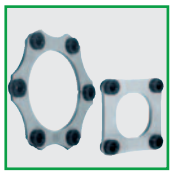
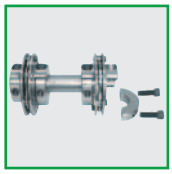
For advanced drive technology KTR





Torsionally stiff shaft couplings:

RADEX®-N
Steel lamina couplings

RADEX®-NC
Servo lamina couplings

RIGIFLEX®
Steel lamina couplings

LAMEX®
Lamina couplings from plastics

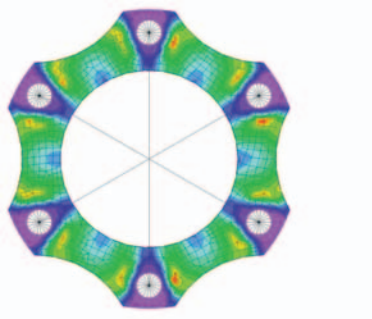
RADEX®-N Steel lamina coupling

Backlash-free, torsionally rigid and maintenance-free couplings

The RADEX®-N is a backlash-free and maintenance-free all-steel coupling. The laminae that are extremely rigid in sense of rotation are made from high-strength, stainless spring steel and enable a compensation for high displacements with low restoring forces. By reason of the all-steel design the RADEX®-N can be used in drives with temperatures of up to 280 °C.

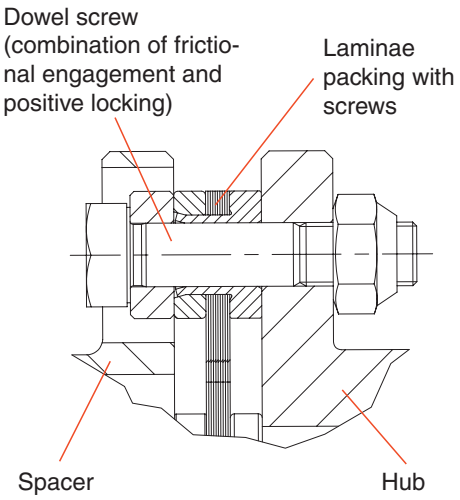
FEM-optimized laminae form

The steel laminae packings from stainless spring steel were developed on the basis of FEM calculations. Under consideration of the necessary possibilities of displacements of the coupling the optimal form regarding torque transmission and torsional rigidity was aimed for. The fitted form of the steel laminae at the outside diameter is the result of this optimization calculation.



Laminae packings with shoulder bolts

The „heart“ of the steel lamina coupling are the laminae packings and their connection to the hubs or spacers. High-strength, special shoulder bolts that are alternately screwed with hubs and spacer enable a combination of frictional engagement and positive locking. Thus a high power density with simultaneous easy displacement and low restoring forces is guaranteed. Due to the special constructive design of the RADEX®-N components the laminae packings are „artificially“ prestressed. Hereby the torsional rigidity of approx. 30 % is enabled and at the same time the known problem regarding the axial vibrations of the spacer is avoided.



Explosion protection use

RADEX®-N couplings are suitable for the use in drives in hazardous areas. The couplings are certified according to EC Standard 94/9/EC (ATEX 95) and belong to category 2G/2D, are confirmed and thus suitable for the use in hazardous areas of zone G1, G2, D21 and D22.
Clamping ring hubs (clamping hub without shoulder bolt only for category 3) used in hazardous areas must be selected in a way that there is a safety of s = 2 from the peak torque of the unit including all operating parameters to the torque of frictional engagement and to the nominal torque of the coupling.
Further information about this topic under www.ktr.com.

RADEX®-N Steel lamina coupling

Coupling selection

1. **Drives without periodic torsional vibrations**
For example centrifugal pumps, fans, screw compressors, etc. The coupling selection requires that the rated torque T_{KN} and the maximum torque T_{Kmax} are reviewed.

1.1 **Loading by rated torque**
Taking into account the operating factor S_B the permissible rated torque must be at least as big as the rated torque T_N of the machine.

$$T_{KN} \geq T_N \bullet S_B$$

(For operating factor S_B see table below)

1.2 **Loading by torque shocks**
The permissible maximum torque T_{Kmax} of the coupling must be at least as big as the sum of the peak torque T_S and the rated torque T_N of the machine. This is valid in case that the rated torque of the machine is super-imposed by a shock (e. g. starting of the engine). For drives with A. C. motors and large masses on the load side we would recommend calculations by our simulation programme (please consult with our Engineering Department).

$$T_{Kmax} \geq (T_N + T_S)$$

2. **Drives with periodic torsional vibrations**
For drives subject to dangerous torsional vibrations (e. g. diesel engines, piston compressors, piston pumps, generators, etc.) it is necessary to perform a torsional vibration calculation (please consult with our Engineering Department).

2.1 **Loading by rated torque**
Taking into account the operating factor S_B the permissible rated speed must be at least as large as the rated torque T_N of the machine.

$$T_{KN} \geq T_N \bullet S_B$$

2.2 **Passing through resonance**
The peak torque T_{SR} arising while passing through resonance must not exceed the permissible maximum torque of the coupling T_{Kmax}.

$$T_{Kmax} \geq T_{SR}$$

2.3 **Loading by vibratory torque**
The permissible vibratory torque of the coupling T_{KW} must not be exceeded by the maximum periodic vibratory torque of the machine T_W.

$$T_{KW} \geq T_W$$

Explanation of the above-mentioned coupling torques

Description	Code	Explanation
Rated torque of coupling	T_{KN}	Torque which can be transmitted continuously over the entire speed range of the coupling.
Vibratory torque of coupling	T_{KW}	Torque amplitude of the permissible periodic torque fluctuation with a frequency of 10 Hz and a basic load of T_{KN} or dynamic load up to T_{KN}.

Description	Code	Explanation
Maximum torque of coupling	T_{Kmax}	Torque which can be transmitted during the entire life of the coupling $\geq 10^5$ times as spike load or 5 x 10^4 times as alternating load.

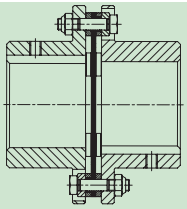
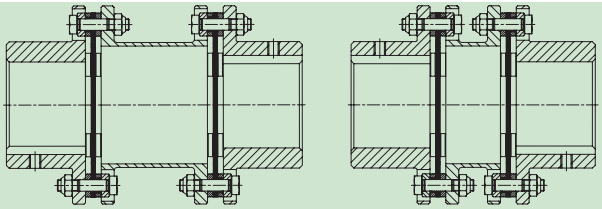
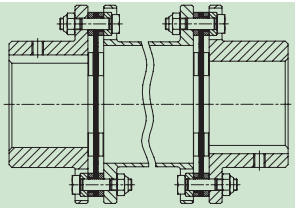
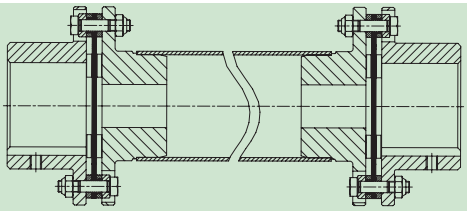
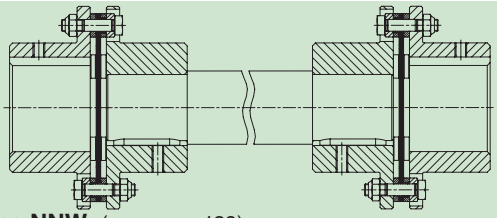
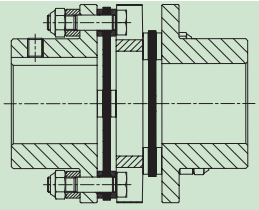
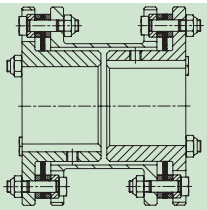
Guidelines for operating factor S_B

Application	S_B
Construction machinery	2
Agitators	1 - 2
Centrifuges	1,5
Conveyors	2
Elevators	2
Fans/Blowers	1,5
Generators	1
Calanders	2
Crushers	2,5
Textile machinery	2
Rolling mills	2,5

Application	S_B
Woodworking machinery	1,5
Mixers and extruders	2
Stamps, presses	2,5
Machine tools	2
Grinders	2,5
Packaging machines	1
Roller drives	2,5
Piston pumps	2,5
Centrifugal pumps	1,5
Piston compressors	2,5
Turbo compressors	2

RADEX®-N Steel lamina coupling

Types and applications

Types	Characteristics	Applications
 **Type NN** (see page 128)	• single cardanic design • only angular and axial displacement permissible • high torsional rigidity • compact dimensions	• mixers • agitating machines • immersion pumps • fans • applications with high radial load
 **Type NANA 1/NANA 2** (see page 128)	• double cardanic design • compensation of high misalignment with low restoring forces • standard spacers available from stock	• paper machines • printing and processing machines • conveyors • steel mills • generators • grinding machines
 **Type NANA 3** (see page 131)	• double cardanic design • spacers adapted to standard dimensions of pumps • radial assembly, no movement of the machine required • **available according to API standard**	• process pumps • water pumps • pumps according to API standard • turbines • compressors
 **Type NANA 4** (see page 129)	• spacers can be determined by the customer • maximum shaft distance dimension up to approx. 6 m • welded intermediate pipes for high torsional rigidity	• foil and paper machines • pallet and conveyor systems • portal robots • test benches • cooling towers/blowers
 **Type NNW** (see page 129)	• spacers can be determined by the customer • coupling consisting of 2 x type NN with intermediate shaft • for drives with relatively low speeds	• low speed drives with big shaft distance dimensions • agitating machines • crushers • presses • packaging machines
 **Type NNZ** (see page 129)	• compact double cardanic design • cannot be radially assembled • with intermediate disk • ideal for replacement of curved-tooth gear couplings from steel • standard type up to size 70	• robotics • paper machines and inserters • machine tools • packaging machines • test benches
 **Type NENE 1** (see page 128)	• with reduced hubs • compact double cardanic design • spacers cannot be assembled radially • variable spacer length	• applications with short shaft distance dimensions • replacement for curved-tooth gear couplings from steel

RADEX®-N Steel lamina coupling

Technical data

Torques, misalignments

Size	Torques [Nm]			Permissible misalignments				
				Angular [°] each lamina	Axial [mm]		Radial [mm]	
	T_{KN}	$T_{K\,max}$	T_{KW}		NN	NANA 1/2 a. NNZ	NANA 1	NANA 2/NNZ
20	15	30	5	1,0	0,6	1,2	0,5	0,1
25	30	60	10	1,0	0,8	1,6	0,5	0,2
35	60	120	20	1,0	1,0	2,0	0,5	0,2
38	120	240	40	1,0	1,2	2,4	0,6	0,3
42	180	360	60	1,0	1,4	2,8	0,6	0,3
50	330	660	110	1,0	1,6	3,2	0,8	0,4
60	690	1380	230	1,3	1,0	2,0	1,7	1,0
70	1100	2200	370	1,3	1,1	2,2	2,1	1,2
80	1500	3000	500	1,3	1,3	2,6	2,5	1,5
85	2400	4800	800	1,3	1,3	2,3	2,5	1,5
90	4500	9000	1500	1,0	1,0	2,0	2,0	1,4
105	5100	10200	1700	1,0	1,2	2,4	2,5	1,6
115	9000	18000	3000	1,0	1,4	2,8	2,0	1,3
135	12000	24000	4000	1,0	1,75	3,5	4,0	2,8
160	15000	30000	5000	0,7	2,75	5,5	3,2	–
180	25000	50000	8000	0,7	3,0	6,0	3,2	–
190	35000	70000	12000	0,7	3,5	7,0	3,2	–
220	50000	100000	16000	0,7	4,0	8,0	3,2	–

Permissible speeds, torsional stiffness

Size	Max. speed unbalanced [min^{-1}] (higher speeds balanced on request)	Torsion spring rigidity x 10^6 [Nm/rad] per laminae set
20	20000	0,017
25	16000	0,028
35	13000	0,092
38	12000	0,198
42	10000	0,282
50	8000	0,501
60	6700	0,56
70	5900	0,90
80	5100	1,14
85	4750	1,52
90	4300	1,94
105	4000	2,54
115	3400	3,48
135	3000	6,85
160	2800	32,2
180	2400	42,3
190	2150	76,8
220	1950	98,0

Mass moments of inertia

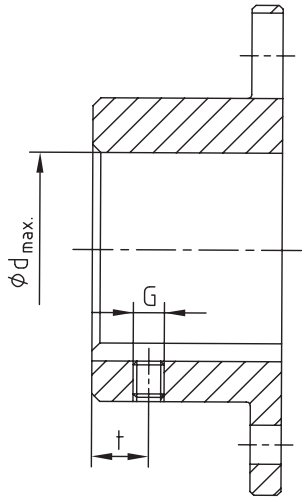
Size	Mass moments of inertia x 10^{-3} [kgm^2], hubs with maximum bore					
	Hub (max. bore)	Lamina set	NN complete	NANA 1 complete	NANA 2 complete	NNZ complete
20	0,000043	0,00001	0,00010	0,00011	–	0,00010
25	0,000116	0,00003	0,00026	0,00029	–	0,00025
35	0,00042	0,00006	0,0008	0,0095	–	0,0085
38	0,00073	0,00015	0,0016	0,0018	–	0,0015
42	0,00123	0,0002	0,0027	0,0029	–	0,0024
50	0,00291	0,0003	0,0061	0,010	–	0,008
60	0,00378	0,0006	0,0082	0,013	0,012	0,01
70	0,00714	0,0009	0,0152	0,024	0,022	0,02
80	0,0134	0,002	0,029	0,044	0,042	–
85	0,0195	0,003	0,042	0,067	0,064	–
90	0,0282	0,008	0,064	0,106	0,103	–
105	0,0414	0,01	0,093	0,148	0,143	–
115	0,0899	0,02	0,199	0,344	0,333	–
135	0,1866	0,11	0,483	0,851	–	–
160	0,3480	0,15	0,846	1,474	–	–
180	0,6283	0,32	1,577	2,687	–	–
190	1,1301	0,53	2,790	4,760	–	–
220	2,0228	0,87	4,916	8,349	–	–

RADEX®-N Steel lamina coupling

Basic programme (cylindrical bores)

Standard hub 1.0 according to DIN 6885 sheet 1 (with keyway)

