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SFC MODEL

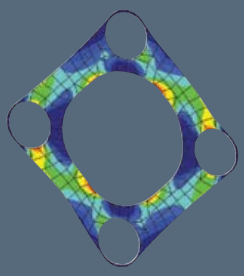
SERVO FLEX: A Wide Selection of Metal Plate Spring Couplings Made of High-power Aluminum Alloy

Two types of couplings, either a rigid type with one element or a flexible type with two elements using a spacer, can be selected.
The clamp method, an easy and exact installation method with no backlash, is adopted for the shaft installation method.
Moreover, it is compatible with the taper shaft by using an adapter.
It also complies with the EU Restriction of Hazardous Substances Directive, "RoHS Directive" that prohibits six hazardous substances such as mercury, lead, and others.

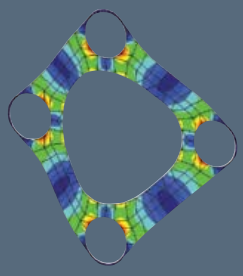
PLATE SPRING OF IDEAL FORM

High Rigidity, High Flexibility

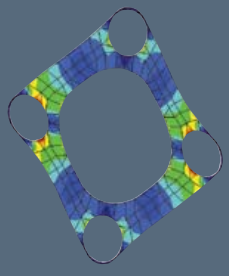
An ideal-shaped plate spring, designed based on thorough analysis using the advanced finite element method (FEM) is applied for the element.
Two types of couplings, either a high-rigidity type with one element or a high-flexibility type with two elements using a spacer, can be selected.



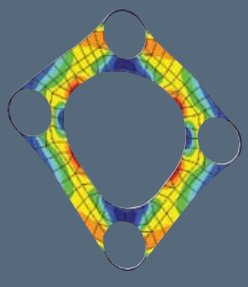
TORQUE



THRUST



BENDING



RADIAL

A Wide Range of Installation Methods

- By adoption of the clamp method, installation is easy and exact.
- The servo motor taper shaft can be optionally supported.

SFC MODEL

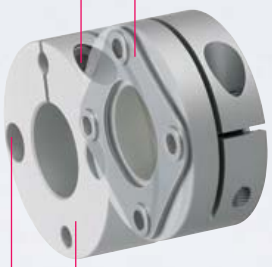
SFC MODEL

High-strength aluminum alloy hub SFC

- Clamp lock
  - High-rigidity single element → **SFC-□SA2-□B-□B**
  - High-flexibility double element → **SFC-□DA2-□B-□B**
- + Taper shaft compatible
  - High-rigidity single element → **SFC-□SA2-□B-□BC**
  - High-flexibility double element → **SFC-□DA2-□B-□BC**

Structure and Material

SFC-SA2



SFC-DA2

SFC-SA2/DA-BC

* The collar material of the items marked with *1 is S45C from size #080 to size #100, using trivalent chromium for the surface treatment.
* The bolt surface treatment of the items marked with *2 is antirust coating from size #080 to size #100.

Wide Range of Installation Methods

The clamp method is adopted for the method of mounting on the shaft, so it is easy to finish only by tightening the right and left sides.
Power transmission is performed entirely by a friction lock. There is no backlash.
A specialized jig is used for assembling couplings, so high-precision concentricity is ensured.
It is also compatible with the servo motor taper shaft by installing a taper adapter.

Taper adapter option

Ultralow Inertia

The outer diameter of the clamp hub is designed so the outer diameter dimension interlocks with the bore diameter that customers adopt. By using a small bore diameter to shrink the outer diameter, it is possible to keep the inertia to the minimum required. One of three pattern shapes is determined automatically according to the combination of bore diameters to be adopted.

