VAROLASTIC®
Highly flexible flange coupling with progressive torsional stiffness

Description of product and application

The VAROLASTIC® is a very sturdy series of highly flexible flange couplings according to the roller principle for internal combustion engine drives The peculiar characteristic of the slightly to moderately progressive torsional stiffness characteristic curve is achieved by special rollers made of synthetic elastomer material precisely guided and loaded between the coupling halves with increasing load. Here the rollers are not only loaded on pressure (like with a jaw coupling), but a significant element of thrust load comes along specifically in main operating areas. This is realized by the convex-concave contour guide in the pockets of the coupling flanges. This contour guide is optimally adjusted based on numerical calculations for each size. The nominal torque range of the coupling can subsequently be utilized for up to 100 %

With low operating loads (like with idle mode) the torsional stiffness of the coupling is very low, heavily insulating vibration amplitudes on the driving side and thus, for example, preventing noise excitation generated by gearbox splines. With increasing load the coupling achieves a torsional stiffness up to the nominal torque typical for the respective size for full power transmission. In real-life operation the torsional stiffness permanently changes depending on the base load, amplitude and frequency. This non-linearity does not create any stationary, settling condition in the range of natural frequencies. The torsional stiffness and consequently the natural frequency evade a potential resonance condition. Finally the coupling stiffness in the overload range increases more strongly so that peak and special loads are effectively damped.

The coupling is available as a standard with or without anti-rotation device, for compatible flywheel connections and a number of hub connections. The elastomers allow for an installation space temperature of 120°C permanently and up to 150°C for a short time.

It is a particulary good choice for variable-speed main drives for which the above-mentioned properties are beneficial, e. g. in combination with gearboxes or wherever a sturdy coupling able to take overload is looked for. Since the torsional stiffness optimally adapts to the tasks each depending on the application, the VAROLASTIC® also serves the trend of component standardisation via the sizes and innovation cycles in the customer portfolio.

VAROLASTIC® - The types

F

FD

The two types of VAROLASTIC® F and VAROLASTIC® FD flange couplings differ in their anti-rotation feature. In the FD variant, this is achieved by a positive meshing (stop) within the coupling halves. In contrast to conventional solutions on the market, the directional coupling stops before the rollers can be overloaded or destroyed. The functionality, as well as the coupling itself, is protected. Even in rare cases of overload, the drive can continue to be operated without restrictions.

Properties of types by comparison		
Properties	**VAROLASTIC® F**	**VAROLASTIC® FD**
Rated torques T_{KN}	According to series scale, usable range up to 100%, direction of rotation bound	
Maximum torques T_{KMax}	2x T_{KN} [1] / 3x T_{KN} [2]	
Failure protection / Stop	No	Stop > 2x T_{KN} [3]
Vibratory properties, e. g. torsional stiffness	non-linear, moderate progressive increase in torsional stiffness, high material damping and power loss	
Materials 1)	Synthetical EPDM up to 120°C permanent operating temperature for hardness ranges HE and UE	
Plug-in	Yes	Yes
Radial assembly	No	No
Mounting length	++	++
Displacement axial	+	Ø
Displacement radial	Ø	Ø
Displacement angular	Ø	Ø
	For flywheel flange and shaft connection (SAE J620, DIN 5480 et seqq., DIN 6281, etc.)	

[1] 100.000 load alternations
[2] 1.000 load alternations
[3] with room temperature