Size	$d_{max.}$	G	t	T_A [Nm]
20	20	M5	6	2,0
25	25	M5	8	2,0
35	35	M6	15	4,8
38	38	M6	15	4,8
42	42	M8	20	10,0
50	50	M8	20	10,0
60	60	M8	20	10,0
70	70	M10	20	17,0
80	80	M10	20	17,0
85	85	M10	25	17,0
90	90	M12	25	40,0
105	105	M12	30	40,0
115	115	M12	30	40,0
135	135			
160	160	on request of customer		
180	170			
190	190			
220	220			



Basic programme (cylindrical bores)

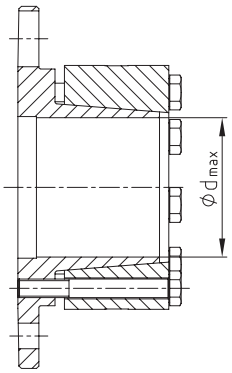
Size	Cylindrical finish bore [mm] H7, keyway to DIN 6885 sheet 1 (JS9) with thread for setscrew																														
	unbored	10	12	14	15	18	19	20	22	24	25	28	30	32	35	38	40	42	45	48	50	55	60	65	70	75	80	85	90	95	100	110
20	●	●		●	●		●	●																							
25	●		●	●		●	●	●	●	●	●																				
35	●			●			●	●		●	●	●	●	●	●																
38	●									●	●	●	●		●	●															
42	●									●	●		●		●	●	●	●													
50	●												●	●	●	●	●	●	●	●	●										
60	●										●		●	●	●	●	●	●	●	●	●	●	●								
70	●																●		●	●	●		●	●	●						
80	●																●		●	●	●	●	●	●	●	●					
85	●																						●	●			●				
90	●																						●	●	●	●	●		●		
105	●																								●		●		●		
115	●																										●		●		●	●
135	●																														
160	pilot bored																														
180	pilot bored																														
190	pilot bored																														
220	pilot bored																														

Backlash-free shaft-hub connections without feather key

Size	Type 6.5 a. 6.0 $d_{max.}$	CLAMPEX® 603/620 $d_{max.}$
20	14	26
25	24	30
35	28	42
38	32	48
42	38	60
50	42	65
60	50	75
70	60	80
80	70	90
85	70	90
90	80	100
105	90	105
115	100	120
135	110	140
160	140	160
180	150	190
190	160	210
220	180	230

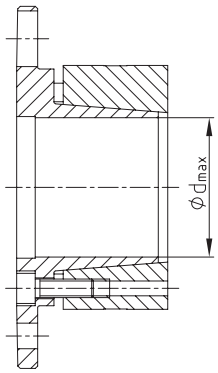
Clamping ring hub type 6.5

(clamping screws from the outside)

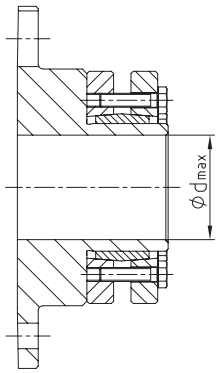


Clamping ring hub type 6.0

(clamping screws from the inside)



Design with CLAMPEX® element type 603



Selection: In case of use in hazardous areas the clamping ring hubs must be selected in a way that there is a minimum safety factor of s = 2 between the peak torque (including all operating parameters) and the nominal torque and frictional torque of engagement of the coupling.

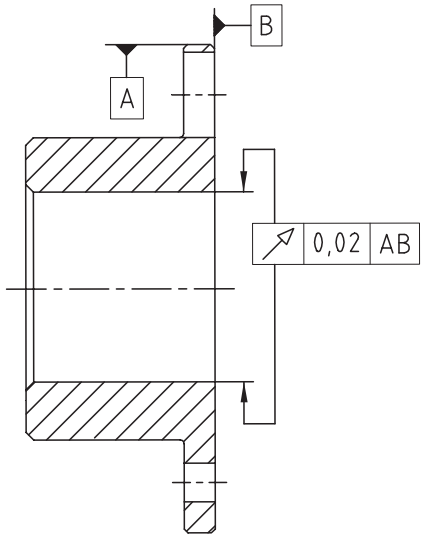
RADEX®-N Steel lamina coupling

Backlash-free, torsionally rigid and maintenance-free couplings

Delivery condition
RADEX®-N are delivered as individual parts (can be delivered assembled on request). The hubs can be supplied unbored or with finish bore and keyway or with a frictionally engaged shaft-hub-connection.

Assembly and operating advice
(please see our mounting instructions KTR standard 47110 see www.ktr.com)
For the assembly it is important to make sure that the laminae sets are assembled free from distortion in axial direction.
The screw tightening torques are shown in the mounting instructions.

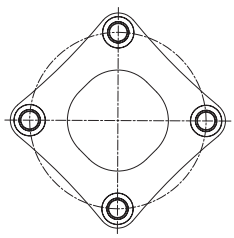
If the finish bore is machined by the customer, the concentric and axial running tolerances have to be observed (see sketch below).



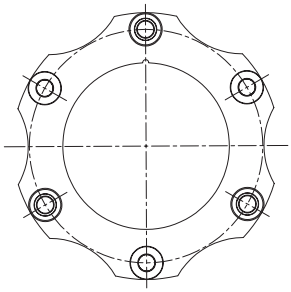
Balancing:
On request of the customer the RADEX®-N couplings can be balanced. For most applications this is not necessary due to the accurate machining of the coupling. Please consult with KTR for any further questions.

The following lamina types are distinguished for RADEX®-N:

Size 20 – 50
(4 hole lamina)



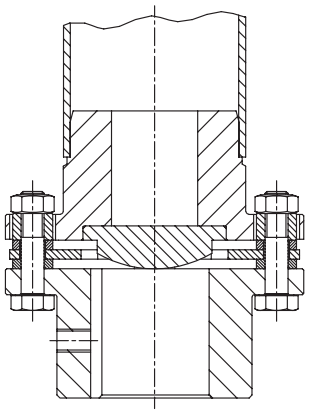
Size 60 – 220
(6 hole lamina)



Screw tightening torques of laminae:

Size	Screw	T_A [Nm]
20	4 x M5	8,5
25	4 x M6	14
35	4 x M6	14
38	4 x M8	35
42	4 x M8	35
50	4 x M10	69
60	6 x M8	33
70	6 x M10	65
80	6 x M10	65
85	6 x M12	115
90	6 x M16	280
105	6 x M16	280
115	6 x M20	550
135	6 x M24	900
160	6 x M24	900
180	6 x M30	1850
190	6 x M33	2450
220	6 x M36	3150

Installation:
RADEX®-N couplings are designed for horizontal installation. For vertical installation the spacer has to be supported (see sketch below). Please contact:



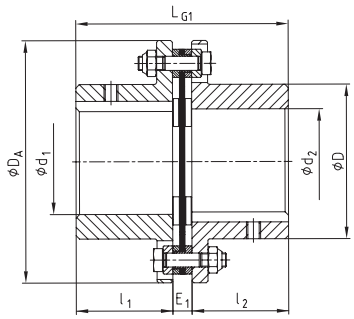
Safety regulations:
The coupling must be selected in a way that the per-missible coupling load is not exceeded in any operating condition. For that purpose a comparison between the actual loads with the permissible coupling characteristics has to be performed.

The customer must protect rotating parts against unintended touch (Safety of Machines DIN EN 292 part 2). Please take precautions that there is a sufficient coupling protection in case of a fracture of the coupling caused by overload.

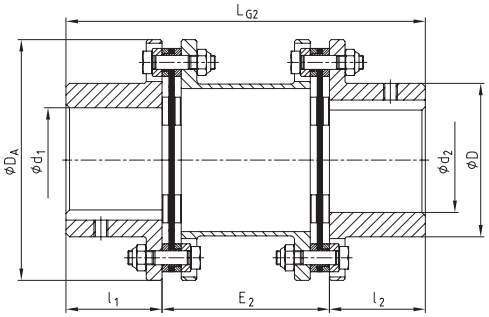
RADEX®-N Steel lamina coupling

Standard types

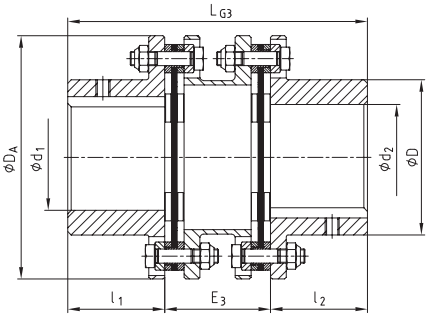
- Standard types available from stock
- Single and double cardanic designs
- Furthermore available with frictionally engaged shaft-hub-connection
- Finish bore according to ISO fit H7, feather keyway according to DIN 6885 sheet 1 - JS9
- Ⓔx Approved according to EC Standard 94/9/EC (Explosion Certificate ATEX 95)



Type NN

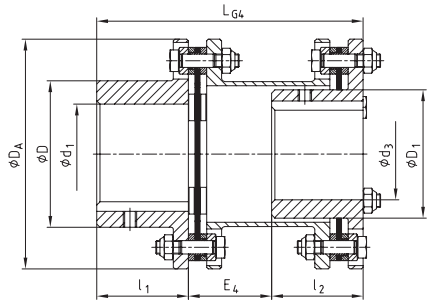


Type NANA 1

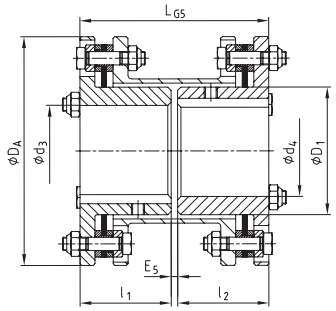


Type NANA 2

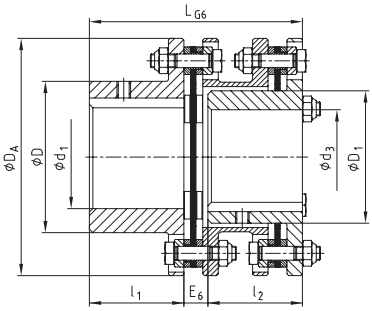
Size	Finish bore		Dimensions [mm]															
	d_1/d_2 max.	d_3/d_4 max.	D	D_1	D_A	l_1/l_2	L_{G1}	E_1	L_{G2}	E_2	L_{G3}	E_3	L_{G4}	E_4	L_{G5}	E_5	L_{G6}	E_6
20	20	–	32	–	56	20	45	5	100	60	–	–	–	–	–	–	–	–
25	25	–	40	–	68	25	56	6	110	60	–	–	–	–	–	–	–	–
35	35	–	54	–	82	40	86	6	150	70	–	–	–	–	–	–	–	–
38	38	–	58	–	94	45	98	8	170	80	–	–	–	–	–	–	–	–
42	42	–	68	–	104	45	100	10	170	80	–	–	–	–	–	–	–	–
50	50	–	78	–	126	55	121	11	206	96	–	–	–	–	–	–	–	–
60	60	55	88	77	138	55	121	11	206	96	170	60	160	50	114	4	124	14
70	70	65	102	90	156	65	141	11	246	116	200	70	190	60	134	4	144	14
80	80	75	117	104	179	75	164	14	286	136	233	83	220	70	154	4	167	17
85	85	80	123	112	191	80	175	15	300	140	246	86	232	72	164	4	178	18
90	90	85	132	119	210	80	175	15	300	140	251	91	233	73	166	6	184	24
105	105	90	147	128	225	90	200	20	340	160	281	101	263	83	186	6	204	24
115	115	100	163	145	265	100	223	23	370	170	309	109	288	88	206	6	227	27
135	135	115	184	160	305	135	297	27	520	250	–	–	–	–	–	–	–	–
160	160	130	213	180	340	160	354	34	620	300	–	–	–	–	–	–	–	–
180	180	140	242	190	390	180	374	34	660	300	–	–	–	–	–	–	–	–
190	190	170	265	230	440	190	420	40	680	300	–	–	–	–	–	–	–	–
220	220	185	305	250	495	220	480	40	740	300	–	–	–	–	–	–	–	–



Type NENA 1



Type NENE 1



Type NENA 2

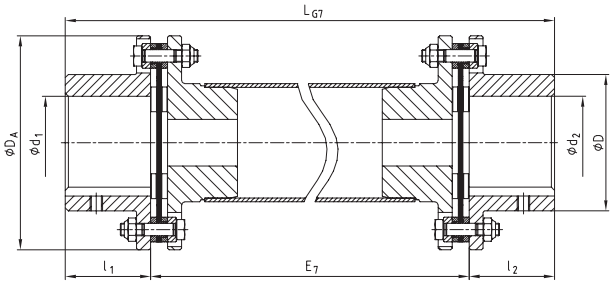
Order form:

RADEX®-N 60	NANA 1	Ø 50	Ø 60
Coupling size	Type	Bore d_1	Bore d_2

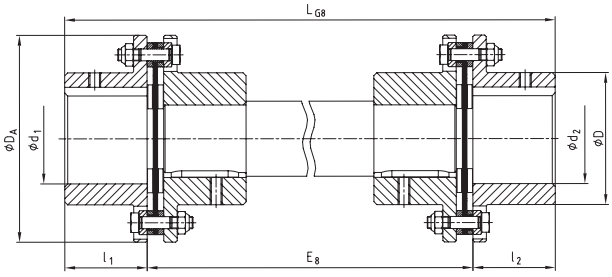
RADEX®-N Steel lamina coupling

Special types on request of customers

- Types as per customer requirements
- Type NANA 4 for shaft distance dimensions up to 6 m
- Type NNW with full shaft (please note the critical whirling speed)
- Type NNZ (double-cardanic) for very short shaft distance dimensions
- Finish bore according to ISO fit H7, feather keyway according to DIN 6885 sheet 1 - JS9
- Ⓔx Approved according to EC Standard 94/9/EC (Explosion Certificate ATEX 95)

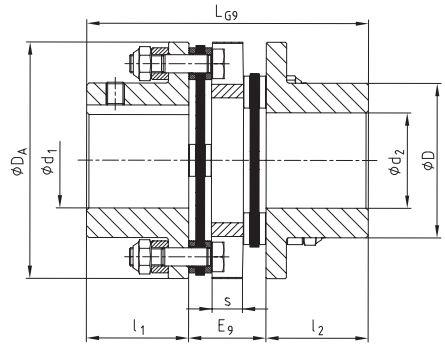


Type NANA 4



Type NNW

Size	Finish bore	Dimensions [mm]									
	d_1/d_2 max.	D	D_A	l_1 / l_2	L_{G7}	E_7	L_{G8}	E_8	L_{G9}	E_9	s
20	20	32	56	20					58	18	8
25	25	40	68	25					70	20	8
35	35	54	82	40					102	22	10
38	38	58	94	45					118	28	12
42	42	68	104	45					124	34	14
50	50	78	126	55					144	34	12
60	60	88	138	55	$L_{G7} = E_7 + l_1 + l_2$	Intermediate shaft dimension according to customer specification	$L_{G8} = E_8 + l_1 + l_2$	Intermediate shaft dimension according to customer specification	144	34	12
70	70	102	156	65					166	36	14
80	80	117	179	75					–	–	–
85	85	123	191	80					–	–	–
90	90	132	210	80					–	–	–
105	105	147	225	90					–	–	–
115	115	163	265	100					–	–	–
135	135	184	305	135					–	–	–
160	160	215	340	160					–	–	–
180	180	245	390	180					–	–	–
190	190	265	440	190					–	–	–
220	220	305	495	220					–	–	–



Type NNZ

Order form:

RADEX®-N 60	NANA 4	Ø 50	Ø 60	2500
Coupling size	Type	Bore d_1	Bore d_2	Shaft distance dimension

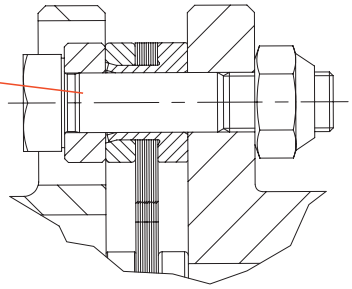
RADEX®-N and RIGIFLEX®
Steel lamina coupling
Standard line for pump drives according to API 610 and 671

Steel lamina coupling acc. to API Standard 610 or 671
The API line has been developed for use in process and chemical pumps, e. g. The requirements of the API 610 and 671 have been considered here. The balancing qualities of manufacture of the couplings are to ISO 1940 (G= 6,3) and AGMA (class 9).

