

HarmonicPlanetary®



Precision Hollow Shaft Planetary Gear Reducers and Actuators **HPF Series**

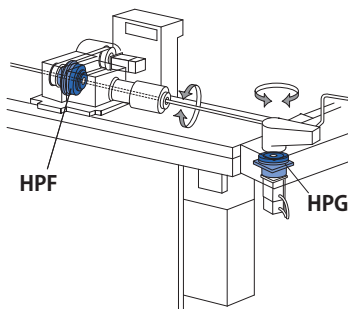
**New Planetary Gear Speed Reducers with a Large Hollow Shaft and Coaxial Input and Output!
High-Speed Hollow Shaft Actuators Incorporating the HPF are Also Now Available!**

The HPF Precision Hollow Shaft Planetary Gear was designed based on the HPG Harmonic Planetary®. The large coaxial hollow shaft allows cables, shafts, ball screws or lasers to pass directly through the axis of rotation. The HPF also incorporates a large output flange for mounting the driven load. This flange is integrated with a robust Cross-Roller Bearing which can support high axial, radial and moment loads without the need for additional support bearings.

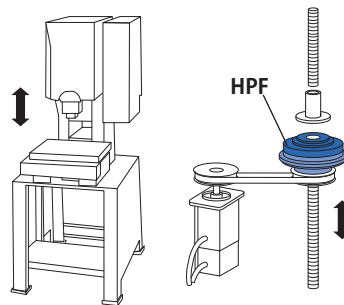
The precision HPF planetary gear is also available in our SHA series Hollow Shaft Brushless Actuators as a standard product. The low ratio planetary gear allows the SHA actuator to achieve higher speeds and still deliver precise positioning. The SHA actuators feature an absolute encoder and is available with a brake. Performance matched servo drives are available that support EtherCAT in addition to standard IO.

Application Examples

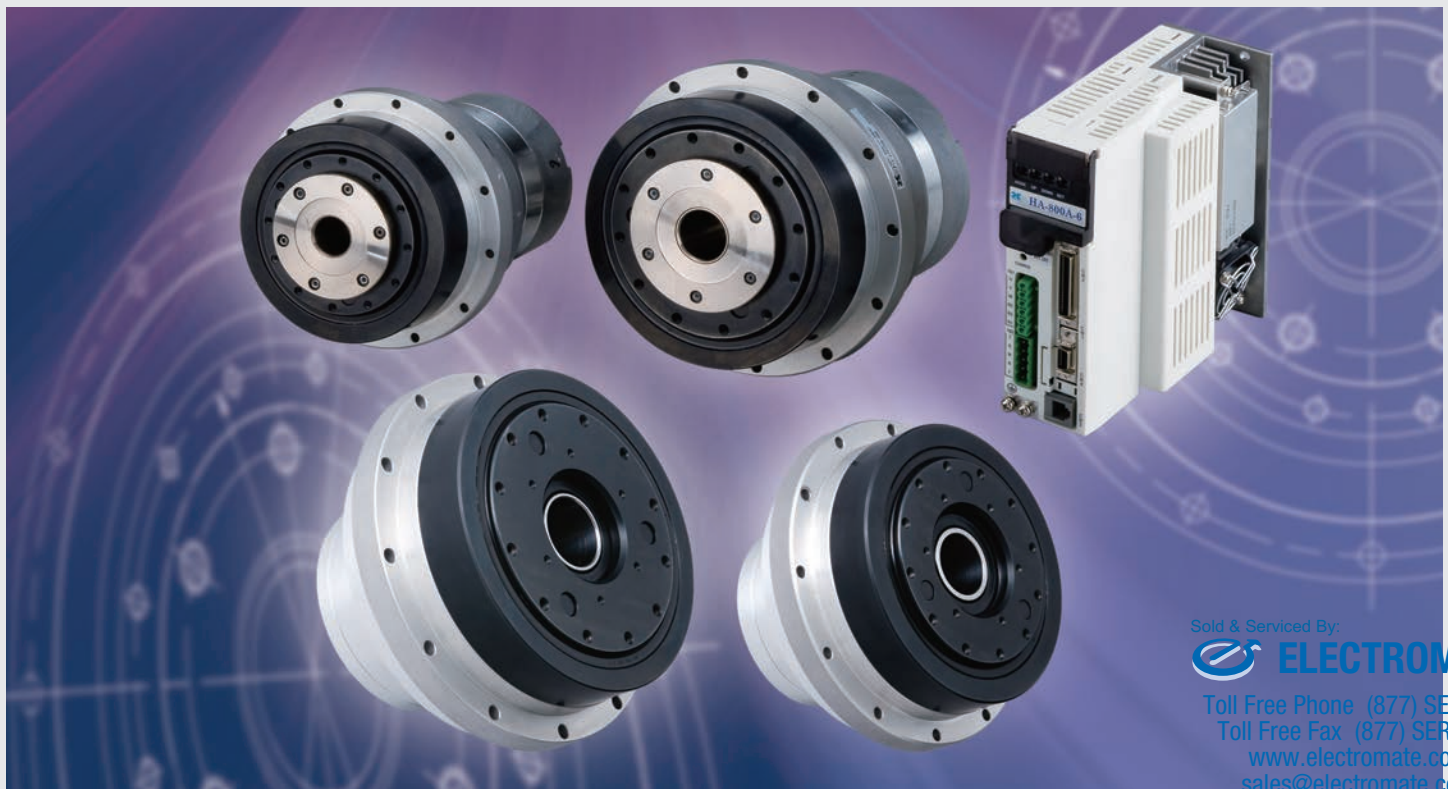
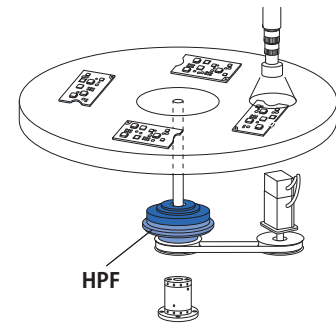
Pipe Bending Machine



