

# The perfect shaft coupling

*Machine Tools  
Servo Drives  
Packaging Machinery  
Automated Systems*



## **smartflex**<sup>®</sup>

*Precision couplings for applications with  
servo and stepper motors*

- *Low cost*
- *Plug-in type, variable bores*
- *Larger shaft misalignment*
- *Minimal mass moment of inertia*

**mayr**<sup>®</sup>  
*your reliable partner*

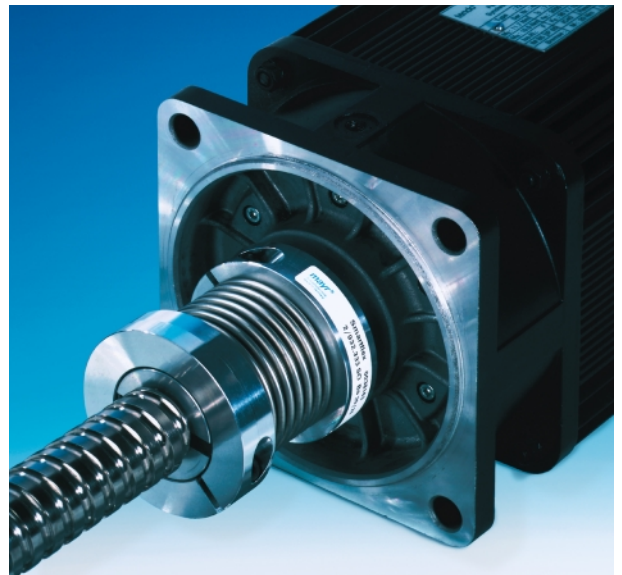
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*Superior technology  
at lower cost*

**smartflex®**

*the perfect  
servo coupling*

Backlash-free, torsionally rigid all-steel flexible coupling for shaft misalignment compensation



### Your benefits of using the new smartflex®-coupling

#### Reduced costs

- Highly competitive price/value ratio due to the unique construction
- Time saving installation with fast, easy shaft attachment

#### Higher accuracy

- Backlash-free shaft attachment
- Backlash-free torque transmission
- High torsional rigidity

#### Faster availability

- Modular concept ensures instantaneous availability
- 24 hours supply for stock items

#### Radial shaft compliance

- Up to three times higher misalignment compliance than with standard steel bellows couplings
- Low reaction forces protect shaft bearings