RADEX®-N

Standard line acc. to API 610 (see page 131)

Securing device of the spacer:
The laminae packings have a sleeve in order to secure the spacer if the lamina breaks.



RIGIFLEX®

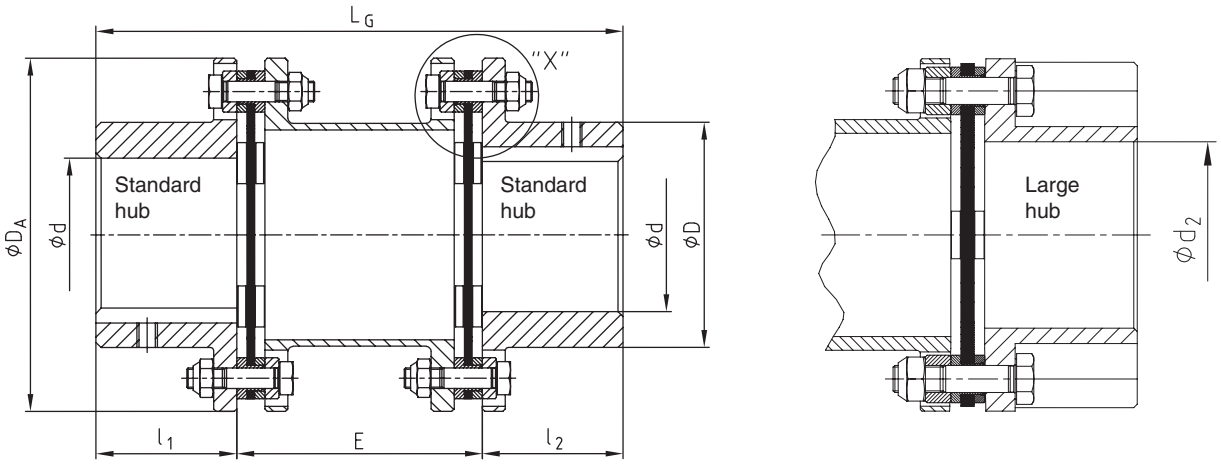
Standard line acc. to API 671 (see page 136 and following)

The hubs, laminae packings and flanges of the RIGIFLEX® are preassembled as one unit by KTR. The spacer is connected with this unit through hexagonal screws.
If a lamina breaks, the space remains in its position through a safety catch between flange and hub.

Explosion protection certification according to ATEX 95
Couplings of the RADEX®-N and RIGIFLEX® standard line of line NA are suited for the use in drives in hazardous areas. The couplings are certified according to EC Standard 94/9/EC and belong to category 2G and are thus suitable for the use in hazardous areas of zone G1, G2, D21 and D22.
Further information about this topic under www.ktr.com.

RADEX®-N Steel lamina coupling
Standard line NANA 3
for pump drives according to API 610

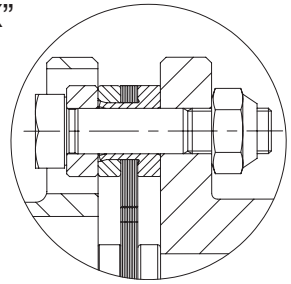
- Line NANA 3 for pump drives
- Coupling according to API 610
- High balancing quality due to precise manufacture (AGMA class 9)
- Device to secure the spacer if the lamina breaks (see detail “X”)
- Also available with large hub for larger bore diameters
- Finish bore according to ISO fit H7, feather keyway according to DIN 6885 sheet 1 - JS9
- Ex Approved according to EC Standard 94/9/EC (Explosion Certificate ATEX 95)



Size	Torques [Nm]			Dimensions [mm]						Perm. displacements	
	T_{KN}	$T_{K\,max}$	T_{KW}	$d_{max.}$	$d_{2\,max.}$	D	D_A	$E_{Standard}$ [1]	l_1 / l_2	Angle each lamina [°]	Axial [mm]
20	15	30	5	20	–	32	56	18/60	20	1,0	1,2
25	30	60	10	25	–	40	68	20/60	25	1,0	1,6
35	60	120	20	35	–	54	82	22/70/140	40	1,0	2,0
38	120	240	40	38	50	58	94	28/80	45	1,0	2,4
42	180	360	60	42	58	68	104	34/80/100	45	1,0	2,8
50	330	660	110	50	65	78	126	34/96/140/180	55	1,0	3,2
60	690	1380	230	60	80	88	138	34/60/96/100/140/180/250	55	1,3	2,0
70	1100	2200	270	70	90	102	156	36/70/100/116/140/180	65	1,3	2,2
80	1500	3000	500	80	105	117	179	83/100/136/140/180/250	75	1,3	2,6
85	2400	4800	800	85	115	123	191	50/86/100/140/180/250	80	1,3	2,3
90	4500	9000	1500	90	120	132	210	91/140/180/250	80	1,0	2,0
105	5100	10200	1700	105	130	147	225	101/160/250	90	1,0	2,4
115	9000	18000	3000	115	150	163	265	109/170	100	1,0	2,8
135	12000	24000	4000	135	–	184	305	250	135	1,0	3,5
160	15000	30000	5000	160	–	213	340	300	160	0,7	5,5
180	25000	50000	8000	180	–	242	390	Acc. to customer’s request	180	0,7	6,0
190	35000	70000	12000	190	–	265	440		190	0,7	7,0
220	50000	100000	16000	220	–	305	495		220	0,7	8,0

1) Other E-dimensions available on request.

Detail “X”



Securing device of the spacer:
The laminae packings have a sleeve in order to secure the spacer if the lamina breaks.

Order form:

RADEX®-N 60	NANA 3	Ø 50	Ø 60	140
Coupling size	Type	Bore d_1	Bore d_2	Shaft distance dimension

RADEX®-N Steel lamina coupling

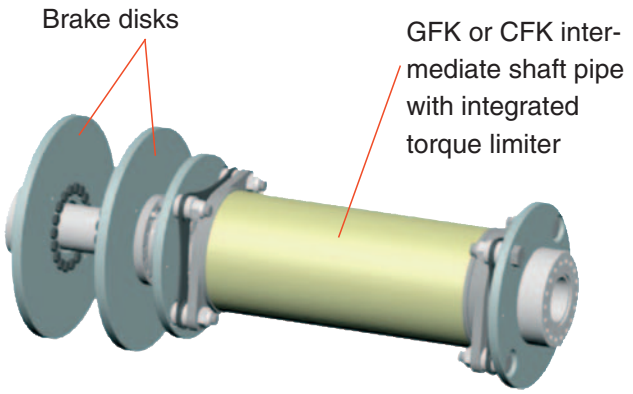
Other types

RADEX®-N with GFK or CFK intermediate pipes
Particularly the steel lamina couplings are well-suited for applications with especially large distance dimensions between the drive and the driven side (e. g. cooling towers, ventilators etc.) due to their design. In order to be able to realize high speeds with large distance dimensions, RADEX®-N couplings with intermediate shafts made from glass fiber or carbon fiber reinforced nylon (GFK or CFK) are used, if necessary.

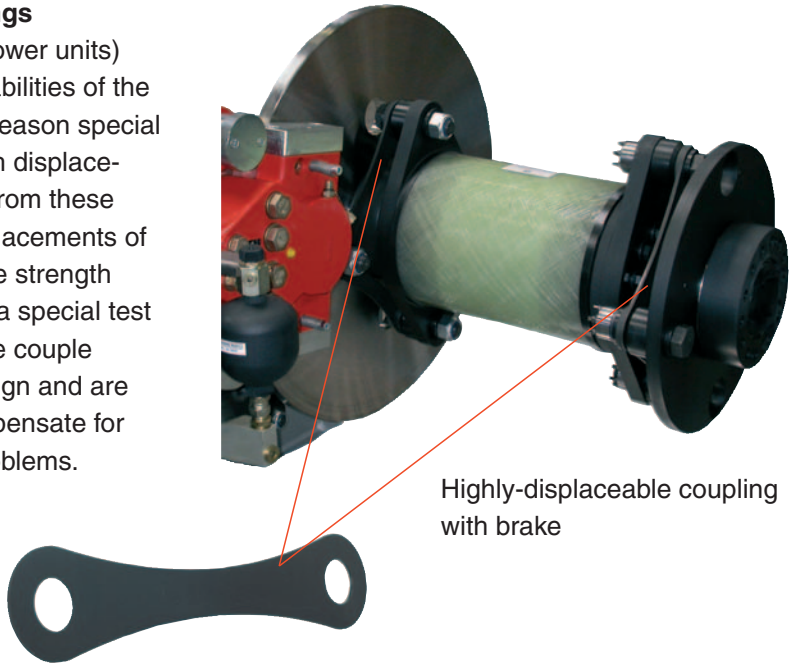
RADEX®-N spec. with CFC intermediate pipe for cooling tower drives

Integrated overload protection
In this case the spacer is integrated into a torque limiter. If the torque arising in the drive train is too high, the torque limiter is slipping. Each torque limiter is set on a test bench in order to ensure an accurate slipping torque. If necessary, the slipping torque can be changed by means of usual hexagon screws without problems. This torque limiter can be used in combination with spacers from steel, glass-fiber reinforced plastics and carbon fiber reinforced plastics.

Spec. RADEX®-N with GFK intermediate shaft pipe and integrated brake disks



Highly-displaceable RADEX®-N couplings
Some applications (train drives or wind power units) place very high demands to the displaceabilities of the power transmitting components. For this reason special laminae packings were developed for high displacements and low reaction forces (resulting from these displacements). They permit angular displacements of up to 2°. The laminae exposed to a fatigue strength checking with extreme displacements on a special test bench of KTR have larger distances in the couple points in comparison with the normal design and are thus axially softer, i. e. they can also compensate for large shaft displacements without any problems.



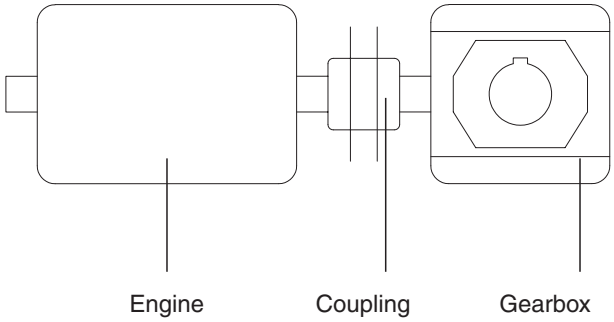
Highly-displaceable coupling with brake

RADEX®-NC Servo lamina coupling

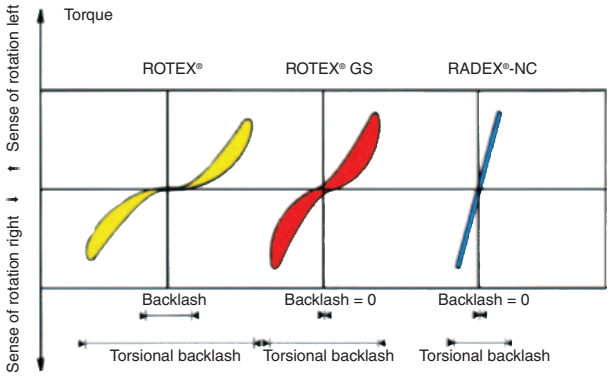
Backlash-free, torsionally rigid and maintenance-free couplings

The RADEX®-NC is a line particularly developed for the servo technology. In this coupling a package of torsionally rigid steel laminae that are soft in bending ensures a reliable compensation for axial, angular and radial shaft displacements. As all-metal coupling - the laminae are made from stainless steel - the RADEX®-NC can even be used with high temperatures (up to 200 °C) and under aggressive ambient conditions. The RADEX®-NC is manufactured in 6 sizes from size 5 to 35 for max. torques of up to 200 Nm. The hubs are frictionally engaged clamping hubs made from aluminium (size 42 made from steel) and are thus backlash-free even in a reversing drive.

A typical application of the RADEX®-NC are backlash-free worm gear pairs with low transmissions. The rigidity of the coupling must be converted by reason of the transmission of the gearbox from the drive side to the driven side.
Here the transmission itself has a decisive influence because it is squarely included in the calculation. This converted rigidity is added in line to the gearbox stiffness in order to get the total rigidity. In case of transmissions that are lower than i = 8 we recommend to use the RADEX®-NC due to the loss of rigidity of the total system if flexible couplings are used.



