Made for Motion KTR

Coupling selection steel laminae coupling

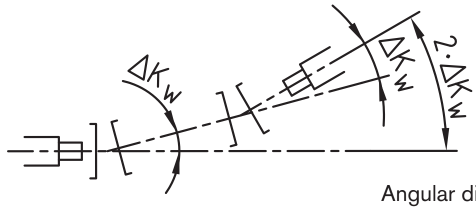
Description	Code	Explanation
Rated torque of coupling	T_{KN}	Torque which can be transmitted continuously over the entire speed range of the coupling.
Vibratory torque of coupling	T_{KW}	Torque amplitude of the permissible periodic torque fluctuation with a frequency of 10 Hz and a basic load of T_{KN} or dynamic load up to T_{KN}.
Maximum torque of coupling	T_{Kmax}	Torque which can be trans-mitted during the entire life of the coupling ≥ 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	2,0
Agitators	1,0 - 2,0
Centrifuges	1,5
Conveyors	2,0
Elevators	2,0
Fans/Blowers	1,5
Generators	1,0
Calanders	2,0
Crushers	2,5
Textile machinery	2,0
Rolling mills	2,5
Woodworking machinery	1,5
Mixers and extruders	2,0
Stamps, presses	2,5
Machine tools	2,0
Grinders	2,5
Packaging machines	1,0
Roller drives	2,5
Piston pumps	2,5
Centrifugal pumps	1,5
Piston compressors	2,5
Turbo compressors	2,0

1. **Permissible displacements:**

ΔK_a: Permissible axial displacement
ΔK_w: Permissible angular displacement
ΔK_r: Permissible radial displacement

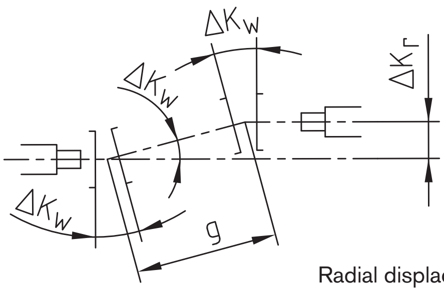
The steel laminae couplings are selected in a way that the maximum permissible angular excursion ΔK_w may be compensated by every laminae set. Consequently the maximum permissible angular excursion of two shafts combined with each other is
$2 \cdot \Delta K_w$. The maximum angular excursion for each laminae set is shown in the table "Technical capacity utilization".



Angular displacement

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

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



Radial displacement

In the table "Technical data" (RADEX®-N page 113 and RIGIFLEX®-N page 122) 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.
(See our mounting instructions www.ktr.com).

Coupling selection steel laminae coupling

Selection of the coupling size

2. **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 $T_{K\,max}$ are reviewed.

2.1 **Loading by rated torque**

Taking into account the operating factor S_B, directional factor S_R and temperature factor S_t, the permissible rated speed must be at least as large as the rated torque T_N of the machine.

The nominal torque T_{KN} of the coupling is:

$$T_{KN} \geq T_N \cdot S_B \cdot S_t \cdot S_R$$

T_N = Torque of the machine
S_B = Operating factor (see table page 109)
S_R = Factor of direction
= 1,00 same torque direction
= 1,70 changing torque direction
S_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

2.2 **Loading by torque shocks**

The permissible maximum torque T_{Kmax} of the coupling must be at least as high as the sum of the peak torque T_S and rated torque T_N of the machine taking into account the operating factor S_B, temperature factor S_t and directional factor S_R. 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).

$$T_{K\,max} \geq (T_N + T_S) \cdot S_t \cdot S_R$$

T_S = Peak torque

Selection of the coupling size

3. **Drives <u>with</u> 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).

3.1 **Loading by rated torque**

Taking into account the operating factor S_B, directional factor S_R and temperature factor S_t, the permissible rated speed must be at least as large as the rated torque T_N of the machine.

The nominal torque T_{KN} of the coupling is:

$$T_{KN} \geq T_N \cdot S_B \cdot S_t \cdot S_R$$

T_N = Torque of the machine
S_B = Operating factor (see table page 109)
S_R = Factor of direction
= 1,00 same torque direction
= 1,70 changing torque direction
S_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

3.2 **Passing through resonance**

The peak torque T_{SR} arising while passing through resonance must not exceed the permissible maximum torque of the coupling $T_{K\,max}$.

$$T_{K\,max} \geq T_{SR}$$

3.3 **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.

$$T_{KW} \geq T_W$$

Technical data

Torques, misalignments

Size	Torques [Nm]			Permissible misalignments				
				Angular [°] each laminae	Axial [mm]		Radial [mm]	
	T_{KN}	$T_{K\ max}$	T_{KW}		NN	NANA 1/ NANA2/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	–
138	23000	46000	11500	0,5	1,3	2,6	$\Delta Kr = \tan 0{,}5° \times (E_7 - E_1)$	–
158	33000	66000	16500	0,5	1,3	2,6		–
168	45000	90000	22500	0,5	1,45	2,9		–
208	70000	140000	35000	0,5	1,75	3,5		–
248	120000	240000	60000	0,5	2,1	4,2		–
288	200000	400000	100000	0,5	2,4	4,8		–
338	280000	560000	140000	0,5	2,5	5,0		–

