ZERO-MAX® ServoClass® Couplings

ZERO-MAX SERVO***CLASS*** COUPLINGS

- For high performance servo motor and demanding motion control applications
- High torsional stiffness for precision positioning
- Eco-Friendly, Adapted to RoHS Directive with no banned substances
- Low inertia for high speed reversing applications
- Zero backlash and low hysteresis ensures repeatable precise positioning
- Low bearing loads

- Available in 11 sizes in single and double disc models.
- Double disc models provide highest misalignment capability.
- Operating temperature range is -22° to +212°F (-30° to +100C)
- Torque ratings range from 0.5 to 250Nm.
- Hubs and center members manufactured of aluminum alloy for strength and durability. Both are treated to prevent oxidation and to preserve appearance.
- Disc members are made of 304 stainless steel.
- Couplings are precisely assembled using high strength, corrosion resistant fasteners.
- Integral clamp style hubs provide fast, easy mounting.
- RoHS compliant – manufactured of RoHS compliant materials and contain no banned substances.

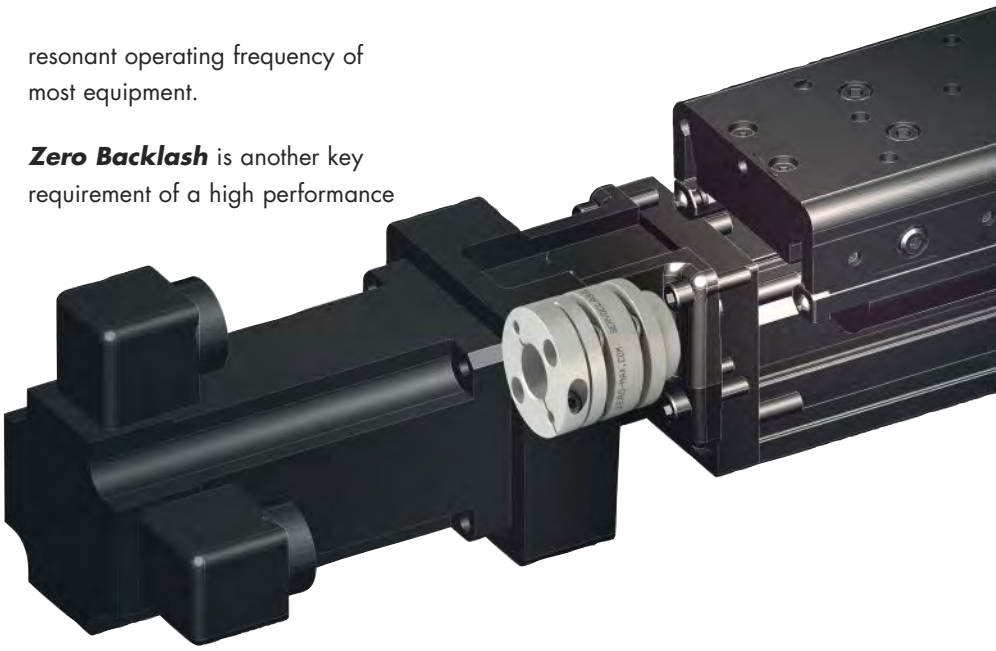
SERVO***CLASS*** COUPLINGS FOR EVERY SERVO SYSTEM REQUIREMENT

Today's servo motor applications are more demanding than ever. The precision positioning requirements and high reverse load characteristics of AC and DC servomotor applications necessitate a coupling design that specifically addresses the needs of these sophisticated systems.

Low Inertia is a critical feature of a superior servo coupling. The inertia should be low so as not to add significantly to overall inertia of the servo system. The lower the inertia, the less energy required by the motor to move the system and therefore, higher acceleration is possible. Because Zero-Max ServoClass couplings are made from 7075-T6 aluminum they have very low inertia.

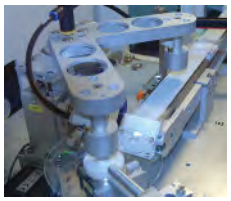
High torsional stiffness is an important quality of any high performance coupling. Low torsional stiffness couplings will reduce system performance and accuracy. The torsional stiffness characteristic of the Zero-Max ServoClass coupling increases the system resonant frequency which exceeds the resonant operating frequency of most equipment.

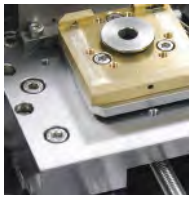
Zero Backlash is another key requirement of a high performance servo coupling. A coupling may be considered zero backlash and still have a large amount of windup. Zero backlash is the ability of the coupling to maintain the same relative relationship between the input and output shaft without lost motion. The Zero-Max ServoClass coupling is a zero backlash coupling and it exhibits a very low amount of windup.