TYPE A

TYPE B

TYPE C

SFC MODEL

SFC-SA2

Specification

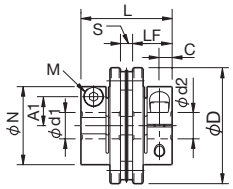
Model	Permissible tourque [N·m]	Max. permissible misalignment			Max. rotation speed [min⁻¹]	Torsional stiffness [N·m/rad]	Radial displacement [N/mm]	Shape TYPE	Moment of inertia [kg·m²]	Mass [kg]	Price
		Parallel offset [mm]	Angular misalignment [°]	Axial displacement [mm]							
SFC-005SA2	0.6	0.02	0.5	±0.05	10000	500	140	C	0.25×10^{-6}	0.007	–
SFC-010SA2	1.0	0.02	1	±0.1	10000	1400	140	C	0.58×10^{-6}	0.011	–
SFC-020SA2	2.0	0.02	1	±0.15	10000	3700	64	C	2.36×10^{-6}	0.025	–
SFC-030SA2	5.0	0.02	1	±0.2	10000	8000	64	A	4.00×10^{-6}	0.033	–
								B	6.06×10^{-6}	0.041	–
								C	8.12×10^{-6}	0.049	–
SFC-035SA2	8.0	0.02	1	±0.25	10000	18000	112	C	18.43×10^{-6}	0.084	–
SFC-040SA2	10	0.02	1	±0.3	10000	20000	80	A	16.42×10^{-6}	0.076	–
								B	22.98×10^{-6}	0.090	–
								C	29.53×10^{-6}	0.105	–
SFC-050SA2	25	0.02	1	±0.4	10000	32000	48	A	54.88×10^{-6}	0.156	–
								B	77.10×10^{-6}	0.185	–
								C	99.33×10^{-6}	0.214	–
SFC-060SA2	60	0.02	1	±0.45	10000	70000	76.4	A	143.7×10^{-6}	0.279	–
								B	206.1×10^{-6}	0.337	–
								C	268.5×10^{-6}	0.396	–
SFC-080SA2	100	0.02	1	±0.55	10000	140000	128	C	709.3×10^{-6}	0.727	–
SFC-090SA2	180	0.02	1	±0.65	10000	100000	108	C	1227×10^{-6}	0.959	–
SFC-100SA2	250	0.02	1	±0.74	10000	120000	111	C	1858×10^{-6}	1.181	–

* The indicated values in the moment of inertia and mass are measured with the maximum bore diameter.
* The torsional stiffness indicates the actual measurement value of element.

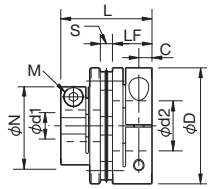
Dimensions

CAD

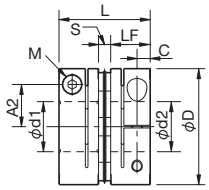
■ TYPE A

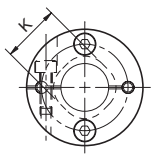


■ TYPE B



■ TYPE C





Unit [mm]

Model	d1*1		d2*1		D	N	L	LF	S	A1	A2	C	K	M	Tightening torque [N·m]	Shape TYPE	CAD file No.
	Min.	Max.	Min.	Max.													
SFC-005SA2	4	6	4	6	16	–	16.7	7.85	1.0	–	4.8	2.5	6.5	2-M2	0.4 to 0.5	C	C005S2B1
SFC-010SA2	4	8	4	8	19	–	19.35	9.15	1.05	–	5.8*2	3.15	8.5	2-M2.5*3	1.0 to 1.1*3	C	C010S2B1
SFC-020SA2	5	10	5	10	26	–	23.15	10.75	1.65	–	9.5	3.3	10.6	2-M2.5	1.0 to 1.1	C	C020S2B1
SFC-030SA2	5	10	5	10	34	21.6	27.3	12.4	2.5	8	–	3.75	14.5	2-M3	1.5 to 1.9	A	C030S2B1
	5	10	Over10	14						8	12.5					B	C030S2B2
	Over 10	14	Over10	14		–				–	12.5					C	C030S2B3
SFC-035SA2	8	16	8	16	39	–	34.0	15.5	3.0	–	14.0	4.5	17	2-M4	3.4 to 4.1	C	C035S2B1
SFC-040SA2	8	15	8	15	44	29.6	34.0	15.5	3.0	11	–	4.5	19.5	2-M4	3.4 to 4.1	A	C040S2B1
	8	15	Over 15	19						11	17.0					B	C040S2B2
	Over 15	19	Over 15	19		–				–	17.0					C	C040S2B3
SFC-050SA2	10	19	10	19	56	38	43.4	20.5	2.4	14.5	–	6	26	2-M5	7.0 to 8.5	A	C050S2B1
	10	19	Over 19	25						14.5	22.0					B	C050S2B2
	Over 19	25	Over 19	25		–				–	22.0					C	C050S2B3
SFC-060SA2	12	24	12	24	68	46	53.6	25.2	3.2	17.5	–	7.75	31	2-M6	14 to 15	A	C060S2B1
	12	24	Over 24	30						17.5	26.5					B	C060S2B2
	Over 24	30	Over 24	30		—				–	26.5					C	C060S2B3
SFC-080SA2	20	35	20	35	82	–	68	30	8	–	28	9	38	2-M8	27 to 30	C	C080S2B1
SFC-090SA2	25	40	25	40	94	–	68.3	30	8.3	–	34	9	42	2-M8	27 to 30	C	C090S2B1
SFC-100SA2	35	45	35	45	104	–	69.8	30	9.8	–	39	9	48	2-M8	27 to 30	C	C100S2B1

* *1 The torque permitted could be limited depending on the bore diameter. Refer to the “Standard bore diameter” on page15.
* *2 indicates the value when d1 or d2 is ø4 to ø7. It will be 0.6 if d1 or d2 is ø8.
* *3 indicates the value when d1 or d2 is ø4 to ø7. It will be M2 if d1 or d2 is ø8. The tightening torque of M2 is 0.4 to 0.5N·m.
* The dimensional tolerance of the target shaft is h7. However, for a shaft diameter of ø35, the tolerance is $^{+0.010}_{-0.025}$. Contact us for tolerances other than h7.

