Precision Servo Gearboxes

SureGear® Servo Gearbox Overview

PGA In-line Series

The SureGear PGA series of high-precision servo gear reducers is an excellent choice for applications that require good accuracy and reliability at an exceptional value. This in-line planetary gear reducer has a thread-in mounting style, along with a level of precision and torque capacity that is best in its class. Offered in a concentric shaft design with a maximum seven arc-min backlash rating, the SureGear PGA series is an accurate, high-performance, and cost effective solution for any OEM.

The machining quality of the SureGear PGA helical planetary gears provides a very quiet and more efficient reducer than other competitive products that are similarly priced. The SureGear PGA series easily mates to SureServo motors, and is the perfect solution for applications such as gantries, injection-molding machines, pick-and-place automation, and linear slides.

SureGear PGA Gearbox

PGB Right-angle Series

The SureGear PGB series of high-precision right-angle servo gear reducers is an excellent choice for applications that require a more compact footprint.

The PGB right-angle planetary gear reducers offer similar technical specifications to the PGA series in-line gear reducers, and provides the customer with an excellent solution when space and clearance requirements are limited.

Offered with a six arc-min backlash rating for 2-stage and nine arc-min backlash for 3-stage, the SureGear PGB series performs to OEMs' demanding expectations.

SureGear PGB Gearbox

PGD Hub Style In-line Series

The SureGear PGD series sets a new standard in applications requiring extremely high-torque ratings and rigidity. The compact design and hub-style output is ideal for equipment that requires high-speed, high-precision indexing movement. The remarkable torsion stiffness and the low backlash of the planetary gearing combine to provide outstanding positioning accuracy.

With a backlash rating less than 3 arc-minutes and exceptional torque handling capabilities, the PGD series offers a high performance robust planetary solution for OEM customers. The PGD reducer is often used for larger indexing applications and dial tables commonly found in packaging and filling equipment and assembly automation systems.

SureGear Hub Style PGD Gearbox

SureGear 2-Stage Cutaway View

Features

- Thread-in mounting style
- Best-in-class backlash
- Four gear ratios available (5:1, 10:1, 15:1, 25:1), Two additional for PGD models (35:1 and 50:1)
- Mounting hardware included for attaching to SureServo motors
- Helical-cut planetary gears for quiet operation and reduced vibration
- Right-angle reducer utilizes a spiral bevel gear; motor can be located at a 90° position from the reducer, providing a more compact footprint
- Uncaged needle roller bearings for high rigidity and torque
- Adapter bushing connection for simple and effective attachment to most servo motors
- High-viscosity, anti-separation grease does not migrate away from the gears; no leakage through the seal
- Maintenance free: No need to replace the grease for the life of the unit
- At nominal speed, service life is 20,000 hours
- Can be positioned in any orientation
- IP55 environmental rating
- 5-year warranty

Applications

- Gantries
- Injection-molding machines
- Pick-and-place automation
- Linear slides
- Packaging machines
- Conveyors