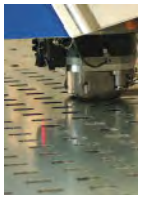


Misalignment capability of a coupling is also important in a motion control system. Usually, the alignment of a well manufactured servo system will be very good. Over time and under high load conditions, this alignment may deteriorate. Another important benefit of a high misalignment capability is the low reaction loads on the bearings in the system. The Zero-Max ServoClass coupling utilizes a design that provides flexibility but does not sacrifice any of the torque capability or the torsional stiffness capability and therefore minimizes the reaction loads to the servo motor bearings.








SERVO*CLASS*® *SC* SERIES

- For high performance servo motor and demanding motion control applications
- High torsional stiffness for precision positioning
- Eco-Friendly, adapted to RoHS Directive with no banned substances
- Low inertia for high speed applications
- Zero backlash and low hysteresis ensures repeatable precise positioning

SC Series
ServoClass Double Disc Specifications

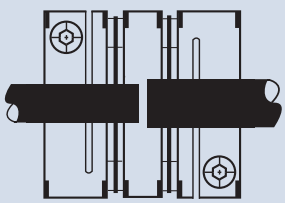
Model	Operating Torque	Maximum RPM	Torsional Stiffness	Axial Stiffness	Misalignment Capacity			Moment of Inertia	Weight	Style
					Parallel	Angular	Axial			
	in.lb. (Nm)	r/min	in.lb./deg. (Nm/rad)	lb./in. (N/mm)	inch (mm)	degree	± inch ± (mm)	lb.in.^{2} kgm^2(x10^{-6})	Oz. (gm)	
SC005R	4.4 (0.5)	10,000	39 (250)	400 (70)	0.002 (0.05)	0.5	0.004 (0.10)	0.0012 (0.36)	0.35 (10)	C
SC010R	7 (0.8)	10,000	108 (700)	400 (70)	0.004 (0.11)	1	0.008 (0.20)	0.0027 (0.79)	0.53 (15)	C
SC020R	13 (1.5)	10,000	286 (1,850)	183 (32)	0.006 (0.15)	1	0.013 (0.33)	0.012 (3.40)	1.3 (36)	C
SC030R	35 (4.0)	10,000	618 (4,000)	183 (32)	0.007 (0.18)	1	0.016 (0.4)	0.025 (7.33)	1.9 (53)	A
								0.032 (9.39)	2.2 (61)	B
								0.039 (11.5)	2.4 (69)	C
SC035R	53 (6.0)	10,000	1,390 (9,000)	320 (56)	0.009 (0.24)	1	0.020 (0.5)	0.092 (26.8)	4.3 (123)	C
SC040R	89 (10)	10,000	1,545 (10,000)	228 (40)	0.009 (0.24)	1	0.024 (0.6)	0.101 (29.5)	4.3 (122)	A
								0.123 (36.1)	4.8 (136)	B
								0.146 (42.6)	5.3 (151)	C
SC050R	221 (25)	10,000	2,471 (16,000)	137 (24)	0.011 (0.28)	1	0.031 (0.8)	0.331 (96.9)	8.7 (246)	A
								0.407 (119)	9.7 (275)	B
								0.483 (141)	10.7 (304)	C
SC060R	531 (60)	10,000	5,406 (35,000)	218 (38)	0.013 (0.34)	1	0.035 (0.9)	0.862 (252)	15.5 (440)	A
								1.08 (315)	17.6 (498)	B
								1.29 (377)	19.5 (556)	C
SC080R	885 (100)	10,000	10,812 (70,000)	366 (64)	0.02 (0.52)	1	0.04 (1.10)	3.54 (1,034)	37.0 (1,051)	C
SC090R	1,593 (180)	10,000	7,723 (50,000)	308 (54)	0.02 (0.52)	1	0.05 (1.30)	6.08 (1,776)	48.4 (1,373)	C
SC100R	2,213 (250)	10,000	9,268 (60,000)	317 (55)	0.02 (0.52)	1	0.06 (1.48)	9.26 (2,704)	60.2 (1,707)	C

- Moment of Inertia and Weight are measured with the maximum bore diameters
- Tolerance of mounted shaft should be h7

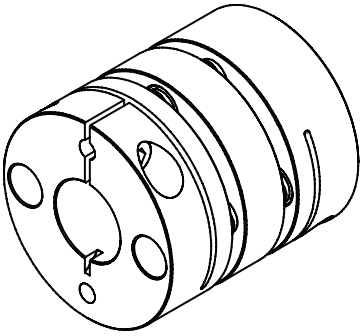
Style A

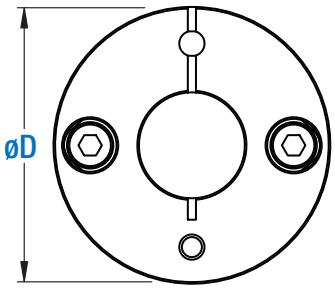
Style B

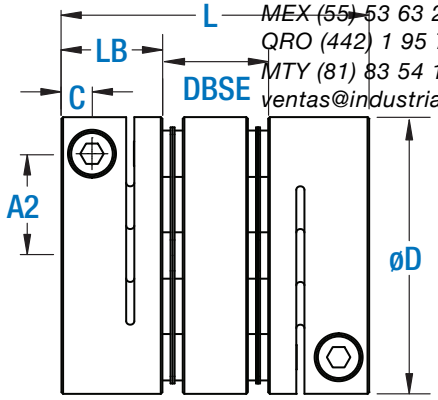
Style C



The shafts of the equipment (up to the maximum bore size of the coupling) may be extended into the interior of the coupling without any modification to the ServoClass coupling. However, the ends of the shafts must never touch each other.