Standard bore diameter

Model	Standard bore diameter d1·d2 [mm]																												
	4	5	6	6.35	7	8	9	9.525	10	11	12	14	15	16	17	18	19	20	22	24	25	28	30	32	35	38	40	42	45
SFC-005SA2	●	●	●																										
SFC-010SA2	●	●	●	●	●	●																							
SFC-020SA2		1.2	●	●	●	●	●	●	●																				
SFC-030SA2		2.8	3.4	●	●	●	●	●	●	●	●	●																	
SFC-035SA2						●	●	●	●	●	●	●	●	●															
SFC-040SA2						9	●	●	●	●	●	●	●	●	●	●	●												
SFC-050SA2									22	●	●	●	●	●	●	●	●	●	●	●	●								
SFC-060SA2											51	●	●	●	●	●	●	●	●	●	●	●	●						
SFC-080SA2																		●	●	●	●	●	●	●	●				
SFC-090SA2																					●	●	●	●	●	●	●		
SFC-100SA2																									●	●	●	●	●

* The bore diameters with value or marked ● are supported as standard bore diameter.
* The permissible torque of small bore diameter indicated in the column with value is limited by the shaft locking mechanism. The value indicates its operating torque [N·m].
* For bore diameters other than those above, processing cost is added to the standard price.

Optional: Taper shaft compatible

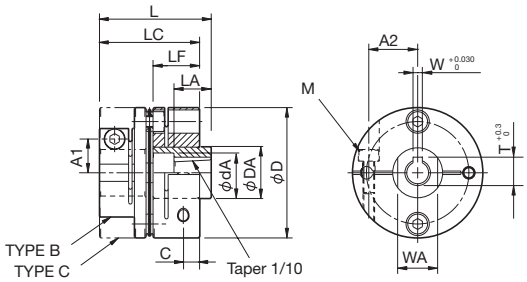
Specification

SFC-□SA2-□B-□BC

Model	Moment of inertia [kg·m²]		Mass [kg]		Price
	Shape TYPE B	Shape TYPE C	Shape TYPE B	Shape TYPE C	
SFC-050SA2-□B-11BC	81.52×10^{-6}	103.7×10^{-6}	0.237	0.266	–
SFC-050SA2-□B-14BC	87.34×10^{-6}	109.6×10^{-6}	0.268	0.297	–
SFC-050SA2-□B-16BC	94.16×10^{-6}	116.4×10^{-6}	0.306	0.335	–
SFC-060SA2-□B-16BC	225.3×10^{-6}	287.8×10^{-6}	0.469	0.528	–

Dimensions

SFC-□SA2-□B-□BC



CAD

Model	CAD file No.	
	Shape TYPE B	Shape TYPE C
SFC-050SA2-□B-11BC	C050S2C1	C050S2C2
SFC-050SA2-□B-14BC	C050S2C3	C050S2C4
SFC-050SA2-□B-16BC	C050S2C5	C050S2C6
SFC-060SA2-□B-16BC	C060S2C1	C060S2C2

Unit [mm]

Model	W	T	WA	LA	dA	DA	L	D	LC	LF	C	A1	A2	M
SFC-050SA2-□B-11BC	4	12.2	18	16	17	22	48.4	56	43.4	20.5	6	14.5	22	2-M5
-□B-14BC	4	15.1	24	19	22	28	53.4							
-□B-16BC	5	17.3	24	29	26	30	63.4							
SFC-060SA2-□B-16BC	5	17.3	24	29	26	30	69.6	68	53.6	25.2	7.75	17.5	26.5	2-M6

* The shape type is either TYPE B or TYPE C.

Ordering Information

SFC - 040 - SA2 - 14 B - 15 B

- SFC: Series
- 040: Size
- SA2: Type: SA2
- 14 B: Bore diameter: d1 d2
- 15 B: B: Clamp, BC: Taper adapter

