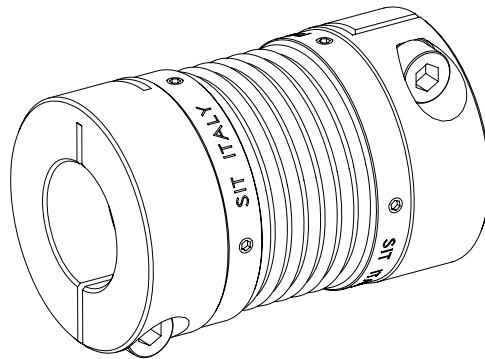


SERVOPLUS® couplings

SERVO-PLUS® bellow couplings are the perfect coupling in all servo motor applications where high torsional rigidity, truly backlash free torque transmission, low inertia and superior reliability are required. The innovative modular system allows quick delivery and competitive cost advantage.

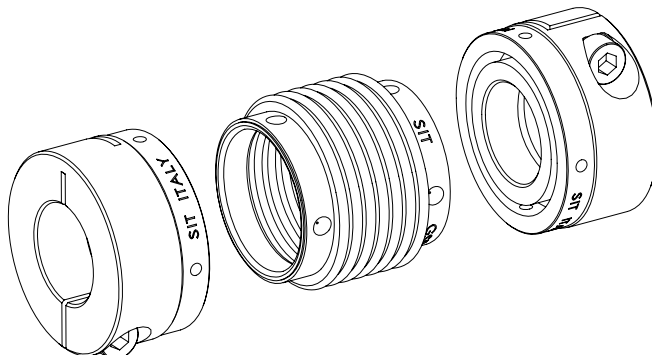
SERVOPLUS® couplings features:

- backlash free for highest torque transmission precision
- low moment of inertia
- excellent dynamic characteristics, for superior drives at high speed and torque inversions
- allow for axial, radial and angular misalignment
- easy mounting
- high torsional rigidity
- wear and maintenance free
- working temperature up to 300 °C
- innovative modular execution



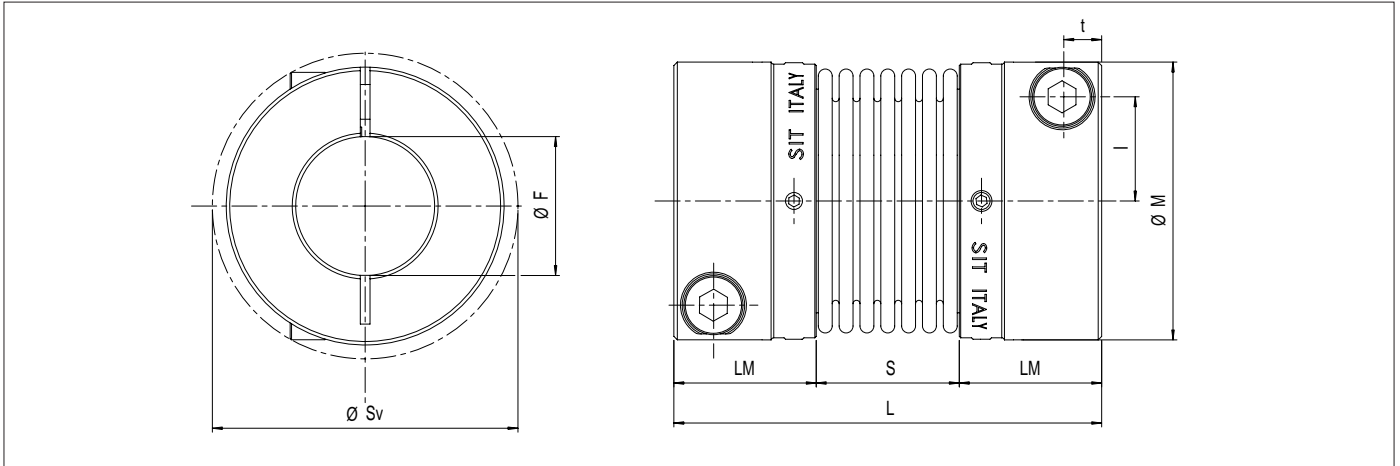
SERVOPLUS® high tech bellow couplings

The innovative modular system allows competitive costs and very quick delivery for any shaft combination. Additional benefits include bellow replacement without moving shaft.



Standard execution

Technical characteristics



Size	Dimensions (mm)							Screws				Socket set screws		Technical data										
	ØF		ØM	ØSv	LM	S	L	Type	t	l	TA (Nm)	Type	TAG (Nm)	Torque Tkn (Nm)	Speed n (rpm ⁻¹)	Moment of inertia (x10 ⁴ Kg·m ²)	Ct Torsional stiffness (Nm/rad)	Axial spring stiffness (N/mm)	Radial spring stiffness (N/mm)	Misalignment			Mass max bore (kg)	
	min	max																		Δka Axial (mm)	Δka Radial (mm)	α Angular (degrees)		
16	5	16	34	36	17	16,5	50,5	M4	4,5	12	2,9	M3	0,8	5	14000	14	3050	30	93	±0.5	0,2	1,5	0,082	
20	8	20	40	44	20,5	21	62	M5	5,5	15	6	M3	0,8	15	11900	34	7000	44	130	±0.6	0,2	1,5	0,135	
30	10	30	55	58	22,5	27	72	M6	6,5	20	10	M4	2	35	8700	140	16100	68	160	±0.8	0,25	2	0,289	
38	14	38	65	73	26	32	84	M8	8	25	25	M4	2	65	7300	310	31000	75	225	±0.8	0,25	2	0,438	
45	14	45	83	89	31	41	103	M10	9,5	30	49	M4	2	150	5800	1056	62000	85	480	±1	0,3	2	0,924	

