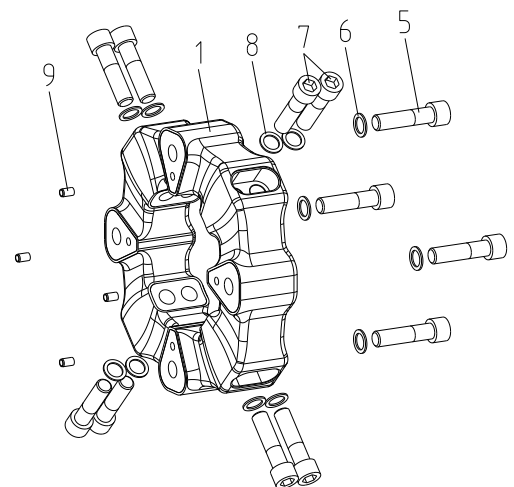


Illustration 11: EVOLASTIC® type E (size 360 and 560)



4 Assembly

4.2 Components of the couplings

Components of type EH

Component	Quantity	Description
1	1	Elastomer part E
2	1	Hub radial
5	see table 11	Cap screw DIN EN ISO 4762 - 12.9
6	see table 11	Ratchet washer
7	see table 11	Cap screw DIN EN ISO 4762 - 12.9
8	see table 11	Ratchet washer
9 ¹⁾	see table 11	Clamping sleeve DIN 7346
10 ¹⁾	see table 11	Clamping sleeve DIN 7346

1) Components 9 and 10 are omitted with size 12

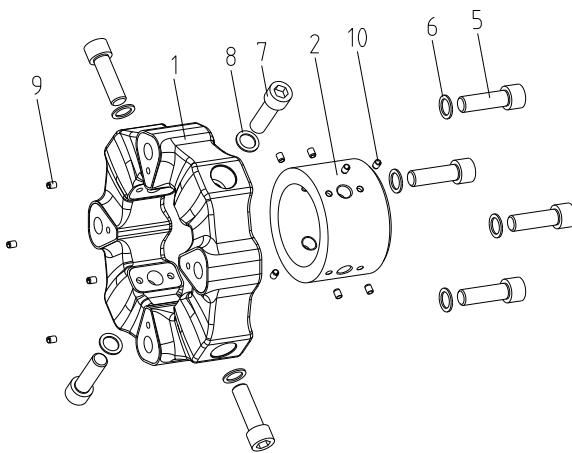


Illustration 12: EVOLASTIC® type EH (size 12 to 280)

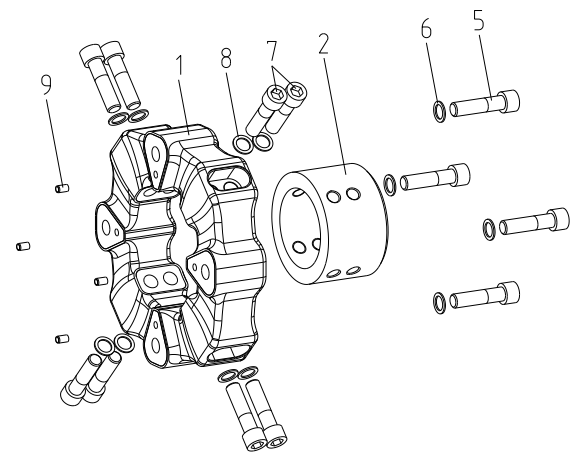


Illustration 13: EVOLASTIC® type EH (size 360 and 560)

Components of type E2H

Component	Quantity	Description
1	1	Elastomer part E
2	1	Hub radial
3	1	Hub axial
5	see table 11	Cap screw DIN EN ISO 4762 - 12.9
6	see table 11	Ratchet washer
7	see table 11	Cap screw DIN EN ISO 4762 - 12.9
8	see table 11	Ratchet washer
9 ¹⁾	see table 11	Clamping sleeve DIN 7346
10 ¹⁾	see table 11	Clamping sleeve DIN 7346