SFC MODEL

SFC-DA2

Specification

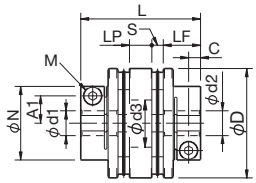
Model	Permissible torque [N·m]	Max. permissible misalignment			Max. rotation speed [min⁻¹]	Torsional stiffness [N·m/rad]	Radial displacement [N/mm]	Shape TYPE	Moment of inertia [kg·m²]	Mass [kg]	Price
		Parallel offset [mm]	Angular misalignment [°]	Axial displacement [mm]							
SFC-005DA2	0.6	0.05	0.5 (one side)	±0.1	10000	250	70	C	0.36×10^{-6}	0.010	–
SFC-010DA2	1.0	0.11	1 (one side)	±0.2	10000	700	70	C	0.79×10^{-6}	0.015	–
SFC-020DA2	2.0	0.15	1 (one side)	±0.33	10000	1850	32	C	3.40×10^{-6}	0.035	–
SFC-030DA2	5.0	0.18	1 (one side)	±0.4	10000	4000	32	A	7.33×10^{-6}	0.053	–
								B	9.39×10^{-6}	0.061	–
								C	11.45×10^{-6}	0.069	–
SFC-035DA2	8.0	0.24	1 (one side)	±0.5	10000	9000	56	C	26.78×10^{-6}	0.123	–
SFC-040DA2	10	0.24	1 (one side)	±0.6	10000	10000	40	A	29.49×10^{-6}	0.122	–
								B	36.05×10^{-6}	0.136	–
								C	42.61×10^{-6}	0.151	–
SFC-050DA2	25	0.28	1 (one side)	±0.8	10000	16000	24	A	96.94×10^{-6}	0.246	–
								B	119.2×10^{-6}	0.275	–
								C	141.4×10^{-6}	0.304	–
SFC-060DA2	60	0.34	1 (one side)	±0.9	10000	35000	38.2	A	252.4×10^{-6}	0.440	–
								B	314.8×10^{-6}	0.498	–
								C	377.3×10^{-6}	0.556	–
SFC-080DA2	100	0.52	1 (one side)	±1.10	10000	70000	64	C	1034×10^{-6}	1.051	–
SFC-090DA2	180	0.52	1 (one side)	±1.30	10000	50000	54	C	1776×10^{-6}	1.373	–
SFC-100DA2	250	0.52	1 (one side)	±1.48	10000	60000	55.5	C	2704×10^{-6}	1.707	–

* The indicated values in the moment of inertia and mass are measured with the maximum bore diameter.
* The torsional stiffness indicates the actual measurement value of element.

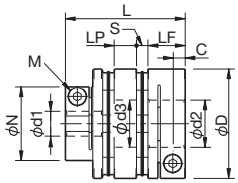
Dimensions

CAD

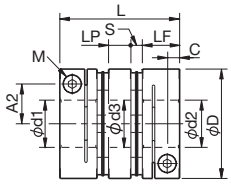
■ TYPE A

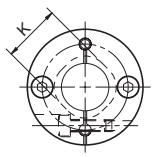


■ TYPE B



■ TYPE C





Unit [mm]

Model	d1*1		d2*1		D	N	L	LF	LP	S	A1	A2	C	d3	K	M	Tightening torque [N·m]	Shape TYPE	CAD file No.
	Min.	Max.	Min.	Max.															
SFC-005DA2	4	6	4	6	16	–	23.2	7.85	5.5	1.0	–	4.8	2.5	6.5	6.5	2-M2	0.4 to 0.5	C	C005D2B1
SFC-010DA2	4	8	4	8	19	–	25.9	9.15	5.5	1.05	–	5.8*2	3.15	8.5	8.5	2-M2.5*3	1.0 to 1.1*3	C	C010D2B1
SFC-020DA2	5	10	5	10	26	–	32.3	10.75	7.5	1.65	–	9.5	3.3	10.6	10.6	2-M2.5	1.0 to 1.1	C	C020D2B1
SFC-030DA2	5	10	5	10	34	21.6	37.8	12.4	8	2.5	8	–	3.75	15	14.5	2-M3	1.5 to 1.9	A	C030D2B1
	5	10	Over 10	14							8	12.5						B	C030D2B2
	Over 10	14	Over 10	14		–					–	12.5						C	C030D2B3
SFC-035DA2	8	16	8	16	39	–	48	15.5	11	3	–	14.0	4.5	17	17	2-M4	3.4 to 4.1	C	C035D2B1
SFC-040DA2	8	15	8	15	44	29.6	48	15.5	11	3	11	–	4.5	20	19.5	2-M4	3.4 to 4.1	A	C040D2B1
	8	15	Over 15	19							11	17.0						B	C040D2B2
	Over 15	19	Over 15	19		–					–	17.0						C	C040D2B3
SFC-050DA2	10	19	10	19	56	38	59.8	20.5	14	2.4	14.5	–	6	26	26	2-M5	7.0 to 8.5	A	C050D2B1
	10	19	Over 19	25							14.5	22.0						B	C050D2B2
	Over 19	25	Over 19	25		–					–	22.0						C	C050D2B3
SFC-060DA2	12	24	12	24	68	46	73.3	25.2	16.5	3.2	17.5	–	7.75	31	31	2-M6	14 to 15	A	C060D2B1
	12	24	Over 24	30							17.5	26.5						B	C060D2B2
	Over 24	30	Over 24	30		–					–	26.5						C	C060D2B3
SFC-080DA2	20	35	20	35	82	–	98	30	22	8	–	28	9	40	38	2-M8	27 to 30	C	C080D2B1
SFC-090DA2	25	40	25	40	94	–	98.6	30	22	8.3	–	34	9	47	42	2-M8	27 to 30	C	C090D2B1
SFC-100DA2	35	45	35	45	104	–	101.6	30	22	9.8	–	39	9	50	48	2-M8	27 to 30	C	C100D2B1