FLANGE COUPLINGS
TYPES AND OPERATING DESCRIPTION

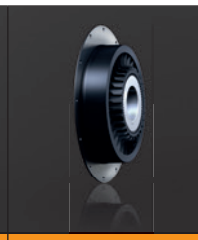
Properties of flange couplings

Product	BoWex® FLE-PA/-PAC	VAROLASTIC®	MONOLASTIC®	BoWex-ELASTIC®	SINULASTIC®
Type	Torsionally stiff flange coupling	highly flexible flange coupling with progressive characteristic	Flexible flange coupling	Highly flexible flange coupling	Highly flexible flange coupling
Properties					
Torsionally stiff	●				
Torsionally flexible		●	●		
Highly flexible		●		●	●
Direction of rotation bound		●			
Damping vibrations		●	●	●	●
Maintenance-free	●	●	●	●	●
Axial plug-in	●	●	●	●	●
Special features/applications					
Variant diversity	very high	high	high	very high	very high (type A, B, T, V)
Flange dimension	SAE standard and special dimensions	SAE standard and special dimensions	type 3/4 hole, SAE standard and special dimensions	SAE standard and special dimensions	SAE standard and special dimensions
internal spline	see standard programme of BoWex® hubs	see standard programme of hubs	for SAE or DIN pump shafts	see standard programme of BoWex® hubs	Type B
Applications	hydrostatic drives of construction machines, agricultural machines, …	Main drives in mechanical and plant engineering	hydrostatic drives of construction machines, agricultural machines, …	generators, splitterboxes, water pumps, piston compressors, agricultural machines, gensets, mill drives, separator drives, …	generators, gensets, splitterboxes, traction drives, hydraulic pumps, piston compressors, ...
Performance data					
Max. rated torque T_{KN} [Nm]	6,600	8000	1,850	70,000	25,000
Max. speed n [rpm]	6,000	5,000	6,000	6,200	3,800
Flange (standard and special)					
Material	fibre-glass reinforced polyamide (PA) combination of polyamide with carbon fibre share and steel flange (PAC)	EPDM	natural rubber	natural rubber	natural rubber EPDM
Elastomer hardness	torsionally stiff	HE / UE	65, 70 Shore A	various kinds of hardness for vibration adaptation of drives	miscellaneous: S, M, H, U
Flange (standard)					
Temperature range [°C] min./max.	-25 / +130 (PA) -25 / +130 (PAC)	-30 / +120	-40 / +100	-40 / +100	-40 / +120
Engine power [kW]					
Max.	800	1500	250	5,000	3,500

● ≈ Standard
O ≈ On request
* ≈ Depending on size

FLANGE COUPLINGS
TYPES AND OPERATING DESCRIPTION

Product finder of flange couplings

					
Product	**BoWex® FLE-PA/-PAC**	**VAROLASTIC®**	**MONOLASTIC®**	**BoWex-ELASTIC®**	**SINULASTIC®**
Type	Torsionally stiff flange coupling	highly flexible flange coupling with progressive characteristic	Flexible flange coupling	Highly flexible flange coupling	Highly flexible flange coupling
Geometries					
Design	extremely short	short	short	short	short
max. radial displacement	0.5 mm	0.3 mm	1 mm	9.5 mm	3 mm
shaft diameter min./max. [mm]	20 / 125	20 / 110	20 / 60	21 / 275	20 / 240
Types (extract)					
Intermediate shaft types » bridging larger shaft distances	–	–	–	HE-ZS	Type B and V
shaft-to-shaft connection	–	–	–	HEW1 and HEW2, HEW-ZS	O
flange-to-shaft connection	Standard	●	Standard	HE1, HE2, HE3 and HE4, HE-ZS	●
For cardan shafts » connecting couplings for I. C.-engines	–	O	–	HEG1 and HEG2	O
Combination with pump mounting flange	●	●	●	●	●
Certifications / type examinations					
ATEX		O		●	O
UL-listed	●	O		●	O
GOST R/GOST TR		O		●	O
DNV/GL	●	O	●	●	O
ABS		O			
Bureau Veritas		O			
LR		O			
RS CLASS		O			
CCS		O			
ClassNK		O			

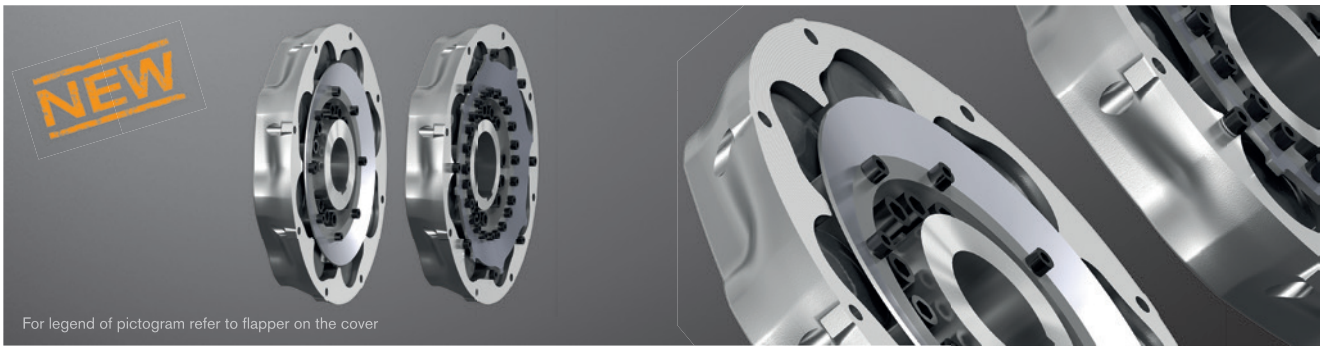
● ≈ Standard
O ≈ On request
* ≈ Depending on size