1) Components 9 and 10 are omitted with size 12

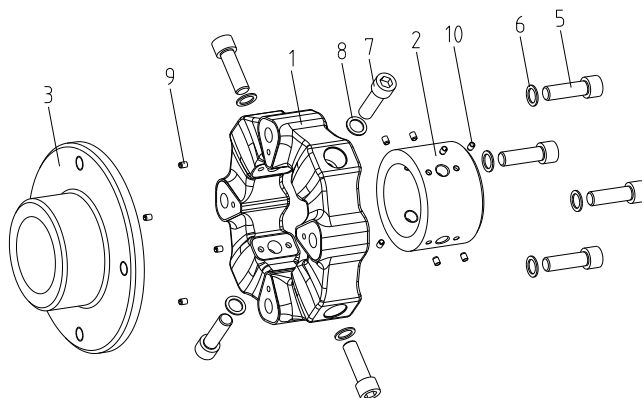


Illustration 14: EVOLASTIC® type E2H (size 12 to 280)

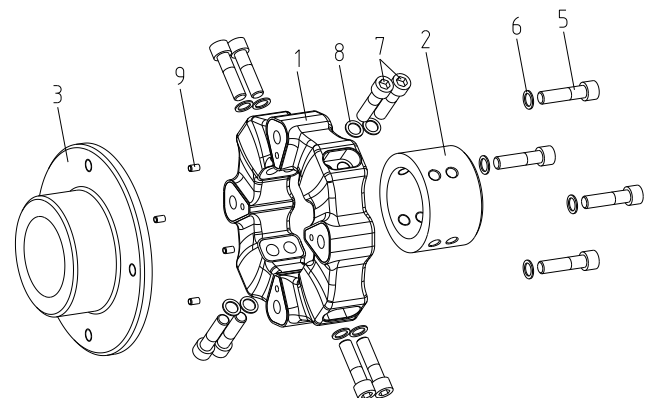


Illustration 15: EVOLASTIC® type E2H (size 360 and 560)

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4 Assembly

4.2 Components of the couplings

Components of type EFH

Component	Quantity	Description
1	1	Elastomer part E
2	1	Hub radial
4	1	Flange
5	see table 11	Cap screw DIN EN ISO 4762 - 12.9
6	see table 11	Ratchet washer
7	see table 11	Cap screw DIN EN ISO 4762 - 12.9
8	see table 11	Ratchet washer
9 ¹⁾	see table 11	Clamping sleeve DIN 7346
10 ¹⁾	see table 11	Clamping sleeve DIN 7346

1) Components 9 and 10 are omitted with size 12

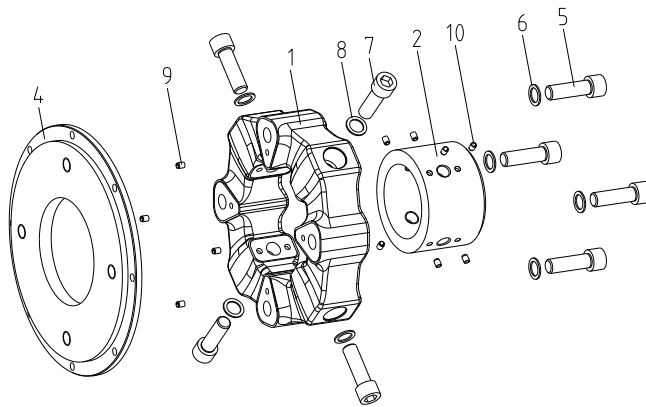


Illustration 16: EVOLASTIC® type EFH (size 12 to 280)

