

# Flight Stand 150

High-accuracy professional thrust stand

Motor and propeller not included



## Introduction

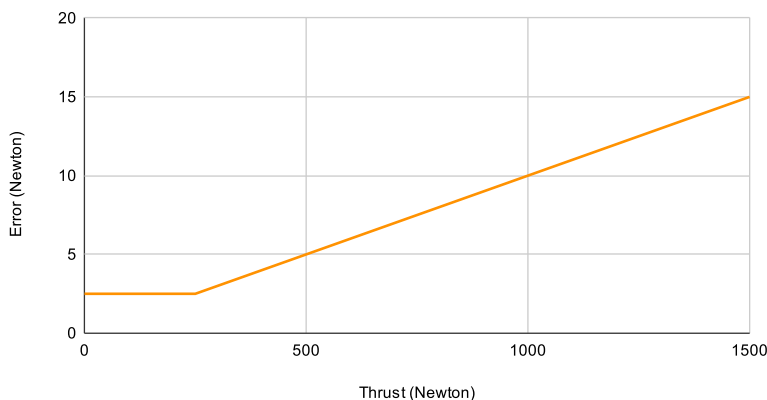
The Flight Stand 150 thrust stand allows you to precisely characterize and evaluate the performance of your motors and propellers by measuring thrust, torque, RPM, current, voltage, temperature, airspeed, propeller efficiency and motor efficiency.

## Description

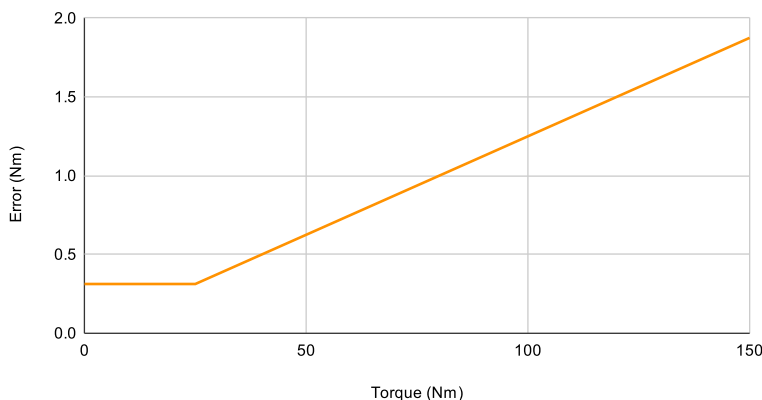
The Flight Stand 150 is designed to meet the needs of commercial developers and research institutions that are building and testing very large UAVs, eVTOL, and other electric aircraft.

It's impressive design and performance mirror that of our Flight Stand 15 / 50 Pro, but with a thrust measurement capacity up to 150 kgf and torque measurement up to 150 Nm.

Thrust Measurement Accuracy



Torque Measurement Accuracy



## Technical Specifications

	Specification	Value
Basic Information	Storage temp & humidity	23°C, 20% to 80% suggested
	Operating temp & humidity	0°C to 40°C, 20% to 80% suggested
	Operating environment	Indoor and outdoor testing possible, not waterproof
	Power adapter input power / output power	90 - 264 VAC, 1 A input adapts into 9 V, 2 A
Measurement Information	Sampling rate	1,000 Hz
	Wireless testing	Yes
	Thrust calibration	ASTM E74 standard (213 points, push & pull)
	Torque calibration	ASTM E2428 standard (213 points, CW & CCW)
Voltage and Current	Voltage range (high voltage port)	25 to 1000 V
	Voltage range (low voltage port)	5 to 180 V
	Voltage resolution	0.001 V
	Voltage accuracy	0.5% of port voltage limit
	Current range	0 to 500 A
	Current resolution	0.12 A
	Current accuracy	1% from 25 to 500 A
Thrust	Range	±1500 N
	Resolution	0.5 N
	Accuracy	±1.0% of measured value, with lower limit of ±250 N (± 2.5 to ± 15 N)
	Temperature effect	±1.5 N per 10 degree Celsius
Torque	Range	±150 Nm
	Resolution	0.01 Nm
	Accuracy	±1.25% of measured value, with lower limit of 25 Nm (± 0.3125 to ± 1.875 Nm)
	Temperature effect	±0.5 Nm per 10 degree Celsius
Fiber Optic RPM Sensor	Range	Two-blade propeller: 16,800 RPM Three-blade propeller: 11,200 RPM Four-blade propeller: 8,400 RPM
	Resolution	1 RPM
	Accuracy	±1 RPM
Temperature Sensors	PT100 sensor range	-30 °C to 100 °C, ±2 °C
	IR sensor range	-70°C to +380°C (object temperature), -40°C to +125°C (sensor temperature)
	IR sensor resolution	0.02 °C
	IR sensor accuracy	±1 °C at room temperature
Airspeed Pressure Sensor	Range (differential pressure)	10 to 498 Pa
	Accuracy (differential pressure)	± 2.25%
	Range (airspeed)	2 to 28 m/s
	Resolution (airspeed)	0.1 m/s
	Pitot tube	Not included
	Humidity	up to 95% RH - non-condensing
General Analog Inputs	Range	2 inputs of ±10 V differential (by default, inputs occupied by HV measurement unit and airspeed sensor)
	Resolution	0.001 V
	Accuracy	±0.5% of measured value ±0.25 V
	Supply pin	5 V ± 0.1 V 30 mA max
External Inputs and Outputs	Connect CAN ESCs, pressure sensors, sound level sensors, and more	Included

