

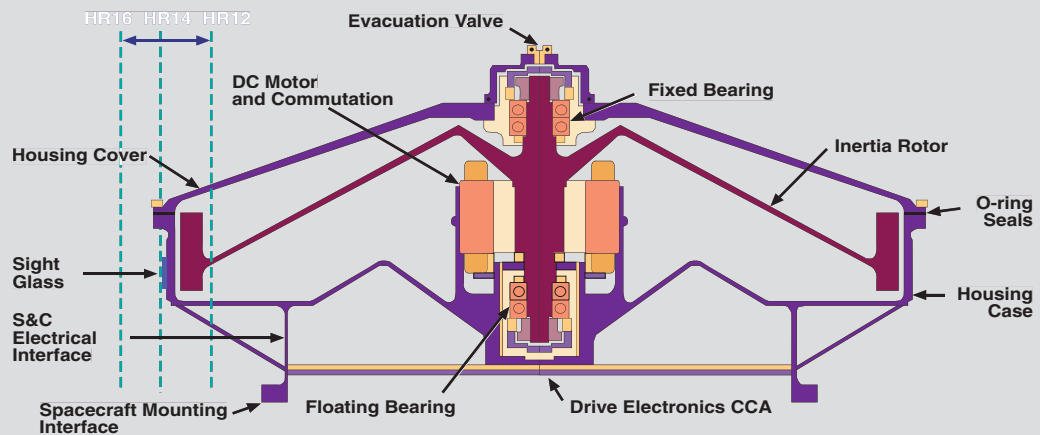
## Constellation Series Reaction Wheels

Economical,  
Reliable,  
High Performance

AEROSPACE

This versatile line of Reaction Wheels (HR12, HR14 and HR16) provides an economical, compact, and lightweight solution for general applications with momentum requirements ranging from 12 to 150 N-m-s.

### Cross Sectional View



### Mechanical Design

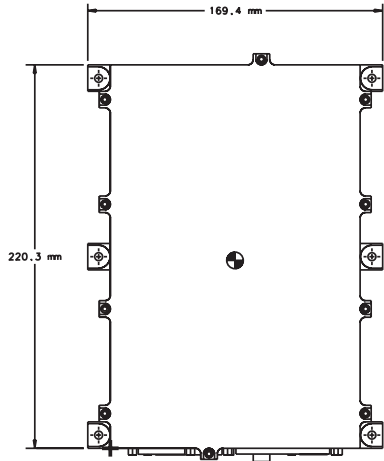
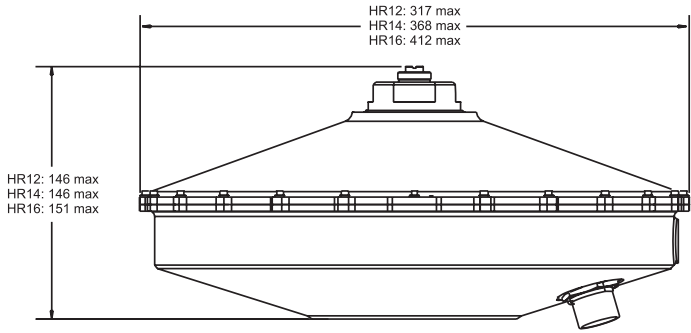
- ◆ **Advanced rotor momentum package design featuring single piece rotor technology:**
  - Precise dynamic modal tuning
  - Low emitted disturbance/jitter
  - Performance stability over environments
- ◆ **Innovative lightweight housing chassis:**
  - Compact design with high momentum-to-mass efficiency
  - Wheel unit available separated or integrated with drive electronics
  - Common mounting spacecraft interface for all momentum classes
  - Interchangeable rotor momentum sizing within class
- ◆ **Advanced duplex bearing and lubrication:**
  - Proven on-orbit extended life capability
  - Unmatched performance in longevity, reliability and value
  - Insensitive to temperature environment

### Electrical Design

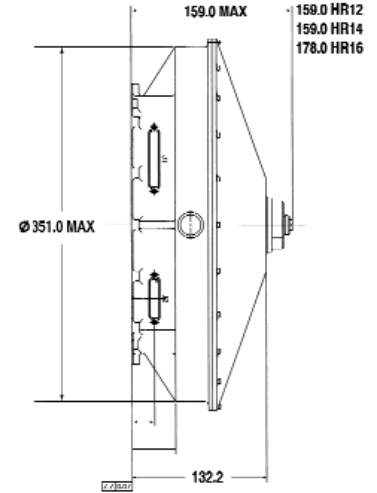
- ◆ **Versatile and simplified customer interface provides:**
  - Standard analog
  - Serial digital RS422
  - Wide bus voltage range
- ◆ **DC Brushless spin motor:**
  - Modular output torque options
  - Extended high torque capability
  - Integrated Hall commutation and speed telemetry
- ◆ **Motor Drive Electronics:**
  - Integrated or separated motor drive electronics configurations available
  - Versatile interchangeable interfaces between all wheel classes
  - Radiation hardened in excess of 300Krad (Si)
  - Signal noise filtering and fault isolation
  - Over/under voltage and overspeed protection
  - Internal temperature telemetry
  - Detorque power management options available



# Constellation Series Envelope Specification:



Separated Electronics



Integrated Wheel

## Performance Characteristics

PERFORMANCE ITEM	UNIT	HR12	CAPABILITY HR14	HR16
Momentum	N-m-s	12, 25, 50 <sup>2</sup>	25, 50, 75	50, 75, 100 <sup>1</sup>
Reaction torque				
Nominal	N-m		0.1 to 0.2 <sup>3</sup>	
Extended	N-m		up to 0.4 (@3000 rpm) <sup>4</sup>	
Rotor Balance <sup>6</sup>				
Static	g-cm	0.15, 0.24, 0.44	0.22, 0.35, 0.48	0.28, 0.38, 0.48
Dynamic	g-cm <sup>2</sup>	2.2, 4.6, 9.1	4.6, 9.1, 13.7	7.7, 11.5, 15.4
Peak Power	Watts		105, 195 <sup>5</sup>	
Steady State (@ 6000 rpm)	Watts		< 22 typical	
Bus Voltage Range	Volts		14 up to 80	
Wheel Speed	rpm		± 6000	
Mass	kg	6.0, 7.0, 9.5	7.5, 8.5, 10.6	9, 10.4, 12
Integrated Wheel Outline (Height x Width)	mm	159 x 316	159 x 366	178 x 418
Separate Electronics Outline	mm	WU H148X316D WDE H60XW169XL230	WU H148X366D WDE H60XW169XL230	WU H152X418D WDEH60XW169XL230
Life				
Storage	Years		> 5	
On-orbit Operation	Years		> 15	
Radiation Hardness Capability	Krads (Si)		> 300	
Parts Screening			S	
Operational Temperature Range (Qual)	°C		-30 to 70	
Vibration	Grms		13.8	
Interface	NA		Analog/Digital	

Note 1: Additional momentum designs are available including 68, 125 and 150 N-m-s.

Note 2: Additional momentum designs are available including 18 and 37.5 N-m-s.

Note 3: At maximum speed.

Note 4: Extended high torque capability exists at specified operating conditions relative to bus voltage, duty cycle and operating temperature.

Note 5: At 0.1 N-m and 0.2 N-m and a 50V regulated bus respectively.

Note 6: Balance performance represents BOL, Fine Balance Option, in a fully flight assembled configuration following ATP environmental exposure, as delivered. Further improvement of balance performance of >2X is possible.

# Honeywell

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