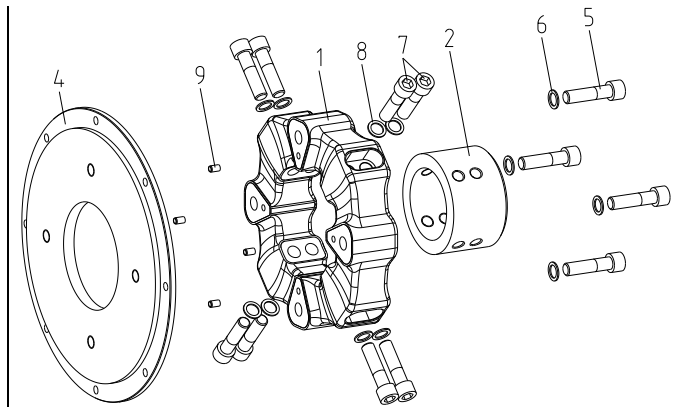


Illustration 17: EVOLASTIC® type EFH (size 360 and 560)

Table 11: Number of cap screws, ratchet washers and clamping sleeves

Size	12	24	48	60	86	125	200	280	360	560
Number of cap screws (component 5)	3	3	4	3	4	3	4	4	4	4
Number of ratchet washers (component 6)	3	3	4	3	4	3	4	4	4	4
Number of cap screws (component 7)	3	3	4	3	4	3	4	4	8	8
Number of ratchet washers (component 8)	3	3	4	3	4	3	4	4	8	8
Number of clamping sleeves (component 9)	-	3	4	3	4	3	4	4	4	4
Number of clamping sleeves (component 10)	-	6	8	6	8	6	8	8	-	-



4 Assembly

4.3 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.

- Hub bores machined by the customer have to observe concentricity or axial runout, respectively (see illustration 18).
- Please make absolutely sure to observe the figures for $\varnothing D_{max}$.
- Carefully align the hubs when the finish bores are drilled.
- If possible, provide for a setscrew according to DIN EN ISO 4029 with a cup point or an end plate to fasten the hubs axially.

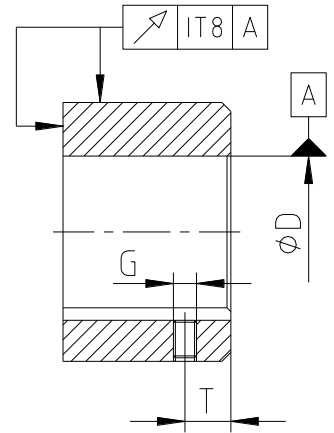


Illustration 18: Concentricity and axial runout



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.

Table 12: Setscrew DIN EN ISO 4029

Size	12	24	48	60	86	125	200	280	360	560
Dimension G	M8	M8	M8	M10	M10	M10	M10	M12	M12	M16
Dimension T	15	15	20	20	20	20	20	30	30	40
Tightening torque T_A [Nm]	10	10	10	17	17	17	17	40	40	80

4.4 General advice for assembly



The EVOLASTIC® coupling may only be assembled in the order described here.



In case if a dimensional drawing was prepared for the coupling, the dimensions specified have to be primarily observed.



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.



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



We recommend to secure all screw connections against working loose additionally to securing screws by the ratchet washer, e. g. applying Loctite screw adhesive (average strength), while the elastomer parts must not come into contact with any type of adhesive.

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4 Assembly

4.5 Assembly of clamping sleeves (component 9 and 10)

- **Only valid from size 24:**
Drive the clamping sleeves (component 9) in the hub axial (component 3) or flange (component 4) respectively the attachment provided by the customer (see illustration 19).
- **Only valid for size 24 to 280:**
Drive the clamping sleeves (component 10) in the hub radial (component 2) (see illustration 20).
- **Only valid for type E:**
Drive the clamping sleeves (component 10) in the attachment provided by the customer or the elastomer part (component 1) (see illustration 21).



For the assembly of the clamping sleeves please observe dimensions A1, DB and LB2 according to table 1.

- **Only valid for type E as spare part versus other manufacturers:**
The clamping sleeves (component 10) and the bores for the relevant clamping sleeves can be omitted.



