

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 %

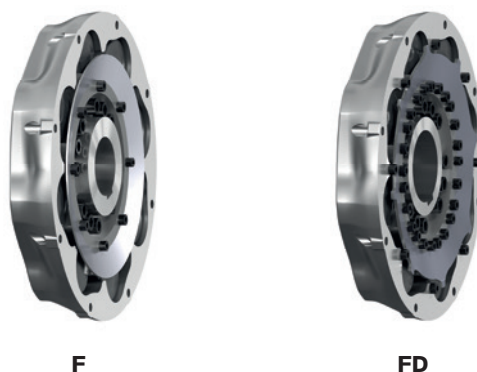
With low operating loads (like with idle mode) the torsional stiffness of the coupling is very low, heavily insulating vibration amplitudes on the driving side and thus, for example, preventing noise excitation generated by gearbox splines. With increasing load the coupling achieves a torsional stiffness 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 particularly 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



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 | + | ∅ |
| Displacement radial | ∅ | ∅ |
| Displacement angular | ∅ | ∅ |
| 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) | EPDM | natural rubber | natural rubber | natural rubber EPDM |
| | combination of polyamide with carbon fibre share and steel flange (PAC) | | | | |
| 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) | -30 / +120 | -40 / +100 | -40 / +100 | -40 / +120 |
| | -25 / +130 (PAC) | | | | |
| Engine power [kW] | | | | | |
| Max. | 800 | 1500 | 250 | 5,000 | 3,500 |

- ≈ Standard
- ≈ 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 | ○ |
| flange-to-shaft connection | Standard | ● | Standard | HE1, HE2, HE3 and HE4, HE-ZS | ● |
| For cardan shafts » connecting couplings for I. C.-engines | – | ○ | – | HEG1 and HEG2 | ○ |
| Combination with pump mounting flange | ● | ● | ● | ● | ● |
| Certifications / type examinations | | | | | |
| ATEX | | ○ | | ● | ○ |
| UL-listed | ● | ○ | | ● | ○ |
| GOST R/GOST TR | | ○ | | ● | ○ |
| DNV/GL | ● | ○ | ● | ● | ○ |
| ABS | | ○ | | | |
| Bureau Veritas | | ○ | | | |
| LR | | ○ | | | |
| RS CLASS | | ○ | | | |
| CCS | | ○ | | | |
| ClassNK | | ○ | | | |

- ≈ Standard
○ ≈ On request
* ≈ Depending on size

Please note: Pump mounting flanges



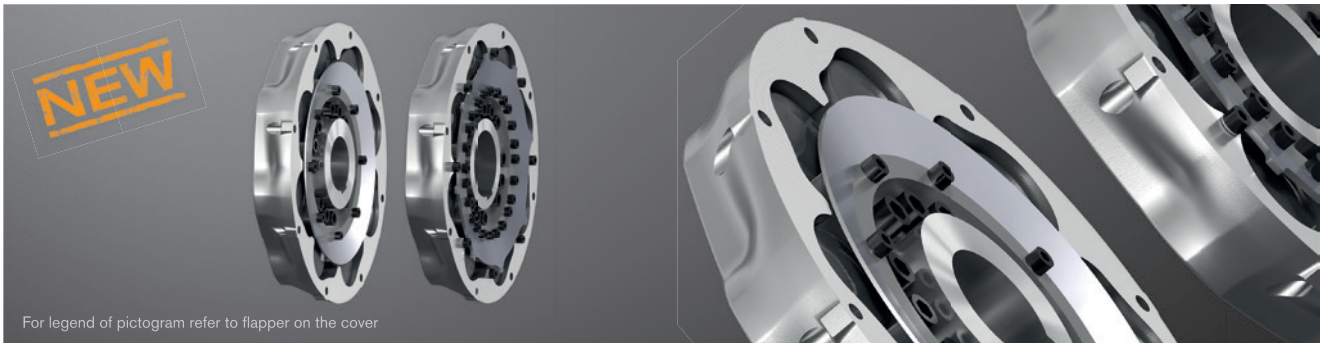
For connecting hydraulic pumps to the diesel engine, KTR supplies mounting flanges according to SAE connection dimensions sizes SAE 6 to SAE 1. These flanges are made of steel and EN-GJL-250 for hydraulic pumps with flange connections according to SAE-A, -B, -C, -D and -E as types with 2 and 4 holes.

