LIBRA REACTION WHEELS

A high-performance alternative to a propulsion-based reaction control system, reaction wheels provide spacecraft with control torque by means of momentum exchange between the satellite body and the rotating wheel. The increasing popularity of these wheels coupled with our commitment to high quality, fit-for-purpose components has resulted in NSS offering these wheels in a range of standard sizes (NRWA-T065, NRWA-T2, NRWA-T6, NRWA-T8 and NRWA-T32) or can offer a customised flywheel for mission optimisation.

PERFORMANCE	LIBRA-065 [NRWA-T065]	LIBRA-2 [NRWA-T2]	LIBRA-6 [NRWA-T6]	LIBRA-32 [NRWA-T32]
FUNCTIONAL CHARACTERISTICS				
Max wheel torque	20 mNm (Nominal)	90 mNm	200 mNm (Nominal) 310 mNm (Peak)	310 mNm (0 Nms) 280 mNm (32 Nms)
Max wheel momentum	0.65 Nms (at 6500 RPM and 20 mNm) 0.94 Nms (at 9000 RPM)	1Nms (at 1850 RPM and 84 mNm) 1.47Nms (at 2700 RPM)	6Nms (at 3800 RPM and 200 mNm) 7.83 Nms (at 5000 RPM)	32Nms (at 280mNm) 109Nms (at 0mNm)
Speed range	±9000 rpm	±2600 RPM (Speed/Torque mode) ±2700 RPM (Current mode)	±5000 RPM	±4900 RPM
Rotor moment of inertia	1.0 x 10-3 kg.m2	5.2 x 10-3 kg.m2		212.5 x 10-3 kg.m2
Speed control accuracy	±1 RPM @ >100 RPM	±1 RPM @ >100 RPM	±1 RPM @ >100 RPM	
PHYSICAL CHARACTERISTICS				
Dimensions (wheel)	102 mm x 102 mm x 105 mm	150 mm x 150 mm x 75 mm	206 mm x 206 mm x 100 mm	460 mm x 190.5mm
Dimensions (electronics)	Internal	Internal	Internal	190 mm x 165 mm x 30 mm
Mass	1.6 kg	2.8 kg	4.7 kg	8.2kg (wheel) 0.85kg (electronics)

ENVIRONMENTAL CHARACTERISTICS

Thermal (acceptance)	-10 °C to +45 °C	-10°C to +55°C	-30°C to +55°C	-25°C to +65°C
Mechanical Tests (Qualification)	16.95gRMS (random)	16.02gRMS (random)	14gRMS (random)	14gRMS (Random, wheel) 24 gRMS (Random, electronics)
Radiation (TID) (Qualification)	10 krad (component level)	10 krad (component level)	20 krad (component level)	30 krad (component level)

INTERFACES

Power supply	28 V unregulated	28 V unregulated	28 V unregulated	28 V unregulated
Power consumption	2.6W (Quiescent) 4W (Steady state at 3000RPM) 6W (Steady state at 6500RPM) 1.7W / mNm	1.7W (Quiescent) 4W (Steady state at 1500RPM) 4.8W (Steady state at 2600RPM) 0.4W / mNm	5.88W (Quiescent) 17.3W (Steady state at 3Nms) 28W (Steady state at 6Nms) 26W Nominal power consumption 136W Peak power consumption	4.7W (Quiescent) 17.3W (steady state at 44Nms) 28W (steady state at 86Nms) 76W (Peak torque at 32Nms) 188W (peak torque at 99Nms)
Data	RS-422	RS-422	RS-485	RS-485
Connector	9-pin D-type Male	9-pin D-type Male	9-pin D-type Male (Power interface 25-pin D-type Male (Data interface)	9 pin D type Male (Power) 25 pin D type Male (Data) 25 pin D type Female (Redundant Data) 15 pin D type Female (Electronics motor interface) 15 pin D type Male (Spindle motor interface)

ACCEPTANCE TESTING: *All FM parts undergo random vibration (10 grms) as well as thermal cycling (four cycles at ambient pressure) to five degrees beyond operational thermal specifications. However, NewSpace can perform additional environmental testing if required by a client.*

CONFIGURATION MANAGEMENT: *Specifications are subject to change. Please refer to the latest version.*

FEATURES

- Wheel torque and momentum capacity suited to client mission requirements
- Current, speed and Torque control
- Simple digital interface to the spacecraft bus
- Integration with an optional gyroscope for inertial rate control and inertial angle control modes is possible on T065
- Hermetically sealed (T065 & T2)
- Long demonstrated lifetimes

APPLICATIONS

- High-performance three-axis torque and momentum exchange actuators for agile small satellite missions
- Momentum bias
- Inertial rate control for accurate pointing of imagers

QUALIFICATION

The NewSpace Systems (NSS) Reaction Wheel product range is extensively qualified and based on a robust design with significant in-orbit heritage. The T065 wheel, which first flew in 2014, has more than 3 million failure-free hours in-orbit with no reported SEU's. Since then, NSS has expanded its wheel range and now offers custom wheel solutions. With an order book of >300 wheels, and wheels baselined on 4 constellation programmes, the NSS wheels have become a preferred choice for longer lifetime missions and constellation programmes.

NEWSPACE SYSTEMS

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