Please read these Operational Instructions carefully and follow them accordingly!
Ignoring these Instructions may lead to malfunctions or coupling failure, resulting in damage to other parts.

Contents:

Page 1:  
- Contents  
- Safety and Guideline Signs  
- Safety Regulations

Page 2:  
- Coupling Variants  
- Parts List  
  - Table 1: Technical Data  
  - Table 2: Clamping Connection Bore Sizes with Respective Transmittable Torques $T_R [Nm]$  
  - Table 3: Preferred Bore Sizes

Page 3:  
- Design  
- Function  
- State of Delivery  
- Installation Guidelines for Shaft Ends  
- Adapting to the Shaft Diameter  
- Shaft Requirements  
- Temperature Resistance  
- Installation Position

Page 4:  
- Coupling Installation  
  - Important Installation Guidelines  
  - Coupling Installation Types 932.333 / 932.433  
  - Coupling Installation Type 932.343  
  - Coupling Installation Types 932.333 / 932.433 onto Cylindrical Shaft  
  - Coupling Installation Type 932.343 onto Conical Shaft  
  - Coupling Installation into a Bell-Type Housing

Page 5:  
- Coupling Dimensioning  
  - Diagram 1 (Sizes 0 to 2)  
  - Diagram 2 (Sizes 3 to 5)  
  - Table 4: Temperature Factors  
  - Permitted Shaft Misalignments

Page 6:  
- Maintenance  
- Disposal  
- Malfunctions / Breakdowns

Safety and Guideline Signs

CAUTION
Danger of injury to personnel and damage to machines.

Please Observe!
Guidelines on important points.

Safety Regulations

These Installation and Operational Instructions (I + O) are part of the coupling delivery.
Please keep them handy and near to the coupling at all times.

It is forbidden to start initial operation of the product until you have ensured that all applicable EU directives and directives for the machine or system, into which the product has been installed, have been fulfilled.

At the time these Installation and Operational Instructions go to print, the smartflex® couplings accord with the known technical specifications and are operationally safe at the time of delivery.

Without a conformity evaluation, this product is not suitable for use in areas where there is a high risk of explosion. This statement is based on the ATEX directive.

CAUTION
- If the smartflex® couplings are modified.
- The relevant standards for safety and / or installation conditions are ignored.

User-implemented Protective Measures
- Cover all moving parts to protect against seizure, dust or foreign body impact.

To prevent injury or damage, only specialist personnel are allowed to work on the components. They must be familiar with the dimensioning, transport, installation, initial operation, maintenance and disposal according to the relevant standards and regulations.

Please read the Installation and Operational Instructions carefully prior to installation and initial operation of the device.

These Safety Regulations are user hints only and may not be complete!
## Parts List

*Only use mayr® original parts*

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Steel bellows</td>
</tr>
<tr>
<td>2</td>
<td>Clamping ring</td>
</tr>
<tr>
<td>3</td>
<td>Holding spring</td>
</tr>
<tr>
<td>4</td>
<td>Cap screw</td>
</tr>
<tr>
<td>5</td>
<td>Reducing bushing</td>
</tr>
<tr>
<td>6</td>
<td>Reducing bushing with tapered bore</td>
</tr>
<tr>
<td>7</td>
<td>Washer</td>
</tr>
</tbody>
</table>

### Table 1: Technical Data

<table>
<thead>
<tr>
<th>smartflex® Size</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bore reducing bushing (Item 5) from – to</td>
<td>[mm]</td>
<td>8 – 19</td>
<td>11 – 25</td>
<td>16 – 36</td>
<td>18 – 50</td>
<td>30 – 62</td>
</tr>
<tr>
<td>Tapered bore (Item 6)</td>
<td>[mm]</td>
<td>- -</td>
<td>16</td>
<td>16</td>
<td>- -</td>
<td>- -</td>
</tr>
<tr>
<td>Coupling nominal torque $T_{EN}$</td>
<td>[Nm]</td>
<td>16</td>
<td>40</td>
<td>100</td>
<td>200</td>
<td>400</td>
</tr>
<tr>
<td>Max. speed $n_{max}$</td>
<td>[rpm]</td>
<td>10000</td>
<td>8000</td>
<td>6000</td>
<td>4000</td>
<td>3000</td>
</tr>
<tr>
<td>Tightening torque clamping screw (Item 4)</td>
<td>[Nm]</td>
<td>10 15%</td>
<td>14 15%</td>
<td>17 15%</td>
<td>41 15%</td>
<td>77 15%</td>
</tr>
<tr>
<td>Axial displacement $ΔK_a$ on Type 932.3_3</td>
<td>[mm]</td>
<td>±0.4</td>
<td>±0.6</td>
<td>±0.8</td>
<td>±0.8</td>
<td>±0.8</td>
</tr>
<tr>
<td>Axial displacement $ΔK_a$ on Type 932.433</td>
<td>[mm]</td>
<td>- -</td>
<td>±0.3</td>
<td>±0.4</td>
<td>±0.4</td>
<td>±0.6</td>
</tr>
<tr>
<td>Radial misalignment $ΔK_r$ for Type 932.3_3</td>
<td>[mm]</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Radial misalignment $ΔK_r$ for Type 932.433</td>
<td>[mm]</td>
<td>- -</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Angular misalignment $ΔK_w$ on Type 932.3_3</td>
<td>[°]</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td>Angular misalignment $ΔK_w$ on Type 932.433</td>
<td>[°]</td>
<td>- -</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.2</td>
</tr>
</tbody>
</table>

