

# REACTION WHEELS

Space-Proven, High-Performance Range of Wheels

CubeSpace (CS) offers reaction wheels from 1.7mNms suitable for a 3U CubeSat, all the way up to 10Nms suitable for larger MicroSat platforms. Our wheels are built to ensure the highest precision for demanding earth observation missions but are also designed with mass-manufacturing in mind, enabling us to offer the low prices and short lead-times that commercial space missions demand. We ensure unparalleled reliability through built-in full electronic redundancy (including redundant motor windings), as well as using the bearings and lubrication from industry leading suppliers that have decades of experience with long lifetime space missions. All of this is made possible through our in-house designed and manufactured brushless-DC motors which are scaled and optimised for each size reaction wheel.

## MICROSAT WHEEL KEY FEATURES

- ✦ Full electrical redundancy, including redundant motor windings
- ✦ In-house designed and manufactured BLDC motors
- ✦ Accelerated lifetime testing done on all wheels
- ✦ Kistler table verified vibration measurements and waterfall plots
- ✦ Orthogonal or Pyramid mounting configuration
- ✦ Pyramid mount includes dampers to dramatically reduce micro-vibrations
- ✦ Bearings and lubrication from industry leaders with decades of experience with long-life missions
- ✦ Vibration and shock qualified for Falcon 9
- ✦ Laser balanced flywheels



The Gold Standard in Control Systems for Satellites up to 1 Ton

	CW0017	CW0057	CW0162	CW0500		CW1200	CW2500	CW5000	CW10K*	CW40K*	CW100K*	
<b>PERFORMANCE</b>												
Nominal Motor Supply Voltage [V]	6.4	11	11	12	Nominal Motor Supply Voltage [V]	12	24	24	24	24	TBD	
Max Speed @ Nominal Voltage [RPM]	10000	10000	10000	10000	Max Speed @ Nominal Voltage [RPM]	10000	8000	8000	7000	6000	TBD	
Rated Momentum [mNms]	1.77	5.7	16.2	50	Rated Momentum [Nms]	0.12	0.25	0.5	1.0	4.0	10.0	
Speed @ Rated Momentum [RPM]	8000	6000	6000	5810	Speed @ Rated Momentum [RPM]	5890	5246	5090	5200	3450	TBD	
Torque @ Rated Momentum [mNm]	0.23	2	7	10	Torque @ Rated Momentum [mNm]	20	27	37	40	120	TBD	
Imbalance	All reaction wheels are balanced according to ISO-1940 G0.4 (High-Precision Systems) or better.				Imbalance	All reaction wheels are balanced according to ISO-1940 G0.4 (High-Precision Systems) or better.						
<b>PHYSICAL</b>												
Mass [g]	60	115	144	322	Mass [g]	490	750	1140	1460	3850	TBD	
Dimensions [mm]	28x28x26	35x35x24.2	46x46x24.2	66x66x26	Dimensions [mm]	73x73x31.8	86x86x36.4	100x100x37.5	124x124x46	180x180x64	TBD	
<b>POWER &amp; DATA</b>												
Data Bus	CAN/UART/I2C/RS-485			CAN/UART/RS-485	Data Bus	CAN/UART/RS-485					TBD	
Connector	Molex Micro-Lock Plus				Connector	Harwin Gecko SL					TBD	
Digital Supply Voltage [V]	3.3	3.3	3.3	3.3	Digital Supply Voltage [V]	3.3	3.3	3.3	3.3	3.3	TBD	
Motor Supply Voltage Range [V]	6.4-16.8	6.4-16.8	6.4-16.8	12-24	Motor Supply Voltage Range [V]	12-24	16-36	16-36	16-36	16-36	TBD	
Nominal Steady-state Power: at rated momentum [W] (Includes digital power)	<0.3	<0.8	<0.8	<3.4	Nominal Steady-state Power: at rated momentum [W] (Includes digital power)	<4	<11	<9	TBD	<16	TBD	
Peak Power: Accelerating at nominal torque, at rated momentum [W] (Includes digital power, excludes Inrush at start-up)	0.9	2.7	7.2	15	Peak Power: Accelerating at nominal torque, at rated momentum [W] (Includes digital power, excludes Inrush at start-up)	32	33	50	TBD	100	TBD	
<b>QUALIFICATION TEST</b>												
Radiation (TID)	24 kRad				Radiation (TID)	24 kRad						
Vibration	14 g RMS (NASA GEVS)				Vibration	14 g RMS (NASA GEVS)						
Shock	1500 g				Shock	1500 g						
Thermal (Vacuum) [°C]	-20 to 80 °C				Thermal (Vacuum) [°C]	-20 to 80 °C						
Thermal (Hot & Cold Start) [°C]	-35 to 70 °C				Thermal (Hot & Cold Start) [°C]	-35 to 70 °C						