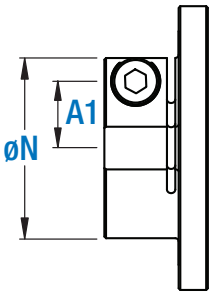
SC Series
ServoClass Double Disc Dimensions

Model	Bores		Outside Diameter	Overall Length	Hub Length	Reduced Hub Diameter	Distance Between Shaft Ends	Clamp Bolt to Bore (on reduced hubs)	Clamp Bolt to Bore	Clamp Bolt to End of Hub	Clamp Screw Size	Tightening Torque
	Min	Max	D	L	LB	N	DBSE	A1	A2	C	M	
	Inch (mm)	Inch (mm)	Inch (mm)	Inch (mm)	Inch (mm)	Inch (mm)	Inch (mm)	Inch (mm)	Inch (mm)	Inch (mm)	Size	in. lb. (Nm)
SC005R	0.157 (4)	0.236 (6)	0.63 (16)	0.913 (23.2)	0.309 (7.85)	–	0.295 (7.5)	–	0.189 (4.8)	0.098 (2.5)	M2.0	3.5 (0.4)
SC010R	0.157 (4)	0.3125* (8)*	0.748 (19)	1.02 (25.9)	0.36 (9.15)	–	0.299 (7.6)	–	0.228 (5.8)	0.124 (3.15)	M2.5*	9* (1)*
SC020R	0.1875 (5)	0.375 (10)	1.024 (26.0)	1.272 (32.3)	0.423 (10.75)	–	0.425 (10.8)	–	0.374 (9.5)	0.130 (3.3)	M2.5	9 (1)
SC030R	0.1875** (5)**	0.5625 (14)	1.339 (34.0)	1.488 (37.8)	0.488 (12.4)	0.850 (21.6)	0.511 (13.0)	0.315 (8)	0.492 (12.5)	0.148 (3.75)	M3	13 (1.5)
SC035R	0.3125 (8)	0.625 (16)	1.535 (39.0)	1.890 (48)	0.610 (15.5)	–	0.669 (17.0)	–	0.551 (14)	0.177 (4.5)	M4	30 (3.4)
SC040R	0.3125** (8)**	0.750 (19)	1.732 (44.0)	1.890 (48)	0.610 (15.5)	1.165 (29.6)	0.669 (17.0)	0.433 (11)	0.669 (17)	0.177 (4.5)	M4	30 (3.4)
SC050R	0.375** (10)**	1.000 (25)	2.205 (56.0)	2.354 (59.8)	0.807 (20.5)	1.496 (38)	0.739 (18.8)	0.571 (14.5)	0.866 (22)	0.236 (6)	M5	62 (7)
SC060R	0.500** (12)**	1.1875 (30)	2.677 (68.0)	2.886 (73.3)	0.992 (25.2)	1.811 (46)	0.902 (22.9)	0.689 (17.5)	1.043 (26.5)	0.305 (7.75)	M6	124 (14)
SC080R	0.875 (20)	1.375 (35)	3.228 (82.0)	3.858 (98)	1.181 (30)	–	1.496 (38.0)	–	1.102 (28)	0.354 (9)	M8	266 (30)
SC090R	1.000 (25)	1.5 (40)	3.622 (92.0)	3.882 (98.6)	1.181 (30)	–	1.520 (38.6)	–	1.339 (34)	0.354 (9)	M8	266 (30)
SC100R	1.438 (35)	1.75 (45)	4.095 (104.0)	4.000 (101.6)	1.181 (30)	–	1.638 (41.6)	–	1.535 (39)	0.354 (9)	M8	266 (30)

*SC010 with a bore of 8mm or 0.3125" will have a M2 clamp screw and a tightening torque of 3.5 in lbs. or 0.4Nm

** Reduced Hub Dimensions

Model	Min	Max
	Inch (mm)	Inch (mm)
SC030R	0.1875 (5)	0.375 (10)
SC040R	0.3125 (8)	0.5625 (15)
SC050R	0.375 (10)	0.750 (19)
SC060R	0.500 (12)	0.9375 (24)



New Zero-Max Configurable 3D CAD Downloads.
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- Low inertia for high speed applications
- Zero backlash and low hysteresis ensures repeatable precise positioning