The opposite diagram shows the influence of backlash and torsion angle on the drive train.
By reason of the high torsional rigidity of the RADEX®-NC the torsion angle under torque is very low.
Contrary to the flexible ROTEX® and ROTEX® GS a damping of torsional vibrations etc. is not possible.



Explosion protection use

RADEX®-NC couplings are suitable for power transmission in drives in hazardous areas. The couplings with feather key are approved according to EC Standard 94/9/EC (ATEX 95) as units of category 2G/2D and are thus suitable for use in hazardous areas in zones G1, G2, D21 and D22. Please see our Certificate and our operating and mounting instructions on our web site www.ktr.com.

Selection: In case of use in hazardous areas the clamping hubs without feather key, only for use in category 3 (with feather key for category 2), must be selected in a way that there is a minimum safety factor of s = 2 between the peak torque (including all operating parameters) and the nominal torque and frictional torque of engagement of the coupling.

RADEX®-NC Servo lamina coupling

Coupling selection

1. **Drives without periodic torsional vibrations**
For example centrifugal pumps, fans, screw compressors, etc. The coupling selection requires that the rated torque T_{KN} and the maximum torque T_{Kmax} are reviewed.

1.1 **Loading by rated torque**
Taking into account the operating factor S_B the permissible rated torque must be at least as big as the rated torque T_{KN} of the machine.

$$T_{KN} \geq T_N \bullet S_B$$

(For operating factor S_B see table below)

1.2 **Loading by torque shocks**
The permissible maximum torque T_{Kmax} of the coupling must be at least as big as the sum of the peak torque T_S and the rated torque T_N of the machine. This is valid in case that the rated torque of the machine is superimposed by a shock (e. g. starting of the engine). For drives with A. C. motors and large masses on the load side we would recommend calculations by our simulation programme (please consult with our Engineering Department).

$$T_{Kmax} \geq (T_N + T_S)$$

2. **Drives with periodic torsional vibrations**
For drives subject to dangerous torsional vibrations (e. g. diesel engines, piston compressors, piston pumps, generators, etc.) it is necessary to perform a torsional vibration calculation (please consult with our Engineering Department).

2.1 **Loading by rated torque**
Taking into account the operating factor S_B the permissible rated speed must be at least as large as the rated torque T_N of the machine.

$$T_{KN} \geq T_N \bullet S_B$$

2.2 **Passing through resonance**
The peak torque T_{SR} arising while passing through resonance must not exceed the permissible maximum torque of the coupling T_{Kmax}.

$$T_{Kmax} \geq T_{SR}$$

2.3 **Loading by vibratory torque**
The permissible vibratory torque of the coupling T_{KW} must not be exceeded by the maximum periodic vibratory torque of the machine T_W.

$$T_{KW} \geq T_W$$

Explanation of the above-mentioned coupling torques

Description	Code	Explanation
Rated torque of coupling	T_{KN}	Torque which can be transmitted continuously over the entire speed range of the coupling

Description	Code	Explanation
Maximum torque of coupling	T_{Kmax}	Torque which can be transmitted during the entire life of the coupling $\geq 10^5$ times as spike load or 5×10^4 times as alternating load.

Guidelines for operating factor S_B

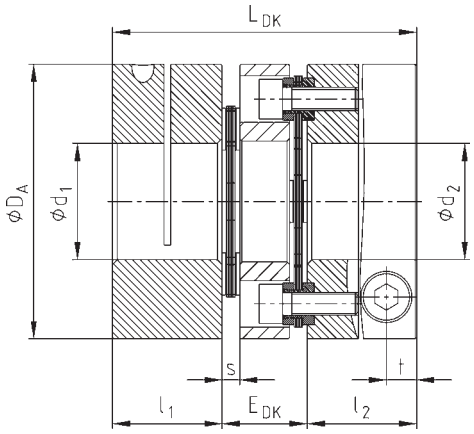
Application	S_B
Construction machinery	2
Agitators	1 - 2
Centrifuges	1,5
Conveyors	2
Elevators	2
Fans/Blowers	1,5
Generators	1
Calanders	2
Crushers	2,5
Textile machinery	2
Rolling mills	2,5

Application	S_B
Woodworking machinery	1,5
Mixers and extruders	2
Stamps, presses	2,5
Machine tools	2
Grinders	2,5
Packaging machines	1
Roller drives	2,5
Piston pumps	2,5
Centrifugal pumps	1,5
Piston compressors	2,5
Turbo compressors	2

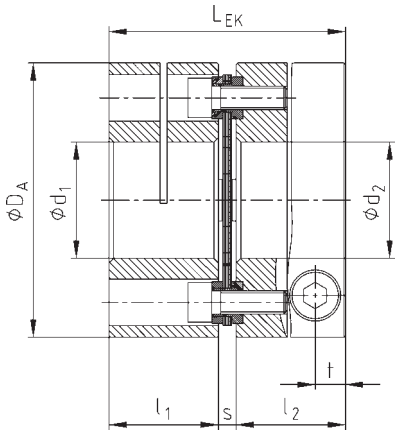
RADEX®-NC Servo lamina coupling

Standard types

- Backlash-free torque transmission
- Higher torsional rigidity
- Backlash-free shaft-hub-connection
- Low mass moment of inertia
- High speeds
- Operating temperature up to 200 °C
- Compact type
- Ⓔx Approved according to EC Standard 94/9/EC (Explosion Certificate ATEX 95) (without feather key only for category 3)



Type DK



Type EK

Size	Technical data					Displacement type DK			Displacement type EK		
	T_{KN} [Nm]	$T_{K\,max.}$ [Nm]	Max. speed [min^{-1}]	Torsional rigidity [Nm/rad] Type EK	Type DK	Radial [mm]	Axial [mm]	Angular for each lamina [°]	Radial [mm]	Axial [mm]	Angular for each lamina [°]
5	2,5	5	25000	2400	1200	0,10	0,4	1	–	0,2	1
10	7,5	15	20000	5600	2800	0,14	0,8	1	–	0,4	1
15	20	40	16000	12000	6000	0,16	1,0	1	–	0,5	1
20	30	60	12000	30000	15000	0,25	1,2	1	–	0,6	1
25	60	120	10000	60000	30000	0,30	1,6	1	–	0,8	1
35	100	200	9000	72000	36000	0,40	2,0	1	–	1,0	1
42	180	360	7000	120000	60000	0,50	2,8	1	–	1,4	1

Size	Dimensions [mm]								Clamping screw		Mass moments of inertia	
	Max. d_1/d_2	D_A	l_1/l_2	L_{DK}	E_{DK}	L_{EK}	s	t	M	T_A [Nm]	DK [kgm²]	EK [kgm²]
5	10	26	12	34	10	26,5	2,5	3,5	M2,5	0,8	0,000004	0,000003
10	15	35	16	44	12	35	3	5,0	M4	3	0,000014	0,00001
15	20	47	21	55	13	45	3	6,8	M6	10	0,000054	0,00004
20	25	59	24	67	19	52	4	6,5	M6	10	0,00019	0,00015
25	35	70	32	88	24	69	5	9,0	M8	25	0,00046	0,00035
35	40	84	35	98	28	77	7	10,5	M10	49	0,0010	0,0008
42	55	104	40	116	36	91	11	10,5	M10	69	0,0075	0,0062

Size	Transmittable torque of the RADEX®-NC clamping hub [Nm] for standard bores																				
	Pilot bored	3	5	8	10	12	14	15	16	19	20	24	25	28	30	32	35	38	40	45	50	55
5	2,5	2,2	2,3	2,4	2,5																	
10	4,5		8	9	10	10	11	11														
15	5,5				28	30	31	32	32	34	35											
20	7,5					36	37	38	39	40	41	44	45									
25	9,5							82	83	87	88	93	94	98	100	103	106					
35	11,5									155	157	165	167	173	177	181	187	193	197			
42	15,0											285	287	296	301	307	315	323	329	343	357	370

Order form:

RADEX®-NC 20	DK	Ø 20	Ø 25
Coupling size	Type	Bore d_1	Bore d_2

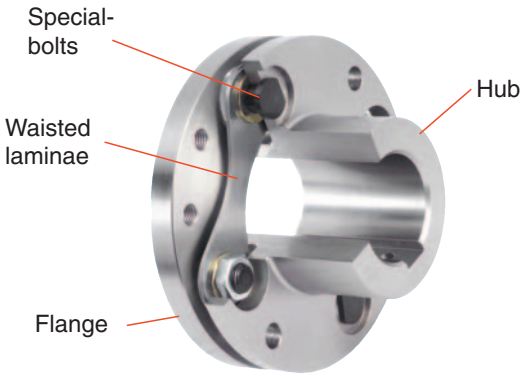
RIGIFLEX® Steel lamina coupling

Backlash-free, torsionally rigid and maintenance-free couplings

As of January 1, 2004 **KTR Kupplungstechnik** has taken over the manufacture of the RIGIFLEX® couplings from **SAB WABCO GmbH** (THYSSEN BSI). By adding the **RIGIFLEX®** to the product range KTR has extended its performance range to a max. torque of more than 1,100,000 Nm and a shaft diameter of 660 mm.

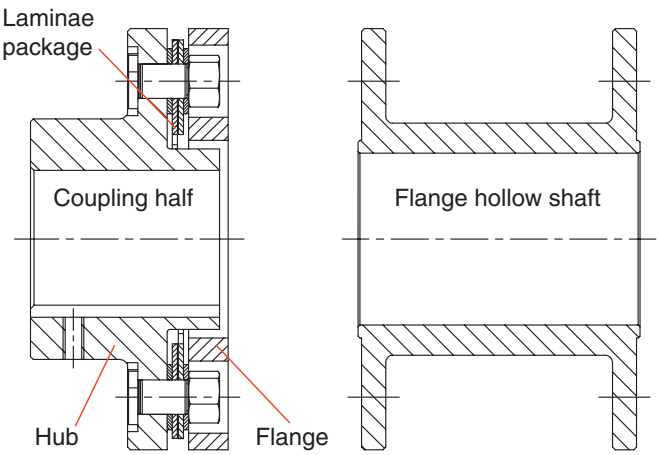
RIGIFLEX® laminae

The laminae of RIGIFLEX® are arranged in pile and waisted single laminae. They are connected with the hubs and flanges through positive plug gauges in a completely backlash-free way. Dependent on the coupling size laminae packages with 4, 6 or 8 special gauges are used. Dependent on the number of the piled single laminae torques, displacement figures and stiffness for special types can be varied.



Pre-assembled laminae, hubs and flanges

Contrary to the steel lamina coupling RADEX®-N the RIGIFLEX® is supplied in pre-assembled assembly groups (coupling halves). Hubs, laminae packages and flanges are factory-assembled as one unit. Highly resistant plug gauges are used to connect the laminae with the hubs and flanges. This ensures a completely backlash-free torque transmission throughout the complete torque range. The customer only has to connect the flange hollow shafts with the coupling halves through usual hexagonal screws.



RIGIFLEX® torsionally rigid steel lamina couplings, that are horizontally assembled, are suitable for the use in drives in hazardous areas. The couplings are certified according to EC Standard 94/9/EC (ATEX 95) and belong to category 2G/2D, are confirmed and thus suitable for the use in hazardous areas of zone G1, G2, D21 and D22.
Further information about this topic under www.ktr.com.

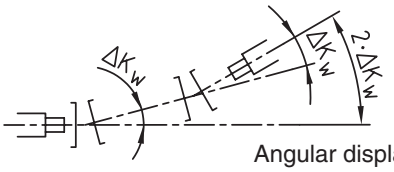
Coupling selection

1. **Permissible displacements:**
   ΔK_a: Permissible axial displacement
   ΔK_w: Permissible angular displacement
   ΔK_r: Permissible radial displacement

   RIGIFLEX® couplings are selected in a way that the max. permissible angular displacement ΔK_w must be as follows in every coupling element (coupling half)

from size	32 to 300	ΔK_w = 1.00°
from size	350 to 460	ΔK_w = 0.75°
from size	530 to 580	ΔK_w = 0.50°

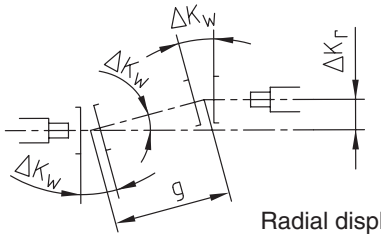
   The max. possible angular displacement of two shafts connected with each other is thus 2 • ΔK_w.



Angular displacement

   The permissible radial displacement ΔK_r with distance g of the coupling elements is

$$\Delta K_r = g \bullet \tan(\Delta K_w)$$



Radial displacement

   In the table **"Technical data"** you can see the max. permissible radial displacements ΔK_r for every size and type based on the given standard lengths of the flange hollow shaft as well as the permissible angular displacement ΔK_w of the coupling elements.

   The max. permissible axial displacements ΔK_a for every size and type are also mentioned in the table **"Technical data"**.

   The figures of the permissible displacements indicated are dependent on each other!

   With an increasing axial displacement ΔK_a the permissible angular displacement ΔK_w decreases and thus the radial displacement ΔK_r.

   If the permissible axial displacement ΔK_a is used by 35 % when using a coupling (2 joints), you have only 40 % of the indicated permissible radial displacement available in case of an angular displacement of ΔK_w = 0.25°.

2. **Selection of the coupling size**
   The nominal torque T_{KN} of the coupling is:

$$T_{KN} \geq T_N \bullet K \bullet f_R \bullet f_T$$

   The shock torque T_{Kmax} of the coupling is:

$$T_{Kmax} \geq T_N \bullet A_1 \bullet f_R \bullet f_T$$

   T_N = Torque of the machine

   K = Operating factor (see table page 138)

   A_1 = Shock factor (see table page 138)
   The max. shocks occuring must not strain the coupling above the shock torque mentioned in the catalogue.
   The operating factor is the figure that the nominal torque T_N of the machine must be multiplied with in order to get a fictive torque $T_{KN} = K \bullet T_N$. This fictive torque must ensure the same safety against coupling damages like the really active, timely changeable torque in case of a constant and any long influence on the coupling.
   Hints are given in the VDI Standard 2151, page 2.

   f_R = Factor of direction
   = 1.00 same torque direction
   = 1.70 changing torque direction

   f_T = Operating temperature
   Temperature factor

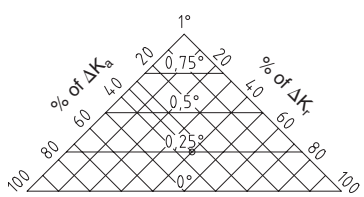
°C	- 30	0	+ 150	+ 200	+ 230	+ 270
Factor	1.00	1.00	1.00	1.10	1.25	1.43

3. **Operating and shock factors**
   Extract of applications from VDI Standard 2151.
   The deciphered figures mentioned are valid for the load figure A_1 (medium), i. e. the dynamical behaviour is neither very favourable nor very infavourable or it is unknown.