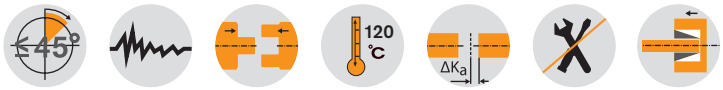
Please note: Pump mounting flanges

For connecting hydraulic pumps to the diesel engine, KTR supplies mounting flanges according to SAE connection dimensions sizes SAE 6 to SAE 1. These flanges are made of steel and EN-GJL-250 for hydraulic pumps with flange connections according to SAE-A, -B, -C, -D and -E as types with 2 and 4 holes.
Pump connection housings made of EN-GJL-250 to be mounted directly to the back plate of the engine.

VAROLASTIC® F and FD
Highly flexible flange coupling with progressive torsional stiffness

Pluggable roller coupling with optimised characteristic curve



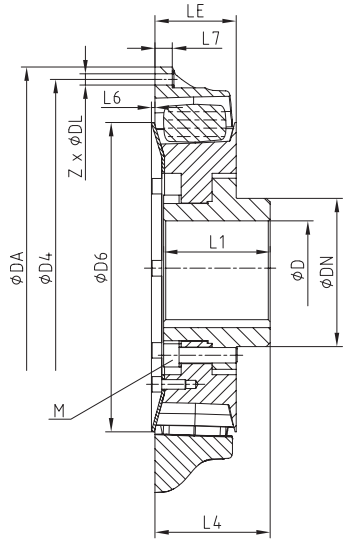


Technical data

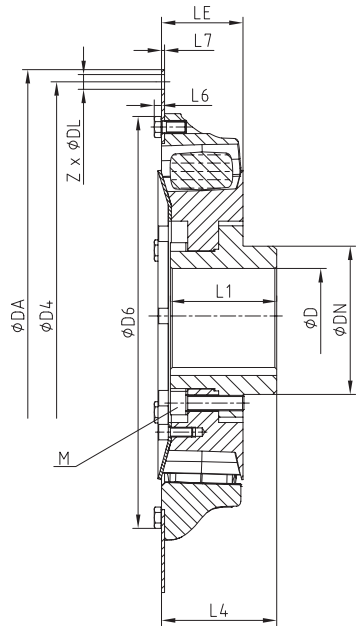
Size	Elas-tomer type	Torque [Nm] 1)				Dynamic torsion spring stiffness $C_{dyn.}$ [Nm/rad]					Relative damping ψ [-]		Perm. damping power P_{KW} [W] 2)		Operating speed [rpm]	
		T_{KN}	T_{Kmax}	T_{Kmax1}	T_{KW}	10% T_{KN}	25% T_{KN}	50% T_{KN}	75% T_{KN}	100% T_{KN}	30 °C	80 °C	30 °C	80 °C	n_t	$n_{max.}$
80	UE	800	1600	2400	400	1200	1700	4500	11500	24000			120	65	4500	5000
160	UE	1600	3200	4800	800	2500	5700	11000	24000	48000			200	110	4050	4500
240	UE	2400	4800	7200	1200	3800	7800	15000	35000	67000	1.6	1.17	250	140	3240	3600
300	UE	3000	6000	9000	1500	6000	10500	24000	52000	97000			350	190	2700	3000
450	UE	4500	9000	13500	2250	7000	12000	31000	71000	115000			530	270	2520	2800
600	UE	6000	12000	18000	3000	12000	19000	48000	104000	182000			600	320	2340	2600
800 3)	UE	8000	16000	24000	4000	–	–	–	–	–			800	430	2160	2400