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

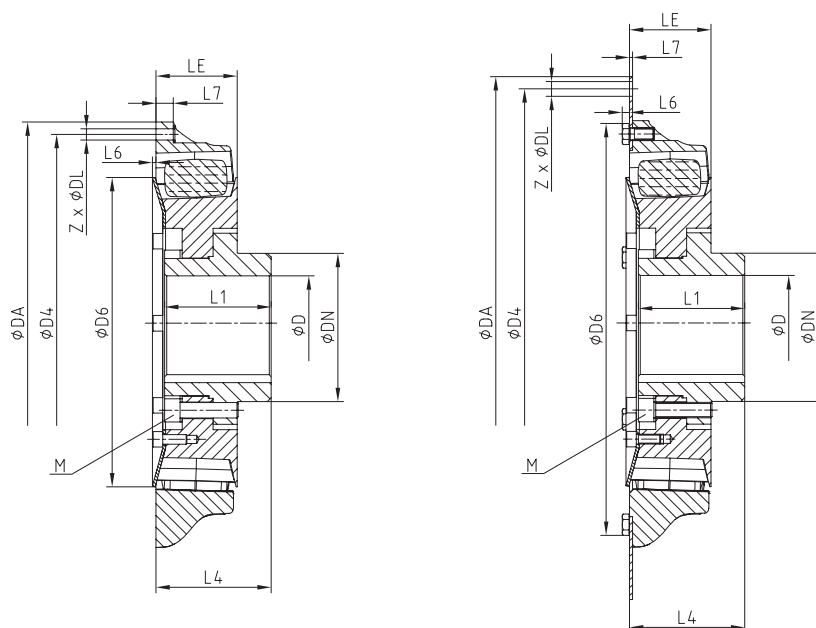
Pluggable roller coupling with optimised characteristic curve



| Technical data | | | | | | | | | | | | | | | | |
|-------------------|----------------|---------------------------|-------------------|--------------------|-----------------|--|---------------------|---------------------|---------------------|----------------------|------------------------|-------|---|-------|-----------------------|-------------------|
| Size | Elastomer 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
 T_{Kmax} Transient torque peaks (e. g. resonance passage), min. 100,000 load alternations pulsating
 T_{Kmax1} 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

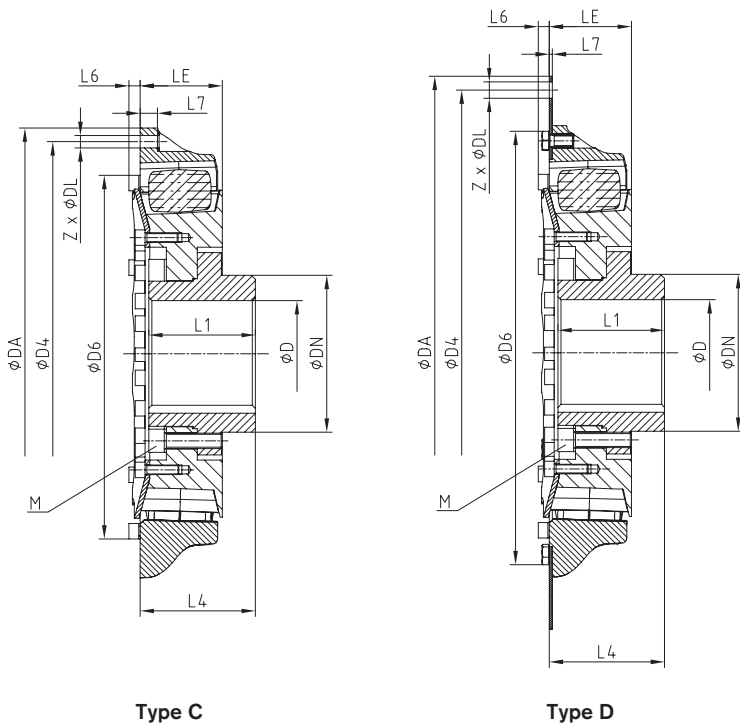
| Flange dimensions according to SAE J620 [mm] | | | | |
|--|--------|--------|---|----|
| Nominal size | DA | D4 | Z | DL |
| 8" | 263.52 | 244.47 | 6 | 11 |
| 10" | 314.32 | 295.27 | 8 | 11 |
| 11 1/2" | 352.42 | 333.37 | 8 | 11 |
| 14" | 466.72 | 438.15 | 8 | 13 |
| 18" | 571.50 | 542.90 | 6 | 17 |