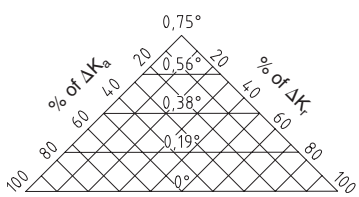
   In case of deviating dynamical behaviour, i. e. in case of a very favourable or infavourable behaviour and for further applications, the regulations of VDI Standard 2151 must be considered.

   The factors mentioned refer to four groups of drive machines:

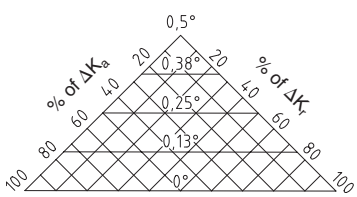
Group I:	Electro motors with low starting shocks
Group II:	Electro motors with high starting shocks (see page 138)
Group III:	Piston power machines with more than 2 cylinders, water turbines, hydraulic engines
Group IV:	Piston power machines with one or two cylinders



Angular displacement ΔK_w
Size 32 - 300



Angular displacement ΔK_w
Size 350 - 460



Angular displacement ΔK_w
Size 530 - 580

Selection factors

Operating and shock factors

Machine	Group/Kind	Shock factors	Operating factors
Elevator	I	3,15	1,60
Excavator	I III	5,00 5,00	2,00 2,00
Crusher	I III	6,30 6,30	2,24 2,24
Rotating furnace	I III	4,00 4,00	1,80 1,80
Conveyor belt	I	4,00	1,80
Windlass	I	4,00	2,00
Generator	I III IV	3,15 4,00 5,00	1,25 1,25 1,60
Rubber roller	I	4,00	1,60
Suspension track	I III	3,15 4,00	1,40 1,80
Wood working machine	I III IV	2,50 4,00 5,00	1,60 1,80 2,00
Piston compressor	I III IV	3,15 4,00 5,00	1,60 1,80 2,24
Turbo compressor	I III	2,50 3,15	1,25 1,40
Converter	I	5,00	1,80
Crane	I III IV	4,00 5,00 6,30	1,60 2,24 2,24
Mixer	I III IV	3,15 5,00 6,30	1,80 1,80 2,24

Machine	Group/Kind	Shock factors	Operating factors
Paper machine	I I IV	3,15 5,00 5,00	2,00 2,50 2,50
Propeller	I III	2,50 4,00	1,40 1,40
Pump excavator	I III	4,00 5,00	1,80 1,80
Piston pump (1 to 2 cylinders)	I III IV	5,00 5,00 5,00	1,80 1,80 1,80
Piston pump (3 and more cylinders)	I III IV	4,00 4,00 5,00	1,60 1,60 1,60
Centrifugal pump	I III IV	2,50 3,15 4,00	1,25 1,40 1,80
Positive displacement pump	I III IV	2,50 4,00 5,00	1,40 1,40 1,40
Agitator (light liquids)	I	2,50	1,25
Agitator (semi liquids)	I	4,00	1,60
Textile machine	I	3,15	1,80
Ventilator (large)	I III	3,15 5,00	2,00 2,00
Ventilator (small)	I	2,00	1,25
Roller mill	I	4,00	2,00
Machine tool	I	3,15	1,60
Ball-and-pebble mill	I	6,30	2,00
Drawing machine	I	3,15	1,80

Technical advice

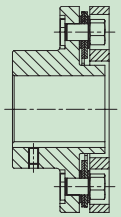
1. The bores in the coupling hubs show the H7 fit as standard. The feather keyways correspond to DIN 6885, sheet 1 with JS9 fit (keyway breadth). Other bore and feather keyway designs are possible on request.
2. Further shaft-hub connections (like taper bores, hydraulic releases, frictionally engaged connections etc.) are also available on request.
3. The hubs are supplied with setscrews, if not ordered differently.
4. Couplings with long flange hollow shafts must be checked regarding the speed being critical in bending. Please consult with our Engineering Department.
5. If the coupling is assembled vertically, the flange hollow shaft must be supported, under circumstances. Please consult with our Engineering Department.
6. Materials:
   The coupling hubs and flanges are made from steel. Due to the complete precise machining of these parts a low residual unbalance is ensured. The laminae are made from highly alloyed steel with high permanent resistance. For the connection with coupling flanges grinded, hardened bolts are used.
7. Please look at our RIGIFLEX® mounting instructions for the assembly.

RIGIFLEX® Steel lamina coupling

Types

Standard type “Coupling half“

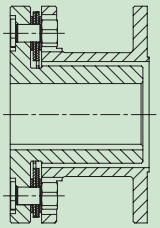
Type 01



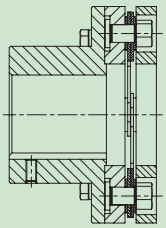
Type 02

Type 03

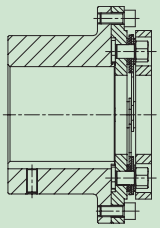
Type 04



Type 05

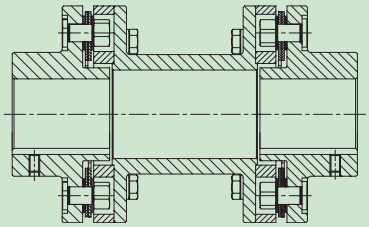


Type 06

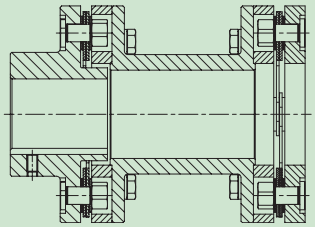


Standard type with flange hollow shaft

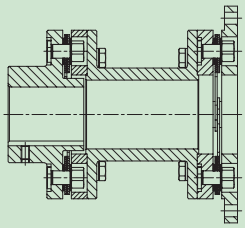
Type 11



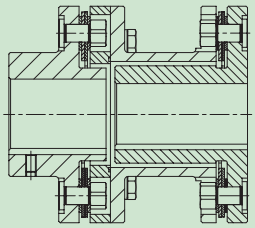
Type 12



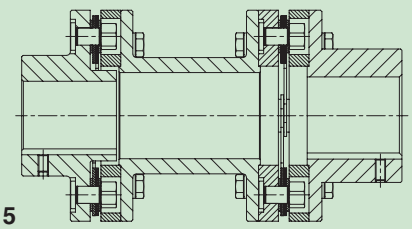
Type 13



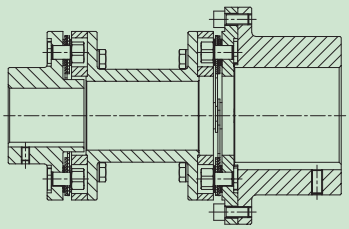
Type 14



Type 15



Type 16



RIGIFLEX® Steel lamina coupling

Technical data

Torques, speeds and displacements

Coupling size		Torques [Nm]		Max. speed [min^{-1}]	Permissible displacements [mm]			
New KTR size	Former size	T_{KN}	T_{Kmax}		Angular [°] each lamina	Axial		Radial type 11 M = standard
						Coupling half	Double-cardanic with flange hollow shaft	
32	**20**	200	300	20000	1,00	1,25	2,5	1,3
48	**32**	320	480	14000	1,00	1,75	3,5	1,5
60	**100**	1000	1500	11200	1,00	1,50	3,0	2,5
65	**160**	1600	2400	10000	1,00	1,75	3,5	2,5
75	**200**	2000	3000	9000	1,00	2,0	4,0	3,0
80	**251**	2500	6250	8300	1,00	1,0	2,0	3,0
90	**321**	3200	8000	7700	1,00	1,0	2,0	3,0
100	**401**	4000	10000	7000	1,00	1,5	3,0	4,0
110	**501**	5000	18000	6300	1,00	2,0	4,0	4,0
120	**631**	6300	22500	5800	1,00	2,5	5,0	5,0
130	**801**	8000	28000	5400	1,00	3,0	6,0	5,0
140	**1001**	10000	34900	5100	1,00	3,0	6,0	5,0
150	**1251**	12500	43000	4800	1,00	3,0	6,0	6,0
160	**1601**	16000	54500	4600	1,00	3,0	6,0	6,0
180	**2001**	20000	68000	4200	1,00	4,0	8,0	6,5
190	**2501**	25000	84000	4000	1,00	4,0	8,0	7,0
200	**3201**	32000	106000	3800	1,00	4,0	8,0	7,0
210	**4001**	40000	131500	3400	1,00	4,0	8,0	7,5
230	**5001**	50000	160000	3200	1,00	4,0	8,0	8,0
260	**6301**	63000	205000	2900	1,00	5,0	10,0	8,5
280	**8001**	80000	254000	2700	1,00	5,0	10,0	9,0
300	**10001**	100000	314000	2500	1,00	5,0	10,0	10,0
350	**12501**	125000	376000	2350	0,75	4,0	8,0	7,0
390	**16001**	160000	490000	2170	0,75	5,0	10,0	7,5
420	**20001**	200000	606000	2020	0,75	5,0	10,0	8,0
460	**25001**	250000	750000	1890	0,75	5,0	10,0	8,5
530	**32001**	320000	870000	1600	0,50	5,0	10,0	6,0
580	**40001**	400000	1145000	1480	0,50	5,0	10,0	6,5

Mass moments of inertia (further types on request)

Coupling size		Mass moments of inertia [kgm^2]			Coupling size		Mass moments of inertia [kgm^2]		
New **KTR** size	Former size	Type 01 (hubs pilot bored/ unbored)	Type 02	Type 11 [1] (hubs pilot bored/ unbored)	New **KTR** size	Former size	Type 01 (hubs pilot bored/ unbored)	Type 02	Type 11 [1] (hubs pilot bored/ unbored)
32	**20**	0,0014	0,014	0,003	**180**	**2001**	3,082	2,592	8,059
48	**32**	0,005	0,004	0,015	**190**	**2501**	3,823	3,084	10,069
60	**100**	0,012	0,011	0,040	**200**	**3201**	5,351	4,108	14,102
65	**160**	0,035	0,031	0,095	**210**	**4001**	8,717	6,638	22,704
75	**200**	0,045	0,040	0,128	**230**	**5001**	12,224	8,872	31,798
80	**251**	0,105	0,090	0,271	**260**	**6301**	19,263	13,708	49,882
90	**321**	0,145	0,122	0,377	**280**	**8001**	26,981	17,976	68,626
100	**401**	0,234	0,192	0,606	**300**	**10001**	38,748	26,534	98,056
110	**501**	0,372	0,316	0,983	**350**	**12501**	53,729	29,000	139,020
120	**631**	0,566	0,486	1,482	**390**	**16001**	79,866	43,000	206,357
130	**801**	0,815	0,666	2,145	**420**	**20001**	120,300	61,000	305,131
140	**1001**	1,085	0,886	2,853	**460**	**25001**	161,823	85,000	414,587
150	**1251**	1,554	1,298	4,008	**530**	**32001**	310,275	131,632	799,409
160	**1601**	2,007	1,558	5,360	**580**	**40001**	481,777	197,413	1222,622

[1] In case of spacer length M = standard

RIGIFLEX® Steel lamina coupling

Technical data, weights

Axial, angular and torsion spring stiffness

Coupling size		Axial stiffness total coupling (2 coupling halves) [N/mm]	Angular spring stiffness (1 coupling half) [Nm/rad]	Torsion spring stiffness [10^6 Nm/rad]		
New **KTR** size	Former size			(1 coupling half)	Flange hollow shafts	
					M-dimension (standard)	More length of 1 m each
32	**20**	52,0/450,0[1]	58/850[1]	0,0580/0,15[1]	0,14	0,00875
48	**32**	45,0/177,0[1]	109/355[1]	0,0125/0,25[1]	0,53	0,043
60	**100**	78,0/240,0[1]	264/800[1]	0,4500/0,71[1]	1,12	0,112
65	**160**	74,5/408,0[1]	292/1650[1]	0,2800/0,95[1]	1,55	0,175
75	**200**	69,0/375,0[1]	315/1800[1]	0,3550/1,18[1]	1,95	0,257
80	**251**	562,5	3250	1,60	2,80	0,400
90	**321**	450,0	3000	1,95	3,15	0,515
100	**401**	354,0	3000	2,43	5,00	0,850
110	**501**	562,5	11688	3,07	8,75	1,60
120	**631**	502,5	12376	3,87	7,30	1,40
130	**801**	637,5	18151	5,30	8,75	1,75
140	**1001**	562,5	18151	6,00	11,80	2,50
150	**1251**	750,0	28327	7,50	16,00	3,55
160	**1601**	600,0	25439	8,25	42,50	10,30
180	**2001**	817,5	38503	10,90	26,50	6,70
190	**2501**	945,0	51566	13,60	28,00	7,50
200	**3201**	1162,5	72880	17,50	38,70	10,90
210	**4001**	900,0	68755	21,20	58,00	17,50
230	**5001**	945,0	84569	27,20	67,00	20,60
260	**6301**	945,0	103132	35,50	100,00	32,50
280	**8001**	975,0	123759	43,70	128,00	46,20
300	**10001**	1035,0	154011	54,50	150,00	63,00
350	**12501**	1418,0	126854	115,00	224,00	90,00
390	**16001**	1418,0	154698	155,00	300,00	132,00
420	**20001**	1463,0	185639	185,00	380,00	175,00
460	**25001**	1553,0	231017	230,00	355,00	175,00
530	**32001**	1950,0	247518	503,00	609,00	335,00
580	**40001**	2070,0	308022	627,00	787,00	472,00

[1] Figures valid for laminae package/massive laminae

Calculation of the torsion spring stiffness of a complete coupling:

$$\frac{1}{C_{tot.}} = \frac{1}{C_{coupling\ half}} + \frac{1}{C_{coupling\ half}} + \frac{1}{C_{standard\ hollow\ shaft}} + \frac{1}{C_{more\ length}}$$