Please note that the hub radial must have some kind of knurling respectively another provision against twisting of the elastomer part on the hub radial.
Any kind of twisting must be eliminated with assembly of the elastomer part (component 1).

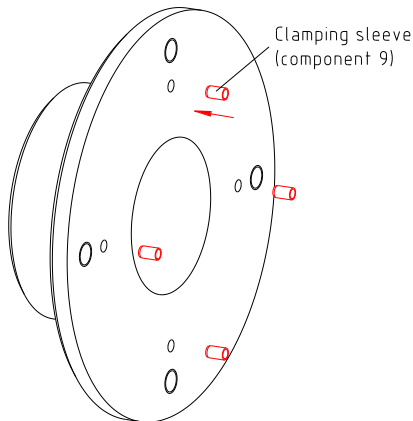


Illustration 19: Assembly of clamping sleeves (component 9)
(Example: type E2H)

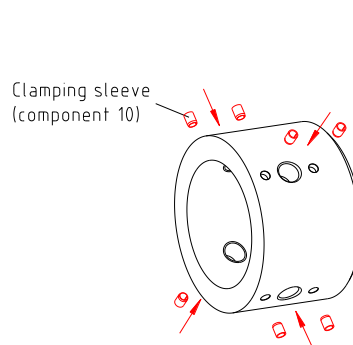


Illustration 20: Assembly of clamping sleeves (component 10)

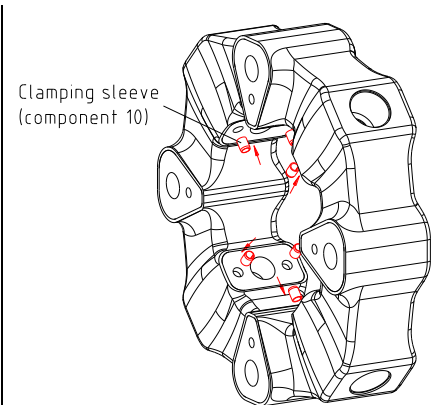


Illustration 21: Type E - assembly of clamping sleeves (component 10)



4 Assembly

4.6 Assembly of the hubs (components 2 and 3)

- Mount the hubs (component 2 and 3) on the shaft of driving and driven side.
- Fasten the hubs by tightening the setscrew DIN EN ISO 4029 with a cup point (tightening torque T_A see table 12) or an end plate.

4.7 Assembly of the flange (component 4)

- Push the flange (component 2) into the centering of the flywheel.
- Align the through holes of the connection flange to the threads of the flywheel.
- Hand-tighten the components via suitable screws (not part of the scope of delivery) first.
- Tighten the screws at the tightening torques T_A specified in table 14 by means of a suitable torque key.



We recommend to secure all screw connections against working loose additionally, e. g. applying Loctite screw adhesive (average strength), while the elastomer parts must not come into contact with any type of adhesive.

Table 14: Screw tightening torque for screwing the connection flange to the engine flywheel

Size of flywheel acc. to SAE - J620 ¹⁾	6.5"	7.5"	8"	10"	11.5"	14"
Screw size	M8	M8	M10	M10	M10	M12
Tightening torque [Nm]	25	25	49	49	49	120
Minimum screw strength	8.8	8.8	8.8	8.8	8.8	10.9
Inch screw	5/16 - 18	5/16 - 18	3/8 - 16	3/8 - 16	3/8 - 16	1/2 - 13
Tightening torque [Nm]	24	24	42	42	42	150
Minimum screw strength	5	5	5	5	5	8

1) For dimensions of flange connection see table 9.



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4.8 Assembly of elastomer part (component 1)



We recommend to secure all screw connections against working loose additionally, e. g. applying Loctite screw adhesive (average strength), while the elastomer parts must not come into contact with any type of adhesive.

- Mount the elastomer part (component 1) to the hub axial (component 3) or the flange (component 4) respectively the attachment provided by the customer and align the bores to the clamping sleeves (component 9) (see illustration 22).
- Hand-tighten the elastomer part and the hub via the cap screws (component 5) and the ratchet washers (component 6) first.



