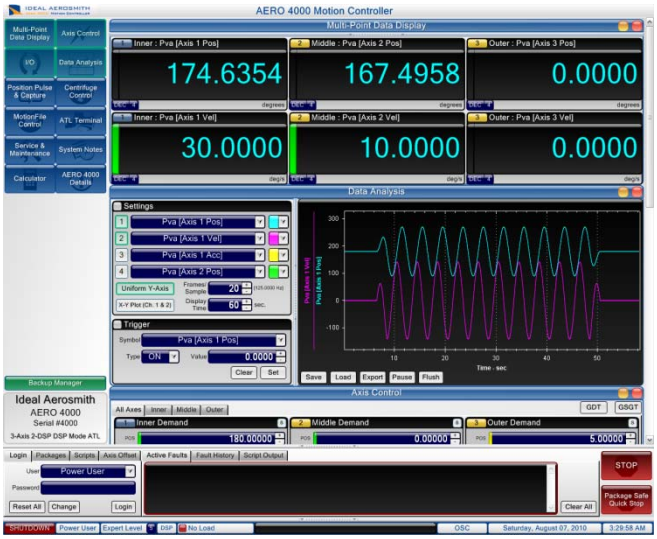
IDEAL AEROSMITH
Earned Expertise

Datasheet

AERO 4000 Precision Motion Controller



The AERO 4000 controller is the most advanced and capable digital servo controller on the market today. Ideal's 4th generation digital motion controller was introduced to the market in 2006. Ideal was assigned US Patent # 7,702,400 in 2010 covering some of the key functional building blocks.

The AERO 4000 is designed for Ideal's next generation of precision Hardware-in-the-Loop Flight Motion Systems, rate table systems, and precision centrifuges. Of equal importance, the AERO 4000 controller brings significant benefits to users of older flight motion systems and rate tables. By retrofitting a system controlled by an older analog and first-generation digital controllers with the new AERO 4000, users can gain accuracy, reliability, and service life with a new generation controller that has a well-defined future support path built on PC-based components. Even for systems controlled by newer generation digital controllers, upgrading to the AERO 4000 improves reliability while extending the support life.

In the AERO 4000, Ideal Aerosmith continues to adhere to its long-standing philosophy of using COTS (commercial off-the-shelf) technology so that all of its motion-based test systems will benefit customers with the lowest life-cycle cost of ownership.

AERO 4000-Setting the Standard

Simplicity

- Single computer solution for both Inertial Test and HWIL applications
- Patented architecture enables real-time HWIL capability without a real-time operating system
- Distributed software architecture provides greater performance/flexibility
- Distributed hardware architecture reduces wiring while improving accuracy and reliability

Performance

- 40 bit floating point calculations
- 5.0 kHz frame rate for single axis/optional on multi-axis
- 2.5 kHz frame rate for cost sensitive multi-axis applications
- 100 kHz inner control loop for dual loop applications such as Hydraulic actuators
- Patented method for exchanging data with reflective memory interface at controller frame rate
- Sinusoidal feedback error correction for smoother rates and more accurate positioning
- Motor commutation with error correction for smoother rates

Ease of Use

- Based on Windows 10 IoT Enterprise 2016 LTSB to minimize operator training
- C#, Visual Basic® and LabVIEW® VI examples provided to simplify host computer programming
- IEEE-488, RS-232, and Ethernet remote host interface

Optional Modules

- GPS or 10 Mhz/1PPS sync input
- 100 kHz dual loop compensation
- SCRAMNet® or VMIC® reflective memory interface
- Modular architecture reduces price when advanced options are not required

Ideal Aerosmith AERO 4000 Key Specifications

General	
Chassis Packaging	• 4U 19-inch industrial rack-mount PC on chassis slides. • 19-inch rack-mounted power distribution/switch • 19-inch rack-mount axis drive modules (electric or hydraulic) with E-stop • Rack-mounted Keyboard, Mouse, Flat-Panel Monitor
Power Requirements	• 90-264 Vac / 47-63 Hz
Axis Configuration	• Configurable from 1 to 6 axes. Drive Type and Feedback devices can be mixed. • Rotational and translational axes in various configurable units. Supports modulo and bi-polar control and feedback • Hydraulic, electric brush motor or electric brushless motor
Controller Type	• Digital PID with velocity & acceleration feedforward. Bi-quad filters can be programmed for various filters. • State Estimation with tracking filter or Luenberger observer • Optional dual loop card used for hydraulic axes to close pressure loop at 100kHz
Controller Frequency	• 2500/5000 Hz (Speed selected by Ideal based on application.) • Control frame period synchronized across all axes. • Optional GPS/10MHz-1pps synchronization system
Readout Vector	• Position, velocity, and acceleration. • Optional configurable selectable filtering. • At-position and at-velocity indicators with configurable epsilons (tolerance band).
Demand Vector	• Used upon new demand trigger for: o Position, velocity, and acceleration. o Mode select.
Diagnostics/Self-Test	• System check on power-up. • Power Supply Voltage Monitoring • Chassis temperature available in all chassis
Load Menu	• Gain settings for various payloads can be selected/stored via GUI or remote interface.
Signal I/O	
Torque Outputs	• Per axis configurable: o 2 torque outputs to support single or dual actuator axes. o Each torque output may be DC or sin θ and sin θ+120 (2 signals being one torque output) commutated. o 16-bit (min), $\pm$10V o Analog torque signal can be generated in various locations to reduce noise.
Once Per N Interval Output/Per Rev Output	• Per axis configurable: o $\leq$ 1.0 arc-sec error at all rates. o 1 microsecond (nominal) pulse width, TTL level. o N (degrees) rounded to nearest integer number of feedback pulses
Capture Input	• Per axis: o Asynch.position capture within 1 microsecond of rising edge, TTL level.
Analog Inputs	• Per axis: o 2 channels, 16-bit (min), $\pm$10V o Configurable gains, offsets, and usage within controller.
Analog Outputs	• Per axis: o 2 channels, 16-bit (min), $\pm$10V o Configurable gains, offsets, and usage within controller.

For special requirements or custom specifications, contact Ideal Aerosmith. Specifications are subject to change without notice. Please call for pricing. Rev. N