* *1 Permissible torque could be limited depending on the bore diameter. Refer to the “Standard bore diameter” on page 17.
* *2 indicates the value when d1 or d2 is ø4 to ø7. It will be 6.0 if d1 or d2 is ø8.
* *3 indicates the value when d1 or d2 is ø4 to ø7. It will be M2 if d1 or d2 is ø8. The tightening torque of M2 is 0.4 to 0.5N·m.
* The dimensional tolerance of the target shaft is h7. However, for a shaft diameter of ø35, the tolerance is $^{+0.010}_{-0.025}$. Contact us for tolerances other than h7.

Standard bore diameter

Model	Standard bore diameter d1·d2 [mm]																												
	4	5	6	6.35	7	8	9	9.525	10	11	12	14	15	16	17	18	19	20	22	24	25	28	30	32	35	38	40	42	45
SFC-005DA2	●	●	●																										
SFC-010DA2	●	●	●	●	●	●																							
SFC-020DA2		1.2	●	●	●	●	●	●	●																				
SFC-030DA2		2.8	3.4	●	●	●	●	●	●	●	●	●																	
SFC-035DA2						●	●	●	●	●	●	●	●	●															
SFC-040DA2						9	●	●	●	●	●	●	●	●	●	●	●												
SFC-050DA2									22	●	●	●	●	●	●	●	●	●	●	●	●								
SFC-060DA2											51	●	●	●	●	●	●	●	●	●	●	●	●						
SFC-080DA2																		●	●	●	●	●	●	●	●				
SFC-090DA2																					●	●	●	●	●	●	●		
SFC-100DA2																									●	●	●	●	●

* The bore diameters with value or marked ● are supported as standard bore diameter.
* The permissible torque of small bore diameter indicated in the column with value is limited by the shaft locking mechanism. The value indicates its operating torque [N·m].
* For bore diameters other than those above, processing cost is added to the standard price.

Optional: Taper shaft compatible

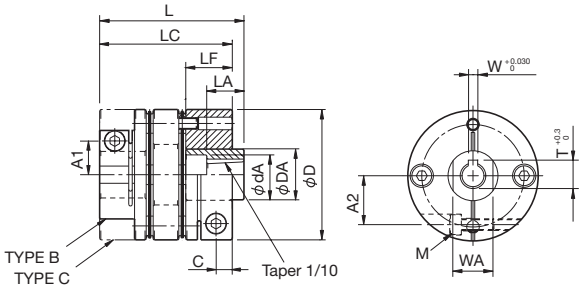
Specification

SFC-□DA2-□B-□BC

Model	Moment of inertia [kg·m²]		Mass [kg]		Price
	Shape TYPE B	Shape TYPE C	Shape TYPE B	Shape TYPE C	
SFC-050DA2-□B-11BC	123.6×10^{-6}	145.8×10^{-6}	0.327	0.356	–
SFC-050DA2-□B-14BC	129.4×10^{-6}	151.6×10^{-6}	0.358	0.386	–
SFC-050DA2-□B-16BC	136.2×10^{-6}	158.4×10^{-6}	0.396	0.424	–
SFC-060DA2-□B-16BC	334.1×10^{-6}	396.5×10^{-6}	0.630	0.688	–

Dimensions

SFC-□DA2-□B-□BC



CAD

Model	CAD file No.	
	Shape TYPE B	Shape TYPE C
SFC-050DA2-□B-11BC	C050D2C1	C050D2C2
SFC-050DA2-□B-14BC	C050D2C3	C050D2C4
SFC-050DA2-□B-16BC	C050D2C5	C050D2C6
SFC-060DA2-□B-16BC	C060D2C1	C060D2C2

Unit [mm]

Model	W	T	WA	LA	dA	DA	L	D	LC	LF	C	A1	A2	M
SFC-050DA2-□B-11BC	4	12.2	18	16	17	22	64.8	56	59.8	20.5	6	14.5	22	2-M5
-□B-14BC	4	15.1	24	19	22	28	69.8							
-□B-16BC	5	17.3	24	29	26	30	79.8							
SFC-060DA2-□B-16BC	5	17.3	24	29	26	30	89.3	68	73.3	25.2	7.75	17.5	26.5	2-M6

* The shape type is either TYPE B or TYPE C.