1) T_{KN} Torque that can be continuously transmitted over the full speed range
Tkmax Transient torque peaks (e. g. resonance passage), min. 100,000 load alternations pulsating
TKmax1 Impact loads rarely, min. 1,000 load alternations
For selection consider DIN 740 part II (operating factor, temperature factor)
2) Here permanent damping power. Twice the damping power figure is permissible for one hour.
3) Available 2025

Type F



Type A



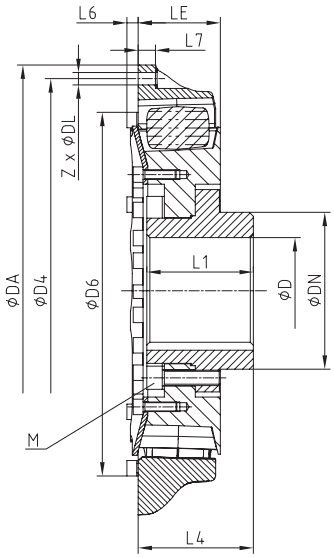
Type B

Flange dimensions according to SAE J620 [mm]				
Nominal size	DA	D4	Z	DL
8"	263.52	244.47	6	11
10"	314.32	295.27	8	11
11 ½"	352.42	333.37	8	11
14"	466.72	438.15	8	13
18"	571.50	542.90	6	17

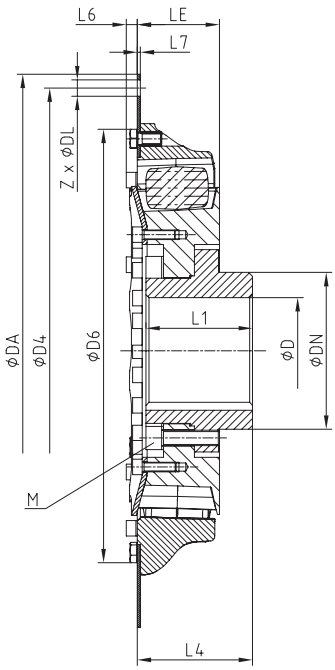
VAROLASTIC® F Type A and B																			
Size	Bore D [mm]	View	Flange connection acc. to SAE - J620					Dimensions [mm]							Cap screws DIN EN ISO 4762		Mass moment of inertia [kgm²] 1)		Weight [kg] 1)
			8"	10"	11 ½"	14"	18"	D6	LN	DN	L1	L4	L6	L7	M	T_A in Nm	J_A	J_L	
80	50	A	●					70	175	49	50	57	6.5	21	M8	32	0.0220	0.0100	4.84
		B		●					264					1.8			0.0330	0.0100	5.49
160	70	A		●				100	234	51	70	75	6.5	22	M12	100	0.0360	0.0730	8.88
		B			●				315					3			0.0590	0.0730	9.81
240	60	A			●			85	227	66	65	82	2	22	M12	100	0.0807	0.0377	11.23
		B				●			353				6.5	3			0.1706	0.0377	13.55
300	80	A			●			112	263	65	75	83	6	26	M12	100	0.0829	0.0648	12.80
		B				●			353				6.5	3			0.1719	0.0648	15.08
450	90	A				●		124	300	84	90	99	3.8	21.5	M16	240	0.2844	0.1544	26.96
600	110	A				●		162	338	85	110	119	3.7	19.5	M16	240	0.3022	0.2344	28.86
		B					●		460				7.5	3			0.4876	0.2344	31.91

1) with max. bore

Type FD



Type C



Type D

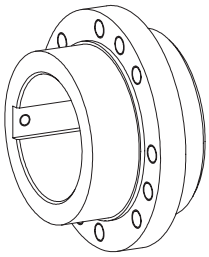
Flange dimensions according to SAE J620 [mm]				
Nominal size	DA	D4	Z	DL
8"	263.52	244.47	6	11
10"	314.32	295.27	8	11
11 ½"	352.42	333.37	8	11
14"	466.72	438.15	8	13
18"	571.50	542.90	6	17