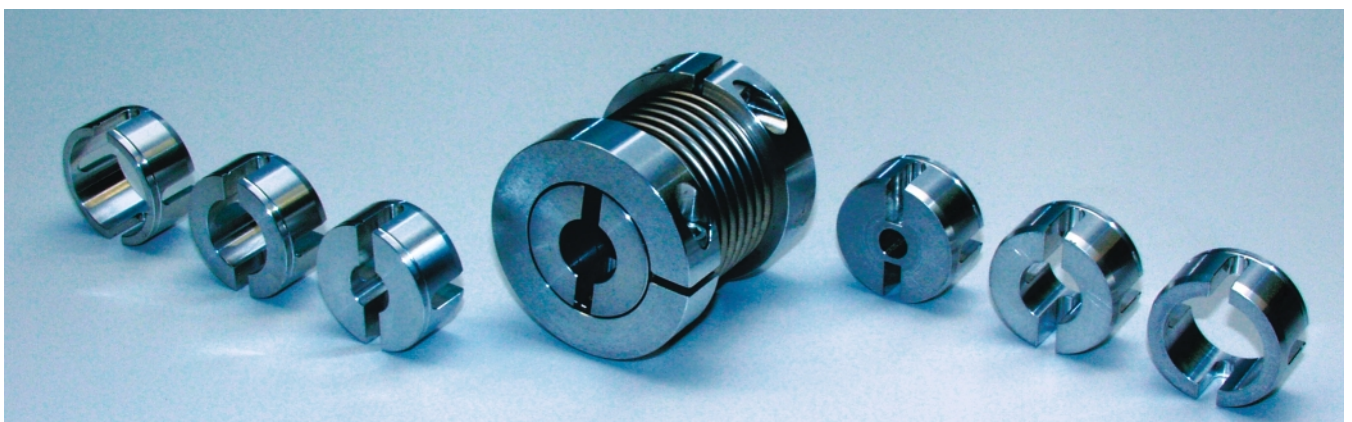
#### More dynamic drives

- Low mass moment of inertia
- Safe torque transmission even at high speeds

#### Higher operating reliability

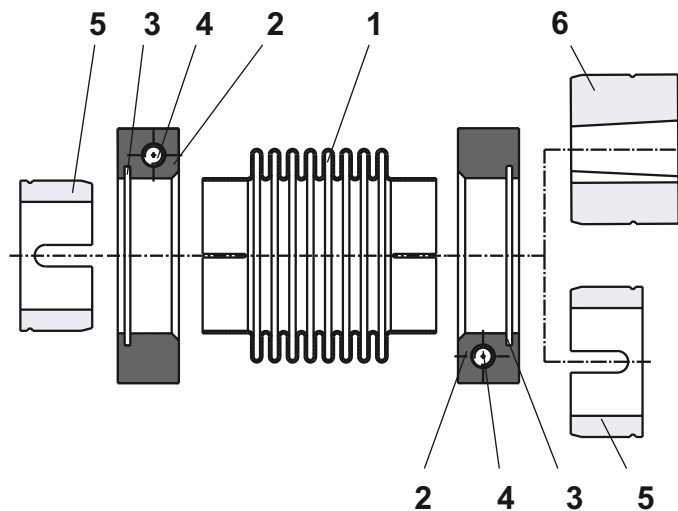
- High misalignment compliance, together with patented steel bellows connection eliminate the common steel bellows failure attributed to the previous generation when applied with too much shaft misalignment

### Readily availability due to flexible modular concept



smartflex® steel bellows and clamping ring couplings are the same for all types within one constructional size. The required shaft diameters are adapted by differently bored hub bushings which are plugged easily and quickly into the clamping rings. This versatility guarantees a very small stock and fast availability.

## Technical description and coupling selection



### Parts List

- 1 Steel bellows
- 2 Clamping ring
- 3 Spring ring
- 4 Cap screw
- 5 Bushing
- 6 Fanuc-hub

### Supply condition

- Packed individually in a folding cardboard box or
- assembled and secured with a cable binder
- Bores of the bushings (5) and Fanuc-hubs (6) are supplied with H7 tolerances.

### Adaptation to the shaft diameter

The bushing (5) can be pressed out of the clamping ring (2), or exchanged by axial pressure (manually or with small hand-operated press).

### Requirements for the shafts

- Surface quality: 1,6 µm
- True running: 0,01 mm
- Minimum tensile strength: 500 N/mm<sup>2</sup>
- Tolerance: h6

Please consult factory for other shaft tolerances.

### Function

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

### Temperature resistance

Up to 250 °C

### Mounting position

Universal

### Temperature factors

Temperature (°C)	50	100	150	200	250
Temperature factor (-)	1	1,075	1,1	1,225	1,3

Table 1

### Coupling selection

The required coupling size is determined by the use of diagram 1 (size 0) or diagram 2 (sizes 1 - 3) which plots „torque M (Nm)“ against „misalignment (%)“:

#### Determination of the co-ordinates „torque M“:

- Establish the max. operating torque.
- **Only if the operating temperature exceeds 50 °C:** multiply the operating torque by the temperature factor as shown in Table 1 (interpolate intermediate values)

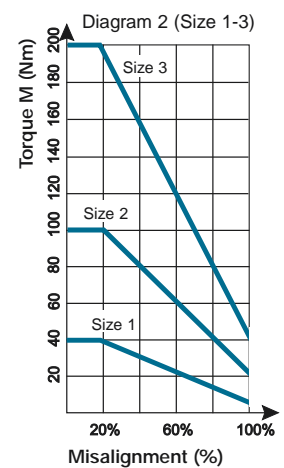
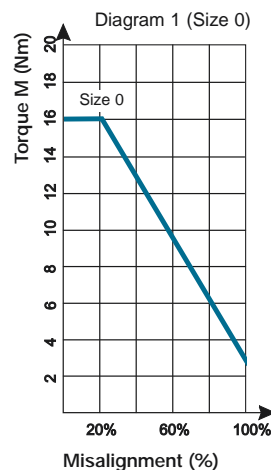
#### Determination of the co-ordinates „misalignment“:

- Determine the various shaft misalignments possible as a percentage of the „permissible shaft misalignments“ as shown in the technical data for the preselected coupling size.  
Example for size 2: 0,2 mm axial displacement corresponds to 25 % of the permissible value 0,8 mm.
- Add each of the percentage values noting that the sum must be smaller than 100 %.