Precision Servo Gearboxes

SureGear® Servo Gearbox Selection

Servo Motor	Gear Ratio	SureGear Gearbox	Frame Size (mm)	Motor Nominal Output Torque		Combo Nominal Output Torque		Nominal Output Speed (rpm)	Max Output Speed (rpm)	Available Load Inertia @ 5:1 Mismatch *	
				N·m	lb·in	N·m	lb·in			kg·cm2	lb·in·s2
SV2L-201(x) APMC-FAL01xxx	5:1	PGD047-05A1	47	0.32	2.83	1.52	13.44	600	1200.00	6.76	0.006
		PGA050-05A1	50							6.94	0.006
		PGA070-05A1	70							5.91	0.005
		PGB070-05A1	70			1.49	13.16			1.59**	0.001**
	10:1	PGD047-10A1	47			3.04	26.89	300	600.00	28.15	0.025
		PGA050-10A1	50							28.35	0.025
		PGA070-10A1	70							25.75	0.023
		PGB070-10A1	70			2.98	26.32			8.35**	0.007**
	15:1	PGA050-15A1	50			4.32	38.21	200	400.00	62.66	0.055
		PGA070-15A1	70							58.16	0.051
		PGB070-15A1	70			4.22	37.36			54.11	0.048
	25:1	PGD047-25A1	47			7.20	63.68	120	240.00	174.69	0.155
		PGA050-25A1	50							174.69	0.155
		PGA070-25A1	70							162.81	0.144
		PGB070-25A1	70			7.04	62.26			151.56	0.134
	50:1	PGD064-50A1	64			14.40	127.35	60	120.00	661.25	0.585
SV2L-202(x)	5:1	PGD064-05A2	64	0.64	5.7	3.04	27.08	600	1200.00	28.75	0.025
		PGA070-05A2	70							29.33	0.026
		PGB070-05A2	70			2.98	26.51			25.00	0.022
	10:1	PGD064-10A2	64			6.08	54.15	300	600.00	118.80	0.105
		PGA070-10A2	70							119.40	0.106
		PGB070-10A2	70			5.95	53.01			102.00	0.090
	15:1	PGA070-15A2	70			8.64	76.95	200	400.00	268.88	0.238
		PGB070-15A2	70			8.45	75.24			264.83	0.234
		PGB090-15A2	90							204.75	0.181
	25:1	PGD064-25A2	64			14.40	128.25	120	240.00	747.50	0.662
		PGA070-25A2	70							748.13	0.662
		PGB070-25A2	70			14.08	125.40			736.88	0.652
		PGB090-25A2	90							581.25	0.514
		PGD090-25A2	90			14.40	128.25			700.00	0.620
	50:1	PGD090-50A2	90			28.80	256.50	60	120.00	2875.00	2.544
		PGD110-50A2	110							2125.00	1.881
SV2L-204(x)	5:1	PGD064-05A2	64	1.27	11.2	6.03	53.20	600	1200.00	53.75	0.048
		PGA070-05A2	70							54.33	0.048
		PGB070-05A2	70			5.91	52.08			50.00	0.044
	10:1	PGD064-10A2	64			12.07	106.40	300	600.00	218.80	0.194
		PGA070-10A2	70							219.40	0.194
		PGB070-10A2	70			11.81	104.16			202.00	0.179
	15:1	PGA070-15A2	70			17.15	151.20	200	400.00	493.88	0.437
		PGB070-15A2	70			16.76	147.84			489.83	0.433
		PGB090-15A2	90							429.75	0.380
	25:1	PGD064-25A2	64			28.58	252.00	120	240.00	1372.50	1.215
		PGA070-25A2	70							1373.13	1.215
		PGB070-25A2	70			27.94	246.40			1361.88	1.205
		PGB090-25A2	90							1206.25	1.068
		PGD090-25A2	90			28.58	252.00			1325.00	1.173
	50:1	PGD090-50A2	90			57.15	504.00	60	120.00	5375.00	4.757
		PGD110-50A2	110							4625.00	4.093

* Available load inertia is calculated based on servo motor inertia using the formula: Available Inertia = (5 x Motor Inertia – Gearbox Inertia) x (Gear Ratio)2 A 5:1 inertia mismatch is a good target for design purposes. Systems with lower or higher mismatch may be possible, depending on operating conditions.

** This gearbox is NOT a suitable choice at a 5:1 mismatch. If inertia balancing is a selection criteria for your end use, please use a mismatch of 8:1 to 10:1.