Please make sure that the ratchet washer (component 6) is inserted with the convex side to the screw head of the cap screw (component 5).

- Tighten the cap screws (component 5) to the tightening torques T_{A1} specified in table 15 by a suitable torque key.
- Shift the power pack of the driven side in axial direction until the mounting dimension E is achieved. Align the bores of the hub radial respectively the attachment provided by the customer to the clamping sleeves (component 10) (see illustration 23).
- Hand-tighten the elastomer part and the hub via the cap screws (component 7) and the ratchet washers (component 8) first.



Please make sure that the ratchet washer (component 8) is inserted with the convex side to the screw head of the cap screw (component 7).

- Tighten the cap screws (component 7) to the tightening torques T_{A2} specified in table 15 by a suitable torque key.



The clamping sleeves (component 9) respectively double radial screw connection (cap screws, component 7) prevent twisting of the elastomer part with mounting.

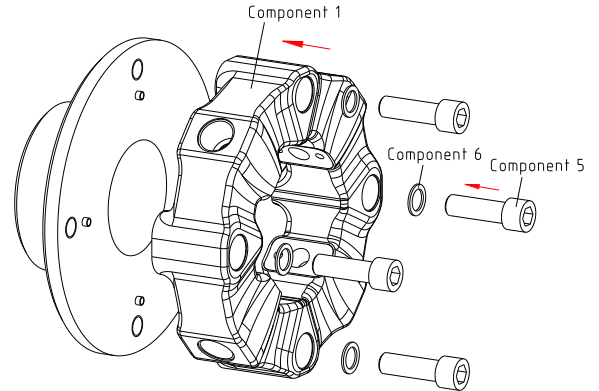


Illustration 22: Assembly of the elastomer part to the hub axial (Example: type E2H)

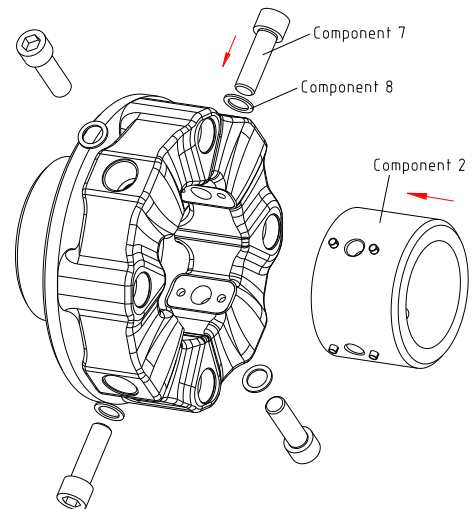


Illustration 23: Assembly of the elastomer part to the hub radial (Example: type E2H)

Table 15: Cap screws DIN EN ISO 4762 - 12.9 (component 5 and 7)

Size	12	24	48	60	86	125	200	280	360	560
Dimension M1	M10	M12	M14	M16	M16	M20	M20	M20	M20	M24
Tightening torque T_{A1} [Nm]	71	123	195	302	302	592	592	592	592	1017
Dimension M2	M10	M12	M14	M16	M16	M20	M20	M20	M20	M20
Tightening torque T_{A2} [Nm]	71	123	195	302	302	592	592	592	592	592

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4 Assembly

4.9 Displacements - alignment of the couplings

The **EVOLASTIC®** flange couplings compensate for position deviations of the machine components to be connected up to the data specified in table 16.

With alignment, the radial and angular displacement should be kept as small as possible, because the service life is increased in this way provided that the operating conditions are maintained.

The **EVOLASTIC®** flange coupling has to be aligned from the coupling hub on the shaft side to one of the machined surfaces of the flywheel or machine.