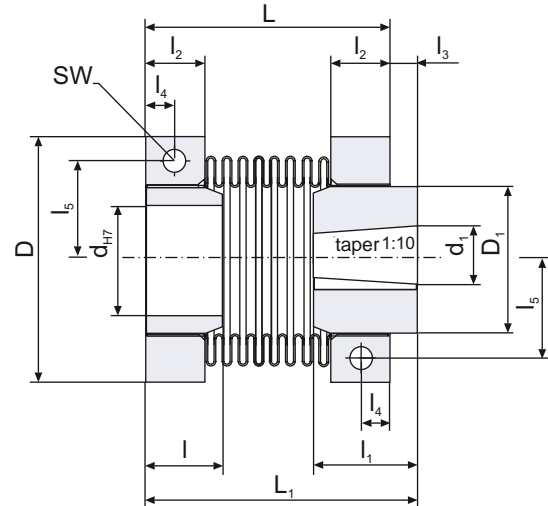
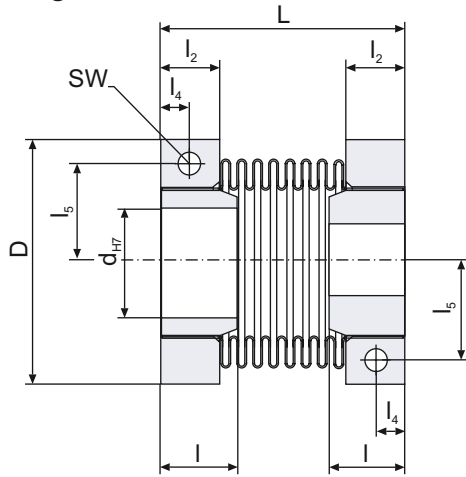
Register both determined co-ordination values in the corresponding diagram. The intersection of these two values must be below the characteristic curve of the pre-selected coupling size.

If the point of intersection is above the characteristic curve,

- select a larger coupling,
- reduce the shaft misalignments or
- contact our factory



Standard-design



Type 932.333

Type 932.343  
(only sizes 1 and 2)

Technical data and table of dimensions

size	nom. torque $T_{KN}$ (Nm)	max. speed $n_{max}$ (rpm)	torsional rigidity $C_T$ (Nm/rad)	axial rigidity $C_{ax}$ (N/mm)	permissible misalignments*			tight. torque of cl. bolt SW (Nm)	inertia Type 932.333 (kgm <sup>2</sup> )	weight Type 932.333 (kg)	inertia Type 932.343 (kgm <sup>2</sup> )	weight Type 932.343 (kg)
					radial $\Delta K_r$ (mm)	axial $\Delta K_a$ (mm)	angular $\Delta K_w$ (°)					
0	16	10000	4000	50	0,3	0,4	3	10	0,000029	0,12		
1	40	8000	9000	70	0,4	0,6	3	14	0,000087	0,24	0,000088	0,25
2	100	6000	22000	90	0,5	0,8	3	17	0,00026	0,41	0,00027	0,45
3	200	4000	50000	120	0,5	0,8	3	41	0,00114	1,00		

\* The permissible misalignments must not achieve simultaneously the max. values (observe torque misalignment diagram)

size	D	D <sub>1</sub>	d <sub>min</sub> <sup>3)</sup>		d <sub>max</sub> <sup>3)</sup>	d <sub>1</sub>	L	L <sub>1</sub>	l	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	l <sub>5</sub>	SW
			from 1)	from 2)											
0	43		8	12	19		49,5		15		13		7	15,8	4
1	55	29,9	11	19	25	16	59,3	71,5	18	30	15	12	8,5	20,5	5
2	70	42,2	16	25	36	16	72	82	20	30	17	10	10	27,5	5
3	90		18	30	50		90,3		26		22		12,5	35	6

- 1) Transmittable torque 60 % of  $T_{KN}$
- 2) Transmittable torque 100 % of  $T_{KN}$
- 3) See Table „Preferred bores“

We reserve the right to make dimensional and design alterations.