SD Series
ServoClass Single Disc Specifications

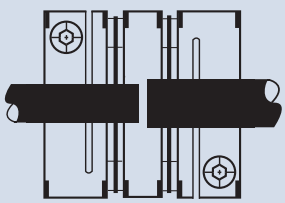
Model	Operating Torque	Maximum RPM	Torsional Stiffness	Axial Stiffness	Misalignment Capacity			Moment of Inertia	Weight	Style
					Parallel	Angular	Axial			
	in.lb. (Nm)	r/min	in.lb./deg. (Nm/rad)	lb./in. (N/mm)	inch (mm)	degree	± inch ± (mm)	lb.in.^{2} kgm^2(x10^{-6})	Oz. (gm)	
SD005R	4.4 (0.5)	10,000	77 (500)	799 (140)	0.001 (0.02)	0.5	0.002 (0.05)	0.0009 (0.25)	0.25 (7)	C
SD010R	7 (0.8)	10,000	216 (1,400)	799 (140)	0.001 (0.02)	1	0.004 (0.10)	0.0019 (0.58)	0.39 (11)	C
SD020R	13 (1.5)	10,000	572 (3,700)	365 (64)	0.001 (0.02)	1	0.006 (0.15)	0.008 (2.36)	0.9 (25)	C
SD030R	35 (4.0)	10,000	1,236 (8,000)	365 (64)	0.001 (0.02)	1	0.008 (0.2)	0.014 (4.00)	1.2 (33)	A
								0.021 (6.06)	1.4 (41)	B
								0.028 (8.12)	1.7 (49)	C
SD035R	53 (6.0)	10,000	2,780 (18,000)	640 (112)	0.001 (0.02)	1	0.010 (0.25)	0.063 (18.4)	3.0 (84)	C
SD040R	89 (10)	10,000	3,089 (20,000)	457 (80)	0.001 (0.02)	1	0.012 (0.3)	0.056 (16.4)	2.7 (76)	A
								0.078 (23.0)	3.2 (90)	B
								0.101 (29.5)	3.7 (105)	C
SD050R	221 (25)	10,000	4,943 (32,000)	274 (48)	0.001 (0.02)	1	0.016 (0.4)	0.188 (54.9)	5.5 (156)	A
								0.263 (77.1)	6.5 (185)	B
								0.339 (99.3)	7.5 (214)	C
SD060R	531 (60)	10,000	10,812 (70,000)	436 (76.4)	0.001 (0.02)	1	0.018 (0.45)	0.491 (144)	9.8 (279)	A
								0.704 (206)	11.9 (337)	B
								0.918 (268)	14 (396)	C
SD080R	885 (100)	10,000	21,625 (140,000)	731 (128)	0.001 (0.02)	1	0.02 (0.55)	2.43 (709.3)	25.6 (727)	C
SD090R	1,593 (180)	10,000	15,446 (100,000)	616 (108)	0.001 (0.02)	1	0.03 (0.65)	4.20 (1,227)	33.8 (959)	C
SD100R	2,213 (250)	10,000	18,535 (120,000)	664 (111)	0.001 (0.02)	1	0.03 (0.74)	6.36 (1,858)	41.6 (1,181)	C

- Moment of Inertia and Weight are measured with the maximum bore diameters
- Tolerance of mounted shaft should be h7

Style A

Style B

Style C



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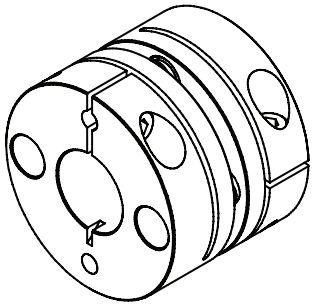
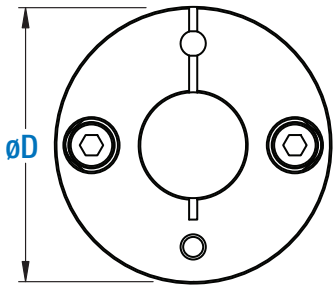
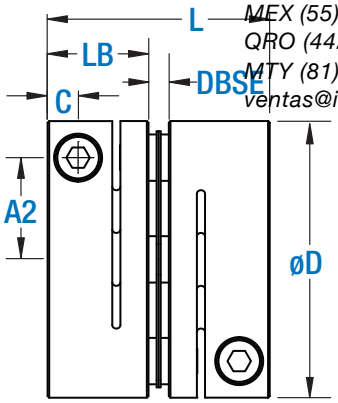






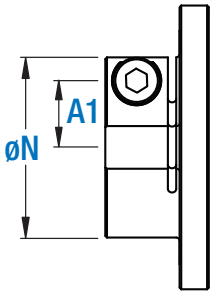
SD Series
ServoClass Single Disc Dimensions