Ordering Information

SFC - 040 - DA2 - 14 B - 15 B

- SFC: Size
- DA2: Type: DA2 Double clamp
- 14 B / 15 B: Bore diameter: d1 d2; B: Clamp; BC: Taper adapter

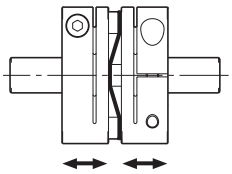
SFC MODEL

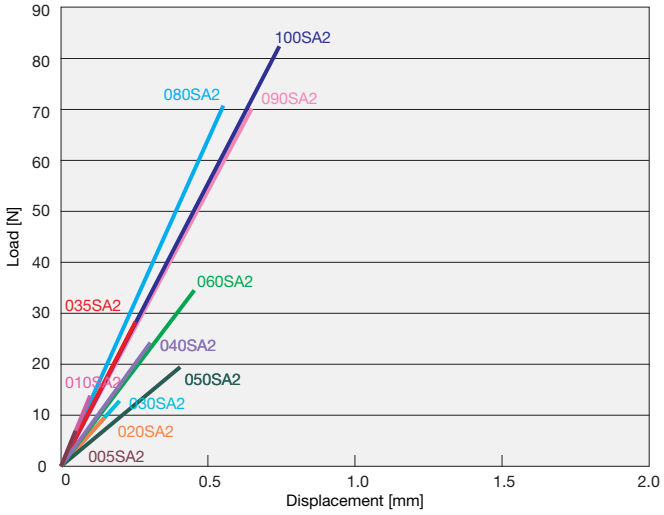
Design Check Items

Spring characteristics

Axial Load and Displacement Amount

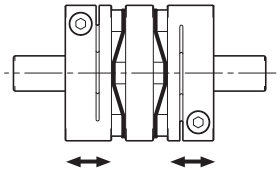
SFC-□SA2

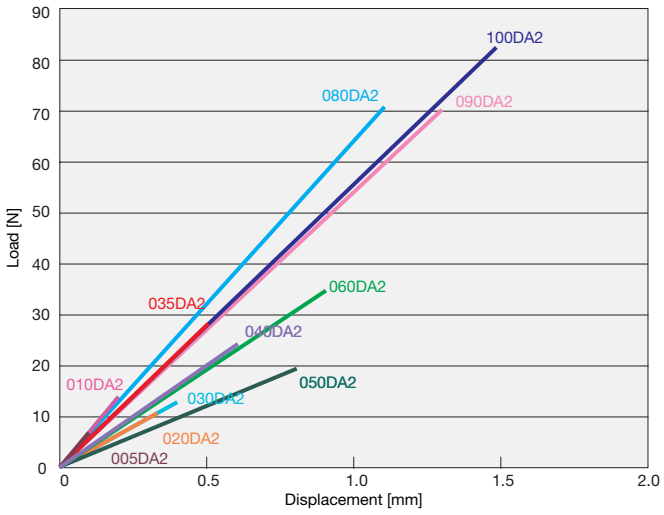




Axial Load and Displacement Amount

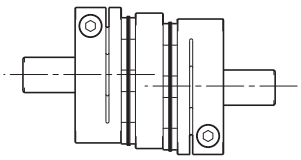
SFC-□DA2

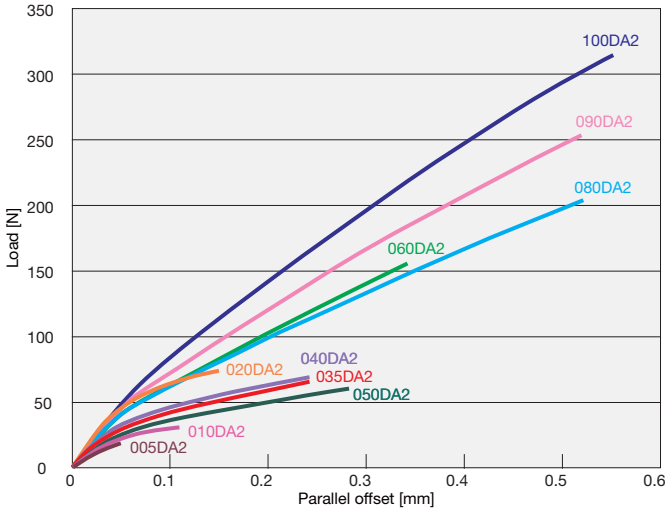




Parallel Offset Direction Load and Displacement Amount

SFC-□DA2





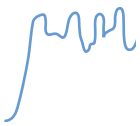
Selection procedure

(1) Calculate torque Ta applied to the coupling based on the motor output P and coupling operating rotation speed n.

$$Ta\ [N{\cdot}m] = 9550 \times \frac{P\ [kW]}{n\ [min^{-1}]}$$

(2) Calculate corrected torque Td applied to the coupling after deciding the service factor K based on load conditions.

$$Td = Ta \times K \text{ (see below)}$$

Load character			
Constant	Fluctuations: Slight	Fluctuations: Medium	Fluctuations: Large
			
1.0	1.25	1.75	2.25

In servo motor drive, multiply the service factor K=1.2 to 1.5 by the maximum torque of servo motor Ts.

$$Td = Ts \times (1.2 \text{ to } 1.5)$$

(3) Select a coupling size with permissible torque Tn that becomes equal or greater than the corrected torque Td.

$$Tn \geq Td$$

(4) Depending on the bore diameters, the coupling permissible torque may be limited. Refer to the “Specification” and “Standard bore diameter”.