VAROLASTIC® F Type C and D																			
Size	Bore D [mm]	View	Flange connection acc. to SAE - J620					Dimensions [mm]							Cap screws DIN EN ISO 4762		Mass moment of inertia [kgm²] 1)		Weight [kg] 1)
			8"	10"	11 ½"	14"	18"	D6	LN	DN	L1	L4	L6	L7	M	T_A in Nm	J_A	J_L	
80	50	C	●					70	213	49	50	57	9.2	21	M8	32	0.0223	0.0120	5.41
		D		●					264					1.8			0.0339	0.0120	6.06
160	70	C		●				100	273	51	70	75	9.2	22	M12	100	0.0370	0.0450	9.76
		D			●				314					3			0.0699	0.0450	10.69
240	60	C			●			85	271	66	65	82	9.5	22	M12	100	0.0834	0.0452	12.31
		D				●			353					3			0.1732	0.0452	14.62
300	80	C			●			112	311	65	75	83		26	M12	100	0.0875	0.0815	14.43
		D				●			353				11.5	3			0.1766	0.0815	16.71
450	90	C				●		124	351	84	90	99		21.5	M16	240	0.2896	0.1744	26.49
600	110	C				●		162	383	85	110	119	3.7	19.5	M16	240	0.3095	0.2781	31.27
		D					●		460				7.5	3			0.4949	0.2781	34.32

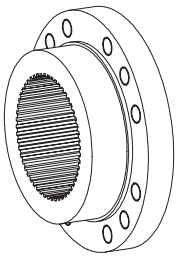
1) With max. bore

VAROLASTIC® F and FD
Highly flexible flange coupling with progressive torsional stiffness

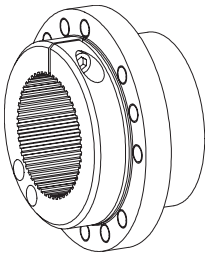
Types of hubs



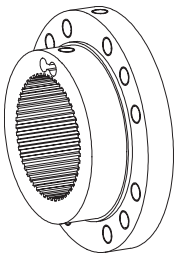
Type 1.0
Hub with feather keyway and setscrew



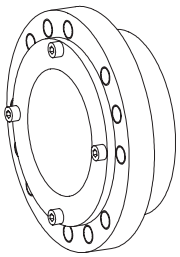
Type 1.3
Hub with spline toothing



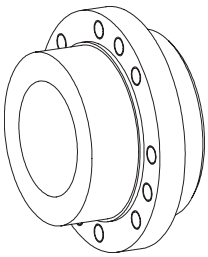
Type 2.1
Clamping hub single slot with spline



Type 3.1
spline/clamping hub N



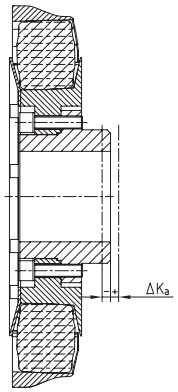
Type 6.0
Clamping ring hub



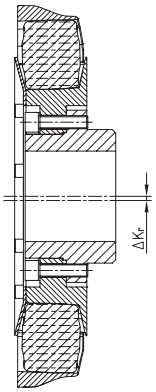
Type 8.0
taper interference fit

Type 8.1
cylindrical interference fit

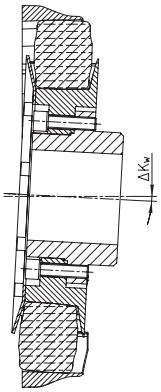
Displacements



Axial displacement



Radial displacement



Angular displacement

VAROLASTIC® F / FD	80	160	240	300	450	600
Perm. axial displacement ΔK_a [mm] [1]	0.20	0.25	0.30	0.30	0.50	0.50
Perm. radial displacement ΔK_r [mm]	0.20	0.20	0.20	0.20	0.30	0.30
Perm. angular displacement ΔK_w [mm]	0.15	0.15	0.20	0.20	0.25	0.25

Alignment accuracy (e.g. assembly)	Type F	Type FD
Axial in mm	±1.5	±1.0
Radial in mm	0.30	0.30
Angular in degree	0.25	0.25

[1] Displacement values during machine operation

Ordering example:

VAROLASTIC®	F	14"	2.7	DIN 5480 - 60x2x28
Coupling size	Type	Motor flange	Hub type	Finish bore