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 [kgm ²] ¹⁾ | | Weight [kg] ¹⁾ | |
|------|-------------|------|--------------------------------------|-----|---------|-----|-----|-----------------|-----|-----|-----|-----|-----|--------|----------------------------|----------------------|--|----------------|---------------------------|----------------|
| | | | 8" | 10" | 11 1/2" | 14" | 18" | D6 | LN | DN | L1 | L4 | L6 | L7 | M | T _A in Nm | J _A | J _L | | |
| | | | | | | | | | | | | | | | | | | | | J _A |
| 80 | 50 | A | ● | | | | | 70 | 175 | | | | | | 21 | M8 | 32 | 0.0220 | 0.0100 | 4.84 |
| | | B | | ● | | | | 264 | 49 | 50 | 57 | 6.5 | 1.8 | 0.0330 | 0.0100 | | | 5.49 | | |
| 160 | 70 | A | | ● | | | | 100 | 234 | | | | | 22 | M12 | 100 | 0.0360 | 0.0730 | 8.88 | |
| | | B | | | ● | | | 315 | 51 | 70 | 75 | 6.5 | 3 | 0.0590 | | | 0.0730 | 9.81 | | |
| 240 | 60 | A | | | ● | | | 85 | 227 | | | | | 2 | M12 | 100 | 0.0807 | 0.0377 | 11.23 | |
| | | B | | | | ● | | 353 | 66 | 65 | 82 | 6.5 | 3 | 0.1706 | | | 0.0377 | 13.55 | | |
| 300 | 80 | A | | | ● | | | 112 | 263 | | | | | 6 | M12 | 100 | 0.0829 | 0.0648 | 12.80 | |
| | | B | | | | ● | | 353 | 65 | 75 | 83 | 6.5 | 3 | 0.1719 | | | 0.0648 | 15.08 | | |
| 450 | 90 | A | | | ● | | | 124 | 300 | | | | | 3.8 | M16 | 240 | 0.2844 | 0.1544 | 26.96 | |
| 600 | 110 | A | | | | ● | | 162 | 338 | | | | | 3.7 | M16 | 240 | 0.3022 | 0.2344 | 28.86 | |
| | | B | | | | | ● | 460 | 85 | 110 | 119 | 7.5 | 3 | 0.4876 | | | 0.2344 | 31.91 | | |

¹⁾ with max. bore

Type FD



| 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 1/2" | 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