Model	Bores		Outside Diameter	Overall Length	Hub Length	Reduced Hub Diameter	Distance Between Shaft Ends	Clamp Bolt to Bore (on reduced hubs)	Clamp Bolt to Bore	Clamp Bolt to End of Hub	Clamp Screw Size	Tightening Torque
	Min	Max	D	L	LB	N	DBSE	A1	A2	C	M	
	Inch (mm)	Inch (mm)	Inch (mm)	Inch (mm)	Inch (mm)	Inch (mm)	Inch (mm)	Inch (mm)	Inch (mm)	Inch (mm)	Size	in. lb. (Nm)
SD005R	0.157 (4)	0.236 (6)	0.63 (16)	0.657 (16.7)	0.309 (7.85)	–	0.039 (1.0)	–	0.189 (4.8)	0.098 (2.5)	M2.0	3.5 (0.4)
SD010R	0.157 (4)	0.3125* (8)*	0.748 (19)	0.762 (19.35)	0.36 (9.15)	–	0.041 (1.05)	–	0.228 (5.8)	0.124 (3.15)	M2.5*	9* (1)*
SD020R	0.1875 (5)	0.375 (10)	1.024 (26.0)	0.911 (23.15)	0.423 (10.75)	–	0.065 (1.65)	–	0.374 (9.5)	0.130 (3.3)	M2.5	9 (1)
SD030R	0.1875** (5)**	0.5625 (14)	1.339 (34.0)	1.075 (27.3)	0.488 (12.4)	0.850 (21.6)	0.098 (2.5)	0.315 (8)	0.492 (12.5)	0.148 (3.75)	M3	13 (1.5)
SD035R	0.3125 (8)	0.625 (16)	1.535 (39.0)	1.339 (34)	0.610 (15.5)	–	0.118 (3.0)	–	0.551 (14)	0.177 (4.5)	M4	30 (3.4)
SD040R	0.3125** (8)**	0.750 (19)	1.732 (44.0)	1.339 (34)	0.610 (15.5)	1.165 (29.6)	0.118 (3.0)	0.433 (11)	0.669 (17)	0.177 (4.5)	M4	30 (3.4)
SD050R	0.375** (10)**	1.000 (25)	2.205 (56.0)	1.709 (43.4)	0.807 (20.5)	1.496 (38)	0.094 (2.4)	0.571 (14.5)	0.866 (22)	0.236 (6)	M5	62 (7)
SD060R	0.500** (12)**	1.1875 (30)	2.677 (68.0)	2.110 (53.6)	0.992 (25.2)	1.811 (46)	0.126 (3.2)	0.689 (17.5)	1.043 (26.5)	0.305 (7.75)	M6	124 (14)
SD080R	0.875 (20)	1.375 (35)	3.228 (82.0)	2.677 (68)	1.181 (30)	–	0.315 (8)	–	1.102 (28)	0.354 (9)	M8	266 (30)
SD090R	1.000 (25)	1.5 (40)	3.622 (92.0)	2.689 (68.3)	1.181 (30)	–	0.327 (8.3)	–	1.339 (34)	0.354 (9)	M8	266 (30)
SD100R	1.438 (35)	1.75 (45)	4.095 (104.0)	2.748 (69.8)	1.181 (30)	–	0.386 (9.8)	–	1.535 (39)	0.354 (9)	M8	266 (30)

*SD010 with a bore of 8mm or 0.3125" will have a M2 clamp screw and a tightening torque of 3.5 in lbs. or 0.4Nm

** Reduced Hub Dimensions

Model	Min	Max
	Inch (mm)	Inch (mm)
SD030R	0.1875 (5)	0.375 (10)
SD040R	0.3125 (8)	0.5625 (15)
SD050R	0.375 (10)	0.750 (19)
SD060R	0.500 (12)	0.9375 (24)



