smartflex®

The perfect shaft coupling
smartflex®
Superior technology at a lower cost

Your advantages when using the new smartflex® coupling

Lower costs
● extremely advantageous cost/performance ratio due to the ingeniously simple construction
● time-saving installation due to simple and fast shaft securement

Higher precision
● backlash-free shaft securement
● backlash-free torque transmission
● high torsional rigidity

Faster availability
● modular construction ensures fastest possible delivery
● delivery of standard stock items within 24 hours

Compensation of much larger shaft misalignments
● up to three times higher misalignment compensation capability for radial shaft misalignment than on standard steel bellows couplings
● low restoring forces on the shaft bearings

More drive dynamics
● minimal mass moment of inertia
● safe torque transmission even at high speeds

Higher operational safety
● high misalignment compensation capability eliminates the most common failure causes suffered by previous generations of steel bellows

The perfect servo coupling
Backlash-free, torsionally rigid steel bellows coupling for flexible compensation of shaft misalignment

According to German notation, decimal points in this catalogue are represented with a comma (e.g. 0,5 instead of 0.5).

High availability due to flexible modular construction

The smartflex® coupling steel bellows and clamping rings are the same for all designs within a construction size. They are adapted via reducing bushings to the required shaft diameter. These bushings can be engaged easily and quickly into the clamping rings.

This concept guarantees you the lowest possible storage numbers and high availability.
The Optimum Shaft Coupling for Every Drive

Each drive has its own specific characteristics and therefore places different demands on the couplings which transmit the torque from one shaft to the second and which compensate for the resulting shaft misalignments. In most cases only backlash-free couplings are able to meet the requirements for high-speed, dynamic or reversing precision drives.

Overview: Backlash-free Shaft Couplings
Types, Designs, Characteristics

<table>
<thead>
<tr>
<th>primeflex</th>
<th>ROBA®-DS</th>
<th>smartflex®</th>
<th>ROBA®-ES</th>
<th>ROBA®-DS</th>
<th>ROBA®-DSM</th>
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<td>Steel bellows couplings</td>
<td>Servo couplings</td>
<td>Steel bellows couplings</td>
<td>Elastomer couplings</td>
<td>All-steel couplings</td>
<td>Torque measurement coupling</td>
<td>All-steel couplings</td>
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</table>

Flexible element
- Steel bellows
- Disk pack
- Steel bellows
- Plastic element
- Disk pack
- Disk pack
- Disk pack

Nominal torque range in Nm
- 24 – 120
- 35 – 150
- 16 – 700
- 4 – 1250
- 190 – 24000
- 190 – 16000
- 22000 – 110000

Max. permitted speed in rpm
- 8000
- 22500
- 10000
- 28000
- 13600
- 9500
- 3600

Shaft diameter in mm
- 10 – 45
- 10 – 45
- 8 – 85
- 6 – 80
- 14 – 170
- 14 – 110
- on request

Max. permanent operation temp. in °C
- 120
- 100
- 120
- 100
- 250
- 70
- 250

Torsionally rigid
- x
- x
- x
- x
- x
- x
- x

Torsionally flexible
- x

Vibration damping
- x

Can be combined with safety clutch
- x
- x
- x
- x
- x
- x

Can be integrated with torque measurement
- x
- x

Distance between shaft ends
- graduated
- variable
- fixed
- variable
- fixed
- variable

Single-joint design
- x
- x
- x
- x

- Shaft misalignment compensation axial
- x
- x
- x

- Shaft misalignment compensation radial
- x

- Shaft misalignment compensation angular
- x
- x
- x

Double-joint design
- x
- x
- x
- x

- Shaft misalignment compensation axial
- x
- x
- x

- Shaft misalignment compensation radial
- x
- x
- x

- Shaft misalignment compensation angular
- x
- x
- x

ATEX design acc. 94/9 EC
- x
- x

Product catalogue
### Technical Data

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<td><strong>Permitted misalignments</strong></td>
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<td>0,8</td>
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1) Please observe transmittable torques and preferred bores according to Tables 1 and 2 on page 5.
2) The permitted misalignments must not simultaneously reach the maximal values.

### Dimension

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### Mass moment of inertia \([10^{-6} \text{kgm}^2]\)

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### Weight [kg]

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We reserve the right to make dimensional and constructional alterations.
### Table 1

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### Table 2

| Order number | 3 | 2 | _ | _ | _ | _ | _ | _ | 3 | / | _ | _ | _ | _ |
|--------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

### Table 3

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### Example

Example: 2 / 932.343 / Ød 20 / Ød 16

3) Type 932.433 (cylindrical bores on both sides combined with short steel bellows): only sizes 1 – 5
4) Type 932.343 (cylindrical bore and tapered bore combined with long steel bellows): only sizes 1 and 2
5) Type 932.443 (cylindrical bore and tapered bore combined with short steel bellows): on request
Size Selection

Coupling Size Selection

Please carry out dimensioning using Diagram 1 (Sizes 0 – 2) or Diagram 2 (Sizes 3 – 5) with "Torque M (Nm)" and "Misalignment (%)":

1. Determining the co-ordinates "torque M":
   - Find the maximum operating torque.
   - Multiply the operating torque with the values from Table 3 (temperature factor) and Table 4 (service factor) (interpolate the interim values).