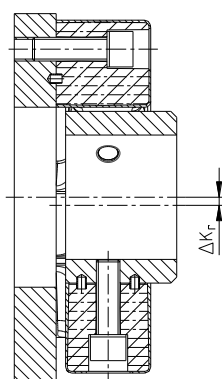


In order to ensure a long service life of the coupling, the shaft ends have to be accurately aligned. Please absolutely observe the displacement figures specified (see table 16). If the figures are exceeded, the coupling will be damaged.

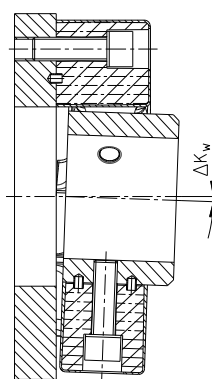
The more accurate the alignment of the coupling, the longer is its service life.

Please note:

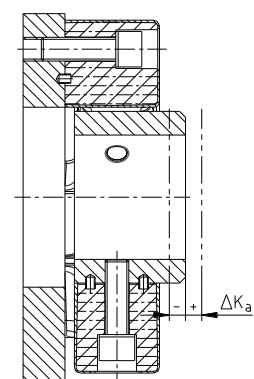
- The displacement figures specified in table 16 are maximum figures which must not arise in parallel. If radial and angular displacements arise at the same time, the permissible displacement values may only be used proportionally (see illustration 25).
- The radial and angular displacement figures specified refer to a reference speed of 1500 RPM. The diagramme of displacement alignment (see illustration 26) provides for a speed-dependent increase or reduction of displacement figures by factor f_{rpm} . The displacement figures between the speeds specified have to be interpolated accordingly.
- The figures of maximum displacements refer to the mounting process; in addition they are permissible for a short time respectively rarely at standstill or with start-up operation as well as with exceptional loading conditions.
- The displacement figures are general standard figures that apply up to an ambient temperature of +80 °C, ensuring a sufficient service life of the **EVOLASTIC®** coupling.
- Please inspect with a dial gauge, ruler or feeler gauge whether the permissible displacement figures specified in table 16 can be observed.



Radial displacement



Angular displacement



Axial displacement

Illustration 24: Displacements



4 Assembly

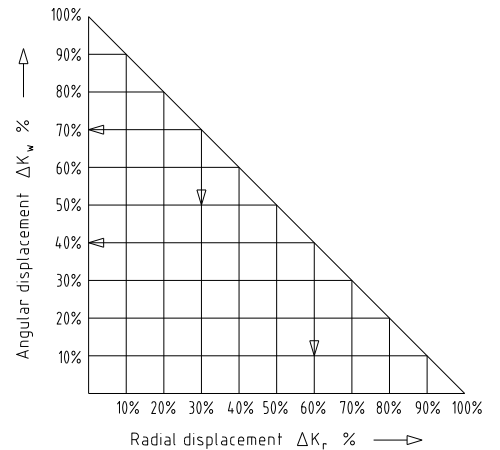
4.9 Displacements - alignment of the couplings

Examples of the displacement combinations specified in illustration 25:

Example 1:
 $\Delta K_r = 30\%$
 $\Delta K_w = 70\%$

Example 2:
 $\Delta K_r = 60\%$
 $\Delta K_w = 40\%$

Illustration 25:
 Combinations of displacement



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

Table 16: Displacement figures

Size		12	24	48	60	86	125	200	280	360	560
Perm. radial displacement ΔK_r [mm]	1500 rpm	2.0	2.0	2.0	2.5	2.0	2.5	2.5	2.5	3.0	3.0
	max. ¹⁾	3.6	3.6	3.6	4.5	3.6	4.5	4.5	4.5	5.4	5.4
Perm. angular displacement ΔK_w [°]	1500 rpm	3.0	3.0	2.0	3.0	2.0	3.0	2.0	2.0	2.0	2.0
	max. ¹⁾	6.0	6.0	4.0	6.0	4.0	6.0	4.0	4.0	4.0	4.0
Perm. axial displacement ΔK_a [mm]		±2.5	±3.0	±2.5	±3.0	±3.0	±3.5	±3.0	±3.5	±4.0	±4.0