Weights (further types on request)

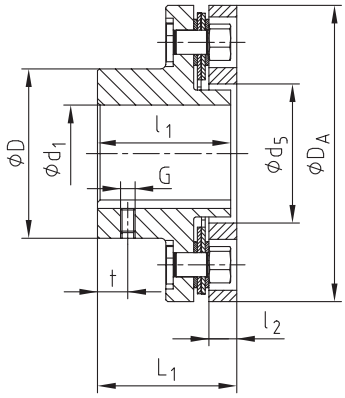
Coupling size		Weight [kg]			Coupling size		Weight [kg]		
New **KTR** size	Former size	Type 01 (hubs pilot bored/ unbored)	Type 02	Type 11 [1] (hubs pilot bored/ unbored)	New **KTR** size	Former size	Type 01 (hubs pilot bored/ unbored)	Type 02	Type 11 [1] (hubs pilot bored/ unbored)
32	**20**	1,6	1,0	4,0	**180**	**2001**	141,2	79,6	356,4
48	**32**	3,7	1,9	10,1	**190**	**2501**	168,0	88,7	425,0
60	**100**	6,5	3,5	16,4	**200**	**3201**	217,5	106,9	550,0
65	**160**	9,5	5,3	25,5	**210**	**4001**	291,9	139,9	723,8
75	**200**	12,2	6,7	31,7	**230**	**5001**	365,9	161,9	894,8
80	**251**	19,2	11,3	48,4	**260**	**6301**	470,7	205,9	1142,4
90	**321**	21,5	12,9	56,0	**280**	**8001**	596,6	231,3	1409,2
100	**401**	30,3	16,0	78,6	**300**	**10001**	723,4	291,4	1746,8
110	**501**	39,6	23,2	103,2	**350**	**12501**	886,9	260,9	2088,8
120	**631**	50,2	30,0	129,4	**390**	**16001**	1124,3	325,3	2664,6
130	**801**	64,3	35,2	162,6	**420**	**20001**	1246,9	396,9	3338,8
140	**1001**	78,5	43,7	201,0	**460**	**25001**	1689,1	500,1	3992,2
150	**1251**	94,1	53,4	241,2	**530**	**32001**	2454,0	482,0	5830,0
160	**1601**	114,3	56,5	289,6	**580**	**40001**	3292,0	613,0	7750,0

[1] In case of spacer length M = standard

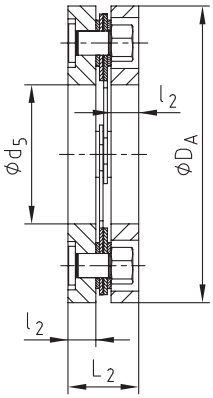
RIGIFLEX® Steel lamina coupling

Half couplings

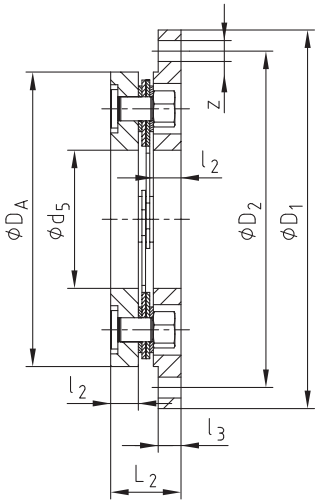
- Standard types „half coupling“
- Is supplied as assembly unit
- Combination with different spacers, flange etc.
- As „half coupling“ only absorption of axial and angular displacements are possible
- Standard shaft-hub connection through feather key-way
- On request frictionally-engaged shaft-hub connection is possible through KTR clamping sets
- Ⓔx Approved according to EC Standard 94/9/EC (Explosion Certificate ATEX 95)



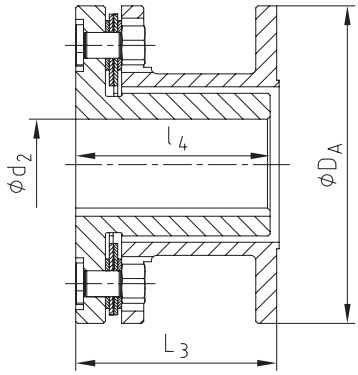
Type 01



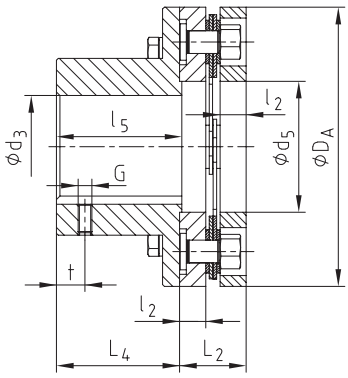
Type 02



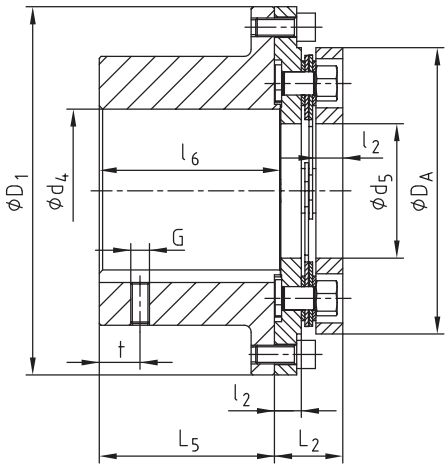
Type 03



Type 04



Type 05



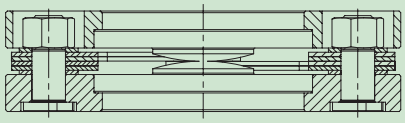
Type 06

RIGIFLEX® Steel lamina coupling

Half couplings

Coupling size		Max. bore [mm]				Dimensions [mm]													
New **KTR** size	Former size	d_1	d_2	d_3	d_4	D	D_A	D_1	d_5	l_1	L_1	l_2	L_2	l_3	l_4	L_3	l_5	L_4	l_6	L_5
32	**20**	32	22	42	50	46	95	145	39	60	78,5	11	29,5	8	50	53,5	70	68	80	78
48	**32**	48	38	55	65	73	135	190	65	70	76	11	30,5	8	70	70,0	80	75	100	98
60	**100**	60	50	75	90	90	170	225	80	80	87	15	41,0	12	80	85,5	90	88	125	122
65	**160**	65	55	80	100	100	190	250	90	90	96	16	42,5	12	90	92,5	95	90	135	132
75	**200**	75	60	85	120	110	210	265	100	95	101	16	43,5	12	95	98,5	100	95	140	137
80	**251**	80	65	100	130	125	230	300	105	110	115	22	56,5	18	135	140	105	103	150	146
90	**321**	90	70	110	140	140	245	315	115	110	115	23	58,5	19	150	155	110	108	155	150
100	**401**	100	80	120	160	155	270	340	135	125	132	25	62,5	21	150	155	120	118	165	160
110	**501**	110	90	140	175	165	300	365	150	130	138	27	73,5	23	160	165	130	127,5	185	180
120	**631**	120	105	150	190	185	325	390	160	130	138	30	81,5	26	160	170	140	137,5	205	200
130	**801**	130	115	160	200	210	350	430	180	145	153	31	85,5	27	165	178	145	142	210	205
140	**1001**	140	125	170	215	225	370	450	190	155	164	33	89,5	29	180	186	155	152	225	220
150	**1251**	150	130	185	230	230	395	470	200	170	179	37	100,5	33	210	215	160	157	240	235
160	**1601**	160	140	190	250	255	415	495	220	190	199	37	100,5	33	230	235	175	172	255	250
180	**2001**	180	145	210	260	260	450	530	230	195	204,5	44	117,5	40	270	275	185	182	265	260
190	**2501**	190	155	220	270	280	470	565	240	220	227	44	119,5	39	285	290	195	192	285	280
200	**3201**	200	170	240	290	305	500	595	260	255	265	46	127,5	40	325	330	210	207	305	300
210	**4001**	210	190	255	325	340	550	665	290	275	285	51	137,5	46	330	335	230	227	345	340
230	**5001**	230	210	280	350	370	590	705	320	305	315	52	141,5	46	335	340	250	247	370	365
260	**6301**	260	245	310	405	420	650	770	360	310	325	55	151,5	49	335	340	270	267	430	425
280	**8001**	280	265	325	440	450	690	810	400	360	375	58	159,5	52	375	380	300	297	465	460
300	**10001**	300	285	350	475	480	750	900	430	375	390	61	168,5	53	430	435	320	317	520	515
350	**12501**	350	300	390	-	560	810	990	500	375	390	52	141,5	46	460	465	360	355	-	-
390	**16001**	390	330	430	-	620	880	1060	550	395	410	55	151,5	49	520	525	400	395	-	-
420	**20001**	420	355	460	-	680	945	1115	580	440	455	58	159,5	52	550	555	430	425	-	-
460	**25001**	460	360	500	-	720	1010	1240	600	460	475	61	168,5	53	580	585	460	455	-	-
530	**32001**	530	500	610	-	810	1180	1370	850	530	545	58	159,5	50	530	535	560	555	-	-
580	**40001**	580	550	660	-	890	1290	1480	930	580	595	61	168,5	53	580	585	600	595	-	-

Further type:



Type 07

Vertical installation

(Dead weight is taken up by built-in, hardened thrust pieces.)

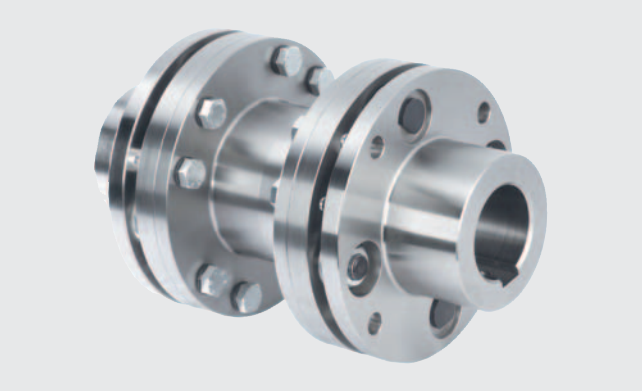
If only one coupling is used, it will be possible to compensate for angular misalignment only, not for axial or radial misalignment!

Order form:

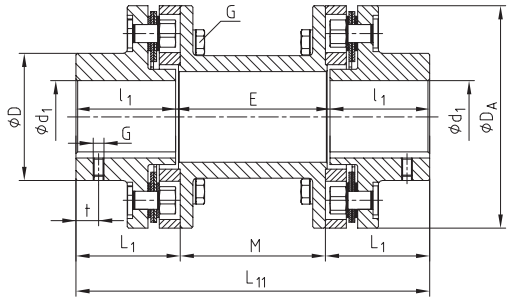
RIGIFLEX® 130	01	d_1 Ø 120
Coupling size	Type	Bore

RIGIFLEX® Steel lamina coupling

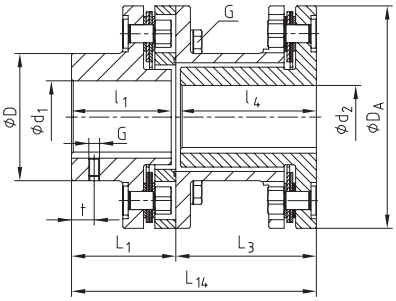
Couplings with flange hollow shafts



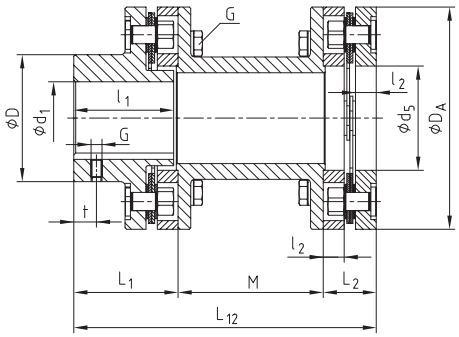
- Standard types „flange hollow shaft“
- Combination of „half coupling“ with flange hollow shaft
- Length of the flange hollow shaft up to 6 m possible
- „Half couplings“ are supplied in assembled condition
- Standard shaft-hub connection through feather keyway
- Ⓔx Approved according to EC Standard 94/9/EC (Explosion Certificate ATEX 95)
- **Coupling design acc. to API 671**



