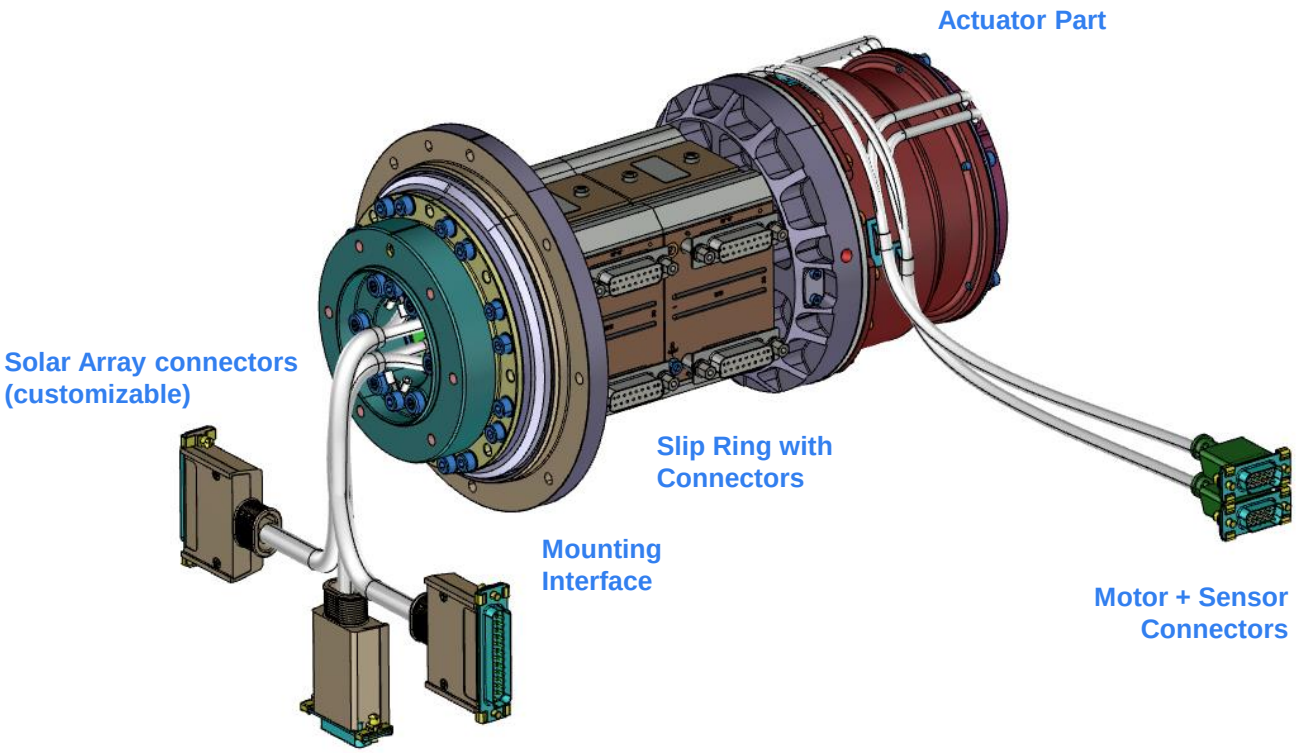
beyond gravity

SEPTA36

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 SEPTA36 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

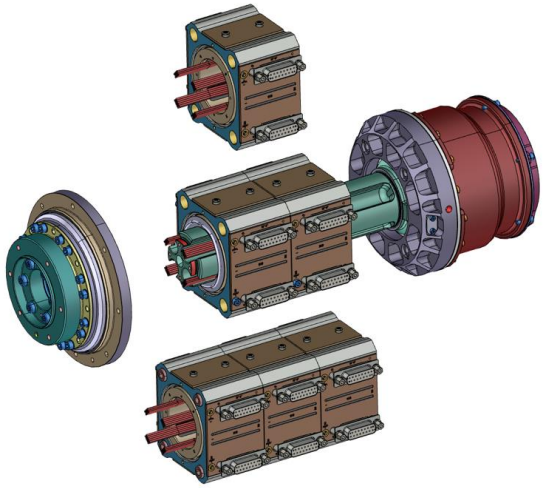
Robust and Proven

- 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.

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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: 19'503 revs as sweeps LEO qualification campaign: 152'437 revs as continuous revs and sweeps		
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	**SEPTA36-1**	**SEPTA36-2**	**SEPTA36-3**
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	6.3 kW	12.6 kW	18.9 kW
Max current per track	3.5 A_{RMS} (simultaneously on all tracks) 4.0A (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)		

Motor Characteristics			
Coil Resistance @ 20°C	76 Ω ± 10%		
Coil Inductance @ 20°C	156 mH ± 20%		
Motor time constant	2 ms		
Mechanical Dimensions & Mass	**SEPTA36-1**	**SEPTA36-2**	**SEPTA36-3**
Max. Outer Diameter mounting flange	144 mm		
Length from front of flange	162.5 mm	212.5 mm	262.5 mm
Length Overall	202 mm	252.0 mm	302 mm
Mass (excl. customer-specific harness)	4.0 kg	4.6 kg	5.4 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	4'800 N
Radial Load	6'200 N
Bending Load	400 Nm
Torsional Load	>55 Nm

Stiffnesses	**SEPTA36-1**	**SEPTA36-2**	**SEPTA36-3**
Axial stiffness (along y)	5.0×10^7 N/m	4.7×10^7 N/m	4.4×10^7 N/m
Shear stiffness (along x, z)	2.1×10^7 N/m	2.1×10^7 N/m	2.0×10^7 N/m
Torsion angular stiffness	5.28×10^3 Nm/rad	2.52×10^3 Nm/rad	1.76×10^3 Nm/rad
Bending angular stiffness	47.7×10^3 Nm/rad	42.6×10^3 Nm/rad	38.0×10^3 Nm/rad
First mode frequency of the mechanism (without yoke mass)	>400 Hz	>330 Hz	>260 Hz

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

High level sine vibrations:	Frequency (Hz)	Qualification Level
	0-20	±11mm
	20-100	25g

Random vibrations:	⊥ MOUNTING PLANE (Y)		// MOUNTING PLANE (X)		// MOUNTING PLANE (Z)	
	Freq. (Hz)	Level (g^2/Hz)	Freq. (Hz)	Level (g^2/Hz)	Freq. (Hz)	Level (g^2/Hz)
	10.00	0.01	10.00	0.01	10.00	0.01
	60.00	0.50	60.00	0.50	60.00	0.50
	444.40	0.50	245.00	0.50	254.00	0.50
	465.00	0.10	255.00	0.30	265.00	0.30
	515.00	0.10	275.00	0.30	285.00	0.30
	538.87	0.50	286.17	0.50	296.56	0.50
	700.00	0.50	700.00	0.50	700.00	0.50
	2000.00	0.07	2000.00	0.07	2000.00	0.07
Global:	23.2 g_{rms}		23.74 g_{rms}		23.74 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	60 g	
	1000 Hz	1600 g	
	10000 Hz	1600 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 (SEPTA 36 QM)

	S/C conductive interface	S/C radiative interface	
Ground Storage	10°C … 30°C	10°C … 30°C	
Hot Non-Operational (Survival)	+ 90°C	+ 65°C	
Hot Operational	+ 70°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	