

Specifications for Aerodynamics Lab Equipment

S.No.	Item Description	Technical Specifications	Qty
1	Component Force Balance (External, strain-gauge type)	• Type: External sting/strut-mounted force balance • Components: 6 (Fx, Fy, Fz, Mx, My, Mz) • Sensing: Strain gauge based (full bridge) • Load capacity: - Normal Force (Fz): $\pm 50\text{N}$ minimum - Axial Force (Fx): $\pm 25\text{N}$ minimum - Side Force (Fy): $\pm 25\text{N}$ minimum - Pitching Moment (My): $\pm 2\text{ N}\cdot\text{m}$ minimum - Rolling Moment (Mx): $\pm 1\text{ N}\cdot\text{m}$ minimum - Yawing Moment (Mz): $\pm 1\text{ N}\cdot\text{m}$ minimum • Accuracy: $\pm 0.1\%$ of full scale • Resolution: 0.01N / $0.001\text{ N}\cdot\text{m}$ • Cross-talk: $<2\%$ between channels • Material: Precipitation-hardened stainless steel • Overload capacity: 150% of rated load • Output: mV/V (compatible with standard DAQ) • Temperature compensation: Built-in • Calibration certificate: NABL/equivalent • Mounting: Compatible with existing wind tunnel • Digital display unit included • Warranty: Minimum 2 years comprehensive	1
2	Data Acquisition System (DAQ)	• Analog inputs: 16 single-ended / 8 differential minimum • Sampling: Simultaneous on all channels (mandatory) • Resolution: 16-bit - Sample rate: 2 MS/s aggregate minimum • Input range: $\pm 10\text{V}$, $\pm 5\text{V}$, $\pm 1\text{V}$ (programmable) • Analog outputs: 2 channels, 16-bit • Digital I/O: 24 channels minimum • Counter/Timer: 4 channels, 32-bit • Interface: USB 2.0 Hi-Speed or higher • Software: LabVIEW and MATLAB compatible (mandatory) • Triggering: Hardware and software • Power: USB bus-powered • Accessories: USB cable, BNC cables (4 nos.) • Calibration certificate: Included • Warranty: 2 years minimum	1
3	3-Axis Motorized Traverse System	• Travel: X: 500mm, Y: 300mm, Z: 300mm minimum • Motors: Stepper motors (NEMA 23 or equivalent) • Resolution: 0.01mm per axis • Repeatability: $\pm 0.05\text{mm}$ • Speed: Up to 50mm/s per axis • Lead screws: Ball screw, anti-backlash • Guides: Linear rails with recirculating bearings • Controller: Stand-alone or PC-controlled • Software: Coordinate input, automated scanning • Interface: USB/RS-232 • Limit switches: Both ends, all axes • Frame: Rigid aluminum/steel construction • Mounting: Compatible with wind tunnel test section • Cable management: Included • Probe holders: Adjustable clamps • Warranty: Minimum 2 years comprehensive	1

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4	Model Mounting & AoA Mechanism	• Angle of Attack range: $\pm 30^\circ$ minimum • Resolution: 0.5° or better • Drive: Motorized (stepper or servo) • Encoder: Absolute, 12-bit minimum • Sting/strut: Stainless steel, various diameters • Model adapters: Standard fittings • Controller: Remote/PC controllable • Speed: Variable, up to $5^\circ/\text{s}$ • Position feedback: Real-time readout • Software: Angle scheduling, data sync • Mounting: Compatible with force balance • Safety: Limit switches, soft limits • Warranty: Minimum 2 years comprehensive	1
5	Airspeed Sensors (Pitot Tube)	• Type: Differential pressure sensor • Sensor: MS4525DO or equivalent • Range: 0-100 m/s (configurable) • Resolution: 0.84 Pa • Accuracy: $\pm 1\%$ full scale • Interface: I2C • Pitot tube: Aluminum or stainless steel • Tubing: Silicone, 4mm OD • Temperature compensation: Built-in • Operating voltage: 3.3V-5V • Warranty: Minimum 2 years comprehensive	4