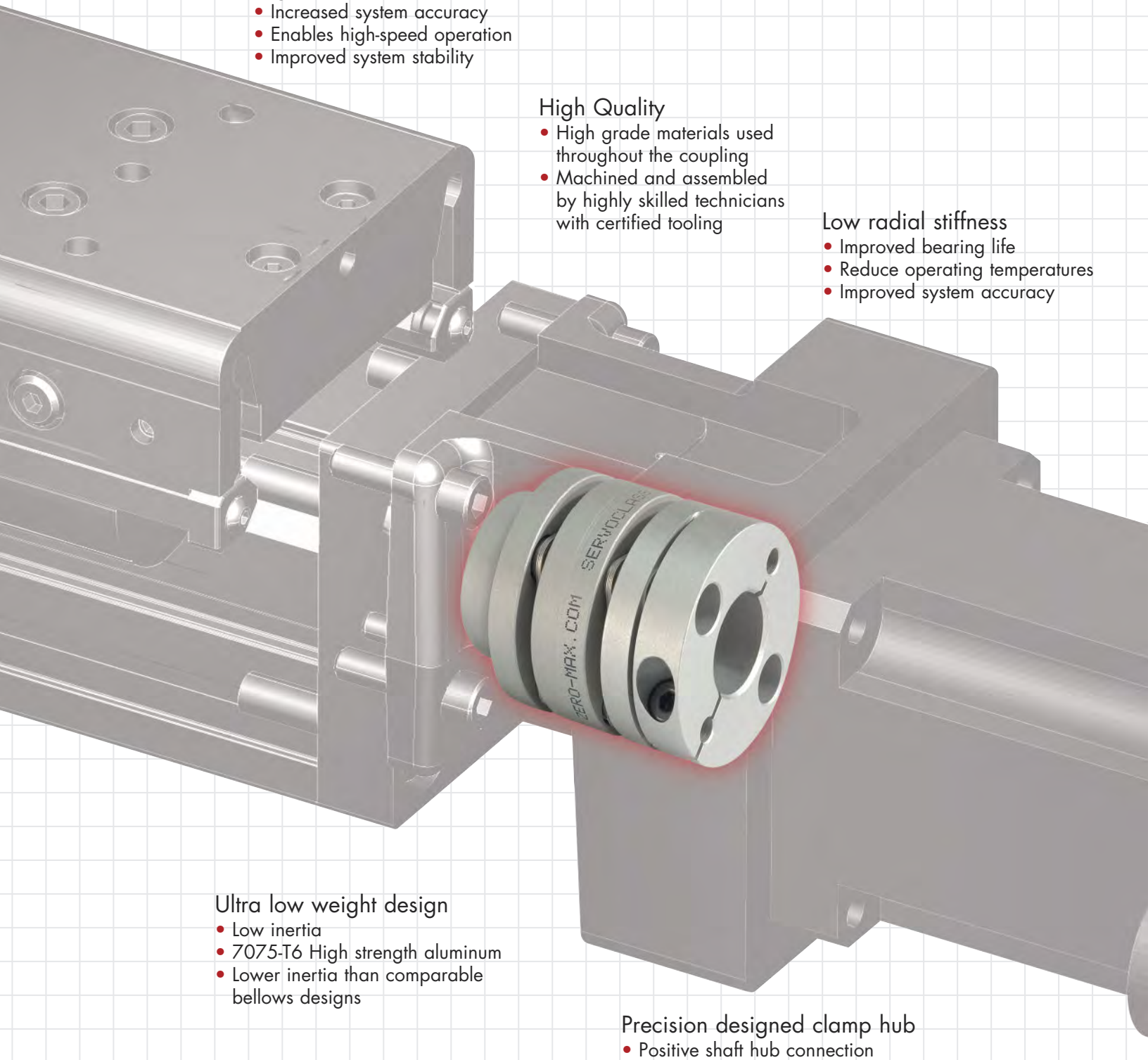
New Zero-Max Configurable 3D CAD Downloads.
www.zero-max.com

The right coupling can add performance and longevity to your system!

High Torsional Stiffness
- Increased system accuracy
- Enables high-speed operation
- Improved system stability

High Quality
- High grade materials used throughout the coupling
- Machined and assembled by highly skilled technicians with certified tooling

Low radial stiffness
- Improved bearing life
- Reduce operating temperatures
- Improved system accuracy

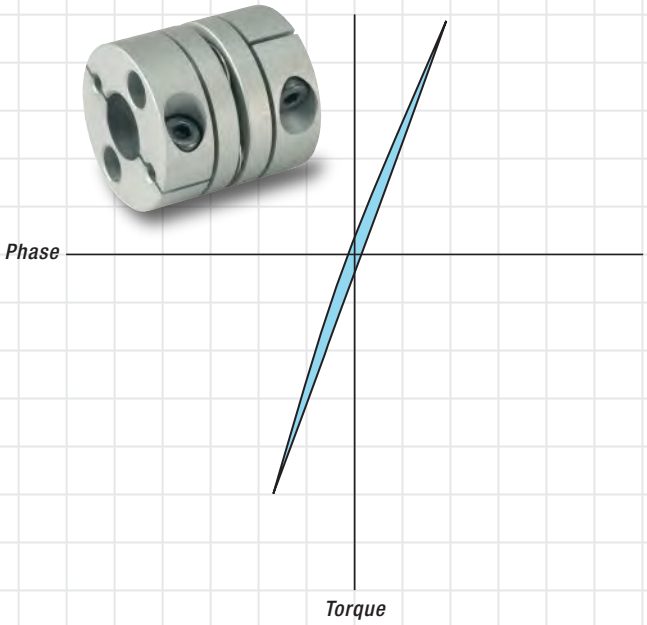


Ultra low weight design
- Low inertia
- 7075-T6 High strength aluminum
- Lower inertia than comparable bellows designs