1) For short-term start-up operation

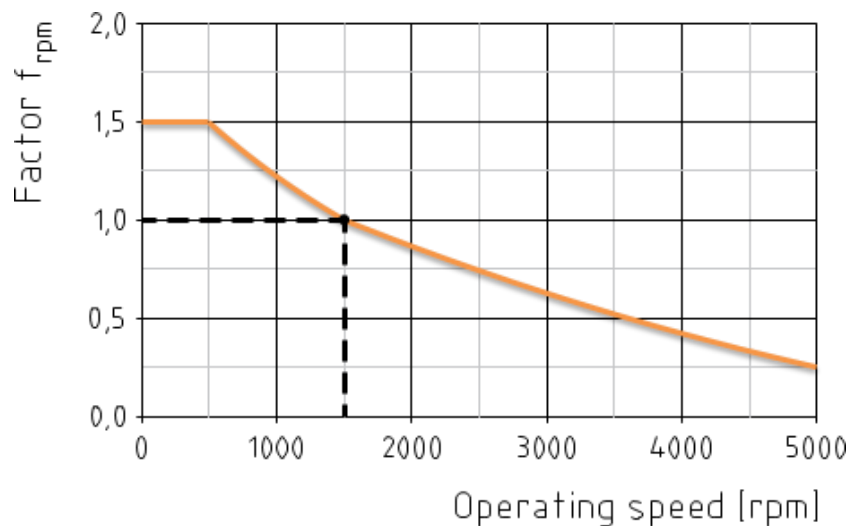


Illustration 26: Diagramme of displacement alignment



5 Start-up

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

Finally the coupling protection against accidental contact must be fitted. It is required in accordance with DIN EN ISO 12100 (Safety of Machinery) and directive 2014/34/EU and must protect against

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

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

During operation of the coupling, please 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.

6 Breakdowns, causes and elimination

The below-mentioned failures can lead to a use of the **EVOLASTIC®** 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 failures the adjacent components must generally be considered.

General failures with use other than intended:

- 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 hub is assembled, the permissible temperature is exceeded.
- The clearance of the components to be assembled is not coordinated with one another.
- Tightening torques have been fallen below/exceeded.
- Components are mixed up by mistake/assembled incorrectly.
- No original **KTR** components (purchased parts) are used.
- Old/already worn out elastomer parts or those stored for too long are used.
- Maintenance intervals are not observed.

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6 Breakdowns, causes and elimination