Power Press



Printed Circuit Board Inspection



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Specifications

■ Hollow Shaft Construction: Coaxial input and output shafts

■ High Speed: Maximum speed

HPF-25A: 500 rpm

HPF-32A: 430 rpm



■ Speed Reducer Specifications

Item	Model	HPF-25A-11-F0U1	HPF-32A-11-F0U1
Reduction Ratio	-	11:1	
Hollow Shaft Diameter	mm	φ25	φ30
Rated Output Torque	Nm	21	44
Average Torque	Nm	48	100
Repeated Peak Torque	Nm	100	220
Maximum Momentary Torque	Nm	170	450
Maximum Average Speed *1	rpm	3000	3000
Maximum Input Speed	rpm	5600	4800
Moment of Inertia (at input shaft)	x10 ⁻⁴ Kgm ²	1.63	3.84
Mass	Kg	3.8	7.2
Backlash	arc-min	3.0	
	x10 ⁻⁴ rad	8.7	
Torsional Angle Under Load D at TRx0.15*2	arc-min	2.0	1.7
	x10 ⁻⁴ rad	5.8	4.9
Torsional Stiffness A/B*2	kgfm/arc-min	1.7	3.5
	x100 Nm/rad	570	1173
Accuracy	arc-min	4.0	
	x10 ⁻⁴ rad	11.6	
Repeatability	arc-sec	±15	
Starting Torque	Ncm	59	75
Backdriving Torque	Nm	6.5	8.3
No Load Running Torque (room temp., input 3000 rpm)	Ncm	78	105
Efficiency (rated torque, room temp., input 3000 rpm)	%	70	80
Suitable Motor (reference value) *3	kW	0.5 to 1.0	0.75 to 2.0
Lubricating Grease (Sealed)	-	EPNOC GREASE AP(N) 2	

*1: The allowable average input speed is established to limit the temperature rise caused by heating of the speed reducer. The temperature rise will vary depending on the thermal characteristics of the housing provided by the customer to mount the speed reducer and on the ambient temperature. A housing surface temperature of 70°C is the upper-limit.

*2: Refer to the technical data in the HPG Harmonic Planetary catalog for more information.

*3: The upper limit for the motor power assumes the peak torque for start and stop of the speed reducer to be equal to the motor peak torque and the lower limit takes the gear efficiency into consideration.