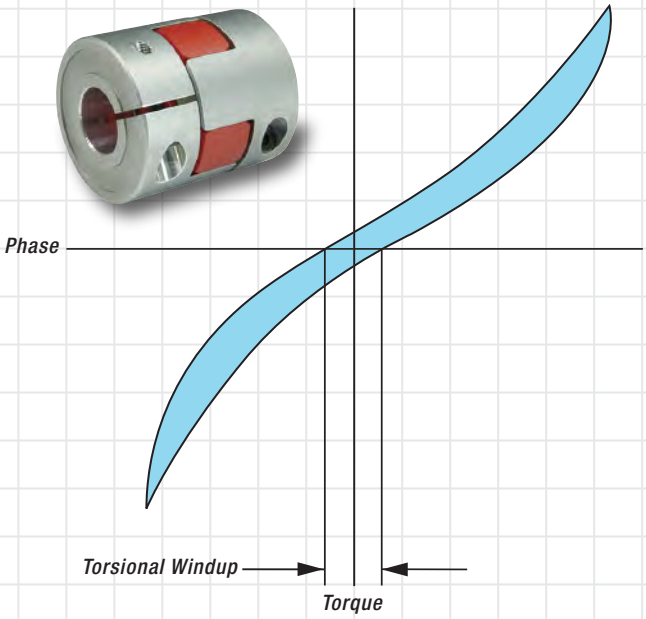
Precision designed clamp hub
- Positive shaft hub connection
- Zero Backlash
- Trouble free assembly

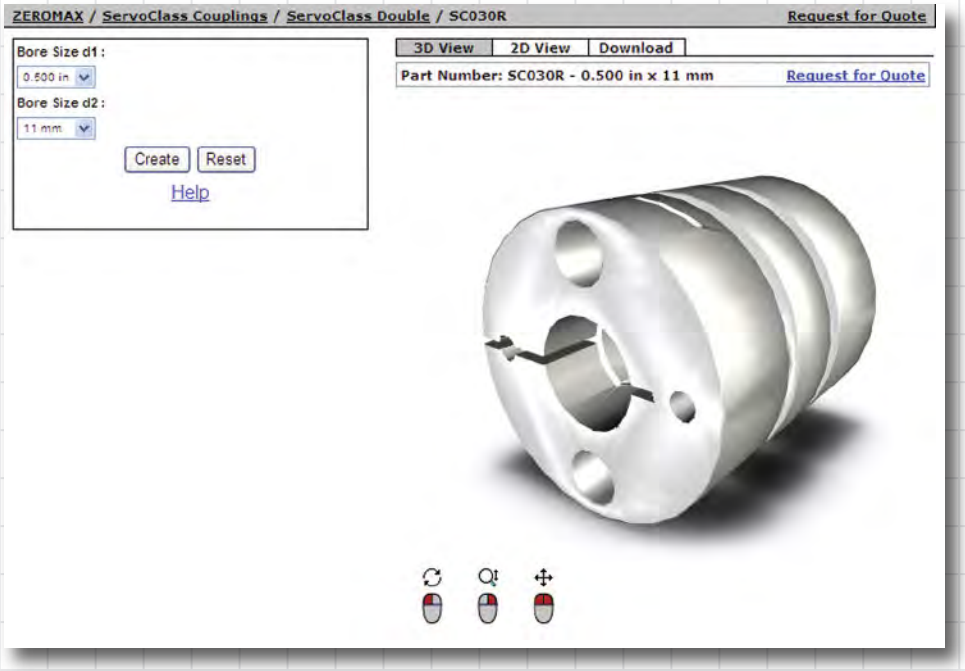
Typical Hysteresis Curves

Zero-Max ServoClass Coupling



Typical "Zero Backlash" Jaw Type Coupling





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Feed Screw Systems

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

Contact us for unclear points concerning oscillation phenomena of servomotors.

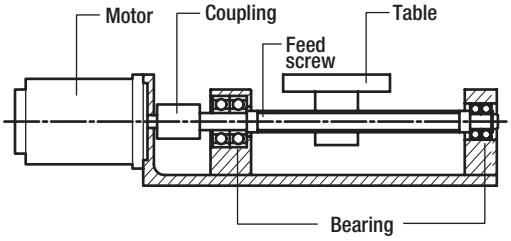
2. Resonance caused by stepping motors
Resonance can occur within a certain speed range due to the pulsation frequency of the stepping motor and the natural frequency of the entire system. Resonance can be avoided by not operating near resonant speed, or by reviewing the resonant frequency in the design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

Contact us for unclear points concerning resonance of stepping motors.

How to evaluate the resonant frequency of feed-screw system

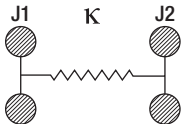
1. Select the coupling according to the normal operating torque and maximum torque of the servomotor/stepping motor.

2. In the following feed-screw system, evaluate the entire resonant frequency: Nf from the torsional spring constant: *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.



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

Nf: Eigenfrequency of the entire feed-screw system [Hz]
K: Torsional spring constant 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



Selection Procedure

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

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

2. Calculate corrected torque Td applied to the coupling after deciding the service factor K based on load conditions.
Td = Ta x K

In servomotor drive, multiply the service factor K=1.2~1.5 by the maximum torque of servomotor Ts.
Td = Ts × (1.2~1.5)

3. Select a coupling size with permissible torque Tn that becomes greater than the corrected torque Td.
Tn ≥ 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.

If our standard line of ServoClass coupling will not exactly fit your system needs, contact us for a custom design.