Precision Servo Gearboxes

SureGear® Servo Gearbox Selection

Servo Motor	Gear Ratio	SureGear Gearbox	Frame Size (mm)	Motor Nominal Output Torque		Combo Nominal Output Torque		Nominal Output Speed (rpm)	Max Output Speed (rpm)	Available Load Inertia @ 5:1 Mismatch *	
				N·m	lb·in	N·m	lb·in			kg·cm2	lb·in·s2
SV2L-207(x)	5:1	PGA070-05A3	70	2.39	21.2	11.35	100.70	600	1200.00	186.83	0.165
		PGB090-05A3	90			11.11	98.58			143.75	0.127
		PGD090-05A3	90			11.35	100.70			174.25	0.154
	10:1	PGA090-10A3	90			22.71	201.40	300	600.00	726.00	0.643
		PGB090-10A3	90			22.23	197.16			586.00	0.519
		PGD090-10A3	90			22.71	201.40			722.00	0.639
	15:1	PGA090-15A3	90			32.27	286.20	200	400.00	1669.50	1.478
		PGB090-15A3	90			31.55	279.84			1622.25	1.436
	25:1	PGA090-25A3	90			53.78	477.00	120	240.00	4643.75	4.110
		PGB090-25A3	90			52.58	466.40			4518.75	3.999
		PGD110-25A3	110			53.78	477.00			4281.25	3.789
	50:1	PGD110-50A3	110			107.55	954.00	60	120.00	17875.00	15.819
SV2L-210(x)	5:1	PGA090-05A4	90	3.18	28.15	15.11	133.69	600	1000.00	321.25	0.284
		PGB090-05A4	90			14.79	130.88			286.25	0.253
		PGD090-05A4	90			15.11	133.69			319.25	0.283
	10:1	PGA090-10A4	90			30.21	267.38	300	500.00	1296.00	1.147
		PGB090-10A4	90			29.57	261.75			1156.00	1.023
		PGD090-10A4	90			30.21	267.38			1292.00	1.143
	15:1	PGA120-15A4	120			42.93	379.96	200	333.33	2884.50	2.553
		PGB120-15A4	120			41.98	371.52			2475.00	2.190
	25:1	PGD110-25A4	110			71.55	633.27	120	200.00	7843.75	6.942
		PGA120-25A4	120							8043.75	7.119
		PGB120-25A4	120			69.96	619.20			6918.75	6.123
	50:1	PGD110-50A4	110			143.10	1266.54	60	100.00	32125.00	28.431
SV2M-210(x)	5:1	PGA090-05A5	90	4.77	42.22	22.66	200.54	400.00	600.00	1041.25	0.922
		PGD090-05A5	90							1039.25	0.920
		PGB120-05A5	120			22.18	196.31			925.75	0.819
	10:1	PGA090-10A5	90			45.32	401.07	200.00	300.00	4176.00	3.696
		PGD110-10A5	110							4172.00	3.692
		PGB120-10A5	120			44.36	392.63			3759.00	3.327
	15:1	PGA120-15A5	120			64.40	569.94	133.33	200.00	9364.50	8.288
		PGB120-15A5	120			62.96	557.28			8955.00	7.925
	25:1	PGD110-25A5	110			107.33	949.91	80.00	120.00	25843.75	22.872
		PGA120-25A5	120							26043.75	23.049
		PGB120-25A5	120			104.94	928.80			24918.75	22.053
	35:1	PGD110-35A5	110			150.26	1329.87	57.14	85.71	50653.75	44.829

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Precision Servo Gearboxes

SureGear® Servo Gearbox Selection

Servo Motor	Gear Ratio	SureGear Gearbox	Frame Size (mm)	Motor Nominal Output Torque		Combo Nominal Output Torque		Nominal Output Speed (rpm)	Max Output Speed (rpm)	Available Load Inertia @ 5:1 Mismatch *	
				N·m	lb·in	N·m	lb·in			kg·cm2	lb·in·s2
SV2M-215(x)	5:1	PGA090-05A5	90	7.16	63.37	34.01	301.01	400.00	600.00	1390.00	1.230
		PGD090-05A5	90							1388.00	1.228
		PGB120-05A5	120			33.29	294.68			1274.50	1.128
	10:1	PGA090-10A5	90			68.02	602.03	200.00	300.00	5571.00	4.930
		PGD110-10A5	110							5567.00	4.927
		PGB120-10A5	120			66.59	589.35			5154.00	4.561
	15:1	PGA120-15A5	120			96.66	855.51	133.33	200.00	12503.25	11.065
		PGB120-15A5	120			94.51	836.50			12093.75	10.703
	25:1	PGD110-25A5	110			161.10	1425.86	80.00	120.00	34562.50	30.588
		PGA120-25A5	120							34762.50	30.765
		PGB120-25A5	120			157.52	1394.17			33637.50	29.769
	35:1	PGD110-35A5	110			225.54	1996.20	57.14	85.71	67742.50	59.952
SV2M-220(x)	5:1	PGD110-05A6	110	9.55	84.52	45.36	401.49	400.00	600.00	4280.00	3.788
		PGA120-05A6	120							4297.50	3.803
		PGB120-05A6	120			44.41	393.04			4212.00	3.728
		PGB155-05A6	155							3914.75	3.465
	10:1	PGD110-10A6	110			90.73	802.98	200.00	300.00	17240.00	15.257
		PGA120-10A6	120							17255.00	15.271
		PGB120-10A6	120			88.82	786.08			16904.00	14.960
		PGB155-10A6	155							15884.00	14.057
	15:1	PGA155-15A6	155			128.93	1141.08	133.33	200.00	38745.00	34.289
		PGB155-15A6	155			126.06	1115.73			37597.50	33.274
	25:1	PGA155-25A6	155			214.88	1901.80	80.00	120.00	107750.00	95.359
		PGB155-25A6	155			210.10	1859.54			104593.75	92.565
SV2M-230(x)	5:1	PGD110-05A6	110	17.55	155.33	83.36	737.80	340.00	600.00	6817.50	6.033
		PGA120-05A6	120							6835.00	6.049
		PGB120-05A6	120			81.61	722.31			6749.50	5.973
		PGB155-05A6	155							6452.25	5.710
	10:1	PGD110-10A6	110			166.73	1475.68	170.00	300.00	27390.00	24.240
		PGA120-10A6	120							27405.00	24.253
		PGB120-10A6	120			163.22	1444.62			27054.00	23.943
		PGB155-10A6	155							26034.00	23.040
	15:1	PGA155-15A6	155			236.93	2097.01	113.33	200.00	61582.50	54.501
		PGB155-15A6	155			231.66	2050.36			60435.00	53.485
	25:1	PGA155-25A6	155			394.88	3494.98	68.00	120.00	171187.50	151.501
		PGB155-25A6	155			386.10	3417.27			168031.25	148.708

