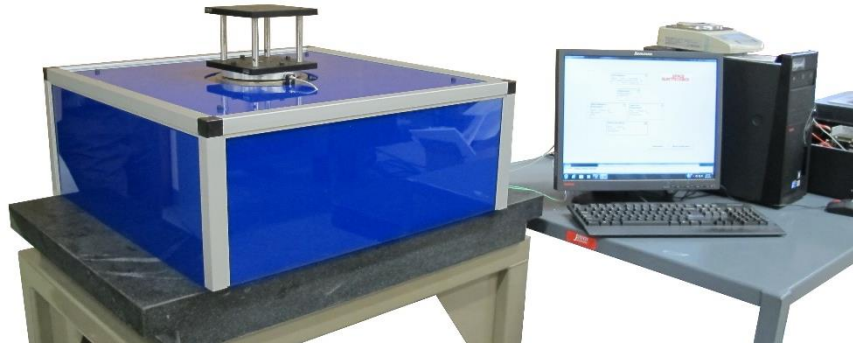


# FBD Series

## Force Balance Dynamometer



### General Description

The Force Balance Dynamometer (FBD) is a new series of spin balance instruments, which measure both static unbalance (due to CG offset) and dynamic unbalance (due to product of inertia). System software collects unbalance data, reports unbalance information, calculates correction mass solutions, and measures the expected residual unbalance of the payload after balancing.

This new instrument has the ability to spin balance a payload in a vacuum environment and thereby provide a solution to eliminate errors due to aerodynamic forces. It is low profile, permanently calibrated, has unmatched sensitivity, and can be used over a wide temperature range.

### General Specifications

	<b>FBD20</b>	<b>FBD200</b>	<b>FBD2200</b>
Maximum Payload Mass	20 lb	200 lb	2,200 lb
Range of Spin Speeds	0 – 40 RPM	50 – 200 RPM	30 – 150 RPM
Minimum Achievable Readout	0.02 lb-in <sup>2</sup> at 20/30 rpm	0.14 lb-in <sup>2</sup> at 50 rpm 0.02 lb-in <sup>2</sup> at 100 rpm 0.006 lb-in <sup>2</sup> at 200 rpm	2 lb-in <sup>2</sup> at 30 rpm 0.5 lb-in <sup>2</sup> at 50 rpm 0.15 lb-in <sup>2</sup> at 100 rpm
Unbalance Reduction Ratio	95%	85%	85%

Measurement sensitivity of the FBD system is equivalent to the Raptor Scientific traditional POI series, which features the best accuracy in the world for low spin speed applications.

### Design Features

The FBD instrument is designed for use in vacuum chambers and temperature chambers.

It is designed specifically to be low profile, measuring less than one foot in height, so that the whole instrument can be placed in a chamber. This overcomes limitations of hook height or test chamber space.

This is a major design enhancement over previous designs that use oil or compressed air. With those previous designs the interface between the instrument and the chamber was problematic.

### Instrument Selection

FBD instruments can be delivered with or without a spin motor. The version without a motor is used by test engineers to balance payloads that spin about their own bearings, eliminating the time-consuming process of precisely aligning the payload spin axis with the rotation axis of a spin balance machine.

The payload can be balanced without separating its rotating and non-rotating portions, which allows balancing or balance verification at any point in the integration and test flow without violating the integrity of a fully tested structure. Typical applications include spacecraft and inertia wheels.

Raptor Scientific currently offers three capacity ranges of the FBD instrument: 20, 200 and 2,200 lb. These instruments can be used to balance payloads as small as CubeSats, and as large as full-size spacecraft.