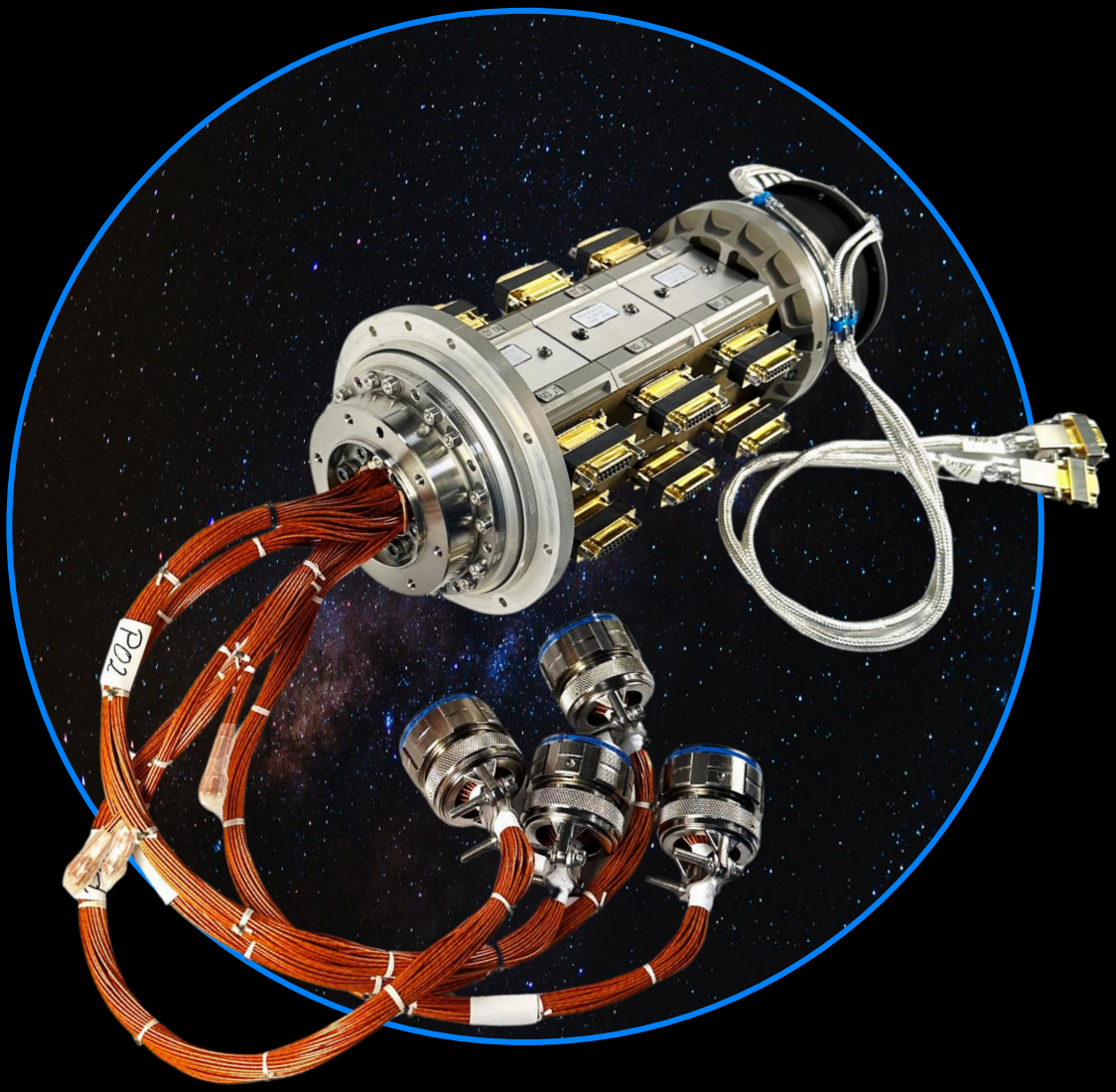
beyond gravity

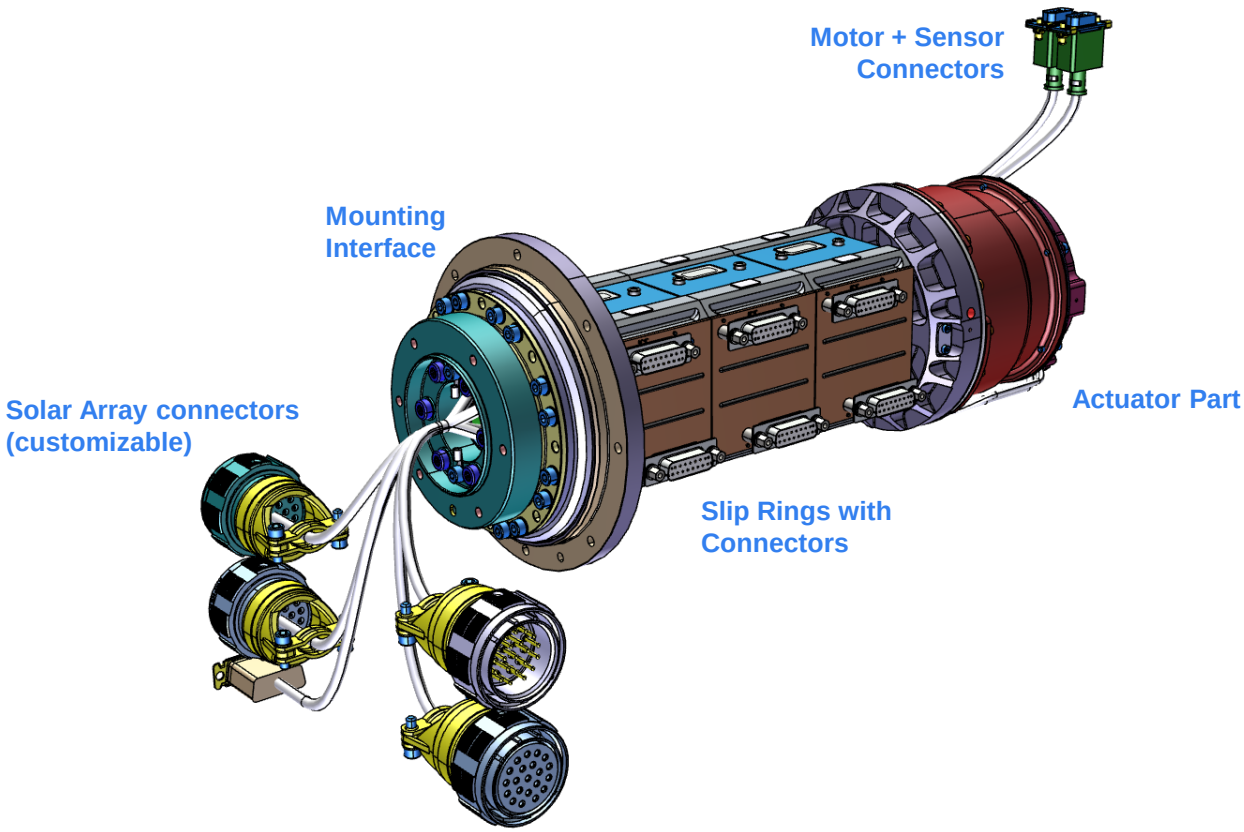


SEPTA36G

Solar Array Drive Mechanism for your demanding mission

Beyond Gravity offers a modular family of Solar Array Drive Mechanisms, to serve a large range of spacecraft. The SEPTA36G is fully qualified and is available at attractive lead times.

Scalable High Power SADM for all missions



Modularity for lowest cost

- Family of SADM for a large range of missions
- Standard mechanical interfaces
- Standard actuator with huge flight heritage
- Rolling Stock enables short lead times and flexibility