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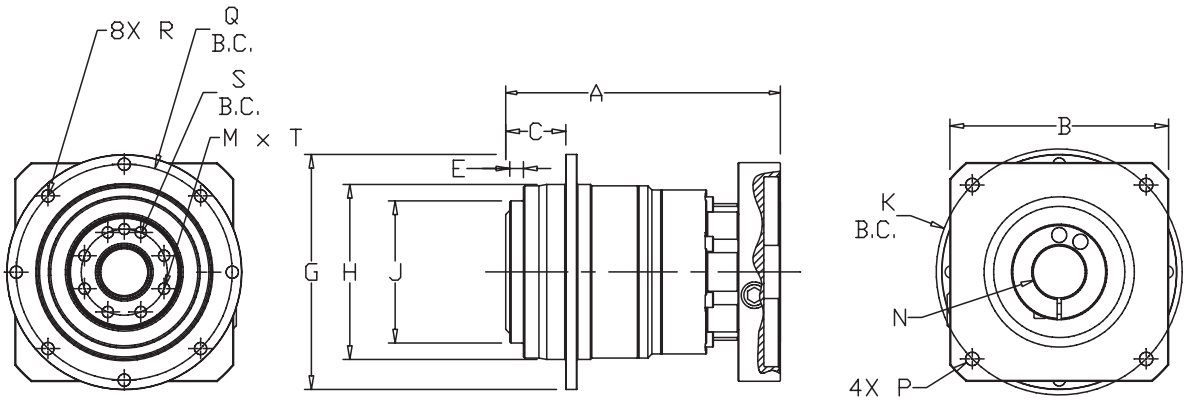
Pricing & Specifications – Hub Style In-Line PGD Series

