

where the world turns for couplings

Lovejoy

High Performance Gear



In This Section:

- FHS Type - High Speed Close Coupled
- FHSA Type - High Speed Standard
- FHSAA Type - High Speed Precision
- FHSPAA Type - High Speed Ultra Precision
- FHSMA Type - High Speed Marine
- FAC Type - High Speed Centrifugal Pump

HP

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Safety Warning

When using Lovejoy products, you must follow these instructions and take the following precautions. Failure to do so may cause the power transmission product to break and parts to be thrown with sufficient force to cause severe injury or death.

Refer to this Lovejoy Catalog for proper selection, sizing, horsepower, torque range, and speed range of power transmission products, including elastomeric elements for couplings. Follow the installation instructions included with the product, and in the individual product catalogs for proper installation of power transmission products. Do not exceed catalog ratings.

During start up and operation of power transmission product, avoid sudden shock loads. Coupling assembly should operate quietly and smoothly. If coupling assembly vibrates or makes beating sound, shut down immediately, and recheck alignment. Shortly after initial operation and periodically thereafter, where applicable, inspect coupling assembly for: alignment, wear of elastomeric element, bolt torques, and flexing elements for signs of fatigue. Do not operate coupling assembly if alignment is improper, or where applicable, if elastomeric element is damaged, or worn to less than 75% of its original thickness.

Do not use any of these power transmission products for elevators, man lifts, or other devices that carry people. If the power transmission product fails, the lift device could fall resulting in severe injury or death.

For all power transmission products, you must install suitable guards in accordance with OSHA and American Society of Mechanical Engineers Standards. Do not start power transmission product before suitable guards are in place. Failure to properly guard these products may result in severe injury or death from personnel contacting moving parts or from parts being thrown from assembly in the event the power transmission product fails.

If you have any questions, contact the Lovejoy Engineering Department at 1-630-852-0500.



High Performance Gear

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Lovejoy High Speed and Engineered Special Gear Couplings

The High Performance group of gear couplings consists of coupling designs that require additional engineering. While standard components do exist, the unique requirements of individual applications will customize a coupling design.

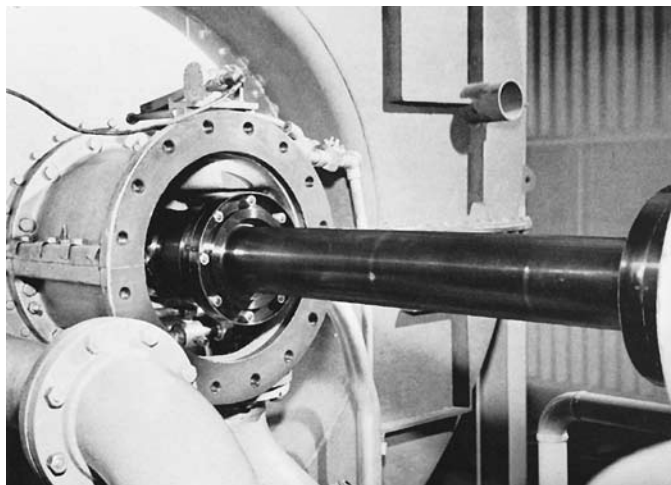
Lovejoy / Sier-Bath High Speed Couplings

The Lovejoy / Sier-Bath F Series High Speed gear couplings are designed for exacting high speed, high efficiency performance beyond the ranges and limits of standard coupling specifications. Typical applications include high speed centrifugal and axial flow compressors, gas turbines, steam turbines, test stands, etc.

High speed couplings are dynamically balanced as assemblies and match marked. Fasteners are weigh balanced in sets. Major diameter fit gear teeth, precision machined tolerances, and high quality components help to reduce the potential unbalance in the coupling assembly.

Features

- Dynamically balanced
- Fasteners are weigh balanced
- Body fitted bolts in reamed holes
- Precision manufactured close tolerances
- Piloted gear fit
- Hubs, sleeves, and spacers are alloy steel



Lovejoy Engineered Couplings

Our other product lines of engineered couplings are designed to suit special applications. Many of the components are standardized, but the special requirements of certain applications will customize each design. These couplings require specific customer input to properly design the coupling to suit the application.

Features

- Custom design assistance
- Components are standardized, yet design flexibility allows for modifications to specific applications
- Available in sizes from 1 through 30 depending on model



WARNING

You must refer to page HP-2 (Page 194) for Important Safety Instructions and Precautions for the selection and use of these products. Failure to follow the instructions and precautions can result in severe injury or death.

Lovejoy / Sier-Bath F Type High Speed Couplings

FHS High Speed Close Coupled

This coupling is made from AISI 1045 steel. The design is similar to the standard "F" except the components are machined to tighter tolerances and controlled fits to allow higher operating speeds. The maximum speed is for assembly balanced couplings. Component balancing is available and may result in lower maximum speeds.

FHSA High Speed Standard

The Lovejoy / Sier-Bath High Speed Standard gear couplings are made of alloy steel with a core hardness of $R_c 30-35$, and they are magnetic particle inspected. They are precision manufactured with ground bores and concentricity for dynamic stability. In addition, gear couplings are dynamically balanced, have a piloted gear fit, and have body-fitted bolts in reamed holes. For nitrided gear teeth, specify Class AN and a surface hardness of 85.5 minimum on the Rockwell 15N scale.

FHSA High Speed Precision

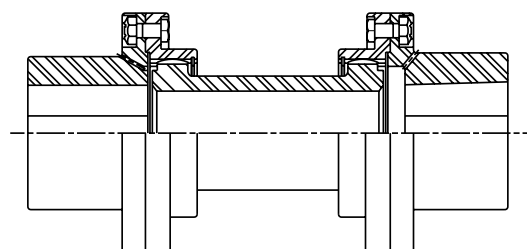
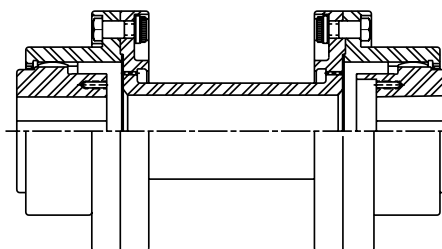
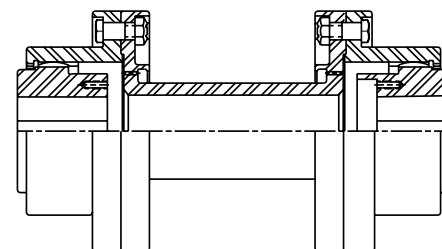
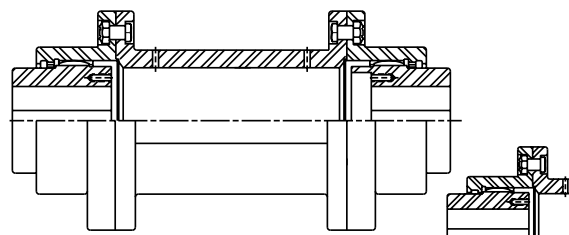
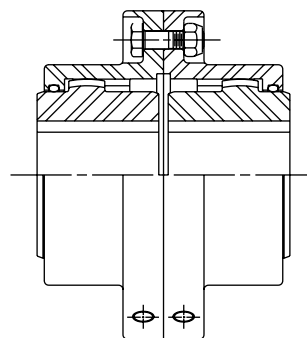
The Lovejoy / Sier-Bath High Speed Precision gear couplings are made of alloy steel with a core hardness of $R_c 30-35$ and are magnetic particle inspected. They have close tolerances and precision manufactured mating surfaces with bores ground to accurate tolerances. In addition, gear couplings are dynamically balanced, have a piloted gear fit, and have body-fitted bolts in reamed holes. The low overhung moment reduces bearing loads. They also have low moment of inertia and are extremely light weight. Balancing bands will be included, if required. For nitrided gear teeth, specify Class AAN and a surface hardness of 85.5 minimum on the Rockwell 15N scale.