■ Cross Roller Bearing Specification (Output Side)

Model No.	Pitch Circle	Offset	Basic Rated Load				Allowable Moment Load Mc*1		Moment Stiffness Km		Allowable Radial Load*2		Allowable Axial Load*2	
	dp	R	Basic Dynamic Load Rating		Basic Static Load Rating Co		Nm	kgfm	x10 ⁴ Nm/rad	kgfm/arc min	N	kgf	N	kgf
	m	m	N	kgf	N	kgf								
25	0.085	0.0153	11400	1163	20300	2071	410	41.8	37.9	11.3	1330	135	1990	203
32	0.1115	0.015	22500	2296	39900	4071	932	95	86.1	25.7	2640	269	3940	402

*1: The allowable moment load is a maximum moment load that can be applied to the output shaft. Calculate the life of the bearing according to the instructions in the HPG catalog.

*2: The allowable radial load and allowable axial load are the values that satisfy the speed reducer life of 20,000 hours when only a pure radial load or a pure axial load is applied to the main bearing. (Radial load is Lr + R = 0mm, axial load is La = 0mm) See the calculations in the HPG catalog when a combined axial and radial load is applied.

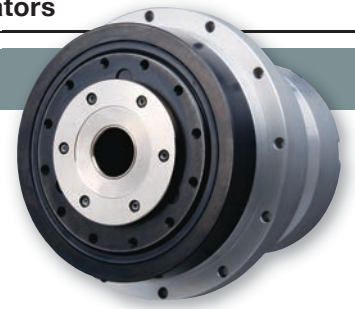
■ Angular Contact Bearing Specification (Input Side)

Model No.	Allowable Axial Load Fac		Allowable Radial Load Frc		Allowable Moment Load Mc	
	N	kgf	N	kgf	Nm	kgfm
25	1538	156.9	522	53.2	10	1.02
32	3263	332.9	966	98.5	19	1.93

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Precision Actuators For High Speed Applications

■ Maximum Output Speed

SHA25A11HP (No. 25) : 500 rpm

SHA32A11HP (No. 32) : 430 rpm

■ Actuator Specifications

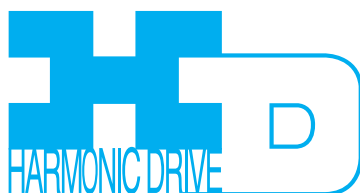
Item	Model	SHA25A11HP	SHA32A11HP
Reduction Ratio		11:1	
Combined driver		REL-230-18	REL-230-36
Maximum Torque	Nm	26	62
	Kg-m	2.7	6.3
Maximum Rotational Speed	rpm	500	430
Torque Constant	Nm/A (rms)	4.2	4.5
	Kg-m/A (rms)	0.43	0.46
Maximum Current	A (rms)	8.9	19
Moment of Inertia (Without Brake)	GD ² /4 Kg-m ²	0.029	0.091
	J Kg-cm-s ²	0.296	0.929
Moment of Inertia (With Brake)	GD ² /4 Kg-m ²	0.034	0.11
	J Kg-cm-s ²	0.347	1.1
Uni-directional Positional Accuracy	arc-sec	120	120
Encoder Method		magnetic absolute encoder	
Encoder Resolution per Motor Revolution		2 ¹⁷ (131,072)	
Multi Revolution Detection		2 ¹⁶ (65,536)	
Output Side Resolution	Pulse/revolution	1,441,792	
Mass (without Brake)	Kg	5.0	9.4
Mass (with Brake)	Kg	5.1	9.7
Environmental Conditions		Operating temperature 0 to 40° C, storage temperature -20 to 60° C Operating humidity / storage humidity 20 to 80% RH (No condensation) Vibration resistance 25m/s ² (frequency 10 to 400Hz), Shock resistance 300m/s ² , No dust, no metal powder, no corrosive gas, no flammable gas, no oil mist Indoor use only. No exposure to direct sunlight. Altitude < 1000m	
Mounting Orientation		Any Orientation	

Servo Drive Features

- EtherCAT[®]
- Easy Driver Set-up Using HDM Software
- Control Modes: Current / Velocity / Position
- Can Operate Using Internal Programming or ASCII Commands



* Please contact Harmonic Drive LLC for details.



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