(5) Confirm if the required shaft diameter does not exceed the maximum bore diameter of the selected size.

For machines whose load torques periodically fluctuate drastically, contact us.

Simplified selection

The table indicates suitable sizes based on the rated output, rated torque and maximum torque of general-purpose servo motors. Since torque characteristics of servo motors differ depending on the manufacturer, select the coupling size after confirming the specification of the manufacturer.

Servo motor specification					Compatible coupling specification		
Rated output [kW]	Rated revolution [min⁻¹]	Rated torque [N·m]	Max. torque [N·m]	Shaft dia. [mm]	Single element Model (SFC-□SA2)	Double element Model (SFC-□DA2)	Max. bore dia. [mm]
0.05	3000	0.16	0.48	8	010SA2	010DA2	8
0.1	3000	0.32	0.95	8	020SA2	020DA2	10
0.2	3000	0.64	1.90	14	030SA2	030DA2	14
0.4	3000	1.30	3.80	14	035SA2	035DA2	16
0.5	2000	2.39	7.16	24	050SA2	050DA2	25
0.5	3000	1.59	4.77	24	050SA2	050DA2	25
0.75	2000	3.58	10.7	22	050SA2	050DA2	25
0.75	3000	2.40	7.20	19	040SA2	040DA2	19
0.85	1000	8.12	24.4	24	060SA2	060DA2	30
1	2000	4.78	14.4	24	050SA2	050DA2	25
1	3000	3.18	9.55	24	050SA2	050DA2	25
1.2	1000	11.5	34.4	35	080SA2	080DA2	35
1.5	2000	7.16	21.6	28	060SA2	060DA2	30
1.5	3000	4.78	14.3	24	050SA2	050DA2	25
2	2000	9.55	28.5	35	080SA2	080DA2	35
2	3000	6.37	15.9	24	050SA2	050DA2	25
3	1000	28.60	85.9	35	090SA2	090DA2	35
3.5	2000	16.70	50.1	35	080SA2	080DA2	35
3.5	3000	11.10	27.9	28	060SA2	060DA2	30
5	2000	23.90	71.6	35	080SA2	080DA2	35
5	3000	15.90	39.7	28	060SA2	060DA2	30
7	2000	33.40	100	35	090SA2	090DA2	35

SFC MODEL

Design Check Items

Feed-screw systems

(1) Oscillation phenomena of servo motors
If the eigenfrequency of the entire feed-screw system is under 400 to 500Hz, oscillation may occur depending on the gain adjustment of the servo motor.
The problems can be avoided by raising the eigenfrequency of the mechanical system or adjusting the tuning function (filter function) of the servo motor.

Contact us for unclear points concerning oscillation phenomena of servo motors.

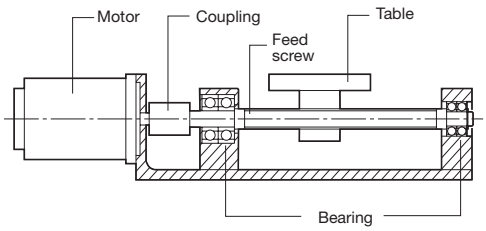
(2) Resonance caused by stepping motors
Resonance can occur within a certain speed range due to the pulsation frequency of the stepping motor and the eigenfrequency of the entire system. Resonance can be avoided by not applying the resonant rotation speed, or by reviewing the eigenfrequency in the design phase.

Contact us for unclear points concerning resonance of stepping motors.

How to evaluate the eigenfrequency of feed-screw system

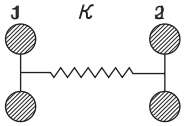
(1) Select the coupling according to the normal operating torque and maximum torque of the servo motor/stepping motor.

(2) In the following feed-screw system, evaluate the entire eigenfrequency: Nf from the torsional stiffness: ***k*** of the coupling and feed screw, the moment of inertia: J1 of the driving side and the moment of inertia: J2 of the driven side.



$$Nf=\frac{1}{2\pi}\sqrt{\kappa\left(\frac{1}{J1}+\frac{1}{J2}\right)}$$

Nf: Eigenfrequency of the entire feed-screw system [Hz]
k: Torsional stiffness of the coupling and feed screw [N·m/rad]
J1: Moment of inertia of the driving side
J2: Moment of inertia of the driven side



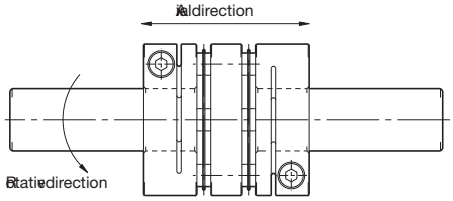
Mounting

The concentricity of the right and left bore diameters is ensured by adjusting with an specialized jig. However, the assembly accuracy may be disturbed if a strong impact is given to the product. Please handle it with care.