FHSPAA High Speed Ultra Precision

The Lovejoy / Sier-Bath High Speed Ultra Precision gear couplings are made of Nitralloy 135 modified with a core hardness of $R_c 32-36$ and they are magnetic particle inspected. They have close tolerances and precision manufactured mating surfaces with bores precision-ground for extremely high accuracy. In addition, they have body-fitted bolts with reamed holes. These gear couplings are dynamically balanced and have a piloted gear fit to insure balance integrity during operation. The low overhung moment reduces bearing loads. They also have low moment of inertia and are extremely lightweight. Balancing bands will be included, if required. For nitrided gear teeth, specify Class PAAN and a surface hardness of 90 minimum on the Rockwell 15N scale.

FHSM High Speed Marine

The Lovejoy / Sier-Bath High Speed Marine gear couplings have a core hardness of $R_c 30-35$ and are magnetic particle inspected. They are precision manufactured with ground bores and close concentricity for dynamic stability. These couplings are dynamically balanced, have piloted gear fit, and have body-fitted bolts in reamed holes. They also have a larger shaft capacity. For nitrided gear teeth, specify Class MAN and a surface hardness of 85.5 minimum on the Rockwell 15N scale.





High Performance Gear

FHS Type

Performance Data

Lovejoy / Sier-Bath High Speed Gear Couplings

FHS Type High Speed Close Coupled Couplings

This coupling is made from AISI 4140 steel. The design is similar to the standard F except the components are machined to tighter tolerances and controlled fits to allow higher operating speeds. The maximum speed is for assembly balanced couplings. Component balance is available and may result in lower maximum speeds.

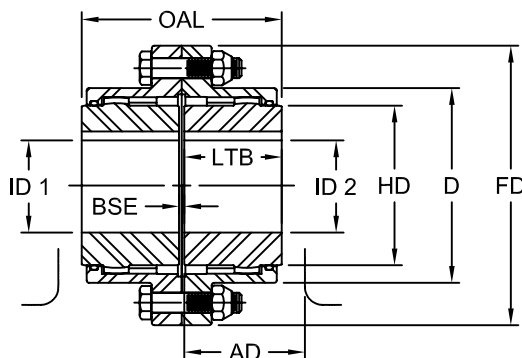
FHS Type High Speed Close Coupled Performance Data

Size	Torque		Max Speed ¹ RPM	ID1 - ID2			Weight		Inertia WR ² GD ² lb-in ² Nm ²		Torsional Stiffness in-lb/rad Nm/rad x 10 ⁶ x 10 ⁶		Parallel Misalignment in mm		Max Angular Misalignment Degrees
				Max Bore											
	in-lb x 10 ³	Nm x 10 ³		Square Keyway in	Standard Keyway in	Metric Keyway mm	lb	kg	lb-in ²	Nm ²	x 10 ⁶	x 10 ⁶	in	mm	
1	7.6	0.86	14,200	1.625	1.750	42	9	4	18.9	0.2	0.91	0.10	0.003	0.7	3/4°
1.5	18.9	2.14	10,800	2.125	2.250	56	19	9	64.9	0.7	3.58	0.40	0.030	0.8	
2	31.5	3.56	9,300	2.750	2.875	73	34	15	149.8	1.7	8.33	0.94	0.043	1.1	
2.5	56.7	6.41	7,800	3.250	3.375	85	54	25	339.8	3.9	15.61	1.76	0.052	1.3	
3	94.5	10.68	6,900	4.000	4.250	107	80	35	656.4	7.5	28.04	3.17	0.058	1.5	
3.5	151.2	17.08	5,900	4.625	4.875	125	130	59	1,482.6	17.0	43.99	4.97	0.066	1.7	
4	220.5	24.92	5,200	5.375	5.625	145	190	86	2,722.0	31.2	66.09	7.47	0.075	1.9	
4.5	302.4	34.17	4,800	6.000	6.500	165	250	114	4,285.7	49.2	93.31	10.54	0.088	2.2	
5	434.7	49.12	4,200	6.500	7.000	180	380	173	8,262.5	94.8	128.00	14.46	0.101	2.6	
5.5	573.3	64.78	3,900	7.250	7.500	200	520	236	12,779.9	146.7	161.00	18.19	0.111	2.8	
6	749.7	84.71	3,600	8.000	8.250	225	650	295	17,258.7	198.1	222.00	25.08	0.080	2.0	1/2°
7	1,008.0	113.90	3,100	9.000	9.500	255	950	431	32,162.1	369.2	341.00	38.53	0.091	2.3	

- Notes:
- 1 indicates: Maximum Speed is based on safe rim stresses and assembly balanced.
 - Angular misalignment is reduced to +/- 3/4° per gear mesh for sizes 1 thru 5.5 and +/- 1/2° per gear mesh for sizes 6 and 7.
 - Weight and inertia are based on maximum bore. Torsional Stiffness is based on nominal bore equal to coupling size.

Lovejoy / Sier-Bath High Speed Gear Couplings

FHS Type High Speed Close Coupled Couplings



FHS Type Dimensional Data

Size	OAL in	ID1 - ID2 Max Bore			LTB in	BSE in	AD in	FD in	D in	HD in
		Square Keyway in	Standard Keyway in	Metric Keyway mm						
1	3.50	1.625	1.750	42	1.69	0.13	2.04	4.56	3.06	2.31
1.5	4.00	2.125	2.250	56	1.94	0.13	2.32	6.00	3.97	3.00
2	5.00	2.750	2.875	73	2.44	0.13	2.94	7.00	4.86	4.00
2.5	6.25	3.250	3.375	85	3.03	0.19	3.47	8.38	5.84	4.63
3	7.38	4.000	4.250	107	3.59	0.19	3.97	9.44	6.84	5.63
3.5	8.63	4.625	4.875	125	4.19	0.25	4.57	11.00	7.91	6.50
4	9.75	5.375	5.625	145	4.75	0.25	5.00	12.50	9.25	7.50
4.5	10.94	6.000	6.500	165	5.31	0.31	5.50	13.63	10.38	8.50
5	12.38	6.500	7.000	180	6.03	0.31	6.34	15.31	11.56	9.50
5.5	14.13	7.250	7.500	200	6.91	0.31	7.04	16.75	12.72	10.50
6	15.13	8.000	8.250	225	7.41	0.31	8.35	18.00	14.00	11.50
7	17.75	9.000	9.500	255	8.69	0.38	9.82	20.75	15.75	13.00



High Performance Gear

FHSA Type

Performance Data

Lovejoy / Sier-Bath High Speed Gear Couplings

FHSA Type High Speed Standard

The High Speed Standard gear couplings are made of alloy steel with a core hardness of HRC 30-35 and are magnetic particle inspected. They are precision manufactured with ground bores and concentricity for dynamic stability. In addition, the gear couplings are dynamically balanced, have a piloted gear fit and have body fitted bolts in reamed holes. For nitrided gear teeth specify Class AN and a surface hardness of 85.5 minimum on the Rockwell 15N scale.