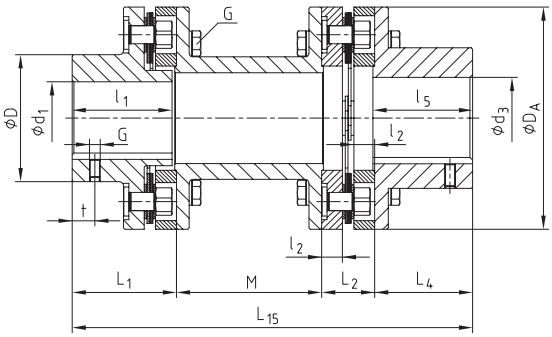
Type 11



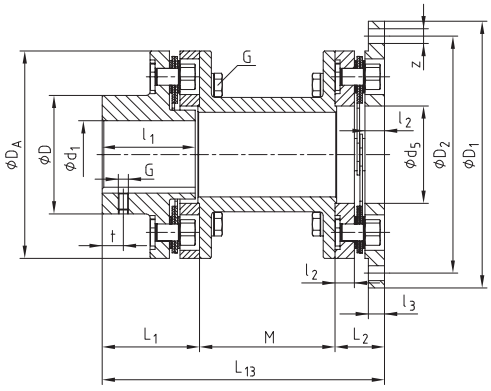
Type 14



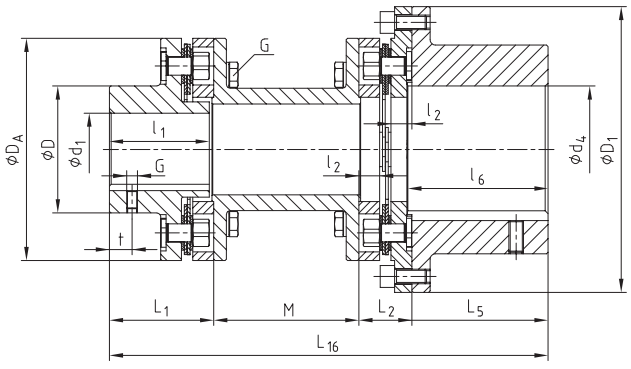
Type 12



Type 15



Type 13



Type 16

RIGIFLEX® Steel lamina coupling

Couplings with flange hollow shafts

Coupling size		Dimensions [mm]									Hexagon bolt [2] DIN EN ISO 4017 - 10.9		
New **KTR** size	Former size	M	E	L_{11}	L_{12}/L_{13}	L_{14}	L_{15}	L_{16}	D_2	Z	G	Quantity z	T_A [1] [Nm]
32	**20**	63	100	220	171	133,5	239	249	120	4 x 11	M10	8	69
48	**32**	80	92	232	186,5	146	261,5	284,5	160	4 x 14	M12	8	120
60	**100**	100	114	274	228	172	312,5	349,5	200	8 x 14	M12	16	120
65	**160**	110	122	302	248,5	188,5	338,5	380,5	220	8 x 14	M12	16	120
75	**200**	130	142	332	274,5	199,5	369,5	411,5	240	8 x 18	M12	16	120
80	**251**	140	150	370	311,5	255	414,5	457,5	265	8 x 14	M16	16	295
90	**321**	160	170	390	333,5	270	441,5	483,5	280	8 x 18	M16	16	295
100	**401**	170	184	434	364,5	287	482,5	524,5	305	12 x 18	M16	24	295
110	**501**	180	196	456	391,5	303	519	571,5	330	12 x 18	M16	24	295
120	**631**	190	206	466	409,5	308	547,0	609,5	360	12 x 18	M16	24	295
130	**801**	200	216	506	438,5	331	580,5	643,5	395	12 x 22	M20	24	580
140	**1001**	210	228	538	463,5	350	615,5	683,5	410	12 x 22	M20	24	580
150	**1251**	225	243	583	504,5	394	661,5	739,5	435	12 x 22	M20	24	580
160	**1601**	240	258	638	539,5	434	711,5	789,5	455	12 x 26	M24	24	1000
180	**2001**	253	272	662	575	479,5	757	835,5	490	12 x 26	M24	24	1000
190	**2501**	268	282	722	614,5	517	806,5	894,5	520	12 x 26	M30	24	2000
200	**3201**	280	300	810	672,5	595	879,5	972,5	550	12 x 26	M30	24	2000
210	**4001**	300	320	870	722,5	620	949,5	1062,5	610	12 x 33	M30	24	2000
230	**5001**	310	330	940	766,5	655	1013,5	1131,5	650	12 x 33	M30	24	2000
260	**6301**	330	360	980	806,5	665	1073,5	1231,5	710	12 x 33	M30	24	2000
280	**8001**	360	390	1110	894,5	755	1191,5	1354,5	750	12 x 39	M36	24	3400
300	**10001**	420	450	1200	978,5	825	1295,5	1493,5	825	12 x 39	M42	24	5500
350	**12501**	400	430	1180	931,5	855	1286,5	-	900	18 x39	M42	36	5500
390	**16001**	440	470	1260	1001,5	935	1396,5	-	980	18 x 45	M42	36	5500
420	**20001**	460	490	1370	1074,5	1010	1499,5	-	1050	18 x 45	M48	36	8200
460	**25001**	500	530	1450	1143,5	1060	1598,5	-	1130	18 x 52	M48	36	8200
530	**32001**	550	580	1640	1254,5	1080	1809,5	-	1280	24 x 45	M42	48	5500
580	**40001**	600	630	1790	1363,5	1180	1958,5	-	1390	24 x 45	M42	48	5500

[1] Screw tightening torque TA (Nm)
[2] Coupling is supplied not assembled

A complete RIGIFLEX® coupling comprises two coupling halves and an intermediate flange hollow shaft:

Examples of combinations:

- Two Type 01 coupling halves can be combined to produce a Type 11 RIGIFLEX® coupling
- One Type 02 coupling half and one Type 05 coupling half can be combined to produce a Type 25 RIGIFLEX® coupling
- One Type 01 coupling half and one Type 07 coupling half can be combined to produce a Type 17 RIGIFLEX® coupling
- One Type 03 coupling half and one Type 04 coupling half can be combined to produce a Type 34 RIGIFLEX® coupling (the short-type 04 coupling half does not necessitate the use of a flange hollow shaft)

Order form:

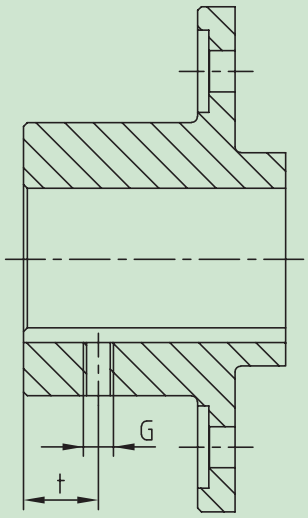
RIGIFLEX® 130	type 15	M 100	d_1 Ø 110 mm	d_3 Ø 140 mm
Coupling size	Design	M dimensions	Bore	Bore

RIGIFLEX® Steel lamina coupling

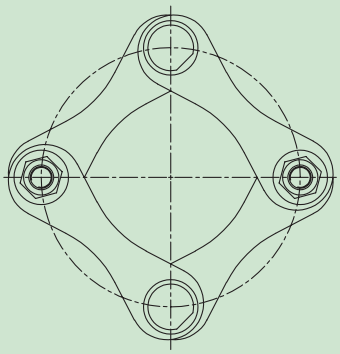
Backlash-free, torsionally rigid and maintenance-free couplings

Standard hub with keyway according to DIN 6885 sheet 1

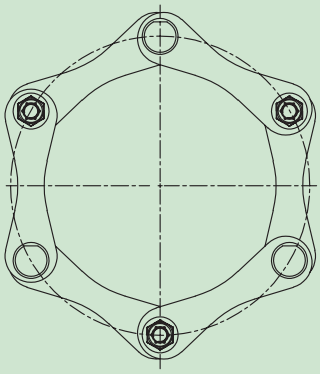
New **KTR** size	Former size	G	t	Tightening torque T_A [Nm]
32	20	M6	15	4,8
48	32	M8	20	10
60	100	M8	20	10
65	160	M10	20	17
75	200	M10	20	17
80	251	M10	20	17
90	321	M12	25	40
100	401	M12	30	40
110	501	M12	30	40
120	631	M12	30	40
130	801	M20	35	140
140	1001	M20	35	140
150	1251	M20	40	140
160	1601	M20	40	140
180	2001	M20	40	140
190	2501	M20	50	140
200	3201	on request of customer		
210	4001			
230	5001			
260	6301			
280	8001			
300	10001			
350	12501			
390	16001			
420	20001			
460	25001			
530	32001			
580	40001			



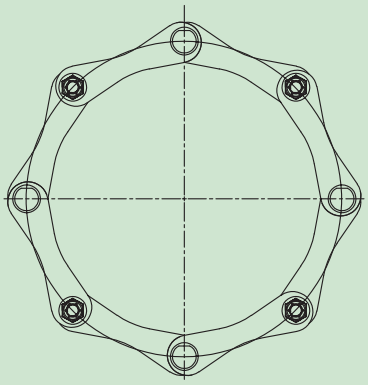
Following lamina forms of RIGIFLEX® have to be distinguished:



Size 32 - 300
(4 hole lamina)

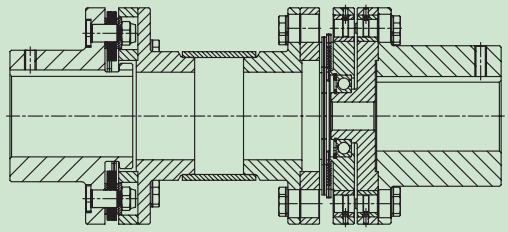


Size 350 - 460
(6 hole lamina)



Size 530 - 580
(8 hole lamina)

Further types

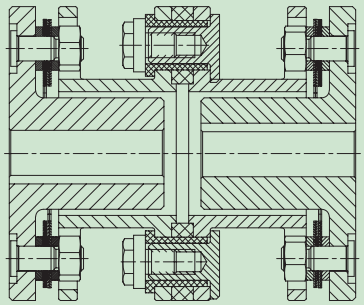


RIGIFLEX® BKN

Shear pin coupling

Torque limitation through shear pins

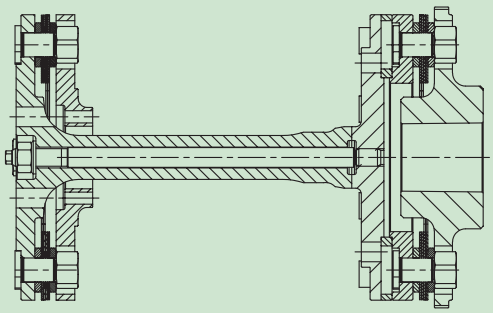
Please indicate the fracture torques in the order!



RIGIFLEX®

Electrically insulated

These types are used to avoid leakage current from the drive side to the driven side.



RIGIFLEX®

In the train and traffic technology

Connection of hollow shaft engine and gearbox with mounted on axle drive.

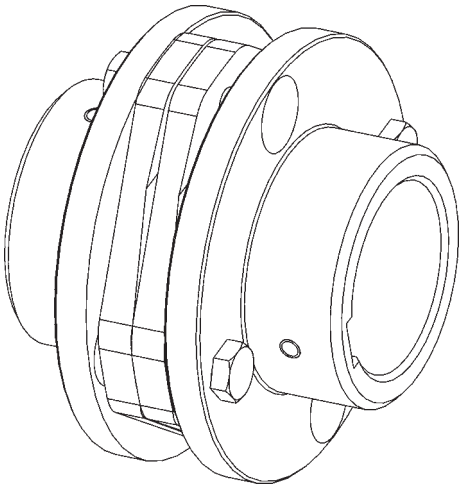
LAMEX® Lamina coupling from plastics

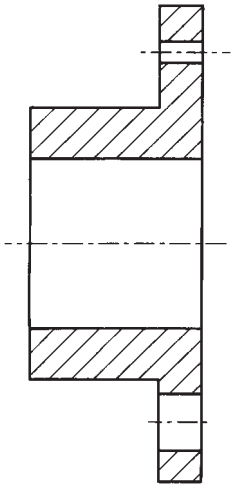
For advanced drive technology KTR

Backlash-free, torsionally rigid and maintenance-free couplings

- Less weight due to highly rigid plastic lamina
- Laminae to be assembled radially
- Lamina material electroconductive
- Release for explosion-proof drives
- Backlash-free and maintenance-free
- Torsionally rigid and flexible under bending

- Easy variation of shaft distance dimensions by using additional discs
- As a result optimally to adapt to the existing adjacent components
- Laminae to be assembled radially
- Available as a reinforced lamina design for higher torques

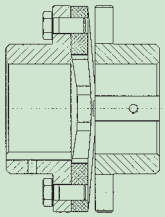
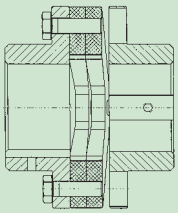
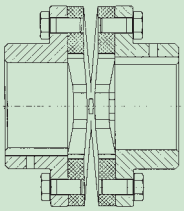
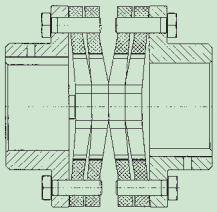
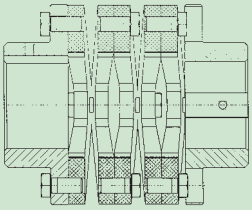
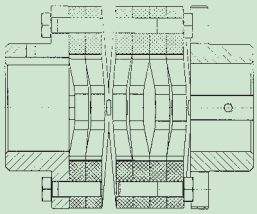


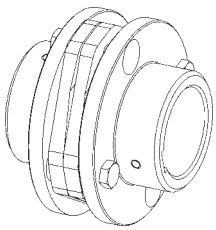


- ***New:*** Revised flanges as turning parts
- Various hub designs can be realized easier:
  - clamping hubs
  - clamping ring hubs
  - hubs with CLAMPEX® clamping sets

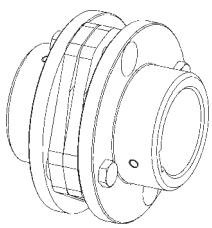
LAMEX® Lamina coupling from plastics

Designs and applications

Design	Characteristics	Applications
 **Design EK**	• single cardanic design • only angular and axial displacement permissible • backlash-free • compact dimensions	• mixers • agitating machines • applications with high radial and axial load
 **Design EKS**	• reinforced design EK • single cardanic design, can be built from design EK by modification of the lamina set	• as design EK, but for higher performance range • for higher radial and axial forces
 **Design DK**	• double cardanic design • angular, axial and radial displacements permissible • lamina set to be assembled radially	• pump drives • for the range of general engineering • for low to average performance
 **Design DKS**	• reinforced design DK • higher torques with maximum displacement figures • easy assembly of lamina sets	• packaging machines • water pumps • paper machines
 **Design ZS**	• coupling with variable intermediate shaft dimensions • length of spacers adapted to standard pump dimensions • easy modification of intermediate shaft dimensions	• standard pumps • process pumps (explosion-proof applications) • for the range of general engineering
 **Design ZSS**	• reinforced design ZS • variable intermediate shaft dimensions • connection of bigger shaft distance dimensions • lamina set to be assembled radially	• as design ZS, but for higher performances • pump drives • packaging machines



standard design



reinforced design

LAMEX® Lamina coupling from plastics

Technical data

Torques, misalignments

Size	Torques [Nm]				Permissible misalignments								
	EK, DK, ZS		EKS, DKS, ZSS		Angular [°]			Axial [mm]			Radial [mm]		
	T_{KN}	T_{Kmax}	T_{KN}	T_{Kmax}	EK/ EKS	DK/ DKS	ZS/ ZSS	EK/ EKS	DK/ DKS	ZS/ ZSS	EK/ EKS	DK/ DKS	ZS/ ZSS
19	10	30	22	60	1	1	1	0,5	1	2	–	0,35	1,4
24	25	75	50	140	1	1	1	0,5	1	2	–	0,35	2
28	40	120	80	240	1	1	1	0,5	1	2	–	0,35	2
38	60	180	120	320	1	1	1	0,5	1	2	–	0,35	2
42	100	300	200	380	1	1	1	0,5	1	2	–	0,35	2
48	150	450	280	590	1	1	1	0,5	1	2	–	0,35	2,5
55	200	600	400	700	1	1	1	0,5	1	2	–	0,35	2,5
65	280	840	560	900	1	1	1	0,5	1	2	–	0,35	2,5
75	380	1140	720	1750	1	1	1	0,5	1	2	–	0,35	2,5
90	580	1740	1040	2200	1	1	1	0,5	1	2	–	0,35	2,5