SERVOPLUS® COUPLING																									
Size	Bore range and clamping hub transmissible torque (Nm)																								
	5	6	7	8	9	10	11	12	14	15	16	18	19	20	24	25	28	30	32	35	38	40	42	45	
16	4,9	5,9	6,9	7,8	8,8	9,8	10,8	11,8	13,7	14,7	15,7														
20				12,8	14,4	16	17,6	19,2	22,3	23,9	25,5	28,7	30,3	31,9											
30							24,9	27,1	31,7	33,9	36,2	40,7	43	45,2	54,3	56,5	63,3	67,9							
38												74,6	78,8	82,9	99,5	104	116	124	133	145	158				
45														132	158	165	184	198	211	231	250	263	277	296	

Additional hub executions available upon request:

- conical clamping bush
- conical bore for FANUC motors

Item code examples:



Coupling selection

Verify the torque to be transmitted

The torque transmissible by the coupling T_{KN} must always be higher than the maximum torque applied to the driver and driven shaft.

Being:

T_{AS} = peak torque of motor side (Nm)
 T_{LS} = peak torque of driven side (Nm)
 k = service factor

$$T_{KN} \geq k \cdot T_{AS/LS}$$

Verify acceleration torque

T_s = acceleration torque (driver or driven side)
The nominal torque must be higher than the acceleration torque.

$$T_{KN} > T_s \cdot k$$

T_s = $T_{AS} \cdot m_A$
 T_s = $T_{LS} \cdot m_L$

With: $m_A = \frac{J_A}{J_A + J_L}$ $m_L = \frac{J_L}{J_A + J_L}$

$k = 1,5$ with uniform load
 $k = 2$ with non uniform load
 $k = 2,5 - 4$ with peak or impact load

For drives in machine tools $k = 1,5 - 2$

For applications with extreme precision requirements it could be important to verify the transmission error which is calculated as follows:

$$\beta = \frac{180 \cdot T_{AS}}{\pi \cdot C_t} \text{ [degrees]}$$

With C_t = torsional stiffness of the coupling (Nm/rad)

Verify shaft diameter

After having selected the coupling, verify that the required shaft diameters are compatible with the selected coupling size (F_{min}/F_{max}).

Verify misalignment

Misalignment in the application must be compatible with the allowable misalignment of the coupling. It must be considered that the maximum values of misalignment of the coupling can not be reached simultaneously.

Given the values of misalignment of the application and converted in percentage with respect to the corresponding maximum values of the coupling, the percentage sum must not exceed 100%.

$$\frac{\Delta kaM}{\Delta ka} \cdot 100\% + \frac{\Delta krM}{\Delta kr} \cdot 100\% + \frac{\alpha M}{\alpha} \cdot 100\% < 100\%$$

With:

- ΔkaM , ΔkrM , αM respectively axial, radial and angular misalignment of the machine
- Δka , Δkr , α respectively axial, radial and angular misalignment which the coupling can bear
- **axial misalignment:** usually due to temperature variation
- **angular misalignment:** values up to 2° are acceptable
- **radial misalignment:** pay close attention not to exceed maximum radial misalignment. It could bring to bellow distortion.

Verify hub transmissible torque

It is important to verify that the torque required in the drive, is compatible with the transmissible load of the hub-shaft connection. It is possible to deliver coupling with different clamping system in case of need in special application. Also it is possible to deliver couplings with minimum bore smaller than indicated in catalogue. In such a case the hub shaft connection transmissible torque will be lower.

Technical features

Long lasting

SERVOPLUS® couplings are designed for an infinite number of cycles when the maximum misalignment values and peak torque are respected.

Peak torque

SERVOPLUS® couplings allow for short periods a peak torque equal to the double of the nominal torque. The hub shaft connection must be correctly dimensioned.

Bearing load

Due to flexibility in handling axial, angular and radial misalignment, SERVOPLUS® couplings allow reduced bearing load which drives down maintenance cost.

Working temperature

SERVOPLUS® couplings may be used up to 300°C without limitation.

Maintenance and wear

SERVOPLUS® couplings are wear and maintenance free.

Mounting instruction

SERVOPLUS® couplings are delivered with finished bore and ready for installation.

- carefully clean the contact surfaces
- position the coupling on the shafts ends and carefully tighten the radial clamping screws to the indicated torque T_A

Dismounting

- loosen radial screws
- pull apart the drive and remove the coupling

The special design of the SERVOPLUS® coupling allows the removal of the coupling or the bellow replacement without pulling apart the drive.

- loosen the socket screws
- loosen the radial clamping screws
- move the clamping hubs on the shafts
- remove the clamping hubs

Shaft requirements for a safe torque transmission are:

- tolerance $h6$
- roughness $R_{tmax} 16\mu$

Note

It is recommended to pay maximum care during the mounting and dismounting operation. Damaging the bellow may render coupling unusable.

Safety norms

All rotating parts must be protected against any possibility of contact with people.

Protection must be designed so that even in case of coupling breakage, no damage can be done to people and equipment.

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