FHSA Type High Speed Standard Performance Data

Size	Torque		Max Speed	ID1 - ID2		Nominal BSE		Weight		Inertia		Torsional Stiffness		Max Angular Misalignment Degrees
				Max Bore										
	in-lb x 10 ³	Nm x 10 ³		Square Keyway in	Metric Keyway mm					WR ² lb-in ²	GD ² Nm ²	in-lb/rad x 10 ⁶	Nm/rad x 10 ⁶	
1.5	12.6	1.42	18,000	1.5	38	5	127.00	12.0	5.4	25.7	0.3	2.0	0.23	1/2°
2	22.6	2.55	17,000	2.0	52	5	127.00	20.1	9.1	85.4	1.0	5.1	0.58	
2.5	46.6	5.27	16,000	2.5	65	5	127.00	35.2	16.0	163.5	1.9	10.8	1.22	
3	68.0	7.68	15,000	3.0	81	5	127.00	56.0	25.4	325.0	3.7	18.3	2.07	
3.5	135.5	15.31	14,000	3.5	95	5	127.00	77.1	35.0	706.4	8.1	31.0	3.50	
4	209.9	23.72	13,000	4.0	107	7	177.80	128.7	58.4	1,573.9	18.1	43.7	4.94	
4.5	310.7	35.11	11,000	4.5	114	7	177.80	184.8	83.8	2,997.3	34.4	68.9	7.79	
5	441.0	49.83	10,000	5.0	137	7	177.80	242.6	110.0	4,639.7	53.3	89.7	10.14	
5.5	590.5	66.72	9,600	5.5	150	8	203.20	362.1	164.2	8,758.4	100.5	120.0	13.56	
6	731.0	82.60	9,000	6.0	162	8	203.20	470.1	231.2	13,797.7	158.4	157.3	17.77	

FHSA Type High Speed Standard Performance Data

Size	Weight						WR ²					Torsional Stiffness	
	Hub	Sleeve	Spacer Per Dim S	Bolts & Nuts Per Flange	Complete Cplg Per Dim BSE	Spacer Body Per Inch	Hub	Sleeve	Spacer Per Dim S	Complete Cplg Per Dim BSE	Spacer Body Per Inch	Spacer Cplg Per BSE (ksi)	Spacer Body Per Inch (ki)
	lb	lb	lb	lb	lb	lb	lb-in ²	lb-in ²	lb-in ²	lb-in ²	lb-in ²	in-lb/rad x 10 ⁶	in-lb/rad x 10 ⁶
1.5	1.48	1.84	5.10	0.13	12.00	0.71	1.4	5.2	12.5	25.7	1.3	2.0	55
2	2.48	2.83	7.76	0.51	20.12	0.95	4.9	18.9	37.8	85.4	2.8	5.1	120
2.5	6.23	4.83	11.78	0.63	35.16	1.46	17.2	27.1	74.9	163.5	70.0	10.8	298
3	10.03	8.68	15.64	1.47	56.00	1.64	39.1	49.5	147.8	325.0	10.9	18.3	462
3.5	18.02	10.80	15.97	1.76	77.13	2.04	100.1	145.3	215.6	706.4	19.2	31.0	815
4	26.94	17.79	32.09	3.58	128.71	2.33	195.9	318.2	545.7	1,573.9	28.6	43.7	1,215
4.5	41.12	27.03	40.15	4.18	184.81	3.18	393.2	632.7	945.5	2,997.3	53.5	68.9	2,269
5	62.41	31.09	47.24	4.18	242.60	3.48	767.1	901.1	1,303.3	4,639.7	69.5	89.7	2,950
5.5	86.69	51.34	72.53	6.77	362.10	3.60	1,308.0	1,846.0	2,450.4	8,758.4	89.5	120.0	3,799
6	120.66	63.27	86.78	7.74	470.12	4.28	2,225.0	2,787.0	3,773.7	13,797.7	129.6	157.3	5,499

Notes: ■ All weights, WR² and Torsional Stiffness are based on maximum bore.

■ To find the stiffness factor for a coupling assembly with a spacer "n" inches longer than standard:

Let k_x = new stiffness factor

n = number of additional inches of spacer

k_s = stiffness factor for standard coupling from table

k_i = stiffness factor for 1 inch length of standard spacer body from table

Then $1/k_x + n/k_i$

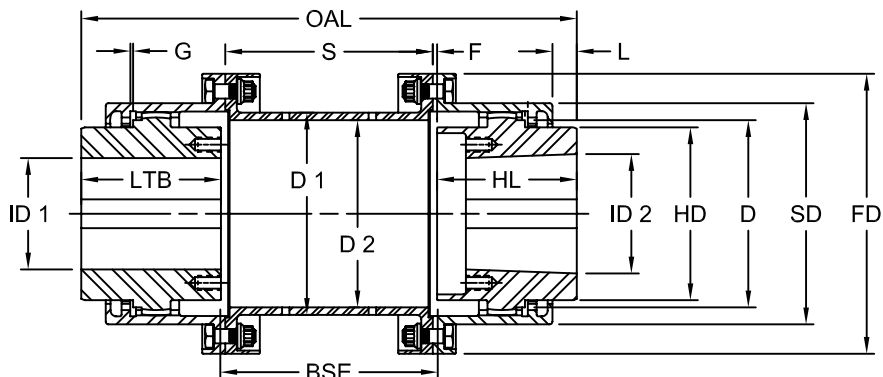
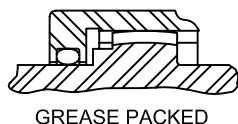
Example: What is the new stiffness factor for a size 1.5 coupling if the spacer length is 3 inches longer than standard?

$$1/k_x = 1/2 + 3 \times 1/55 = 0.55454\ldots k_x = 1.803$$

If coupling spacer is shorter than standard, the formula becomes $1/k_x = 1/k_s - n/k_i$.

Lovejoy / Sier-Bath High Speed Gear Couplings

FHSA Type High Speed Standard Couplings



FHSA Type Dimensional Data

Size	OAL	S	L	G	F	ID1 - ID2 Max Bore	LTB	HL	BSE	FD	SD	D	HD	D1	D2	Bolts Per Flange	
	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	Qty	Size
1.5	9.13	4.81	0.50	0.06	0.09	1.5	2.06	2.06	5	4.56	3.06	2.38	2.19	3.00	2.41	6	1/4
2	8.88	4.81	0.66	0.06	0.09	2.0	2.44	2.44	5	6.00	3.97	3.06	2.88	3.75	3.13	8	3/8
2.5	11.06	4.81	0.75	0.06	0.09	2.5	3.03	3.03	5	7.00	4.91	3.88	3.63	4.75	4.00	10	3/8
3	12.19	4.81	0.81	0.09	0.09	3.0	3.59	3.59	5	8.38	5.91	4.69	4.25	5.50	4.78	10	1/2
3.5	13.38	4.81	1.00	0.09	0.09	3.5	4.19	4.19	5	9.44	6.91	5.63	5.25	6.50	5.75	12	1/2
4	16.50	6.75	1.06	0.09	0.13	4.0	4.75	4.75	7	11.00	7.91	6.38	6.00	7.38	6.63	12	5/8
4.5	17.63	6.75	1.13	0.13	0.13	4.5	5.31	5.31	7	12.50	9.25	7.25	6.88	8.63	7.75	14	5/8
5	19.06	6.75	1.31	0.13	0.13	5.0	6.03	6.03	7	13.63	10.38	8.25	7.75	9.38	8.50	14	5/8
5.5	21.25	7.75	1.38	0.13	0.13	5.5	6.63	6.63	8	15.31	11.56	9.25	8.75	10.38	9.96	14	5/8
6	22.75	7.75	1.50	0.13	0.13	6.0	7.38	7.38	8	16.75	12.81	10.25	9.63	11.44	10.96	16	3/4

HP



High Performance Gear

FHSAA Type

Performance Data

Lovejoy / Sier-Bath High Speed Gear Couplings

FHSAA Type High Speed Precision

The High Speed Precision gear couplings are made of alloy steel with a core hardness of HRC 30-35 and are magnetic particle inspected. They have close tolerances and precision manufactured mating surfaces with bores ground to accurated tolerance. In addition, gear couplings are dynamically balanced, have a piloted gear fit and have body fitted bolts in reamed holes. The low overhung moment reduces bearing loads. They also have a low moment of inertia and are extremely light weight. Balancing bands will be included if required. For nitrided gear teeth, specify ANN and a surface hardness of 85.56 minimum in the Rockwell 15N scale.