SureGear® Precision Servo Gearboxes – Hub Style In-Line PGD Series																		
Part Number	Price	Frame Size (mm)	Ratio	Reduction	Nominal Output Torque (N·m [lb·in])	Max. Acceleration Torque (N·m [lb·in])	Emergency Stop Torque (N·m [lb·in])	Backlash (arc-min)	Nominal Input Speed (rpm)	Max. Input Speed (rpm)	Allowable Radial Load (N [lb])	Allowable Thrust Load (N [lb])	Moment of Inertia (kg·cm2)	Efficiency (%)	Max. Housing Temperature	Approx Weight (kg [lb])	Ingress Protection (IP) Rating	Fits SureServo Servo Motor
PGD047-05A1	$923.00	47	5:1	single	9 [80]	18 [159]	35 [310]	≤ 3	4000	8000	300 [67]	330 [74]	0.043	95	90 °C [194 °F]	0.7 [1.5]	IP54	SV(2)L-201(B)
PGD047-10A1	$923.00		10:1	single	6 [53]	12 [106]	30 [266]				370 [83]	450 [101]	0.032					
PGD047-25A1	$1,075.00		25:1	double	9 [80]	18 [159]	35 [310]	≤ 5			510 [115]	550 [124]	0.034	90		0.8 [1.8]		
PGD064-50A1	$1,399.00	64	50:1	double	27 [239]	50 [443]	100 [885]	≤ 3	3000	6000	850 [191]	750 [169]	0.049	90		1.6 [3.5]		SV(2)L-202(B) SV(2)L-204(B)
PGD064-05A2	$1,195.00		5:1	single	27 [239]	50 [443]	100 [885]				400 [90]	390 [88]	0.1	95		1.4 [3.1]		
PGD064-10A2	$1,195.00		10:1	single	18 [159]	35 [310]	80 [708]				500 [112]	530 [119]	0.062	95		1.4 [3.1]		
PGD064-25A2	$1,399.00		25:1	double	27 [239]	50 [443]	100 [885]				680 [153]	750 [169]	0.054	90		1.6 [3.5]		
PGD090-25A2	$1,605.00	90	25:1	double	75 [664]	125 [1106]	250 [2213]				1300 [292]	1400 [315]	0.130	90		4 [8.8]		
PGD090-50A2	$1,605.00		50:1	double	75 [664]	125 [1106]	250 [2213]				1700 [382]	1700 [382]	0.099	90		4 [8.8]		
PGD090-05A3	$1,401.00		5:1	single	75 [664]	125 [1106]	250 [2213]				780 [175]	680 [153]	0.580	95		3.6 [7.9]		SV(2)L-207(B)
PGD090-10A3	$1,401.00		10:1	single	50 [443]	80 [708]	200 [1770]				980 [220]	920 [207]	0.330	95		3.6 [7.9]		
PGD090-05A4	$1,401.00		5:1	single	75 [664]	125 [1106]	250 [2213]				780 [175]	680 [153]	0.580	95		3.6 [7.9]		SV(2)L-210(B)
PGD090-10A4	$1,300.00		10:1	single	50 [443]	80 [708]	200 [1770]				980 [220]	920 [207]	0.330	95		3.6 [7.9]		
PGD090-05A5	$1,300.00		5:1	single	75 [664]	125 [1106]	250 [2213]				780 [175]	680 [153]	0.580	95		3.6 [7.9]		SV(2)M-210(B)
PGD110-50A2	$1,902.00	110	50:1	double	180 [1593]	330 [2921]	625 [5532]				10000 [2248]	6800 [1529]	0.400	90		8.6 [19]		SV(2)L-202(B) SV(2)L-204(B)
PGD110-25A3	$1,902.00		25:1	double	180 [1593]	330 [2921]	625 [5532]				8200 [1843]	5500 [1236]	0.700	90		8.6 [19]		SV(2)L-207(B)
PGD110-50A3	$2,049.00		50:1	double	180 [1593]	330 [2921]	625 [5532]				10000 [2248]	6800 [1529]	0.400	90		8.6 [19]		
PGD110-25A4	$2,049.00		25:1	double	180 [1593]	330 [2921]	625 [5532]				8200 [1843]	5500 [1236]	0.700	90		8.6 [19]		SV(2)L-210(B)
PGD110-50A4	$2,049.00		50:1	double	180 [1593]	330 [2921]	625 [5532]				10000 [2248]	6800 [1529]	0.400	90		8.6 [19]		
PGD110-10A5	$1,617.00		10:1	single	120 [1062]	225 [1991]	500 [4425]				6200 [1394]	4200 [944]	1.100	95		7.8 [17.2]		SV(2)M-210(B)
PGD110-25A5	$2,049.00		25:1	double	180 [1593]	330 [2921]	625 [5532]				8200 [1843]	5500 [1236]	0.700	90		8.6 [19]		
PGD110-35A5	$2,049.00		35:1	double	180 [1593]	330 [2921]	625 [5532]				9000 [2023]	6100 [1371]	0.700	90		8.6 [19]		
PGD110-05A6	$1,617.00		5:1	single	180 [1593]	330 [2921]	625 [5532]				5000 [1124]	3400 [427]	2.300	95		7.8 [17.2]		SV(2)M-220(B) SV(2)M-230(B)
PGD110-10A6	$1,743.00		10:1	single	120 [1062]	225 [1991]	500 [4425]				6200 [1394]	4200 [944]	1.100	95		7.8 [17.2]		

Dimensions – Hub Style In-Line PGD Series



SureGear PGD Series Hub Style In-Line Gearboxes Dimension Drawing

SureGear® Precision Servo Gearbox Dimensions – Hub Style In-Line PGD Series (dimensions = mm [in])