Order example:

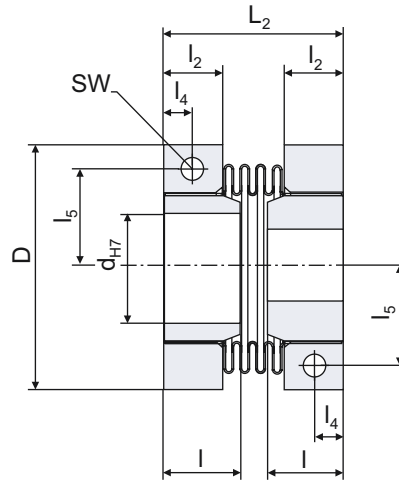
To be included when ordering, please state:	size	Type	bore 1	bore 2
Order number:		932.3_3		

- Cylindrical bore at both sides .....3
- Cylindrical bore and Fanuc-taper .....4

Preferred bores

size	preferred bores
0	8, 9, 10, 11, 12, 14, 15, 16, 18, 19
1	11, 12, 13, 14, 15, 16, 18, 19, 20, 22, 24, 25
2	16, 17, 18, 19, 20, 22, 24, 25, 26, 28, 30, 32, 35
3	19, 20, 22, 24, 25, 28, 30, 32, 35, 36, 38, 40, 42, 45, 48, 50

Short overall length



- Extreme rigid steel bellows
- Short total length

Type 932.433

(Type 932.443 with Fanuc-hub on request)

Technical data and dimensions

size	nom. torque $T_{KN}^{1) 2)}$ (Nm)	max. speed $n_{max}$ (rpm)	torsional rigidity $C_T$ (Nm/rad)	axial rigidity $C_{ax}$ (N/mm)	permissible misalignments*			tight. torque of cl. bolt SW (Nm)	inertia J (kgm <sup>2</sup> )	weight G (kg)
					radial $\Delta K_r$ (mm)	axial $\Delta K_a$ (mm)	angular $\Delta K_w$ (°)			
1	40	8000	18000	140	0,10	0,3	1,5	14	0,000086	0,23
2	100	6000	44000	180	0,10	0,4	1,5	17	0,00025	0,40
3	200	4000	100000	240	0,10	0,4	1,5	41	0,00093	0,88

\* The permissible misalignments must not achieve simultaneously the max. values (observe torque misalignment diagram)

size	D	$d_{min}^{3)}$		$d_{max}^{3)}$	$L_2$	l	$l_2$	$l_4$	$l_5$	SW
		from 1)	from 2)							
1	55	11	19	25	43,7	18	15	8,5	20,5	5
2	70	16	25	36	53	20	17	10	27,5	5
3	90	18	30	50	66	26	22	12,5	35	6

1) Transmittable torque 60 % of  $T_{KN}$   
 2) Transmittable torque 100 % of  $T_{KN}$   
 3) See Table „Preferred bores“

We reserve the right to make dimensional and design alterations.

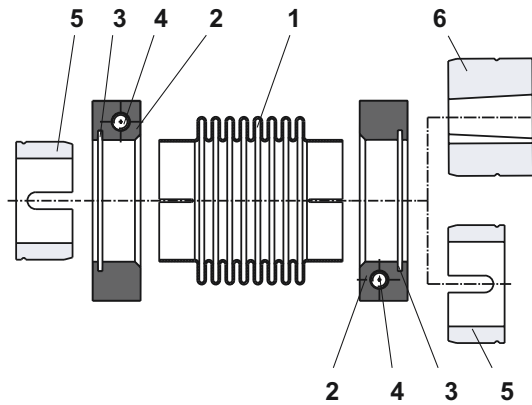
Preferred bores

size	preferred bores
1	11, 12, 13, 14, 15, 16, 18, 19, 20, 22, 24, 25
2	16, 17, 18, 19, 20, 22, 24, 25, 26, 28, 30, 32, 35
3	19, 20, 22, 24, 25, 28, 30, 32, 35, 36, 38, 40, 42, 45, 48, 50