FHSAA Type High Speed Precision Performance Data

Size	Torque		Max Speed RPM	ID1 - ID2		Nominal BSE		Weight		Inertia WR ² GD ²		Torsional Stiffness		Max Angular Misalignment Degrees
	in-lb	Nm		Max Bore	Max Bore									
	x 10 ³	x 10 ³		Square Keyway	Metric Keyway									
				in	mm	in	mm	lb	kg	lb-in ²	Nm ²	in-lb/rad x 10 ⁶	Nm/rad x 10 ⁶	
1.5	18.9	2.14	20,000	1.625	42	5	127.0	15.2	6.9	35.5	0.4	1.7	19.00	1/2°
2	28.3	3.20	18,700	2.125	56	5	127.0	25.9	11.8	76.9	0.9	4.0	0.45	
2.5	63.0	7.12	17,600	2.625	70	5	127.0	36.9	16.8	189.8	2.2	9.0	1.02	
3	100.8	11.39	16,500	3.125	84	7	177.8	60.2	27.3	389.8	4.5	12.2	1.38	
3.5	151.2	17.08	15,400	3.625	97	7	177.8	78.5	35.6	659.3	7.6	20.2	2.28	
4	220.6	24.93	14,300	4.125	111	8	203.2	113.3	51.4	1,169.4	13.4	29.7	3.36	
4.5	330.8	37.38	12,100	4.625	124	8	203.2	163.2	74.0	2,178.2	25.0	47.2	5.33	
5	479.0	54.12	11,000	5.125	140	10	254.0	239.5	108.6	4,116.6	47.3	69.4	7.84	
5.5	617.6	69.79	10,500	5.625	150	10	254.0	317.6	144.1	6,719.7	77.1	92.1	10.41	
6	813.0	91.86	9,900	6.125	170	10	254.0	398.4	180.7	8,993.1	103.2	123.3	13.93	

FHSAA Type High Speed Precision Performance Data

Size	Weight						WR ²					Torsional Stiffness	
	Hub	Sleeve	Spacer Per Dim S	Bolts & Nuts Per Flange	Complete Cplg Per Dim BSE	Spacer Body Per Inch	Hub	Sleeve	Spacer Per Dim S	Complete Cplg Per Dim BSE	Spacer Body Per Inch	Spacer Cplg Per BSE (ksi)	Spacer Body Per Inch (ki)
	lb	lb	lb	lb	lb	lb	lb-in ²	lb-in ²	lb-in ²	lb-in ²	lb-in ²	in-lb/rad x 10 ⁶	in-lb/rad x 10 ⁶
1.5	2.22	2.18	5.48	0.47	15.22	0.39	2.8	7.5	14.9	35.5	0.3	1.7	12
2	3.81	5.00	7.28	0.51	25.92	0.52	7.7	16.2	29.1	76.9	0.7	4.0	31
2.5	6.96	5.63	10.50	0.63	36.94	0.69	23.7	40.0	62.4	189.8	1.7	9.0	72
3	11.79	8.69	16.32	1.47	60.22	1.02	51.1	82.7	122.2	389.8	3.5	12.2	148
3.5	18.31	10.34	17.72	1.76	78.54	1.27	104.6	141.1	167.9	659.3	6.6	20.2	281
4	25.50	13.80	25.20	3.58	113.32	1.54	218.0	204.7	324.0	1,169.4	11.9	29.7	508
4.5	39.99	19.76	36.50	4.18	163.16	2.36	387.3	408.5	586.4	2,178.2	21.7	47.2	923
5	59.32	29.48	52.54	4.15	239.50	3.23	738.9	797.8	1,043.1	4,116.6	42.5	69.4	1,804
5.5	79.84	38.06	68.26	6.77	317.60	3.56	1,196.3	1,259.6	1,807.7	6,719.7	57.1	92.1	2,422
6	99.66	52.87	77.86	7.74	398.40	3.89	1,774.2	2,089.4	2,465.8	8,993.1	74.6	123.3	3,167

Notes: ■ All weights, WR² and Torsional Stiffness are based on maximum bore.

■ To find the stiffness factor for a coupling assembly with a spacer "n" inches longer than standard:

Let kx = new stiffness factor

n = number of additional inches of spacer

ks = stiffness factor for standard coupling from table

ki = stiffness factor for 1 inch length of standard spacer body from table

Then 1/ks + n 1/ki

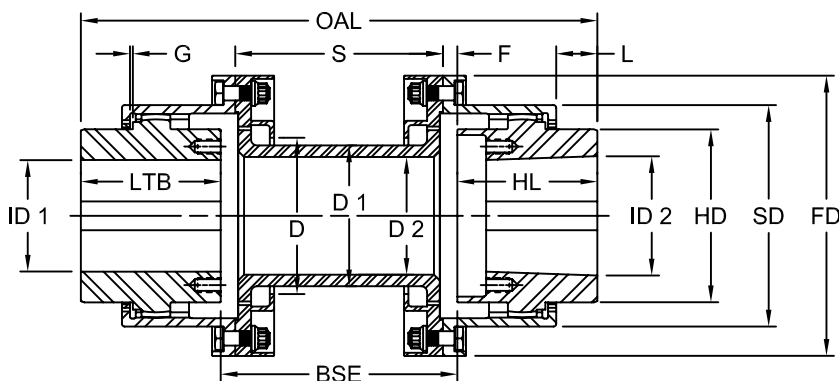
Example: What is the new stiffness factor for a size 1.5 coupling if the spacer length is 3 inches longer than standard?

$$1/kx = 1/21.7 + 3 \times 1/12 = 0.83823..kx = 1.192$$

If coupling spacer is shorter than standard, the formula becomes 1/kx = 1/ks - n 1/ki.

Lovejoy / Sier-Bath High Speed Gear Couplings

FHSAA Type High Speed Precision Couplings



FHSAA Type Dimensional Data

Size	OAL in	L in	F in	S in	G in	ID1-ID2 Max Bore in	HL in	LTB in	BSE in	FD in	SD in	D in	HD in	D1 in	D2 in	Bolts Per Flange	
																Qty	Size
1.5	9.25	0.19	0.09	4.44	0.06	1.625	2.13	2.13	5	5.00	3.50	2.50	2.56	2.00	1.50	8	5/16
2	10.00	0.25	0.09	4.44	0.06	2.125	2.50	2.50	5	5.88	4.31	3.19	3.19	2.63	2.13	8	3/8
2.5	11.25	0.25	0.09	4.44	0.06	2.625	3.13	3.13	5	6.88	5.31	4.00	4.00	3.38	2.88	10	3/8
3	14.25	0.25	0.09	6.44	0.09	3.125	3.63	3.63	7	8.19	6.13	4.69	4.75	4.00	3.38	10	1/2
3.5	15.50	0.25	0.09	6.44	0.09	3.625	4.25	4.25	7	9.00	7.00	5.56	5.50	4.88	4.25	12	1/2
4	17.75	0.25	0.09	7.44	0.09	4.125	4.88	4.88	8	10.00	7.88	6.75	6.38	5.88	5.25	12	5/8
4.5	19.00	0.38	0.09	7.44	0.09	4.625	5.50	5.50	8	11.63	9.13	7.38	7.00	6.50	5.63	12	5/8
5	22.50	0.50	0.09	9.44	0.09	5.125	6.25	6.25	10	13.00	10.50	8.75	7.13	7.75	6.75	14	5/8
5.5	23.50	0.50	0.09	9.44	0.09	5.625	6.75	6.75	10	14.50	11.50	9.50	8.75	8.50	7.50	14	3/4
6	24.50	0.50	0.09	9.44	0.09	6.125	7.25	7.25	10	15.75	12.75	10.44	9.38	9.25	8.25	16	3/4



High Performance Gear

FHSPAA Type

Performance Data

Lovejoy / Sier-Bath High Speed Gear Couplings

FHSPAA Type High Speed Ultra Precision

The High Speed Ultra Precision gear couplings are made of Nit alloy 135 modified with a core hardness of HRC 32-36 and are magnetic particle inspected. They have close tolerances and precision manufactured mating surfaces with bores precision-ground for extremely high accuracy. In addition, they have body fitted bolts with reamed holes. These gear couplings are dynamically balanced and have a piloted gear fit to insure balance integrity during operation. The low overhung moment reduces bearing loads. They also have low moment of inertia and are extremely lightweight. Balancing bands will be included, if required. For nitrided teeth, specify class PAAN and a surface hardness of 90 minimum on the Rockwell 15N scale.