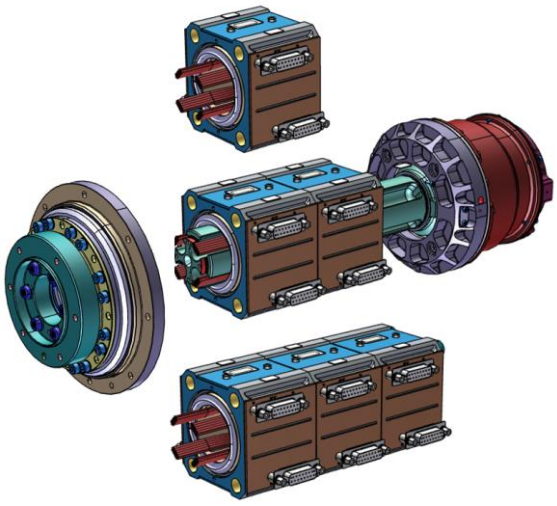
Robust and Proven

- Flight proven slip ring technology
- Standard actuator, components flying since decades
- Enormous database of unit data, family trend and comparisons
- Qualified for LEO and GEO missions

Tailored for you

- Huge engineering expertise allowing adaptation for unusual and specific applications
- Adapted interfaces, test scope, modifications, are feasible on request.

Modularity Concept



Interfaces remain the same, regardless of power class. Ideal for your scalable platform.

Contact us: Beyond Gravity Schweiz AG | Stefan Wismer, Sales Manager | stefan.wismer@beyondgravity.com