Breakdowns	Causes	Elimination
Different operating noise and/or vibrations occurring	Errors in alignment, too high displacement, internal contact of coupling components	<ol style="list-style-type: none"> 1) Set the unit out of operation 2) Eliminate the reason of misalignment (e. g. loose foundation bolts, breaking of the engine mount, heat expansion of unit components, modification of the installation dimension E of the coupling) 3) For visual inspection/inspection of wear see chapter 8 <i>Maintenance</i>
	Axial fastening of hubs working loose and screw connection unfastened	<ol style="list-style-type: none"> 1) Set the unit out of operation 2) Inspect alignment of coupling 3) For visual inspection/inspection of wear see chapter 8 <i>Maintenance</i> 4) Secure the hubs axially and against working loose
Fracture of elastomer part	Fracture of elastomer part/ high dynamic energy/ overload	<ol style="list-style-type: none"> 1) Set the unit out of operation 2) Disassemble the coupling and remove remainders of the elastomer part 3) Inspect coupling components and replace coupling components that are damaged 4) Insert elastomer part, assemble coupling components 5) Find out the reason for overload
	Operating parameters do not meet with the performance of the coupling	<ol style="list-style-type: none"> 1) Set the unit out of operation 2) Review the operating parameters and select a bigger coupling (consider mounting space) 3) Assemble new coupling size 4) Inspect alignment
	Operating error of the unit	<ol style="list-style-type: none"> 1) Set the unit out of operation 2) Disassemble the coupling and remove remainders of the elastomer part 3) Inspect coupling components and replace coupling components that are damaged 4) Insert elastomer part, assemble coupling components 5) Instruct and train the service staff
High rotational angles during operation, formation of wrinkles up to external cracks in the elastomer part, fracture of elastomer, internal depolymerisation	Vibrations of drive, resonance in the elastomer	<ol style="list-style-type: none"> 1) Set the unit out of operation 2) Disassemble the coupling and remove remainders of the elastomer part 3) Inspect coupling components and replace coupling components that are damaged 4) Insert elastomer part, assemble coupling components 5) Inspect alignment, adjust if necessary 6) Find out the reason for vibrations (selection of loads)
	Ambient/contact temperatures which are too high for the elastomer part, max. permissible -30 °C/+80 °C	<ol style="list-style-type: none"> 1) Set the unit out of operation 2) Disassemble the coupling and remove remainders of the elastomer part 3) Inspect coupling components and replace coupling components that are damaged 4) Insert elastomer part, assemble coupling components 5) Inspect alignment, adjust if necessary 6) Inspect and adjust ambient/contact temperature
	e. g. contact with aggressive liquids/oils, influence by ozone, too high ambient temperature etc. causing a physical change of the elastomer part	<ol style="list-style-type: none"> 1) Set the unit out of operation 2) Disassemble the coupling and remove remainders of the elastomer part 3) Inspect coupling components and replace coupling components that are damaged 4) Insert elastomer part, assemble coupling components 5) Inspect alignment, adjust if necessary 6) Make sure that other physical modifications of the elastomer part are excluded



7 Disposal

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

- **Metal**
Any metal components have to be cleaned and disposed of by scrap metal.
- **Nylon materials**
Nylon materials have to be collected and disposed of by a waste disposal company.

8 Maintenance and service

We recommend to perform a visual inspection on the coupling **at least once a year**. Please pay special attention to the condition of the elastomer part of the coupling.

- Remove loose dirt from the coupling.
- Inspect the coupling for spalling or missing components, if necessary. Inspect the elastomer part in particular for cracks.
- Defective components must be replaced immediately resp. missing components must be replaced immediately.
- Inspect and correct the tightening torques of all screw connections, if necessary.
- Since the flexible machine bearings of the driving and driven side settle during the course of load, inspect the alignment of the coupling and re-align the coupling, if necessary.

Please perform visual inspection as follows:

- Inspect adhesion of the elastomer to the metal insert.
- Inspect the elastomer part for wrinkles or cracks in the areas marked with ①, ②, ③, ④ and ⑤ in illustration 27. Formation of wrinkles is trouble-free, but dependent on the application may generate cracks in the long run. If the cracks in the areas marked achieve or exceed the limit specified in table 17, the elastomer part must be replaced.

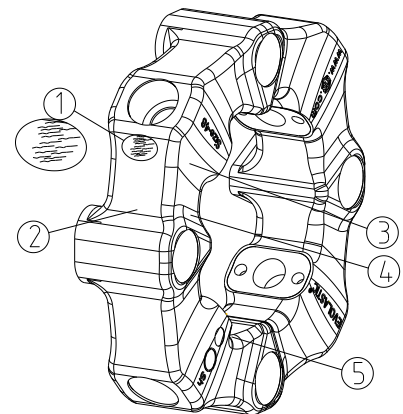


Illustration 27: Visual inspection




Elastomer parts that are damaged or worn off have to be replaced, with the maintenance interval of the engine at the latest.

Table 17: Crack depth

Size	12	24	48	60	86	125	200	280	360	560
Max. perm. crack depth [mm]	3.0	4.0	4.0	4.0	4.0	6.0	6.0	6.0	8.0	10.0

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 KTR-Group	EVOLASTIC® Operating/Assembly instructions Type E, EH, E2H and EFH	KTR-N 48610 EN Sheet: 23 of 23 Edition: 2
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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.



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.

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