Permissible speeds, torsional stiffness

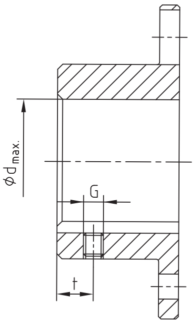
Size	Max. speed [rpm] (higher speeds on request)	Torsion spring rigidity x 10⁶ [Nm/rad] per laminae set	Size	Max. speed [rpm] (higher speeds on request)	Torsion spring rigidity x 10⁶ [Nm/rad] per laminae set
20	20000	0,017	105	4000	2,540
25	16000	0,028	115	3400	3,480
35	13000	0,092	135	3000	6,850
38	12000	0,198	138	3800	13,200
42	10000	0,282	158	3500	18,300
50	8000	0,501	168	3300	26,200
60	6700	0,560	208	2800	52,000
70	5900	0,900	248	2300	71,000
80	5100	1,140	288	2000	108,000
85	4750	1,520	338	1800	156,000
90	4300	1,940			

Weights and mass moments of inertia

Size	Hub [1)] [kg] / [kgm²]	Laminae set [kg] / [kgm²]	NN [1)] complete [kg] / [kgm²]	NANA 1 [1)] complete [kg] / [kgm²]	NANA 2 [1)] complete [kg] / [kgm²]	NNZ [1)] complete [kg] / [kgm²]
20	0,129 / 0,000043	0,044 / 0,00001	0,304 / 0,00010	0,551 / 0,00011	–	0,436 / 0,00010
25	0,24 / 0,000116	0,077 / 0,00003	0,558 / 0,00026	0,935 / 0,00029	–	0,768 / 0,00025
35	0,571 / 0,00042	0,098 / 0,00006	1,242 / 0,0008	1,891 / 0,0095	–	1,597 / 0,0085
38	0,781 / 0,00073	0,2 / 0,00015	1,764 / 0,0016	2,839 / 0,0018	–	2,362 / 0,015
42	1,076 / 0,00123	0,248 / 0,0002	2,407 / 0,0027	3,638 / 0,0029	–	3,157 / 0,0024
50	1,752 / 0,00291	0,462 / 0,0003	3,973 / 0,0061	6,182 / 0,010	–	5,111 / 0,008
60	1,878 / 0,00378	0,395 / 0,0006	4,158 / 0,0082	6,005 / 0,013	5,816 / 0,012	5,287 / 0,01
70	2,778 / 0,00714	0,432 / 0,0009	0,6239 / 0,0152	9,101 / 0,024	8,659 / 0,022	8,028 / 0,02
80	4,12 / 0,0134	0,719 / 0,002	8,973 / 0,029	12,594 / 0,044	12,009 / 0,042	–
85	5,115 / 0,0195	1,011 / 0,003	11,256 / 0,042	16,161 / 0,067	15,522 / 0,064	–
90	6,196 / 0,0282	2,309 / 0,008	14,728 / 0,064	21,987 / 0,106	21,288 / 0,103	–
105	7,601 / 0,0414	2,194 / 0,01	17,423 / 0,093	25,771 / 0,148	24,654 / 0,143	–
115	11,951 / 0,0899	3,931 / 0,02	27,862 / 0,199	42,765 / 0,344	41,225 / 0,333	–
135	18,9 / 0,1866	7,265 / 0,11	45,144 / 0,483	71,397 / 0,851	–	–
138	16,263 / 0,1457	9,895 / 0,143	42,455 / 0,435	Mounting dimension E as indicated by the customer	–	–
158	19,611 / 0,2064	14,238 / 0,242	53,494 / 0,655		–	–
168	29,483 / 0,3609	15,090 / 0,315	174,161 / 1,038		–	–
208	54,171 / 0,9738	22,375 / 0,679	130,854 / 2,629		–	–
248	84,221 / 2,1508	38,161 / 1,605	206,759 / 5,909		–	–
288	142,962 / 4,8456	53,823 / 3,056	340,051 / 12,755		–	–
338	221,02 / 10,2386	77,499 / 5,778	520,540 / 26,313		–	–

[1)] hubs with maximum bore

Cylindrical bores



Standard hub 1.0 according to DIN 6885 sheet 1 (with keyway)									
Size	$d_{max.}$	G	t	T_A [Nm]	Size	$d_{max.}$	G	t	T_A [Nm]
20	20	M5	6	2,0	105	105	M12	30	40,0
25	25	M5	8	2,0	115	115	M12	30	40,0
35	35	M6	15	4,8	135	135	on request of customer		
38	38	M6	15	4,8	138	135			
42	42	M8	20	10,0	158	150			
50	50	M8	20	10,0	168	165			
60	60	M8	20	10,0	208	200			
70	70	M10	20	17,0	248	240			
80	80	M10	20	17,0	288	280			
85	85	M10	25	17,0	338	330			
90	90	M12	25	40,0					

