SERVOPLUS® BELLOW COUPLINGS

sit | DRIVE SOLUTIONS

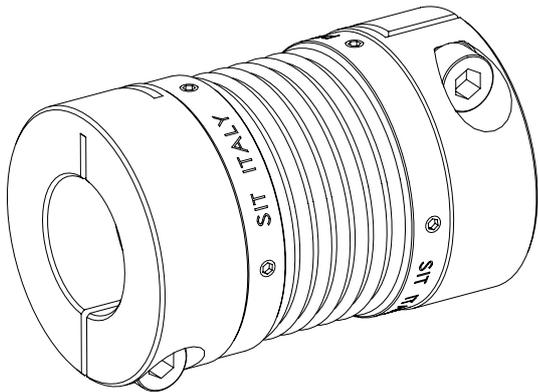SERVOPLUS®

SERVOPLUS® bellow couplings

Description

SERVOPLUS® bellows 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.

Note: It is possible to have aligned keyways upon inquiry.

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
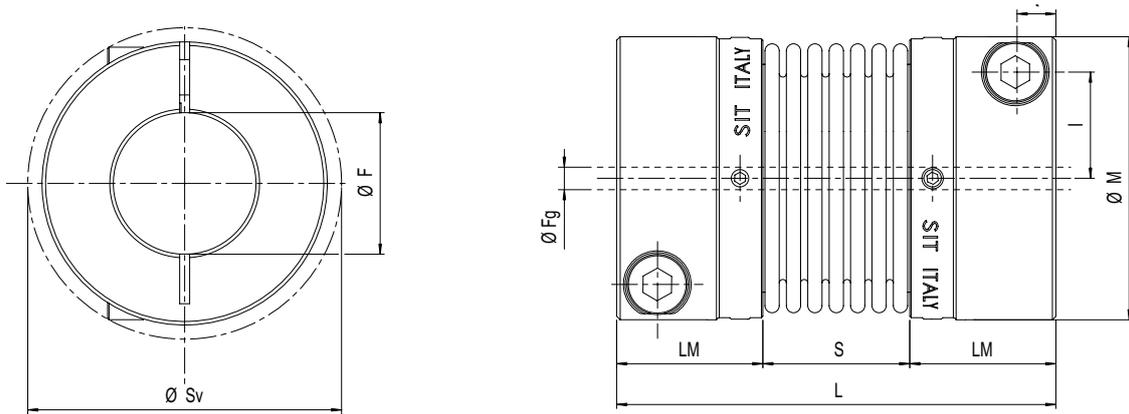- material: aluminum hub, bellow in stainless steel

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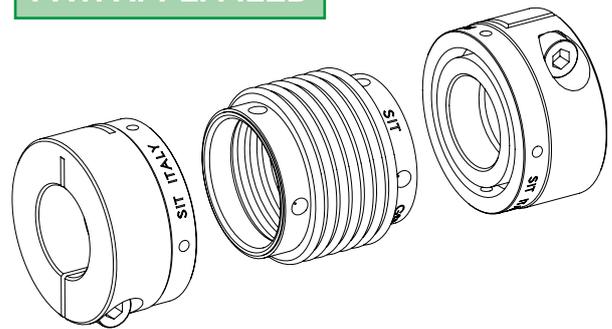
SERVOPLUS® high tech bellows couplings

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

Standard execution

Size	Dimensions [mm]								Screws				Socket set screws		Technical data								Misalignments			W* [kg]
	Prebored Fg	F		M	Sv	LM	S	L	Type	t	l	Ms [Nm]	Type	Ms [Nm]	T_KN [Nm]	T_Kmax [Nm]	n_max [rpm]	Moment of inertia [x10⁻⁶ · Kgm²]	Torsional rigidity C_T [Nm/rad]	Axial spring stiffness [N/mm]	Radial spring stiffness [N/mm]	Δka	Δkr	Δkw	
		min	max																							
16	4,5	5	16	34	36	17,0	16,5	50,5	M4	4,5	12	2,9	M3	0,8	5	7,5	14000	14	3050	29	92	±0,5	0,2	1,5	0,082
20	7,5	8	20	40	44	20,5	21,0	62	M5	5,5	15	6	M3	0,8	15	22,5	11900	34	6600	42	126	±0,6	0,2	1,5	0,135
30	9,5	10	30	55	58	22,5	27,0	72	M6	6,5	20	10	M4	2,0	35	52,5	8700	140	14800	65	155	±0,8	0,25	2,0	0,289
38	13,5	14	38	65	73	26,0	32,0	84	M8	8,0	25	25	M4	2,0	65	97,5	7300	310	24900	72	212	±0,8	0,25	2,0	0,438
45	13,5	14	45	83	89	31,0	41,0	103	M10	9,5	30	49	M5	3,8	150	225	5800	1056	64000	88	492	±1,0	0,3	2,0	0,924

*= with max bore
Bore tolerance F7

SERVOPLUS® coupling																							
Size	Bore range and dampening 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:

- **taper bore for taper bushings**
- **conical bore for FANUC motors**

Hub	**GSP**	**30**	**MF**	**20**

GSP: SERVOPLUS® coupling

Size

M: hub with pilot bore
S: bellows
MF: hub with finished bore

Bore diameter in mm (only in case of hub with finished bore)

M_S	Screw tightening torque	Nm
T_KN	Coupling nominal torque	Nm
T_Kmax	Coupling maximum torque	Nm
n_max	Maximum rpm	rpm
C_T	Torsional rigidity	Nm/rad
ΔK_a	Maximum axial misalignment	mm
ΔK_r	Maximum radial misalignment	mm
ΔK_w	Maximum angular misalignment	°
W	Weight	kg

To configure a complete coupling select two hubs with the requested pilot bore/finish bore and one bellows.

Technical data SERVOPLUS® couplings

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 = $T_{LS} \cdot m_L$

con: $m_A = \dfrac{J_A}{J_A + J_L}$ $m_L = \dfrac{J_L}{J_A + J_L}$

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:

$\beta = \dfrac{180 \cdot T_{AS}}{\pi \cdot C_T} \; [\circ]$ with C_T = torsional stiffness of the coupling [Nm/rad]

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

Verifica disallineamento
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 cannot 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%.

Con: $\dfrac{\Delta k_{aM}}{\Delta k_a} \cdot 100\% + \dfrac{\Delta k_{rM}}{\Delta k_r} \cdot 100\% + \dfrac{\Delta k_{wM}}{\Delta k_w} \cdot 100\% < 100\%$

• Δk_{aM}, Δk_{rM}, Δk_{wM} respectively axial, radial, and angular misalignment of the machine

• Δk_a, Δk_r, Δk_w 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 bellows distortion.

Verify hub transmissible torque
It is important to verify the torque required in the drive is compatible with the transmissible load of the hub-shaft connection. It is possible to deliver couplings with different clamping systems in case a special application is needed. 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 1,5 time 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 reduces 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 instructions

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 bellows 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} 16μ

Note
It is recommended to pay careful attention during the mounting and dismounting operation. Damaging the bellows 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 failure, personnel and equipment is protected.

Zero backlash - SERVOPLUS®