

ENGINEERING PUBLICATION

MOTION CONTROL DIVISION

PRODUCT: SIGMA I & II

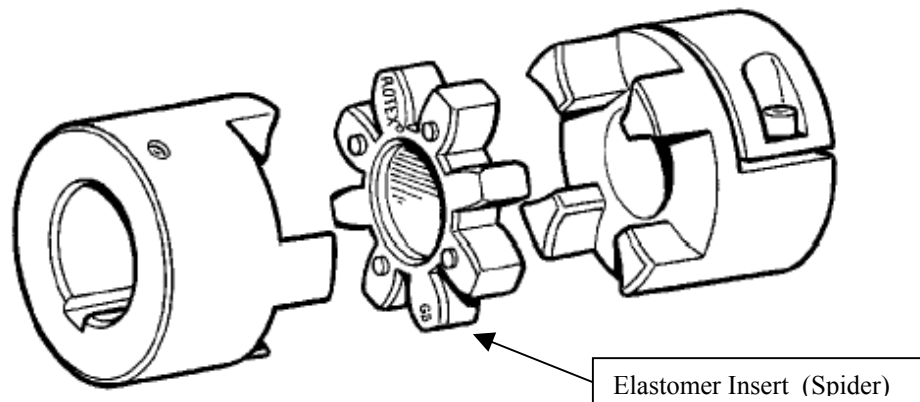
SUBJECT: COUPLINGS

CATEGORY: APPLICATION NOTES

ENGINEER: Bill Leang

DISTRIBUTION: MCD, SALES

Summary: Representative sample couplings for use with Sigma motors are presented. These couplings can be used on motor shafts with or without keyways. The key application criteria are vibration damping and backlash free torque transmission.



Two types of couplings that meet the criteria and commonly used with Sigma motors are the Rotex GS series and the Gerwah ADS series.

When sizing a coupling for the Sigma motor, the following guidelines should be observed:

1. The maximum hub bore must be greater than the motor shaft and load shaft.
2. Nominal/maximum torque of the coupling must be greater than that of the motor.
3. There are several types of inserts (spiders) with different elastomer hardness. If the system vibrates, select a softer spider. The harder the spider, the better the servo responses.

The Rotex GS and Gerwah ADS couplings are designed for backlash free torque transmission. These shaft to shaft jaw couplings are assembled under preload to minimize backlash. The preload is accomplished by compressing the spider between the jaws of the hub during assembly. The elastomer spider provides vibration damping which helps to avoid resonance problems. The torsional stiffness of the coupling is optimized by using a spider with different elastomer hardness. A spider of very hard elastomer provides the best performance because of its high torsional stiffness. However, due to mechanical resonance and alignment tolerances of the system, use of

a hard spider may not be possible or practical. The choice of the spider is application dependent, a good starting point is the medium hardness 98A.

The chart below shows specifications and the choice of spiders available with Rotex GS couplings:

Coupling Size	Spider Durometer	Maximum Speed [rpm] for Clamping Styles				Nominal Torque		Maximum Torque		Static		Dynamic ²⁾		Radial	
		2.0 / 2.1 / 2.5 / 2.6	1.0 / 1.1 ¹⁾	6.0 ¹⁾	6.0 P ¹⁾	T _{KN}		T _{Kmax}		Torsional Stiffness		Torsional Stiffness		Stiffness	
		[lb in]	[Nm]	[lb in]	[Nm]	[lb in/rad]	[Nm/rad]	[lb in/rad]	[Nm/rad]	[lb/in]	[N/mm]				
5	70 Sh A	38000	46600	----	----	1.3	0.15	2.7	0.3	15.8	1.78	44.3	5	246	43
	80 Sh A					2.7	0.30	5.3	0.6	27.9	3.15	88.5	10	469	82
	92 Sh A					4.4	0.50	8.9	1.0	45.7	5.16	141.6	16	880	154
	98 Sh A					7.5	0.85	15.0	1.7	73.5	8.3	221.3	25	1692	296
7	80 Sh A	27000	33300	----	----	6.2	0.7	12.4	1.4	76.1	8.6	230	26	652	114
	92 Sh A					10.6	1.2	21.2	2.4	126.6	14.3	380	43	1252	219
	98 Sh A					17.7	2.0	35.4	4.0	202.7	22.9	610	69	2406	421
	64 Sh D					21.2	2.4	42.5	4.8	303.6	34.3	911	103	3600	630
9	80 Sh A	19000	23300	----	----	15.9	1.8	31.9	3.6	152.2	17.2	460	52	714	125
	92 Sh A					26.6	3.0	53.1	6.0	278.8	31.5	840	95	1497	262
	98 Sh A					44.3	5.0	88.5	10.0	456.7	51.6	1371	155	2960	518
	64 Sh D					53.1	6.0	106.2	12.0	660.2	74.6	1982	224	4223	739
14	80 Sh A	12700	15800	25400	31800	35.4	4.0	70.8	8.0	532.8	60.2	1593	180	874	153
	92 Sh A					66.4	7.5	132.8	15.0	1014	114.6	3044	344	1920	336
	98 Sh A					110.6	12.5	221.3	25.0	1521	171.9	4540	513	3452	604
	64 Sh D					141.6	16.0	283.2	32.0	2072	234.2	6212	702	4892	856
19	80 Sh A	9500	11650	19000	23800	43.4	4.9	86.7	9.8	3042	343.8	9115	1030	3326	582
	92 Sh A					88.5	10.0	177.0	20.0	5071	573.0	15222	1720	6401	1120
	98 Sh A					150.5	17.0	300.9	34.0	7606	859.5	22833	2580	11487	2010
	64 Sh D					185.9	21.0	371.7	42.0	10976	1240	32922	3720	16745	2930
24	80 Sh A	6900	8800	14000	17300	309.8	35	619.5	70	12673	1432	38019	4296	8458	1480
	92 Sh A					531.0	60	1062	120	18257	2063	54772	6189	14630	2560
	98 Sh A					663.8	75	1327	150	26355	2978	79065	8934	21123	3696
28	92 Sh A	5800	7050	11800	14700	840.8	95	1681	190	20284	2292	60852	6876	10173	1780
	98 Sh A					1416	160	2832	320	30426	3438	91278	10314	18288	3200
	64 Sh A					1770	200	3540	400	38497	4350	115492	13050	24849	4348
38	92 Sh A	4750	5900	9500	11900	1681	190	3363	380	40568	4584	121705	13752	13430	2350
	98 Sh A					2876	325	5752	650	63366	7160	190151	21486	25146	4400
	64 Sh D					3584	405	7168	810	93279	10540	279837	31620	36999	6474
42	92 Sh A	4000	5000	8000	10000	2345	265	4690	530	55755	6300	128236	14490	13887	2430
	98 Sh A					3982	450	7965	900	169920	19200	424800	48000	31833	5570
	64 Sh D					4955	560	9912	1120	244083	27580	610207	68950	41548	7270
48	92 Sh A	3600	4650	7100	9100	2743	310	5487	620	69472	7850	159786	18055	14745	2580
	98 Sh A					4646	525	9292	1050	197974	22370	494936	55925	33890	5930
	64 Sh D					5796	655	11593	1310	320370	36200	800925	90500	47286	8274
55	92 Sh A	3150	3950	6300	7900	3628	410	7257	820	84075	9500	193372	21850	17031	2980
	98 Sh A					6062	685	12124	1370	210630	23800	526575	59500	38210	6686
	64 Sh D					7301	825	14602	1650	366921	41460	917302	103650	52852	9248
65	95 Sh A	2800	3500	5600	7000	8319	940	16638	1880	338070	38200	845175	95500	36679	6418
75	95 Sh A	2350	2950	4750	5950	12965	1465	25990	2930	557815	63000	1393875	157500	49435	8650

1) Higher speeds can be achieved with dynamic balancing. Please consult KTR Corporation for more information.

2) Dynamic torsional stiffness at 0.5 x T_{KN}

The chart below shows the stiffness and alignment tolerances of the Gerwah ADS couplings with spiders of different durometer:

TECHNICAL RATINGS:											
Type ADS	Insert Code	Rated Torque (Nm)	Torsional Stiffness (Nm/rad)	Lateral Spring Stiffness (N/mm)	Misalignment (mm)		Misalignment Angular (degrees ^o)	Moment of Inertia 10 ³ J (gcm ²)	Torque to Tighten Clamps I MA = (Nm)	Max RPM (min ⁻¹)	Mass m (g)
					Lateral	Axial					
ADS 10	92 A	7.5	344	336	0.06	1	0.9	0.1	5	19000	60
	98 A	10	513	604							
	64 D	16	702	856							
ADS 18	92 A	10	1720	1120	0.06	1.2	0.9	0.4	10	14000	140
	98 A	18	2580	2010							
	64 D	21	3720	2930							
ADS 30	92 A	22	2663	1300	0.08	1.3	0.9	0.8	10	12000	200
	98 A	30	4380	2290							
	64 D	36	6325	3310							
ADS 60	92 A	35	4296	1480	0.1	1.4	0.9	1.1	18	10600	300
	98 A	60	6189	2560							
	64 D	75	8934	3696							
ADS 150	92 A	95	6876	1780	0.11	1.5	0.9	4.2	43	8500	550
	98 A	150	10314	3200							
	64 D	200	13050	4348							
ADS 300	92 A	190	13752	2350	0.12	1.8	0.9	18.5	84	7100	1000
	98 A	300	21486	4400							
	64 D	405	31462	6474							
ADS 500	92 A	310	18055	2580	0.16	2.1	0.9	77	145	5600	5100
	98 A	500	55925	5930							
	64 D	655	90500	8274							

Current information on Gerwah couplings can be found at the Internet website of www.rimteccorporation.com. For current information on Rotex couplings, check their website at www.ktrcorp.com.

This is only a sampling of couplings that may be use with the Sigma motors. These couplings can be used on motor shafts with or without keyways. Depending on the application, other couplings that are available on the market may also be suitable.