Speeds, stiffness data

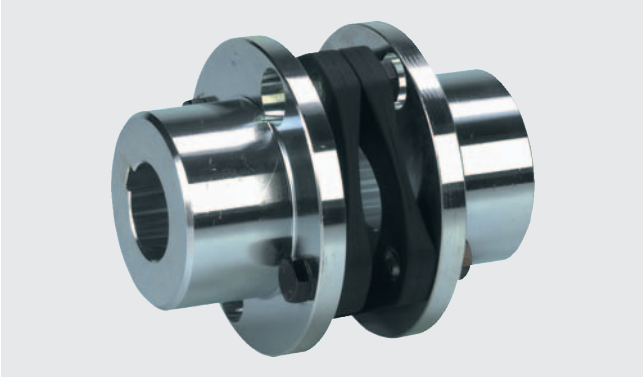
Size	Maximum speed [min^{-1}]	Torsion spring rigidity x 10^6 [Nm/rad]						Axial spring stiffness [N/mm]					
		EK	EKS	DK	DKS	ZS	ZSS	EK	EKS	DK	DKS	ZS	ZSS
19	12500	0,005	0,009	0,002	0,003	0,001	0,001	1852	3260	750	1578	263	600
24	9500	0,023	0,04	0,01	0,12	0,004	0,007	1600	4898	1112	2325	432	898
28	8000	0,046	0,08	0,02	0,03	0,01	0,014	3555	7111	1473	2450	610	1250
38	7100	0,07	0,09	0,03	0,04	0,015	0,02	2500	4000	950	2020	400	900
42	6000	0,08	0,1	0,04	0,05	0,02	0,024	1632	2666	600	1300	285	690
48	5300	0,17	0,26	0,05	0,1	0,04	0,05	2240	4200	1090	1923	323	680
55	4500	0,23	0,3	0,11	0,13	0,05	0,06	1667	3160	800	1500	200	520
65	4000	0,27	0,4	0,1	0,13	0,03	0,06	1200	2200	570	1078	150	400
75	3550	0,38	0,6	0,17	0,2	0,06	0,1	961	1700	430	900	112	312
90	3000	0,4	0,5	0,17	0,2	0,06	0,07	800	1400	400	750	100	250

Mass moment of inertia

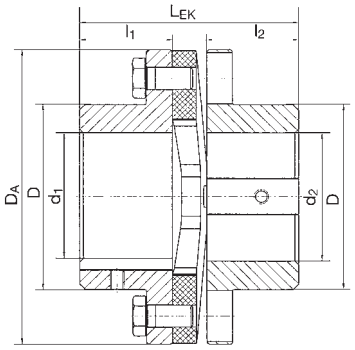
Size	Mass moments of inertia [kgm^2], hubs with maximum bore				
	Hub	Lamina	EK complete	DK complete	ZS complete
19	0,00016	0,00002	0,00034	0,00036	0,00042
24	0,00048	0,00009	0,00105	0,00114	0,00141
28	0,00133	0,00013	0,00279	0,00292	0,00331
38	0,00235	0,00024	0,00494	0,00518	0,00590
42	0,00520	0,00044	0,01084	0,01128	0,01260
48	0,00790	0,00076	0,01656	0,01732	0,01960
55	0,0185	0,0012	0,0382	0,0394	0,0430
65	0,0320	0,0016	0,0656	0,0672	0,0720
75	0,0649	0,0033	0,1331	0,1364	0,1463
90	0,165	0,0073	0,3373	0,3446	0,3665

LAMEX® Lamina coupling from plastics

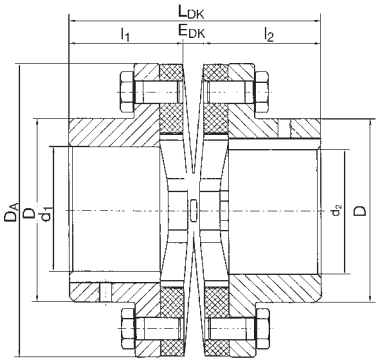
Standard designs



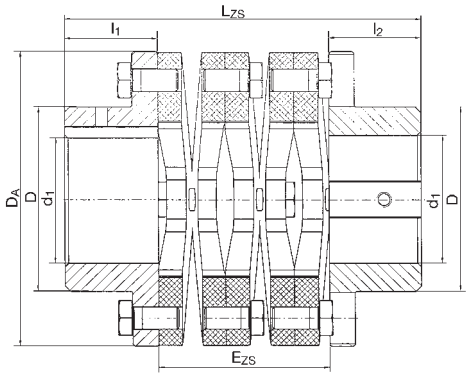
- Standard designs single and double cardanic
- Backlash-free and torsionally rigid, able to compensate for displacements
- Available from stock
- Finish bore according to ISO fit H7, feather keyway according to DIN 6885 sheet 1 - JS9
- Furthermore available with frictionally engaged shaft-hub-connection



EK

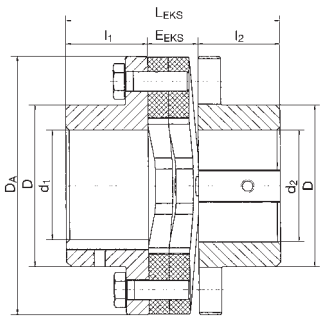


DK

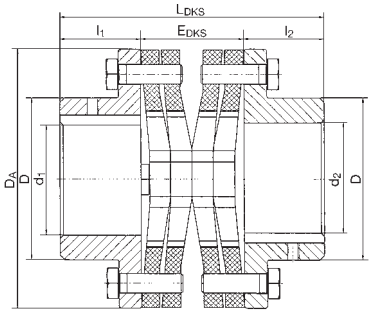


ZS

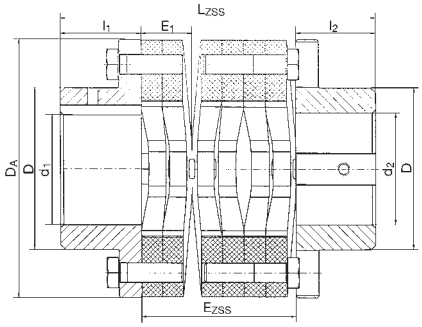
Size	Standard hub 1a				Hub 1				$l_1; l_2$	Designs EK and EKS				Designs DK and DKS				Designs ZS and ZSS				
	d_1/d_2 min.	d_1/d_2 max.	D_A	D	d_1/d_2 min.	d_1/d_2 max.	D_A	D		E_{EK}	L_{EK}	E_{EKS}	L_{EKS}	E_{DK}	L_{DK}	E_{DKS}	L_{DKS}	E_{ZS}	L_{ZS}	E_1	E_{ZSS}	L_{ZSS}
19	–	24	74	38	–	19	70	36	25	20	70	31,0	81,0	40	90	62	112	100	150	31,0	93	143
																					124	174
24	–	30	93	45	–	24	90	41	27	20	74	31,5	85,5	40	94	63	117	100	154	31,5	94,5	148,5
																		140	194		126	180
28	–	38	113	56	–	28	108	48	39	20	98	32,5	110,5	40	118	65	143	100	178	32,5	130	208
																		140	218		162,5	240,5
38	–	48	128	70	–	38	122	61	39	20	98	32,5	110,5	40	118	65	143	100	178	32,5	130	208
																		140	218		162,5	240,5
42	–	65	148	90	–	42	145	71	50	20	120	32,5	132,5	40	140	65	165	100	200	32,5	130	230
																		140	240		162,5	262,5
48	–	70	161	95	–	48	160	76	52	20	124	33,0	137,0	40	144	66	170	140	244	33,0	165	269
																		180	284		198	302
55	–	85	186	120	–	55	185	88	64	20	148	33,0	161,0	40	168	66	194	140	268	33,0	165	293
																		180	308		198	326
65	–	100	206	140	–	65	205	103	66	20	152	33,0	165,0	40	172	66	198	140	272	33,0	165	297
																		180	312		198	330
75	–	115	240	160	–	75	240	121	77	20	174	33,75	187,8	40	194	67,5	221,5	140	294	33,75	168,8	322,8
																		180	334		202,5	356,5
90	–	150	288	205	–	90	288	142	89	20	198	33,75	211,8	40	218	67,5	245,5	140	318	33,75	168,8	346,8
																		180	358		202,5	380,5



EKS



DKS



ZSS

Order form:

LAMEX® 38	ZSS	L_{ZSS}	Ø 38 / Ø 38
Coupling size	Design	Spacer length Indication only for ZS and ZSS	Finish bores

LAMEX® Lamina coupling from plastics

Technical description

Assembly and operating advice:
(Please see our mounting instructions KTR standard 40410)
For the assembly it is important to make sure that the laminae packages are assembled free from distortion in axial direction.

The screw tightening torques of the laminae are shown in the following table:

Screw tightening torques of laminae:

Size	Screw	T_A [Nm]
19	M6	14
24	M8	35
28	M10	69
38	M10	69
42	M10	69
48	M12	120
55	M12	120
65	M12	120
75	M16	295
90	M16	295

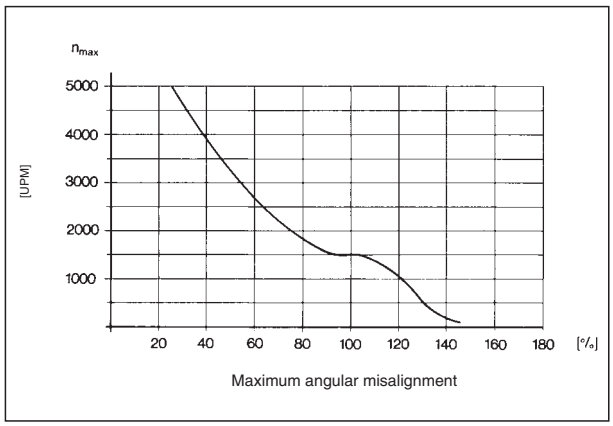
The following lamina types must be distinguished for LAMEX®:

Lamina type	Design
D	4 x through hole
G	4 x tapping
DG	2 x through hole 2 x tapping

Balancing:
On request of the customer the LAMEX® couplings can be balanced. Please consult with us for any further questions.

Shaft misalignments:
For the LAMEX® coupling the compensation of shaft misalignments is effected by the elastic deformation of the plastic laminae. For that reason the lifetime is considerably influenced by the misalignments that arise.
The LAMEX® coupling is selected in a way that it can absorb a maximum angular displacement of 1° with each "lamina joint". These displacement figures refer to the nominal power and the nominal speed of 1500 min^{-1}. For higher or lower speeds please see the maximum permissible figure of angular misalignment in the following diagram:

Permissible angular misalignments:

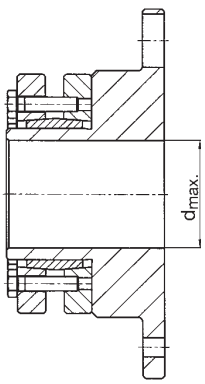


Thread for setscrews:
Position and dimensions of the thread for setscrews of LAMEX® hubs (hub 1.0, cylindrical bore with keyway) are shown in the following table:

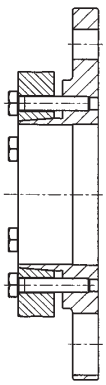
Size	Thread G	Distance t
19	M5	8
24	M5	8
28	M6	10
38	M8	15
42	M8	20
48	M8	20
55	M10	25
65	M10	20
75	M10	20
90	M10	25

Hub designs:
Apart from the above-mentioned standard hub (hub 1.0, cylindrical bore with keyway) frictionally engaged, backlash-free shaft-hub-connections are available, as an example:

Frictionally engaged shaft-hub-connection with KTR 603/620



Frictionally engaged shaft-hub-connection with clamping ring hub



Coupling selection

1. **Drives without periodic torsional vibrations**
For example centrifugal pumps, fans, screw compressors, etc. The coupling selection requires that the rated torque T_{KN} and the maximum torque T_{Kmax} are reviewed.

1.1 **Loading by rated torque**
Taking into account the operating factor S_B the permissible rated torque must be at least as big as the rated torque T_N of the machine.

$$T_{KN} \geq T_N \bullet S_B$$

(For operating factor S_B see table below)

1.2 **Loading by torque shocks**
The permissible maximum torque T_{Kmax} of the coupling must be at least as big as the sum of the peak torque T_S and the rated torque T_N of the machine. This is valid in case that the rated torque of the machine is superimposed by a shock (e. g. starting of the engine). For drives with A. C. motors and large masses on the load side we would recommend calculations by our simulation programme (please consult with our Engineering Department).

$$T_{Kmax} \geq (T_N + T_S)$$

2. **Drives with periodic torsional vibrations**
For drives subject to dangerous torsional vibrations (e. g. diesel engines, piston compressors, piston pumps, generators, etc.) it is necessary to perform a torsional vibration calculation (please consult with our Engineering Department).

2.1 **Loading by rated torque**
Taking into account the operating factor S_B the permissible rated speed must be at least as large as the rated torque T_N of the machine.

$$T_{KN} \geq T_N \bullet S_B$$

2.2 **Passing through resonance**
The peak torque T_{SR} arising while passing through resonance must not exceed the permissible maximum torque of the coupling T_{Kmax}.

$$T_{Kmax} \geq T_{SR}$$

Explanation of the above-mentioned coupling torques

Description	Code	Explanation
Rated torque of coupling	T_{KN}	Torque which can be transmitted continuously over the entire speed range of the coupling.

Description	Code	Explanation
Maximum torque of coupling	T_{Kmax}	Torque which can be transmitted during the entire life of the coupling $\geq 10^5$ times as spike load or 5×10^4 times as alternating load.

Guidelines for operating factor S_B

Application	S_B
Construction machinery	2
Agitators	1 - 2
Centrifuges	1,5
Conveyors	2
Elevators	2
Fans/Blowers	1,5
Generators	1
Calanders	2
Crushers	2,5
Textile machinery	2
Rolling mills	2,5

Application	S_B
Woodworking machinery	1,5
Mixers and extruders	2
Stamps, presses	2,5
Machine tools	2
Grinders	2,5
Packaging machines	1
Roller drives	2,5
Piston pumps	2,5
Centrifugal pumps	1,5
Piston compressors	2,5
Turbo compressors	2

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