Operational Performance			
Drive direction	Continuous rotation in forward and reverse direction		
Max. output speed	1.0 °/s		
Output Step Size (full step)	0.00625°		
Lifetime	15 years in orbit		
Qualified Lifetime (as tested)	500 full revs on ground GEO qualification campaign: 25'903 revs as sweeps (LEO environments qualified via SEPTA36 qualification campaign)		
Delivered Torque			
Unpowered holding torque	~7 Nm (without optional detent break)		
Powered Holding Torque	max. 55 Nm		
Delivered Output Torque @ 200 mA	> 55 Nm		
Delivered Output Torque @ 300 mA	> 55 Nm		
Back-Drivability	Possible with unpowered motor		
Motor Back-EMF Constant	2.33 Vs/rad		
Slip Ring Characteristics	**SEPTA36G-1**	**SEPTA36G-2**	**SEPTA36G-3**
Number of tracks (all tracks identical and usable for power or signal transfer)	30	60	90
Number of lines (1 line = 2 tracks)	15	30	45
Total Power transfer	9 kW*	18 kW*	27 kW*
Max current per track	4.8 A_{RMS} (simultaneously on all tracks) 5.5A (maximum per individual track ; as-qualified)		
Max. voltage across tracks	120V		
Connector-to-Connector Resistance (at 22 °C, with 250mm harness)	< 140 mΩ		
Noise (RMS ; per line, i.e. 2 transfers in series)	≤ 28mΩ		
Insulation	≥ 100 MΩ @ 500 V, 30s		
Dielectric Strength:	No breakdown at 500 VAC		
Position Measurement			
Position Output Accuracy	± 1° (outside of potentiometer dead band)		
Position Output availability	0° … 356.5°		
Max. Dead Band	< 3.5°		
Alignment between main and redundant	0° or 180° (customer's choice) (± 1.5° accuracy)		
Potentiometer End-to-End Resistance	10 kΩ ±10%		
Operating Voltage	2.5V .. 12V (nominal 5V)		

* power transfer capability may be increased depending on the thermal boundary conditions. Please get in touch with Beyond Gravity for further information

Motor Characteristics			
Coil Resistance @ 20°C	76 Ω ± 10%		
Coil Inductance @ 20°C	156 mH ± 20%		
Motor time constant	2 ms		
Mechanical Dimensions & Mass	**SEPTA36G-1**	**SEPTA36G-2**	**SEPTA36G-3**
Max. Outer Diameter mounting flange	144 mm		
Length from front of flange	177.5 mm	237.5 mm	297.5 mm
Length Overall	217 mm	277.0 mm	337 mm
Mass (excl. customer-specific harness)	4.2 kg	5.2 kg	6.2 kg
S/C Interface	8 through holes Ø 4.5mm on a circle with D = 132mm		
S/A Interface	6 threaded blind holes MJ5x0.8 on a circle of D = 76mm (asymmetrically distributed to ensure orientation)		

Static Loads (non-simultaneous ; simultaneous load cases available on request)

Axial Load	6'670 N
Radial Load	4'890 N
Bending Load	420 Nm
Torsional Load	>56 Nm

Stiffnesses	**SEPTA36G-1**	**SEPTA36G-2**	**SEPTA36G-3**
Axial stiffness (along y)	4.5×10^7 N/m *	4.27×10^7 N/m *	4.0×10^7 N/m
Shear stiffness (along x, z)	1.85×10^7 N/m *	1.85×10^7 N/m *	1.76×10^7 N/m
Torsion angular stiffness	4.62×10^3 Nm/rad *	2.21×10^3 Nm/rad *	1.54×10^3 Nm/rad
Bending angular stiffness	39.16×10^3 Nm/rad *	34.98×10^3 Nm/rad *	31.2×10^3 Nm/rad
First mode frequency (with effective mass >10%)	>260 Hz		
	(* values estimated based on S36G-3 QM test data)		

Mechanical Qualification Levels (from SEPTA36G-3 QM for SEPTA36-1 and -2 the notching is slightly different)

High level sine vibrations:	Frequency (Hz)	Qualification Level
	10 - 24.2	±12.7mm
	24.2 - 36	15g
	36 - 55	20g
	55 -100	7g

Random vibrations:	⊥ MOUNTING PLANE (Y)		// MOUNTING PLANE (X&Z)	
	Freq. (Hz)	Level (g^2/Hz)	Freq. (Hz)	Level (g^2/Hz)
	20	0.05	20	0.021
	60	0.4	80	0.2
	422.5	0.4	700	0.2
	445	0.15	2000	0.026
	495	0.15		
	520	0.4		
	600	0.4		
	2000	0.036		
Global:	19.33 g_{rms}		14.92 g_{rms}	

Note: All dynamic mechanical levels are understood with a 2.5kg mass with a CoG at 50mm from the S/A interface plane. Other levels or other yoke masses are possible on request.

Shock levels for each axis (X, Y, Z):	Frequency	Shock input levels	
	100 Hz	80 g	
	1000 Hz	2543 g	
	10000 Hz	2543 g	
	Note: All dynamic mechanical levels are understood with a 2.5kg mass with a CoG at 50mm from the S/A interface plane. Other levels or other yoke masses are possible on request.		

Qualification Temperature Levels (SEPTA36G QM)

	S/C conductive interface	S/C radiative interface	
Ground Storage	10°C … 30°C	10°C … 30°C	
Hot Non-Operational (Survival)	+ 85°C	+ 65°C	
Hot Operational	+ 80°C	+ 60°C	
Cold Operational	– 35°C	– 30°C	
Cold start-up limit	– 40°C	– 30°C	
Cold Non-Operational (Survival)	– 40°C	– 30°C	