### Table 2: Clamping Connection Bores and Respective Transmittable Torques $T_a$ [Nm]

| Sizes | Ø 0 | Ø 8 | Ø 9 | Ø 11 | Ø 12 | Ø 14 | Ø 16 | Ø 18 | Ø 19 | Ø 20 | Ø 22 | Ø 25 | Ø 28 | Ø 30 | Ø 32 | Ø 35 | Ø 36 | Ø 40 | Ø 42 | Ø 45 | Ø 48 | Ø 50 | Ø 55 | Ø 60 | Ø 62 | Ø 65 | Ø 70 | Ø 75 | Ø 80 | Ø 85 |
|-------|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|
| 0     | 9.6 | 11  | 14  | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   |
| 1     | 24  | 26  | 31  | 35   | 39   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   | 40   |
| 2     | 60  | 68  | 72  | 75   | 84   | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  |
| 4     | 240 | 250 | 280 | 290  | 305  | 320  | 340  | 360  | 390  | 400  | 400  | 400  | 400  | 400  | 400  | 400  | 400  | 400  | 400  | 400  | 400  | 400  | 400  | 400  | 400  | 400  | 400  | 400  |
| 5     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 6     | 420 | 440 | 475 | 510  | 530  | 580  | 640  | 660  | 690  | 700  | 700  | 700  | 700  | 700  | 700  | 700  | 700  | 700  | 700  | 700  | 700  | 700  | 700  | 700  | 700  | 700  | 700  | 700  |

### Table 3: Preferred Bores

<table>
<thead>
<tr>
<th>Sizes</th>
<th>Preferred bores Ø d 47</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8, 9, 10, 11, 12, 14, 15, 16, 18, 19</td>
</tr>
<tr>
<td>1</td>
<td>11, 12, 13, 14, 15, 16, 18, 19, 20, 22, 24, 25</td>
</tr>
<tr>
<td>2</td>
<td>16, 17, 18, 19, 20, 22, 24, 25, 26, 28, 30, 32, 35, 36</td>
</tr>
<tr>
<td>3</td>
<td>19, 20, 22, 24, 25, 28, 30, 32, 35, 36, 38, 40, 42, 45, 48, 50</td>
</tr>
<tr>
<td>4</td>
<td>30, 32, 35, 36, 38, 40, 42, 45, 48, 50, 55, 60, 62</td>
</tr>
<tr>
<td>5</td>
<td>40, 42, 45, 48, 50, 55, 60, 62, 65, 70, 75, 80, 85</td>
</tr>
</tbody>
</table>
Installation and Operational Instructions for
smartflex® couplings Types 932.3_3 and 932.433

Design
smartflex® couplings are designed as insertable steel bellows couplings for the connection of two shafts.

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

State of Delivery
- Packed individually in folding boxes or
- plugged together and secured with cable ties.
- Bores in the reducing bushings (5 and 6) have H7 tolerances.

Installation Guidelines for Shaft Ends

Fig. 2
Surface quality and run-out accuracy are valid for conical shafts.

Fig. 3
Adapting to the Shaft Diameter
The reducing bushing (5) can be pressed out of the clamping ring (2) and replaced using axial pressure (manually or on a small hand press).

Due to the shoulder (see Fig. 4), the reducing bushing (5) can be pressed out of the clamping ring (2) only in one direction.

Fig. 4

Shaft Requirements
- Surface quality: $R_a = 1.6 \, \mu m$
- Run-out accuracy: 0.01 mm
- Minimum tensile strength: 500 N/mm²
- Tolerance: h6
For other tolerances, please contact the manufacturer.

Temperature Resistance:
Permanent temperature up to +120 °C
(For higher operating temperatures, please contact the manufacturer.)

Installation Position: Can be defined by the user.
Installation and Operational Instructions for smartflex® couplings Types 932.3_3 and 932.433

Coupling Installation

Important Installation Guidelines

- Wash off the conserving layer in the bores with paraffin, white spirit, cleaner solvent or similar.
- The bores and shafts must be grease and oil-free.
- The permitted shaft misalignments (see Table 1) 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 the 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, meaning that its use is no longer permitted.
- In order to transfer the defined torques in Table 2 on page 2 correctly, the slots in the steel bellows (1), clamping ring (2) and reducing bushing (5) must be aligned (see Fig. 5).