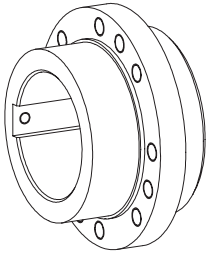
| Size | Bore D [mm] | View | Flange connection acc. to SAE - J620 | | | | | Dimensions [mm] | | | | | | | Cap screws DIN EN ISO 4762 | | Mass moment of inertia [kgm ²] ¹⁾ | | Weight [kg] ¹⁾ | |
|------|-------------|------|--------------------------------------|-----|---------|-----|-----|-----------------|-----|-----|-----|------|-----|--------|----------------------------|----------------------|--|----------------|---------------------------|----------------|
| | | | 8" | 10" | 11 1/2" | 14" | 18" | D6 | LN | DN | L1 | L4 | L6 | L7 | M | T _A in Nm | J _A | J _L | | |
| | | | | | | | | | | | | | | | | | | | | J _A |
| 80 | 50 | C | ● | | | | | 70 | 213 | | | | | | 21 | M8 | 32 | 0.0223 | 0.0120 | 5.41 |
| | | D | | ● | | | | 264 | 49 | 50 | 57 | 9.2 | 1.8 | 0.0339 | 0.0120 | | | 6.06 | | |
| 160 | 70 | C | | ● | | | | 100 | 273 | | | | | 22 | M12 | 100 | 0.0370 | 0.0450 | 9.76 | |
| | | D | | | ● | | | 314 | 51 | 70 | 75 | 9.2 | 3 | 0.0699 | | | 0.0450 | 10.69 | | |
| 240 | 60 | C | | | ● | | | 85 | 271 | | | | | 22 | M12 | 100 | 0.0834 | 0.0452 | 12.31 | |
| | | D | | | | ● | | 353 | 66 | 65 | 82 | 9.5 | 3 | 0.1732 | | | 0.0452 | 14.62 | | |
| 300 | 80 | C | | | ● | | | 112 | 311 | | | | | 6 | M12 | 100 | 0.0875 | 0.0815 | 14.43 | |
| | | D | | | | ● | | 353 | 65 | 75 | 83 | 11.5 | 3 | 0.1766 | | | 0.0815 | 16.71 | | |
| 450 | 90 | C | | | ● | | | 124 | 351 | | | | | 21.5 | M16 | 240 | 0.2896 | 0.1744 | 26.49 | |
| 600 | 110 | C | | | | ● | | 162 | 383 | | | | | 3.7 | M16 | 240 | 0.3095 | 0.2781 | 31.27 | |
| | | D | | | | | ● | 460 | 85 | 110 | 119 | 7.5 | 3 | 0.4949 | | | 0.2781 | 34.32 | | |

¹⁾ With max. bore

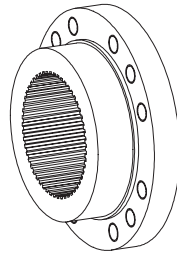
VAROLASTIC® F and FD

Highly flexible flange coupling with progressive torsional stiffness

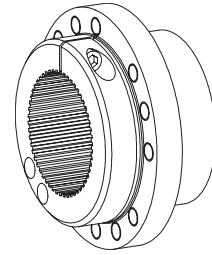
Types of hubs



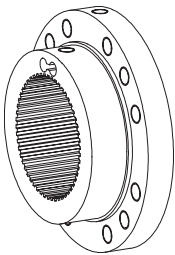
Type 1.0
Hub with feather keyway and setscrew



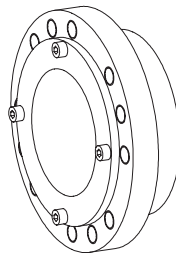
Type 1.3
Hub with spline tothing



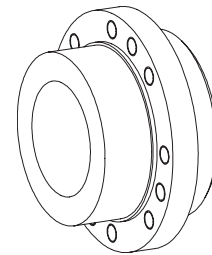
Type 2.1
Clamping hub single slot with spline



Type 3.1
spline/clamping hub N



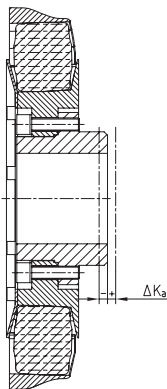
Type 6.0
Clamping ring hub



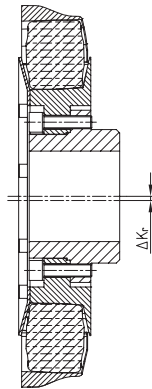
Type 8.0
taper interference fit

Type 8.1
cylindrical interference fit

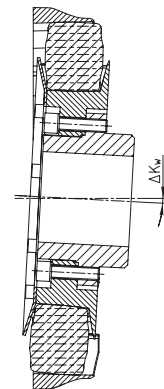
Displacements



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 |