FHSPAA Type High Speed Ultra Precision Performance Data

Size	Torque		Max Speed RPM	ID1 - ID2		Nominal BSE		Weight		Inertia		Torsional Stiffness		Max Angular Misalignment Degrees
	in-lb x 10³	Nm x 10³		Max Bore						WR²	GD²	in-lb/rad x 10⁶	Nm/rad x 10⁶	
				Square Keyway in	Metric Keyway mm									
1.5	18.9	2.14	20,000	1.625	42	5	127.0	15.2	6.9	35.5	0.4	1.7	0.19	1/2°
2	28.3	3.20	18,700	2.125	56	5	127.0	25.9	11.8	76.9	0.9	4.0	0.45	
2.5	63.0	7.12	17,600	2.625	70	5	127.0	36.9	16.8	189.8	2.2	9.0	1.02	
3	100.8	11.39	16,500	3.125	84	7	177.8	60.2	27.3	389.8	4.5	12.2	1.38	
3.5	151.2	17.08	15,400	3.625	97	7	177.8	78.5	35.6	659.3	7.6	20.2	2.28	
4	220.6	24.93	14,300	4.125	111	8	203.2	113.3	51.4	1,169.4	13.4	29.7	3.86	
4.5	330.8	37.36	12,100	4.625	124	8	203.2	163.2	74.0	2,178.0	25.0	17.2	5.33	
5	479.0	54.12	11,000	5.125	140	10	254.0	239.5	108.6	4,116.6	47.3	69.4	7.84	
5.5	617.6	69.79	10,500	5.625	150	10	254.0	317.6	144.1	6,719.7	77.1	92.1	10.41	
6	813.0	91.86	9,900	6.125	170	10	254.0	398.4	180.7	8,993.1	103.2	123.3	13.93	

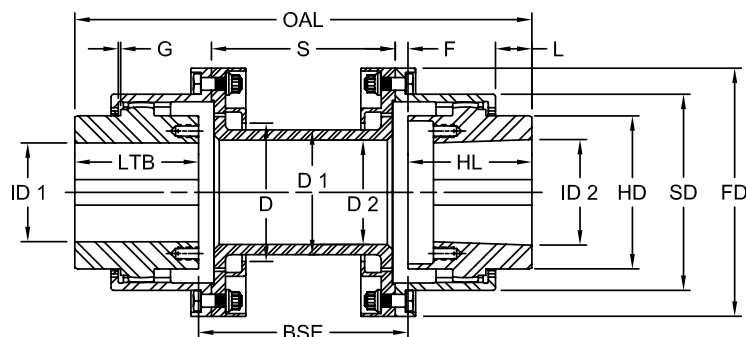
FHSPAA Type High Speed Ultra Precision Performance Data

Size	Weight						WR ²					Torsional Stiffness	
	Hub	Sleeve	Spacer Per Dim S	Bolts & Nuts Per Flange	Complete Cplg Per Dim BSE	Spacer Body Per Inch	Hub	Sleeve	Spacer Per Dim S	Complete Cplg Per Dim BSE	Spacer Body Per Inch	Spacer Cplg Per BSE (ksi)	Spacer Body Per Inch (ki)
	lb	lb	lb	lb	lb	lb	lb-in ²	lb-in ²	lb-in ²	lb-in ²	lb-in ²	in-lb/rad x 10 ⁶	in-lb/rad x 10 ⁶
1.5	2.22	2.18	5.48	0.47	15.22	0.39	2.8	7.5	14.9	35.5	0.3	1.7	12
2	3.81	5.00	7.28	0.51	25.92	0.52	7.7	16.2	29.1	76.9	0.7	4.0	31
2.5	6.96	5.63	10.50	0.63	36.94	0.69	23.7	40.0	62.4	189.8	1.7	9.0	72
3	11.79	8.69	16.32	1.47	60.22	1.02	51.1	82.7	122.2	389.8	3.5	12.2	148
3.5	18.31	10.34	17.72	1.76	78.54	1.27	104.6	141.1	167.9	659.3	6.6	20.2	281
4	28.50	13.80	25.20	3.58	113.32	1.54	218.0	204.7	324.0	1,169.4	11.9	29.7	508
4.5	39.99	19.76	36.50	4.18	163.16	2.36	387.3	408.5	586.4	2,178.2	21.7	47.2	923
5	59.82	29.48	52.54	4.18	239.50	3.23	738.9	797.8	1,043.1	4,116.6	42.5	69.4	1,804
5.5	79.84	38.06	68.26	6.77	317.60	3.56	1,196.3	1,259.6	1,807.7	6,719.7	57.1	92.1	2,422
6	99.66	52.87	77.86	7.74	398.40	3.89	1,774.2	2,089.4	2,465.8	8,993.1	74.6	123.3	3,167

Notes: ■ All weights, WR² and Torsional Stiffness are based on maximum bore.
 ■ To find the stiffness factor for a coupling assembly with a spacer "n" inches longer than standard:
 Let k_x = new stiffness factor
 n = number of additional inches of spacer
 k_s = stiffness factor for standard coupling from table
 k_i = stiffness factor for 1 inch length of standard spacer body from table
 Then $1/k_x + n/k_i$
 Example: What is the new stiffness factor for a size 1.5 coupling if the spacer length is 3 inches longer than standard?
 $1/k_x = 1/1.7 + 3 \times 1/12 = 0.83823..k_x = 1.192$
 If coupling spacer is shorter than standard, the formula becomes $1/k_x = 1/k_s - n/k_i$.