- Custom bores
- Ultra high speeds
- Special finishes
- Special Lengths
- Designed for operation in special environments

Part Numbering Structure

TYPE – **SIZE** **R** **(Bore x Bore)**

Code	Description
SC	Double Flex
SD	Single Flex

Code	Description
005	Size 005
010	Size 010
020	Size 020
030	Size 030
035	Size 035
040	Size 040
050	Size 050
060	Size 060
080	Size 080
090	Size 090
100	Size 100

Code
RoHS Compliant

Note: this is the standard design

See Chart
ServoClass couplings are standard without keyways. Keyways are available upon request.

Example:
SC050R
(20 mm x 1/2")
- Double Flex design
- Size 050
- 20mm bore without keyway x 1/2" bore without keyway

Note: The hub design of ServoClass couplings will provide the necessary clamping force to hold the shaft in a dynamic application without the use of keyways. Keyways are available upon request. Please reference the bore size chart below for more details on bore sizes and torque.

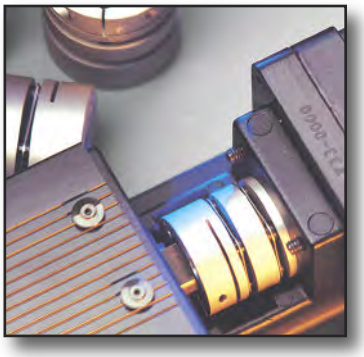
Bore Size : Standard Bore Size – Full Rated Torque.
❍: Standard Bore, See the operating torque in the Bore Size and Operating Torque table above right

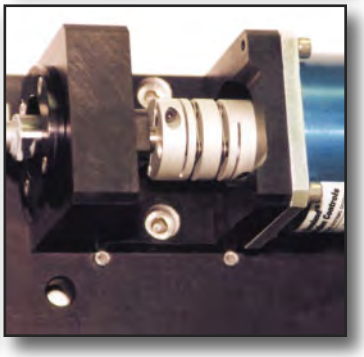
Bore Size D1 D2 mm		Model										
Inch	mm	SD/SC005R	SD/SC010R	SD/SC020R	SD/SC030R	SD/SC035R	SD/SC040R	SD/SC050R	SD/SC060R	SD/SC080R	SD/SC090R	SD/SC100R
0.157	4											
0.1875	5			❍	❍							
0.236	6				❍							
0.250	6.35											
0.275	7											
0.3125	8						❍					
0.354	9											
0.375	9.525											
0.375	10											
0.433	11											
0.500	12							❍				
0.563	14											
0.563	15								❍			
0.625	16											
0.708	18											
0.750	19											
0.813	20											
0.875	22											
0.938	24											
1.00	25											
1.10	28											
1.188	30											
1.250	32											
1.375	35											
1.500	38											
1.563	40											
1.625	42											
1.750	45											

Bore Size and Operating Torque

Bore size affects and limits the operating torque of the coupling

Model	Bore		Coupling Operating Torque	
	Inch	mm	in-lbs	Nm
SD/SC020R	0.1875	5	11	1.2
SD/SC030R	0.1875	5	25	2.8
	0.236	6	30	3.4
SD/SC040R	0.3125	8	80	9
SD/SC050R	0.375	10	195	22
SD/SC060R	0.500	12	451	51





ServoClass® Couplings

Designed for demanding servomotor applications. Zero backlash, high torsional stiffness coupling. Features flexible metal discs and keyless clamp-type mounting hubs. Couplings are RoHS compliant.

ETP® Shaft Locking Connections

Designed for quick, easy and accurate assembly of mounted shaft components. Both inch and metric bore connections are available from stock.

CD® Couplings

These high performance couplings **out last** bellows and steel disc design couplings. The unique design of the composite disc enables the CD Couplings® to withstand punishing applications and deliver high precision performance.

Roh'lix® Linear Actuators

Roh'Lix® Linear Actuators convert rotary motion into precise linear motion. Available in five models. Roh'Lix® actuators have thrust ratings from 5 to 200 lbs. All models feature built in overload protection.

Schmidt Offset Couplings®

Schmidt Offset Couplings® are designed to handle high amounts of parallel offset up to 17.00". Standard models with torque capacities up to 459,000 in-lbs.

Adjustable Speed Drive

Easy to install and maintenance free. Zero-Max Drives offer infinitely variable speeds from 0 rpm to 1/4 of input rpm. 5 models with torque ranges from 12 in-lbs to 200 in-lbs.

Torq-Tender® Couplings

Torq-Tender® Couplings provide reliable overload protection in any mechanical power transmission system. Torque ranges from 2 to 3000 in-lbs.

Crown Gear Drives

Crown Gear Drives® are available with 1:1 and 2:1 ratios. High quality AGMA class 10 spiral bevel gears. Stainless steel shafts and aluminum housings are standard on all Crown Gear Drives®.

Control-Flex® Couplings

Control-Flex® Couplings are zero backlash couplings designed for encoder and instrumentation type applications.

OHLA® Overhung Load Adapters

OHLA® Overhung Load Adapters are designed to eliminate radial and axial loads from a hydraulic pump or motor. 11 models available for mounts from SAE A to SAE F.

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