Order example:

To be included when ordering, please state	size	Type	bore 1	bore 2
Order number:		<b>932.433</b>		

Assembly of the coupling



- Parts List**
- 1 Steel bellows
  - 2 Clamping ring
  - 3 Spring ring
  - 4 Cap screw
  - 5 Bushing
  - 6 Fanuc-hub

**Important mounting instructions**

- The oil film preservation in the bores must be removed with petroleum, white spirit, or similar.
- Bores and shafts must not be oiled or greased.
- The permissible shaft misalignments must not be exceeded.
- Avoid damages to the steel bellows (1) before or during assembly.
- Clamping ring (2) together with spring (3) must be engaged in the bushing (5) or Fanuc-hub (6) respectively.
- If the bushing is dismantled or assembled more than 5 times the snap ring groove can be deformed unacceptably.

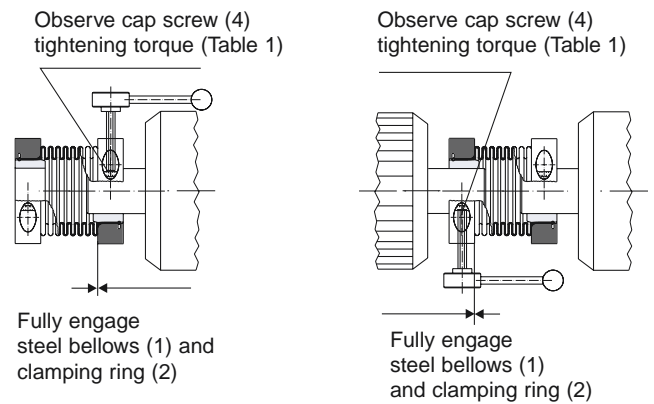
**Installation of the coupling Type 932.333**

1. Check that the coupling can be easily pushed onto both shafts.
2. Push the complete coupling onto one shaft until full engagement with bushing (5) is achieved.
3. Check that the steel bellows (1) are in contact with the clamping ring (2) and bushing (5).
4. Tighten the cap screw (4). The screw tightening torque (see technical data) must be maintained.
5. Push the second shaft into the coupling until full engagement with bushing (5) is achieved.
6. Check that the steel bellows (1) is fully engaged with the clamping ring (2) and bushing (5).
7. Tighten the cap screw (4). The screw tightening torque (see technical data) must be maintained.

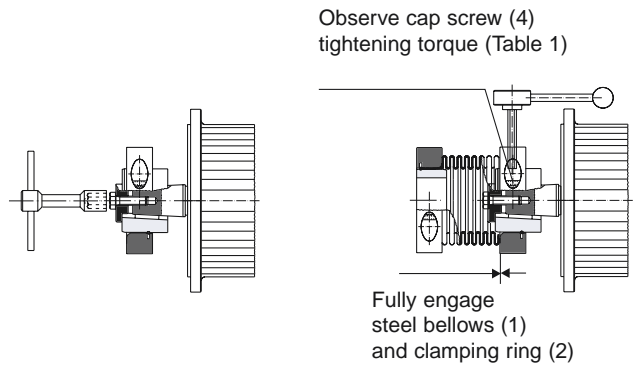
**Installation of the coupling Type 932.343**

1. Remove clamping ring (2) together with the protruding Fanuc-hub (6) from the coupling.
2. Put the keyway, if necessary onto the tapered shaft.
3. Push the Fanuc-hub (6) onto the tapered shaft.
4. Secure the hub against axial movement.
5. Push the rest of the coupling with the open steel bellows side to contact between with the clamping ring (2) and Fanuc-hub (6).
6. Tighten the cap screw (4). The screw tightening torque (see technical data) must be maintained.
7. Push the second shaft into the coupling until the required position is achieved.
8. Ensure that the steel bellows (1) are in contact with the clamping ring (2) and bushing (5).
9. Tighten the cap screws (4). The screw tightening torque (see technical data) must be maintained.

**Assembly of the coupling on cylindrical shaft**



**Assembly of the coupling on tapered shaft**



**Assembly of the coupling in a bell type housing**