Lovejoy / Sier-Bath High Speed Gear Couplings

FHSPAA Type High Speed Ultra Precision Couplings



FHSPAA Type Dimensional Data

Size	OAL in	L in	F in	S in	G in	ID1 - ID2 Max Bore in	HL in	LTB in	BSE in	FD in	SD in	HD in	D in	D1 in	D2 in	Bolts Per Flange	
																Qty	Size
1.5	9.25	0.19	0.09	4.44	0.06	1.625	2.13	2.13	5	5.00	3.50	2.56	2.50	2.00	1.50	8	5/16
2	10.00	0.25	0.09	4.44	0.06	2.125	2.50	2.50	5	5.88	4.31	3.19	3.19	2.63	2.13	8	3/8
2.5	11.25	0.25	0.09	4.44	0.06	2.625	3.13	3.13	5	6.88	5.31	4.00	4.00	3.38	2.88	10	3/8
3	14.25	0.25	0.09	6.44	0.09	3.125	3.63	3.63	7	8.19	6.13	4.75	4.69	4.00	3.38	10	1/2
3.5	15.50	0.25	0.09	6.44	0.09	3.625	4.25	4.25	7	9.00	7.00	5.50	5.56	4.88	4.25	12	1/2
4	17.75	0.25	0.09	7.44	0.09	4.125	4.88	4.88	8	10.00	7.88	6.38	6.75	5.88	5.25	12	5/8
4.5	19.00	0.38	0.09	7.44	0.09	4.625	5.50	5.50	8	11.63	9.13	7.00	7.38	6.50	5.63	12	5/8
5	22.50	0.50	0.09	9.44	0.09	5.125	6.25	6.25	10	13.00	10.50	7.13	8.75	7.75	6.75	14	5/8
5.5	23.50	0.50	0.09	9.44	0.09	5.625	6.75	6.75	10	14.50	11.50	8.75	9.50	8.50	7.50	14	3/4
6	24.50	0.50	0.09	9.44	0.09	6.125	7.25	7.25	10	15.75	12.75	9.38	10.44	9.25	8.25	16	3/4

HP



High Performance Gear

FHSMA Type

Performance Data

Lovejoy / Sier-Bath Type High Speed Gear Couplings

FHSMA Type High Speed Marine

The High Speed Marine gear couplings have a core hardness of HRC 30-35 and are magnetic particle inspected. They are precision manufactured with ground bores and close concentricity for dynamic stability. These couplings are dynamically balanced, have piloted gear fit, and have body fitted bolts and reamed holes. They also have a larger shaft capacity. For nitrided gear teeth, specify Class MAN and a surface hardness of 85.5 minimum on the Rockwell 15N scale.

FHSMA Type High Speed Marine Performance Data

Size	Torque		Max Speed RPM	ID1 - ID2		Nominal BSE		Weight		Inertia		Torsional Stiffness		Max Angular Misalignment Degrees
	in-lb x 10 ³	Nm x 10 ³		Max Bore						WR ² lb-in ²	GD ² Nm ²	in-lb/rad x 10 ⁶	Nm/rad x 10 ⁶	
				Square Keyway in	Metric Keyway mm									
1.5	18.9	2.14	18,000	2.125	56	5	127.0	16.6	7.5	41.2	0.5	3.3	0.37	1/2°
2	28.3	3.20	17,000	2.625	70	5	127.0	26.6	12.1	95.0	1.1	7.0	0.79	
2.5	63.0	7.12	16,000	3.125	84	5	127.0	43.0	19.5	219.6	2.5	13.7	1.55	
3	100.8	11.39	15,000	3.625	97	7	177.8	68.2	30.9	464.0	5.3	20.4	2.31	
3.5	151.2	17.08	14,000	4.625	124	7	177.8	95.1	43.2	885.2	10.2	34.2	3.86	
4	220.6	24.93	13,000	5.125	140	8	203.2	156.3	70.9	1,926.0	22.1	54.6	6.17	
4.5	330.8	37.38	11,000	5.625	150	8	203.2	229.9	104.3	3,695.7	42.4	86.2	9.74	
5	479.0	54.12	10,000	6.625	186	10	254.0	301.3	136.7	6,459.5	74.2	118.1	13.34	
5.5	617.6	69.79	9,600	7.125	192	10	254.0	396.6	179.9	10,200.7	117.1	165.8	18.73	
6	813.0	91.86	9,000	7.625	208	10	254.0	596.3	270.5	19,736.0	226.6	216.7	24.49	

FHSMA Type High Speed Marine Performance Data

Size	Weight						WR ²					Torsional Stiffness		
	Hub	Sleeve	Spacer Per Dim S	Bolts & Nuts Per Flange	Complete Cplg Per Dim BSE	Spacer Body Per Inch	Hub	Sleeve	Spacer Per Dim S	Complete Cplg Per Dim BSE	Spacer Body Per Inch	Spacer Cplg Per BSE (ksi)	Spacer Body Per Inch (ki)	Spacer Body Per Inch (ki)
	lb	lb	lb	lb	lb	lb	lb-in ²	lb-in ²	lb-in ²	lb-in ²	lb-in ²	in-lb/rad x 10 ⁶	in-lb/rad x 10 ⁶	in-lb/rad x 10 ⁶
1.5	4.03	1.92	3.72	0.47	16.56	0.57	10.9	7.3	4.8	41.2	0.62	3.3	26	26
2	7.39	2.82	5.20	0.51	26.64	0.75	27.2	14.7	11.2	95.0	1.37	7.0	57	57
2.5	13.2	3.84	7.70	0.63	43.04	0.95	67.3	28.8	27.4	219.6	2.85	13.7	120	120
3	20.32	5.54	13.52	1.47	68.18	1.38	141.7	57.7	65.2	464.0	5.90	20.4	250	250
3.5	31.03	5.92	17.72	1.76	95.14	1.59	305.9	78.1	117.2	885.2	8.99	34.2	381	381
4	49.66	11.06	27.70	3.58	156.30	2.45	635.4	208.4	238.4	1,926.0	18.64	54.6	790	790
4.5	76.53	15.50	37.44	4.18	229.86	3.22	1248.4	378.7	411.5	3,696.7	33.60	86.2	1,425	1,425
5	98.66	19.12	57.40	4.18	301.32	3.61	2216.7	578.3	869.5	6,459.5	46.70	118.1	1,980	1,980
5.5	123.24	32.42	69.72	6.77	396.56	4.52	3,190.6	1,249.5	1,320.5	10,200.7	74.95	165.8	3,178	3,178
6	209.2	39.42	83.54	7.74	596.26	4.93	7,096.1	1,807.1	1,929.6	19,736.0	97.58	216.7	4,139	4,139

Notes: ■ All weights, WR² and Torsional Stiffness are based on maximum bore.

■ To find the stiffness factor for a coupling assembly with a spacer "n" inches longer than standard:

Let k_x = new stiffness factor

n = number of additional inches of spacer

k_s = stiffness factor for standard coupling from table

k_i = stiffness factor for 1 inch length of standard spacer body from table

Then $1/k_x + n$ $1/k_i$

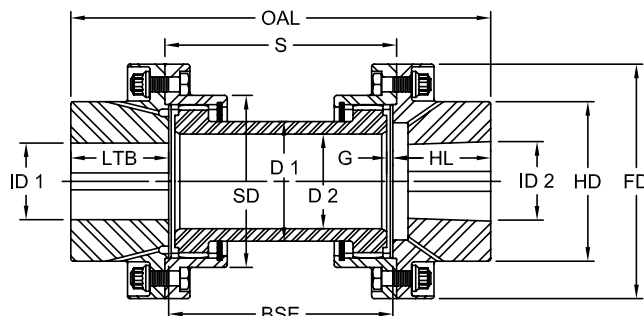
Example: What is the new stiffness factor for a size 1.5 coupling if the spacer length is 3 inches longer than standard?

$$1/k_x = 1/3.3 + 3 \times 1/26 = 0.41841..k_x = 2.389$$

If coupling spacer is shorter than standard, the formula becomes $1/k_x = 1/k_s - n$ $1/k_i$.

