CTR Series

High precision, customizable instrument test centrifuge series

Exail CTR series of instrument test centrifuges are required for calibration and test of high precision accelerometers, and sensors.
High Precision accelerometers used in inertial navigation systems must be calibrated using a high precision centrifuge. Exail.
Maintaining a precise centripetal acceleration requires that the centrifuge main axis rotates at a precise rate without drift. The boom arm length stability is critical for maintaining constant acceleration.
To simulate the complete environment, it is often a requirement to calibrate accelerometers over temperature. Exail have thermal chamber options with small chambers for use on the end of the boom arm or for high g applications the complete security shroud can also incorporate the thermal chamber. Vibration systems or linear shakers may also be installed onto the boom arm making the centrifuge a vibrafuge. Every CTR Series centrifuge includes the requisite power and control cabinet with the Exail nGine controller and ProAxe Graphical User Interface (GUI).

FEATURES

- Direct drive brushless electric motors
- High accuracy optical encoders
- Custom slipring options
- Climatic chamber option with LN2, CO2 or mechanical refrigeration
- Integrated shaker
- Tilt or satellite table options
- Integrated security and aerodynamic shroud

CONTROLLER FEATURES

- Exail nGine controller including:
  - Auto-tuning
  - Adaptive sine
  - Anti-cogging
  - Advanced unbalance and fault detection
- Exail ProaXe Graphical User Interface (GUI)

TRACK RECORD

Exail has been providing centrifuges, position/rate tables and motion simulators for more than 50 years, including more than 15 years with the combination of direct drive brushless electric motors and optical encoders.
This unique experience allows Exail to build the most accurate, stable and dynamic systems, fulfilling all the needs for testing of inertial and optronic payloads.

BEST PRICE-PERFORMANCE RATIO

CTR Series are designed with key components chosen for having the best quality. Brushless motors, optical encoders and slip-ring capsules are critical to the performance of the complete system. Every CTR Series comes with the most advanced control electronics available; the Exail nGine controller and Exail ProaXe Graphical User Interface.

A SCALABLE TEST-TABLE

CThe CTR Series can evolve with your process. The centrifuge may be used for development, production, calibration and verification.

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SPECIFICATIONS

Payload	CTR-10	CTR-20	CTR-30
Payload mass max. (kg)*	Qty 2 x 5	20	50
Payload dimensions max. (mm)*	Qty 2, 300 x 300 x 300	500 x 550 x 500	800 x 800 x 800
Payload mounting (type)*	Table-top (2 balanced loads)	Plate: Vertical or Horizontal	Plate: Vertical or Horizontal
Flatness (µm/m)	0.05	0.05	0.05
Percussion point nominal radius (m)*	0.6	1.0	2.0
Type	Table-top or boom arm	Boom arm	Boom arm

Performance specifications

Max loading (g x kg)*	250 (each)	2'000	5'000
Max g (g)*	50	100	100
Max. rate (degs/s)*	2'000	2'000	1'500
Rate accuracy (ppm)	5	5	5
Acceleration command resolution (g)	±0.001	±0.001	±0.001
g onset (g/sec)	Load dependent	Load dependent	Load dependent
Axis Wobble (arc secs)	3	3	3
Precision Options			
High Precision g (ppm)*	HP ≤50**	HP ≤50**	HP ≤50**
Medium Precision g (ppm)*	MP ≤200	MP ≤200	MP ≤200
Environmental Precision g (ppm)*	EP ≤1'000	EP ≤1'000	EP ≤1'000

*Nominal maximums and subject to change

Mechanical

Thermal Chambers	See below
Shaker	Linear vibration, orthogonal to or coincidental with centripetal acceleration
**Laser interferometer	HP system real-time measurement of the radius of the percussion point in flight to achieve ≤20ppm g precision
Satellite Table	Synchronized rotary motion of UUT with the main axis
Indexing Table	Turn or flip UUT to pre-determined positions, during flight or static.

Slip-Rings

Signal rings	2A, 150VDC
Power rings	5A 400VAC, 20A 400VAC
Data ways	Ethernet, RS232, RS422, 1553
RF ways	GNSS
Gas	Nitrogen, Inert gases, Air, etc.

Thermal chamber (coolant options)

LN2, CO2, Mech	Mechanical in a closed loop with an evaporator in the chamber and static compressor.

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nGine controller features

Main Features	ProAxe GUI PC, auto-tuning of controller parameters, adaptive sine bandwidth, auto tuned anti-cogging, real-time built-in-test, trajectory-file, advanced unbalance and fault detection
Remote interfaces	Standard: USB, RS-232 and Ethernet. Optional: IEEE-488.2 (GPIB), SCRAMNet or VMIC
Analog inputs	1 input per axis, BNC connector on front panel, ±10 V with configurable sensitivity
Analog outputs	2 outputs per axis, BNC connector on front panel, ±10 V with configurable sensitivity
Digital inputs/outputs	Digital inputs for control and trigger Digital outputs, Event pulse generation