Coupling Installation Types 932.333 / 932.433 (Fig. 5)

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 (1), clamping ring (2) and reducing bushing (5) are aligned (see Fig. 5).
4. Tighten the cap screw (4). The screw tightening torques (see Table 1) 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 (1), clamping ring (2) and reducing bushing (5) are aligned (see Fig. 5).
7. Tighten the cap screw (4). The screw tightening torques (see Table 1) must be observed.

Coupling Installation Type 932.343 (Fig. 7)

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 reducing bushing with tapered bore (6) using a nut or a 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 the reducing bushing with tapered bore (6).
6. Tighten the cap screw (4). The screw tightening torques (see Table 1) 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 (1), clamping ring (2) and reducing bushing (5) are aligned (see Fig. 5).
9. Tighten the cap screw (4). The screw tightening torques (see Table 1) must be observed.

Coupling Installation into a Bell-Type Housing

Apply the tool carefully, the clamping ring (2) is not secured against turning.
Installation and Operational Instructions for smartflex® couplings Types 932.3_3 and 932.433

Coupling Dimensioning

Please carry out dimensioning using Diagram 1 (Sizes 0 to 2) or Diagram 2 (Sizes 3 to 5) with “Torque M [Nm]” and “Misalignment [%]”:

Diagram 1 (Sizes 0 to 2)

![Diagram 1](image1)

Diagram 2 (Sizes 3 to 5)

![Diagram 2](image2)

Determining the coordinate “Misalignment [%]”:

1. Determine the individual shaft misalignments in percent, measured using the permitted shaft misalignments for the intended coupling size (see Technical Data). Example for Size 2, Type 932.3_3: 0.2 mm axial displacement equals 25% of the permitted maximum value 0.8 mm.

2. Add up the individual percent values. The sum total must be smaller than 100 percent (see also section “Permitted Shaft Misalignments”).

Enter both defined coordinate values into the respective diagram.

The point of intersection must lie below the characteristic curve of the intended coupling size. If the point of intersection lies above the characteristic curve,

- choose a larger coupling,
- reduce the shaft misalignments or
- contact the manufacturer.

Table 4: Temperature Factors

<table>
<thead>
<tr>
<th>Temperature [°C]</th>
<th>50</th>
<th>80</th>
<th>100</th>
<th>120</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature factor [-]</td>
<td>1</td>
<td>1.1</td>
<td>1.2</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Permitted Shaft Misalignments

The smartflex® coupling compensate for angular, axial and radial shaft misalignments (Fig. 9) without losing its backlash-free function. However, the permitted shaft misalignments indicated in Table 1 must not simultaneously reach their maximum value. If more than one kind of misalignment takes place simultaneously, they influence each other. This means that the permitted misalignment values are dependent on one another (Fig. 10). The sum total of the actual misalignments in percent of the maximum value must not exceed 100 %.

![Fig. 9](image3)

Angular misalignment Radial misalignment Axial displacement

![Fig. 10](image4)

Delta K_a [%] Angular misalignment

Delta K_r [%] Radial misalignment

Delta K_a [%] Axial displacement
## Maintenance
smartflex® couplings are maintenance-free. Special maintenance work may only be necessary in extreme coupling ambient or operating conditions (in this case, please contact the manufacturer).

## Disposal
**All steel components:**
- Steel scrap (Code No. 160117)

**All aluminium components:**
- Non-ferrous metals (Code No. 160118)

## Malfunctions / Breakdowns

<table>
<thead>
<tr>
<th>Malfunction</th>
<th>Possible Causes</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bellows breakage</td>
<td>Incorrect alignment</td>
<td>1) Set the system out of operation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2) Replace the entire coupling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3) Check the alignment</td>
</tr>
<tr>
<td>Bellows have already been damaged in transport</td>
<td>1) Set the system out of operation</td>
<td>2) Replace the entire coupling</td>
</tr>
<tr>
<td>or during installation</td>
<td></td>
<td>3) Check the alignment</td>
</tr>
<tr>
<td>Operating parameters are not appropriate for</td>
<td>1) Set the system out of operation</td>
<td>2) Check the operating parameters and select a suitable coupling</td>
</tr>
<tr>
<td>the coupling performance</td>
<td></td>
<td>(observe installation space)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3) Install a new coupling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4) Check the alignment</td>
</tr>
<tr>
<td>Bellows is energised in natural frequency:</td>
<td>1) Set the system out of operation</td>
<td>2) Re-align the line characteristics</td>
</tr>
<tr>
<td>resonance</td>
<td></td>
<td>3) Replace the entire coupling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4) Check the alignment</td>
</tr>
</tbody>
</table>

**Changes in running noise and vibration**

<table>
<thead>
<tr>
<th>Malfunction</th>
<th>Possible Causes</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Loosened screws, resonances, insufficient coupling securement</td>
<td>1) Set the system out of operation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2) Check the screw tightening torques</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3) Check the line characteristics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4) Check the coupling parts and replace if damaged</td>
</tr>
</tbody>
</table>