Lovejoy / Sier-Bath High Speed Gear Couplings

FHSMA Type High Speed Marine Couplings



FHSMA Type Dimensional Data

Size	OAL in	S in	G in	ID1 - ID2 Max Bore in	HL in	LTB in	BSE in	FD in	HD in	SD in	D1 in	D2 in	Bolts Per Flange	
													Qty	Size
1.5	10.00	4.81	0.09	2.125	2.50	2.50	5	5.00	3.19	3.50	2.38	1.75	8	5/16
2	11.25	4.81	0.09	2.625	3.13	3.13	5	5.88	4.00	4.31	3.00	2.38	8	3/8
2.5	12.25	4.81	0.09	3.125	3.63	3.63	5	6.88	5.00	5.31	3.75	3.13	10	3/8
3	15.50	6.81	0.09	3.625	4.25	4.25	7	8.19	5.75	6.13	4.50	3.75	10	1/2
3.5	17.50	6.75	0.13	4.625	5.25	5.25	7	9.44	6.75	7.00	5.13	4.38	12	1/2
4	20.00	7.75	0.13	5.125	6.00	6.00	8	11.00	7.75	7.88	6.00	5.00	12	5/8
4.5	21.25	7.75	0.13	5.625	6.63	6.63	8	12.50	9.00	9.13	7.00	5.88	12	5/8
5	24.25	9.69	0.16	6.625	7.13	7.13	10	13.63	10.13	10.50	7.75	6.63	14	5/8
5.5	26.00	9.69	0.16	7.125	8.00	8.00	10	15.31	11.00	11.50	8.50	7.50	14	3/4
6	27.50	9.69	0.16	7.625	8.75	8.75	10	16.75	12.50	12.75	9.25	8.25	16	3/4

HP



High Performance Gear

FAC Type

Performance Data

Lovejoy / Sier-Bath High Speed Gear Couplings

FAC Type Engineered Centrifugal Pump Couplings

This coupling is designed specifically for centrifugal pumps and compressors. It is easy to install and replace, efficiently designed to reduce spare part inventory and is precision manufactured.

Individual components are easy to assemble and easy to replace. Component balanced parts eliminate your need to keep complete couplings in stock. Grease seals are replaceable without major disassembly. Four sizes accommodate 80% of all normally used shaft diameters. Other features include extended time between lubrications, infinitely adjustable BSE, M-F pilot for proper fit, vertical modification, center assembly independently replaceable, and conforms to API 610 - 6th edition. Its precision balanced parts are made of high strength alloy 4140 steel. Bolts are weigh-balanced as sets.

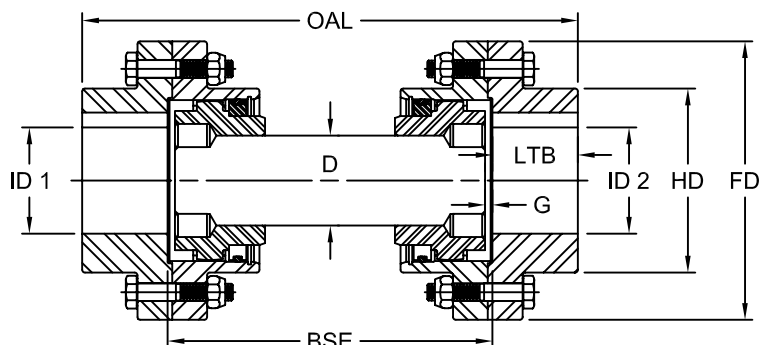
FAC Type Engineered Centrifugal Pump Performance Data

Size	Torque		Max Speed		ID1 - ID2			Nominal BSE		Weight Solid		Inertia		Max Bore Parallel Misalignment		Max Angular Misalignment Degrees
					Max Bore											
	in-lb	Nm			Bal	Unbal	Square Keyway									
	x 10 ³	x 10 ³	RPM	RPM	in	in	mm									
1	11.3	1.28	16,700	10,500	2.125	2.250	56	5	127.0	19.4	8.8	37.1	0.4	0.04	1.0	1/2°
1.5	22.7	2.56	12,700	9,000	2.813	3.000	76	7	177.8	42.2	19.1	138.9	1.6	0.06	1.5	
2	39.0	4.41	10,900	8,100	3.500	3.750	95	7	177.8	68.7	31.2	298.7	3.4	0.06	1.5	
2.5	69.3	7.83	9,100	7,200	4.250	4.500	114	7	177.8	122.0	55.3	767.3	8.8	0.06	1.5	
3	118.0	13.33	8,100	6,500	4.875	5.250	134	10	254.0	184.8	83.8	1,398.1	16.0	0.06	2.0	
3.5	177.0	20.00	6,900	5,950	5.625	6.125	157	10	254.0	288.0	130.6	3,052.7	35.0	0.06	2.0	

HP

Lovejoy / Sier-Bath High Speed Gear Couplings

FAC Type Engineered Centrifugal Pump Couplings



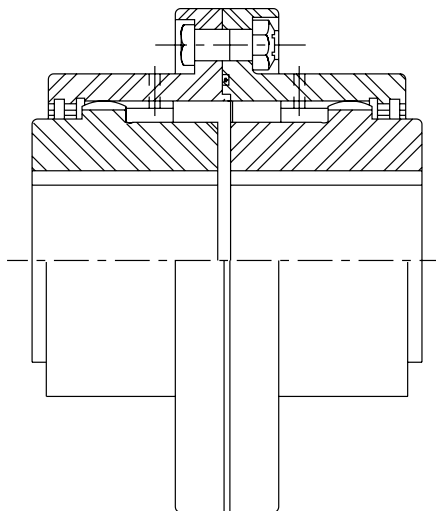
Optional Rigid Hub Design

FAC Type Dimensional Data

Size	OAL in	ID1 - ID2		LTB in	G in	BSE in	FD in	HD in	D in
		Max Bore							
		Square Keyway in	Metric Keyway mm						
1	8.12	2.125	56	1.56	0.16	5	4.56	3.06	1.25
1.5	10.69	2.813	76	1.84	0.16	7	6.00	3.97	1.94
2	11.56	3.500	95	2.28	0.16	7	7.00	4.91	2.50
2.5	12.81	4.250	114	2.91	0.19	7	8.38	5.91	3.00
3	16.81	4.875	134	3.41	0.19	10	9.44	6.91	3.75
3.5	17.88	5.625	157	3.97	0.22	10	11.00	7.91	4.50

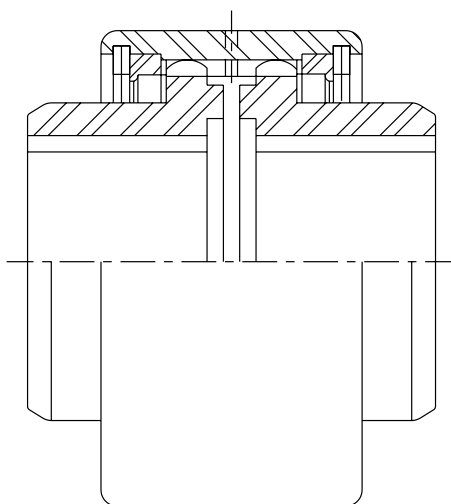
Lovejoy / Sier-Bath F Type High Speed Standard Couplings

Additional Standard Designs



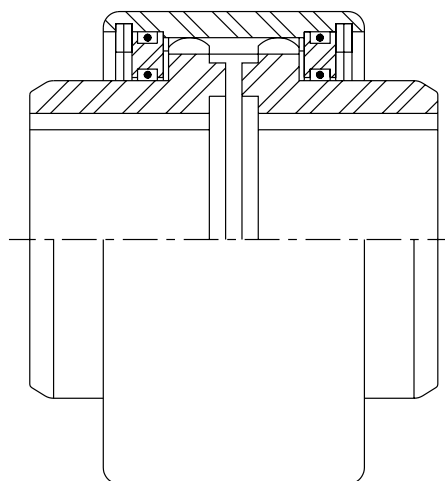
Standard High Speed Flanged Coupling
Continuously Lubricated

For close coupled, continuously lubricated, high speed applications. Sizes and specifications similar to those shown on the previous pages.



Standard High Speed Continuous Sleeve Coupling
Continuously Lubricated

For lighter weight, close coupled, continuously lubricated applications where flange joint is not required. Materials, heat treatments, and precision manufacturing methods outlined on previous pages apply.



