

REACTION WHEELS



Blue Canyon Technologies (BCT) reaction wheels are the industry leading attitude control actuators for Smallsats. BCT reaction wheels feature an advanced lubrication system and vibration isolation for low jitter performance. Spanning a range from 0.015 Nms to 8.0 Nms, the BCT commercial reaction wheel product line offers superior performance with proven ability to support long life missions with highly stable pointing requirements.

BCT reaction wheels are simple to integrate and control over standard RS-422 interface. BCT provides standalone drive control electronics for driving up to four reaction wheels. RWp500 or larger wheels are equipped with integrated electronics. Flexible commanding options include direct torque commanding for nominal flight operation or more advanced wheel speed and PWM control.

HERITAGE

BCT reaction wheels have robust on-orbit heritage, supporting a wide range of successful customer missions from Cubesats to 500kg spacecraft. More than 500 BCT reaction wheels have orbited. BCT reaction wheels have accumulated more than 7 million hours of operation on-orbit, having operated from LEO to Mars and beyond.

ENVIRONMENTS

Every flight reaction wheel is tested to NASA GEVS acceptance level vibration (10.0 Grms) and thermal cycling (-20° to 60°C). BCT reaction wheel designs are radiation tolerant to support missions in excess of five or ten years depending on wheel size. BCT reaction wheels are also backed by ongoing life testing that began in 2015.

WATERFALL PLOT

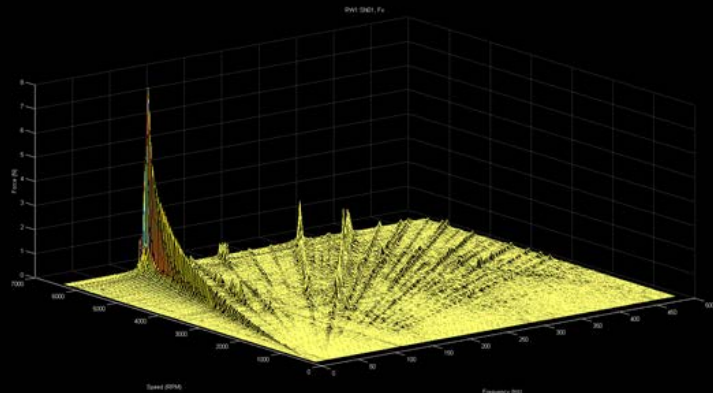
Waterfall plots (radial, axial, and moment) are generated for each reaction wheel and available as an option in end item data package.

KEY ADVANTAGES

- TRL-9 flight-proven
- High-accuracy observer-based control design
- Low-jitter with fine balance available
- Wheel life test ongoing
- High torque-to-speed ratio
- Mature production documentation package

BASELINE DELIVERABLES

- User Manual
- Interface Control Documentation
- Command & Telemetry Handbook
- Functional and Performance Test Results
- Certificate of Conformance
- Static and Dynamic Unbalance values per wheel





PERFORMANCE

	RWp015	RWp050	RWp100	RWp500	RW1	RW4	RW8
MAX MOMENTUM	0.015 Nms	0.050 Nms	0.100 Nms	0.500 Nms	1.0 Nms	4.0 Nms	8.0 Nms
MAX TORQUE	0.004 Nm	0.007 Nm	0.007 Nm	0.025 Nm	0.06 Nm	0.25 Nm	0.25 Nm
STATIC/DYNAMIC UNBALANCE (STANDARD)	< 1.2 g-mm / < 20 g-mm ²	< 1.2 g-mm / < 20 g-mm ²	< 1.5 g-mm / < 20 g-mm ²	< 6 g-mm / < 180 g-mm ²	< 3 g-mm / < 90 g-mm ²	< 6 g-mm / < 300 g-mm ²	< 8 g-mm / < 500 g-mm ²
CONTROL ACCURACY AT MAX TORQUE	2.0 rad			1.0 rad			
CONTROL ACCURACY AT MAX SPEED	Less than 0.1 radians						

MECHANICAL INTERFACE

MASS	0.13 kg	0.24 kg	0.33 kg	0.86 kg	1.1 kg	3.2 kg	4.4 kg
DIMENSIONS	42 x 42 x 19 mm	58 x 58 x 25 mm	70 x 70 x 25 mm	110 x 110 x 38 mm	110 x 110 x 54 mm	170 x 170 x 70 mm	190 x 190 x 90 mm

ELECTRICAL INTERFACE

SUPPLY VOLTAGE	10 - 14 VDC		22 - 34 VDC 28 - 34 VDC (full performance)		22 - 34 VDC		
POWER AT MAX MOMENTUM	0.85 W	0.81 W	0.89 W	5.5 W	14 W	9.7 W	9.7 W
PEAK POWER	5.5 W	9 W	9 W	21.3 W	81.1 W	168 W	168 W
POWER AT ZERO MOMENTUM	0 W	0 W	0 W	1.1 W	4.0 W	5.6 W	5.6 W
PEAK REGENERATED POWER	0.88 W	0.82 W	0.9 W	2.8 W	32.7 W	110 W	110 W
CONTROL RATE	200 Hz						
PROTOCOL	RS-422						
ELECTRONICS	DCE			Integrated			

ENVIRONMENTAL CONDITIONS

VIBRATION QUALIFICATION	14.1 Grms						
OPERATING TEMPERATURE	-20°C to +60°C						
SURVIVAL TEMPERATURE	-30°C to +70°C						
SYSTEM RADIATION HARDNESS (Si)	>40 Krad						
DESIGN LIFE	>5 years			>10 years			



2550 Crescent Drive
Lafayette, CO 80026

BLUECANYONTECH.COM