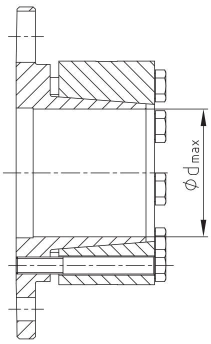
Stock programme cylindrical finish bore [mm] H7, keyway to DIN 6885 sheet 1 (JS9) with thread for setscrew of standrad hub 1.0

Size	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	●																															
138	pilot bore																															
158	pilot bore																															
168	pilot bore																															
208	pilot bore																															
248	pilot bore																															
288	pilot bore																															
338	pilot bore																															

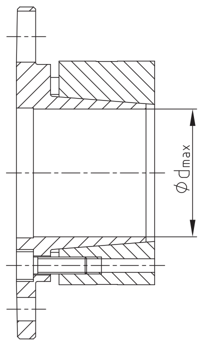
Backlash-free shaft-hub connections without feather key

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.

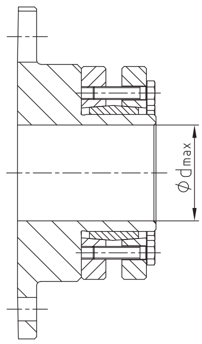
Clamping ring hub type 6.5
(clamping screws from the outside)



Clamping ring hub type 6.0
(clamping screws from the inside)

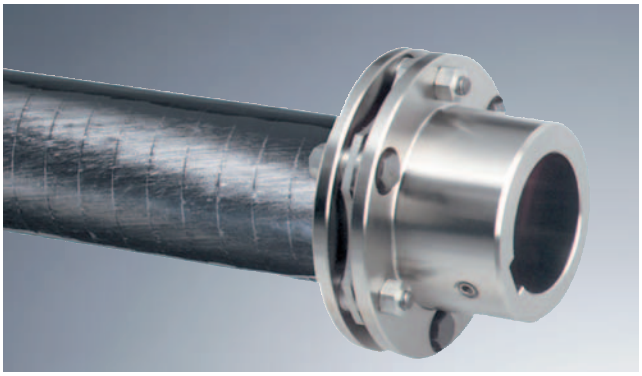


Design with CLAMPEX®
element type 603

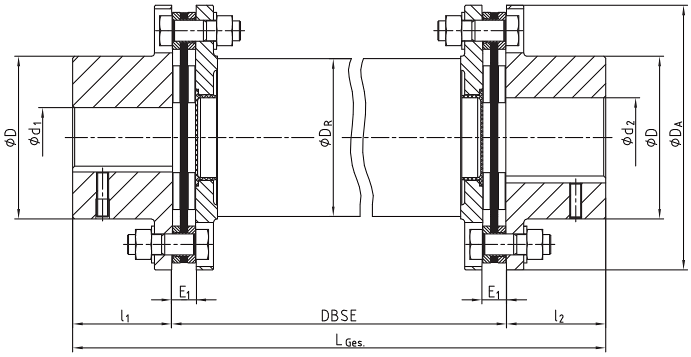


Size	Type 6.5 and 6.0 $d_{max.}$	CLAMPEX® 603/620 $d_{max.}$	Size	Type 6.5 and 6.0 $d_{max.}$	CLAMPEX® 603/620 $d_{max.}$
35	28	36	115	100	115
38	32	36	135	110	125
42	38	42	138	on request	
50	42	60	158		
60	50	70	168		
70	60	75	208		
80	70	80	248		
85	70	90	288		
90	80	95	338		
105	90	105			

Corrosion-resistant type for large shaft distance dimension



- All steel parts made of stainless material
- Composite tubes are conglutinated with the flanges and radially bolted in addition
- Spacer sealed against environmental influences (e. g. penetration of moisture into the glued joint)
- On request also available with brake disc made of stainless material
- ATEX release possible



RADEX®-N type NANA 4 CFK											
Size	Torque [Nm]		Dimensions [mm]								
	T_{KN}	$T_{K\,max.}$	D_A	max. d_1/d_2	D	l_1/l_2	E_1	DBSE	$L_{Ges.}$	Composite Pipe D_R	max. DBSE[1] at 1500 rpm
70	800	1600	149	70	102	65	11	customer's specifications	$l_1 + l_2 +$ DBSE	95	3500
85	1800	3600	184	85	123	80	15			117	3900
90	2500	5000	200	90	135	80	15			128	4100
115	4500	9000	253	115	163	100	23			160	4600

[1] In case of higher speeds or longer DBSE dimensions please contact the KTR engineering department (+49 5971 798-484).
Due to composite tubes optimized by applications the aforementioned technical details (e. g. max. DBSE) may be varied, if required.

Particularly the steel laminae couplings are wellsuited 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 (GRP or CFRP) are used, if necessary.

Order form:

RADEX® - N 85	NANA 4 CFK	Ø 60	Ø 70	3000
Coupling size	Type	Bore d_1	Bore d_2	Shaft distance dimension