Standard High Speed Continuous Sleeve Coupling
Grease Packed

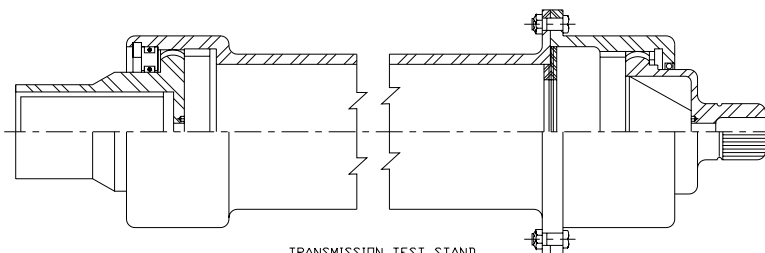
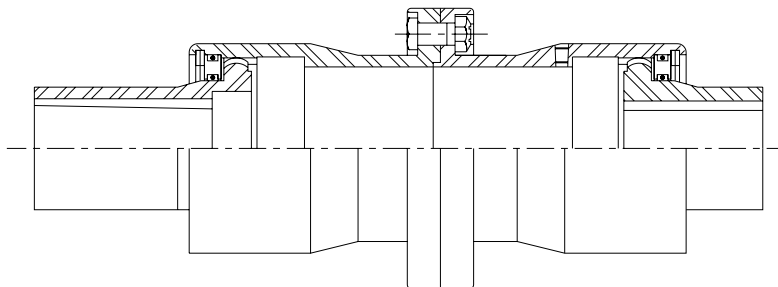
For lighter weight, close coupled, grease packed applications where flange joint is not required. Materials, heat treatments, and precision manufacturing methods outlined on previous pages apply.

Lovejoy / Sier-Bath F Type High Speed Standard Couplings

Transmission Test Stand

High Speed Spacer Coupling

Self-contained oil lubrication, normal speed 16,000 RPM, maximum speed 25,000 RPM. The dimensions are similar to a size 2.5, with an overall length of 35 inches and a total weight of 29 lbs.



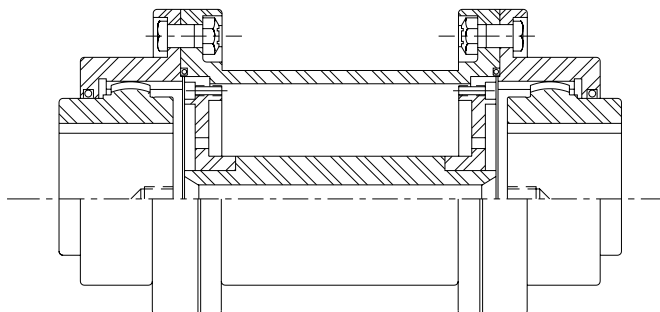
TRANSMISSION TEST STAND

Light Weight Coupling

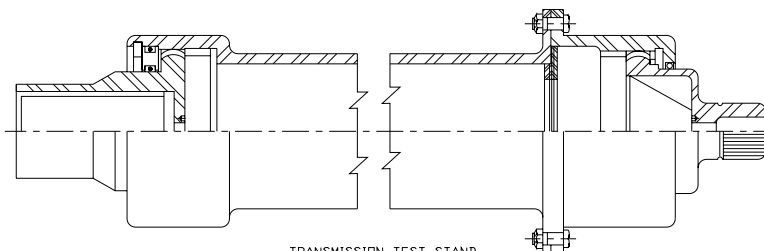
Made of extremely light weight, vacuum melted, AMS material with magnetic particle inspection. The overall length is 29.5 inches and the weight is 19.4 lbs.

Test Stand

High Speed Spacer coupling with internal support for instrumentation wires. Maximum speed of 7,000 RPM.



TEST STAND HIGH SPEED SPACER COUPLING



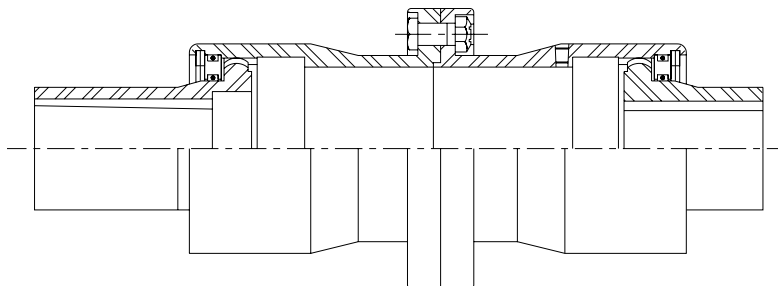
TRANSMISSION TEST STAND

Transmission Test Stand

This High Speed Spacer coupling is grease packed and operates at a maximum speed of 6,000 RPM. Based on a size 3, the overall length is 55 inches.

Single Flange

This High Speed Spacer coupling is grease packed and operates at a maximum speed of 8,000 RPM. The total assembly weight is 19 lbs with an overall length of 19 inches.



Lovejoy / Sier-Bath Flanged Sleeve Type

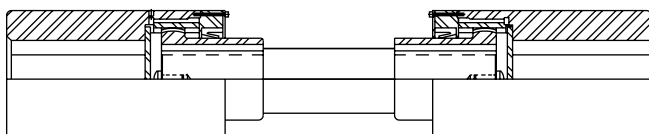
Spindle Couplings

Special Load and No Load Applications

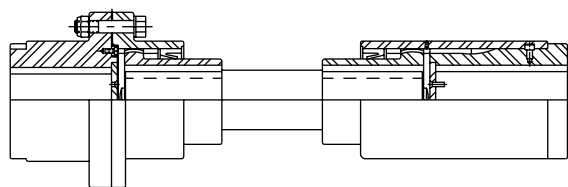
For cases where a spindle coupling operates under a load at a given misalignment angle and requires a higher no load misalignment angle, we design special Vari-Crown® tooth forms. Such forms have compound curvature wherein the Vari-Crown is used for maximum radii of curvature at the load angle. At no load conditions the tooth ends are designed to eliminate edge loading and give proper tangential contact.

Available in several designs up to 40-inch diameter. Any variations of the designs shown can be incorporated to fit your application.

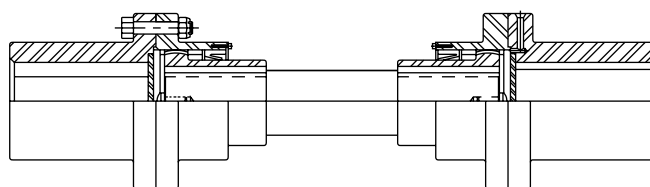
HP



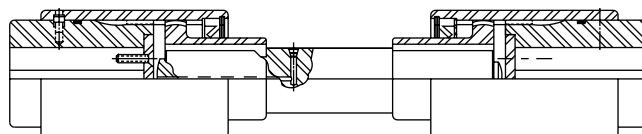
**Replaceable Gearing
Spindle Coupling**



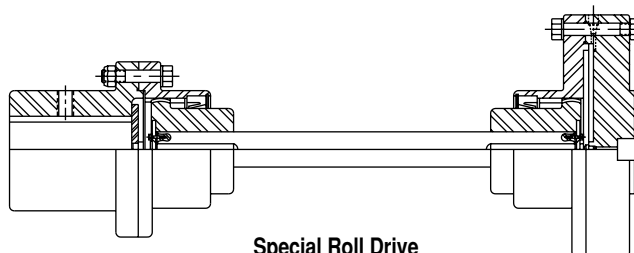
**Special Indexing
Spindle Coupling**



**Flanged Sleeve Main Drive
Spindle Coupling**



**Leveling and Pinch Roll
Spindle Coupling**



**Special Roll Drive
Spindle Coupling**

Only a few special types of couplings are illustrated. Additional special types are available on request.