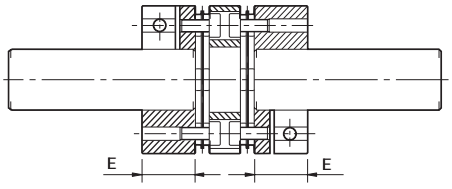
(1) Confirm the clamping bolts are loosened. Remove the rust, dust and oil content on the inside diameter surface of the shaft and coupling. (Wipe off the oil content completely with a waste cloth, etc.)

(2) Insert the coupling into the shaft. At this time, do not apply more than necessary force such as compression or pulling to the element part of the coupling.
After the coupling is mounted into the motor, do not apply excessive compression when inserting the coupling into the mating shaft.

(3) Confirm the two clamping bolts are loosened and the coupling is movable to the axial and rotative directions.
If it does not move smoothly, adjust centering of both shafts again.
If the concentricity can not be confirmed with the method described above, confirm the mounting accuracy by other measures.



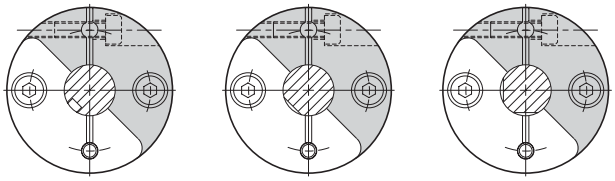
(4) Make sure that the insertion length of the coupling into the shaft is kept in the position so that the target shaft is in contact with the entire length of the flange (LF dimension) as illustrated below.



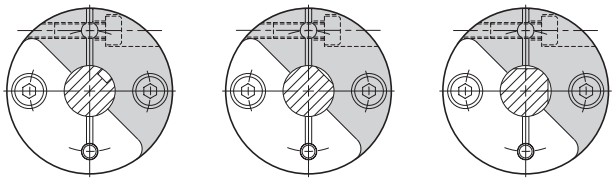
Size	LF dimension [mm]
005	7.85
010	9.15
020	10.75
030	12.4
035	15.5
040	15.5
050	20.5
060	25.2
080	30
090	30
100	30

(5) As a principle, the target shaft is a circular shaft. However, if shafts other than a circular shaft have to be used for a certain reason, be careful with the shaft installation position as illustrated below. (Note that key slot, D-cut, etc. must not be processed on the filling side of the ■ part.)
Certain shaft installation positioning may result in damage to the coupling itself and lowering of shaft-retaining force. It is recommended to use a circular shaft for fully satisfactory coupling performance.

● Example of Good Mounting



● Example of Bad Mounting



(6) After checking that no force such as compression, tension, etc. is applied to the axial direction, the shaft is retained so that the whole length of the clamp hub is in contact with both shafts, and two clamp bolts are tightened at an appropriate torque value.
To tighten the clamp bolts, a calibrated torque wrench is used within the range of the clamp bolt-tightening torque as shown in the table below.

Size	Clamp bolt	Tightening torque [N·m]
005	M2	(0.4 to 0.5)
010	M2	(0.4 to 0.5)
010	M2.5	(1.0 to 1.1)
020	M2.5	(1.0 to 1.1)
030	M3	(1.5 to 1.9)
035	M4	(3.4 to 4.1)
040	M4	(3.4 to 4.1)
050	M5	(7.0 to 8.5)
060	M6	(14 to 15)
080	M8	(27 to 30)
090	M8	(27 to 30)
100	M8	(27 to 30)

* If the bore diameter is ø8, size 010 will be M2.
* For the above tightening torque, solid lubricant film treatment is applied to the bolt and the torque coefficient is 0.18.
* The value of the tightening torque is between the minimum and the maximum values. The bolts should be tightened by the tightening torque within this range.

● Solid lubricant film treatment is applied to the clamp bolt, so make sure that Miki Pulley's specified clamp bolt is used and no coatings such as oil, etc. are applied. If any coating is applied to the surface, the clamp bolt, the coupling itself, and other parts might be damaged due to excessive shaft force.

■ Coupling bore diameter surface treatment

For the SERVO FLEX SFC model, depending on the process, although there are two types of parts, one with bore diameter surface treatment such as additional processing and key slot processing and the other without surface treatment, there is no problem in terms of performance of the couplings. Contact us for advice regarding whether bore diameter surface treatment should be used according to the customers' conditions of use.