2. Determining the co-ordinates "misalignment":
   - Determine the individual shaft misalignments in %, measured using the "Permitted shaft misalignments" for the intended coupling size (see Technical Data, page 4).
   - Example for size 2: 0,2 mm axial displacement equals 25 % of the permitted value 0,8 mm.
   - Add together the individual percent values. The sum total must be below 100 %.

3. Write both the defined co-ordinate values into the respective diagram.
   - The point of intersection must lie below the characteristic curve of the intended coupling size.

4. If the point of intersection lies above the characteristic curve,
   - choose a larger coupling,
   - reduce the shaft misalignments or
   - contact the manufacturers.

Technical Explanations

State of Delivery

- packed individually in folding boxes, or
- plugged together and secured with cable ties
- Bores in the reducing bushings (5) and reducing bushing with tapered bore (6) have H7 tolerances

Adapting to the Shaft Diameter

The reducing bushing (5) can be pressed out of the clamping ring (2) using axial pressure (manually or with a small hand press) and replaced.

Shaft Requirements

- Surface quality: 1,6 µm
- Run-out accuracy: 0,01 mm
- Minimum tensile strength: 500 N/mm²
- Tolerance: h6

For all other tolerances, please contact the manufacturer.

Function

smartflex®-couplings transmit the torque backlash-free and compensate for radial, axial and angular shaft misalignments.

Temperature Resistance

Resistant against permanent temperatures of up to 120 °C (devices resistant to higher temperatures available on request)

Installation Position

Can be defined by the user.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>50 °C</th>
<th>80 °C</th>
<th>100 °C</th>
<th>120 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature factor $f_t$</td>
<td>1</td>
<td>1,1</td>
<td>1,2</td>
<td>1,3</td>
</tr>
</tbody>
</table>

Table 3

<table>
<thead>
<tr>
<th>Load</th>
<th>Even</th>
<th>Uneven</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service factor $f_s$</td>
<td>1,5</td>
<td>2</td>
<td>2,5 – 4</td>
</tr>
</tbody>
</table>

For drives in machine tools (servo motors), we recommend $f_s$ values of 1,5

Table 4
Short Description – Coupling Installation

For a detailed installation description, please see the Installation and Operational Instructions corresponding to the respective product B.9.8.GB.

Important Installation Guidelines

- Wash off the conserving layer in the bores with paraffin, white spirit, cleaner solvent or similar.
- The bores and the shafts must be grease and oil-free.
- The permitted shaft misalignment must not be exceeded.
- Avoid damage to the steel bellows (1) before and during installation.
- The clamping ring (2) with the holding spring (3) must be engaged in the reducing bushing (5) or reducing bushing with tapered bore (6).
- If a reducing bushing is dismantled or re-installed more than 5 times, the snap ring groove may deform, making it unpermitted for use.
- In order to transfer the defined torques in Table 1 (page 5) correctly, the slots in the steel bellows (1), clamping ring (2) and reducing bushing (5) must be aligned (see Fig. 5).

Coupling Installation Type 932.333 (Fig. 1, page 4) and Type 932.433 (Fig. 3, page 4)

1. Please ensure that the coupling can be easily pushed onto both shafts.
2. Push the entire coupling over the whole length of the reducing bushing (5) onto a shaft.
3. Make sure that the steel bellows (1) is pushed between the clamping ring (2) and the reducing bushing (5) up to its limit, and that the slots in the steel bellows, clamping ring (2) and reducing bushing (5) are aligned (see Fig. 5).
4. Tighten the cap screw (4). The screw tightening torques (see Technical Data, page 4) must be observed.
5. Push the second shaft over the entire length of the reducing bushing (5) into the coupling.
6. Make sure that the steel bellows (1) is pushed between the clamping ring (2) and the reducing bushing (5) up to its limit, and that the slots in the steel bellows, clamping ring (2) and reducing bushing (5) are aligned (see Fig. 5).
7. Tighten the cap screw (4). The screw tightening torques (see Technical Data, page 4) must be observed.

Coupling Installation Type 932.343 (Fig. 2, page 4)

1. Remove the clamping ring (2) with the protruding reducing bushing with tapered bore (6) from the coupling.
2. If necessary, insert the key into the conical shaft.
3. Push the reducing bushing with tapered bore (6) onto the conical shaft.
4. Secure the reucing bushing with tapered bore (6) using a nut or screw with press cover.
5. Push the rest of the coupling with the open steel bellows side up to its limit between the clamping ring (2) and reducing bushing with tapered bore (6).
6. Tighten the cap screw (4). The screw tightening torques (see Technical Data, page 4) must be observed.
7. Push the second shaft over the entire length of the reducing bushing (5) into the coupling.
8. Make sure that the steel bellows (1) is pushed between the clamping ring (2) and the reducing bushing (5) up to its limit, and that the slots in the steel bellows, clamping ring (2) and reducing bushing (5) are aligned (see Fig. 5).
9. Tighten the cap screws (4). The screw tightening torques (see Technical Data, page 4) must be observed.

Coupling Installation onto Cylindrical Shaft

Cap screw (4)
Observe tightening torque (see Technical Data)

Fig. 6

Coupling Installation onto Conical Shaft

Cap screw (4)
Observe tightening torque (see Technical Data)

Fig. 7

Coupling Installation into a Bell Housing

Apply the tools carefully. The clamping ring (2) is not secured against turning

Fig. 8
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You can find the complete address for the representative responsible for your area under www.mayr.com in the internet.