	Part Number	A*	B*	C	E	G	H	J	K	M	N**	P	Q	R	S	T
1	PGD047-05A1 PGD047-10A1	66.5 [2.62]	42.0 [1.65]	19.5 [0.7677]	3.0 [0.1181]	Ø72.0 [Ø2.83]	Ø47.0 [Ø1.85]	Ø28.0 [Ø1.102]	Ø46.0 [Ø1.811]	4	Ø8.0 [Ø0.31]	M4- 0.7x9	Ø67.0 [Ø2.6378]	3.4 [0.13]	Ø20.0 [Ø0.7874]	M3- 0.5x6.5
2	PGD047-25A1															
2	PGD064-50A1	98.0 [3.86]	52.0 [2.05]			Ø86.0 [Ø3.385]	Ø64.0 [Ø2.52]	Ø40.0 [Ø1.575]		8	Ø8.0 [Ø0.31]		Ø79.0 [Ø3.11]	4.5 [0.18]	Ø31.5 [Ø1.24]	M5- 0.8x10
1	PGD064-05A2 PGD064-10A2	82.0 [3.228]	65.0 [2.56]								Ø14.0 [Ø0.55]	M5- 0.8x11				M5- 0.8x4
2	PGD064-25A2	103.0 [4.055]							Ø70.0 [Ø2.756]		Ø14.0 [Ø0.55]					M5- 0.8x10
2	PGD090-25A2 PGD090-50A2	122.0 [4.803]		30.0 [1.1811]	6.0 [0.236]	Ø118.0 [Ø4.65]	Ø90.0 [Ø3.54]	Ø63.0 [Ø2.48]		8	Ø14.0 [Ø0.55]		Ø109.0 [Ø4.30]	5.5 [0.22]	Ø50.0 [Ø1.9685]	M6- 1.0x12
1	PGD090-05A3 PGD090-10A3	110.0 [4.33]	80.0 [3.15]						Ø90.0 [Ø3.543]		Ø19.0 [Ø0.75]	M6- 1.0x13				
1	PGD090-05A4 PGD090-10A4	127.0 [5.0]	100.0 [3.94]						Ø115.0 ±0.2 [Ø4.528]		Ø28.0 [Ø1.102]	M8- 1.25x17				
1	PGD090-05A5		130.0 [5.12]						Ø145.0 ±0.2 [Ø5.709]							
2	PGD110-50A2	159.5 [6.28]	65.0 [2.56]	29.0 [1.142]		Ø145.0 [Ø5.70]	Ø110.0 [Ø4.33]	Ø80.0 [Ø3.15]	Ø70.0 [Ø2.756]	15	Ø14.0 [Ø0.55]	M5- 0.8x11	Ø135.0 [Ø5.315]		Ø63.0 [Ø2.48]	
2	PGD110-25A3 PGD110-50A3	169.5 [6.673]	80.0 [3.15]						Ø90.0 [Ø3.543]		Ø19.0 [Ø0.75]	M6- 1.0x13				
2	PGD110-25A4 PGD110-50A4	186.5 [7.3425]	100.0 [3.94]						Ø115.0 ±0.2 [Ø4.528]		Ø28.0 [Ø1.102]	M8- 1.25x17				
1	PGD110-10A5	159.0 [6.26]	130.0 [5.12]						Ø145.0 ±0.2 [Ø5.709]							
2	PGD110-25A5 PGD110-35A5	186.5 [7.3425]														
1	PGD110-05A6 PGD110-10A6	180.0 [7.087]	180.0 [7.087]						Ø200.0 ±0.2 [Ø7.874]		Ø38.0 [Ø1.45]	M12- 1.75x25				

*** Length will vary depending on motor**
**** Bushing will be inserted to adapt to motor shaft**
NOTE: See our website: www.AutomationDirect.com for complete engineering drawings.

SureGear® Servo Gearbox Replacement Parts

SureGear® Precision Servo Gearboxes – Replacement Parts		
Part Number	***Price***	***Description***
PG050-KEY	$4.50	Output Shaft Key, replacement, 4 x 4 x 14 mm, for SureGear PGA050 series gearboxes.
PG070-KEY	$4.75	Output Shaft Key, replacement, 5 x 5 x 22 mm, for SureGear PGA070 and PGB070 series gearboxes.
PG090-KEY	$4.50	Output Shaft Key, replacement, 6 x 6 x 28 mm, for SureGear PGA090 and PGB090 series gearboxes.
PG120-KEY	$4.50	Output Shaft Key, replacement, 10 x 8 x 45 mm, for SureGear PGA120 and PGB120 series gearboxes.
PG155-KEY	$4.50	Output Shaft Key, replacement, 12 x 8 x 65 mm, for SureGear PGA155 and PGB155 series gearboxes.
PGA4-A5-BUSH	$33.50	Input Shaft Bushing, replacement, 28 x 22 x 30.5 mm, for all SureGear gearboxes using SV(2)L-210(B) and SV(2)M-210(B) SureServo motors.
PGA6-BUSH	$23.00	Input Shaft Bushing, replacement, 38 x 35 x 36 mm, for all SureGear gearboxes using SV(2)M-220(B) and SV(2)M-230(B) SureServo motors.