## Applications

Below is a non-exhaustive list of possible applications for the Flight Stand 150:

- **Real-time dynamic testing:** made possible by the 1,000 Hz sampling rate, which enables advanced analysis of harmonics, vibration, current fluctuations, torque ripple and more.
- **Flight replay:** upload flight controller data to the software and recreate throttle patterns while your propulsion system is hooked up to the thrust stand.
- **Efficiency and power characterization:** measure the efficiency of your motor, propeller and overall system. Compare electrical power input with mechanical power output.
- **Endurance and reliability testing:** study the endurance of your system's components using automated tests designed by you. Our user-friendly testing interface allows you to easily design and run step tests, ramp tests, flight replay tests, or any protocol you can come up with.
- **Distributed electric propulsion (DEP) testing:** test up to 8 powertrains simultaneously for a comprehensive understanding of your system's performance. Data is recorded for each individual powertrain as well as the system as a whole.
- **Propeller balancing:** balance propellers to ISO standards in 3 easy steps.



## Advantages

Here's why the Flight Stand is the best propulsion testing tool on the market:

- **Frictionless measurement:** our tools have a solid-state system for measuring thrust and torque, meaning there are no moving parts between the motor and load cells. This design significantly improves the accuracy of measurements and eliminates the need for bearings and hinges, which cause friction and are prone to misalignment.
- **ASTM Calibration:** our Pro thrust stands are rigorously calibrated to ASTM standards to ensure maximum measurement precision. Thrust is calibrated with the ASTM E74 procedure and torque with the ASTM E2428 procedure.
- **Aerodynamic design:** the compact shape of the Flight Stand ensures that there is minimal airflow disturbance from the tool's hardware and wiring. This promotes more realistic measurements and testing conditions that more closely mimic flight.
- **Realistic dual motor testing:** it is possible to perform dual motor tests in 3+ configurations with the Flight Stand, each representing a different aircraft design. In the back-to-back testing configuration, the motors are separated by a distance as little as 200 mm, similar to the distance you'd have in a multicopter.
- **Superior software experience:** our software allows you to perform manual or automated tests with no programming required. We also offer a Python API and data management system with index, plots, tables, filtering and resampling capability.
- **Exceptional customer support:** our team is ready to respond to any questions you may have in a friendly and timely manner.
- **Wireless control:** remotely control the Flight Stand software from any computer on the same network to maintain a safe distance from the thrust stand.

### Award Winning

In 2022, the Flight Stand won the Regional Innovation Award from the Order of Engineers of Quebec, thanks to its ground-breaking design and capabilities.



## Hardware and Electronics

The Flight Stand 150 comes fully equipped with software, hardware and electronics:

### Flight Stand 150:

- Tubular structure: supports the FMU and propulsion system, protects wiring
- Force Measurement Unit (FMU): measures thrust and torque
- Motor Mounting Plate: attaches your motor to the FMU
- Electric Measurement Unit (EMU): measures current and voltage
- High voltage measurement unit: enables 1000 V measurement
- Sync Hub: connects the thrust stand to the software
- Temperature sensors (2 PT100 + 1 IR): records temperature at the desired location
- Fiber optic RPM sensor: provides precise measurement of the motor's rotation speed
- Airspeed pressure sensor: connect your pitot tube to measure airspeed

### Flight Stand 150 Dual Motor:

- 2x everything listed under Flight Stand 150 (except sync hub - only 1 needed for 2 FMUs)
- Dual motor fixture kit: hardware for securing the two FMUs



**Tubular Structure**



**Force Measurement Unit**



**Motor Mounting Plate**



**Electrical Measurement Unit**



**IR Temperature Sensor**



**Sync Hub**



**Fiber Optic RPM Sensor**



**PT-100 Temperature Sensors**



**Airspeed Pressure Sensor**

## Software

The Flight Stand Software controls your thrust stand and records data. You can manually control tests with a throttle slider or automate tests using a table, data from a .CSV file, or the Python API. Supported protocols include:

### ESC:

Standard PWM: 50, 100, 200, 300, 400, 490 Hz

Dshot: 150, 300, 600

Oneshot: 42, 125

Multishot

CAN (using our In/Out API)

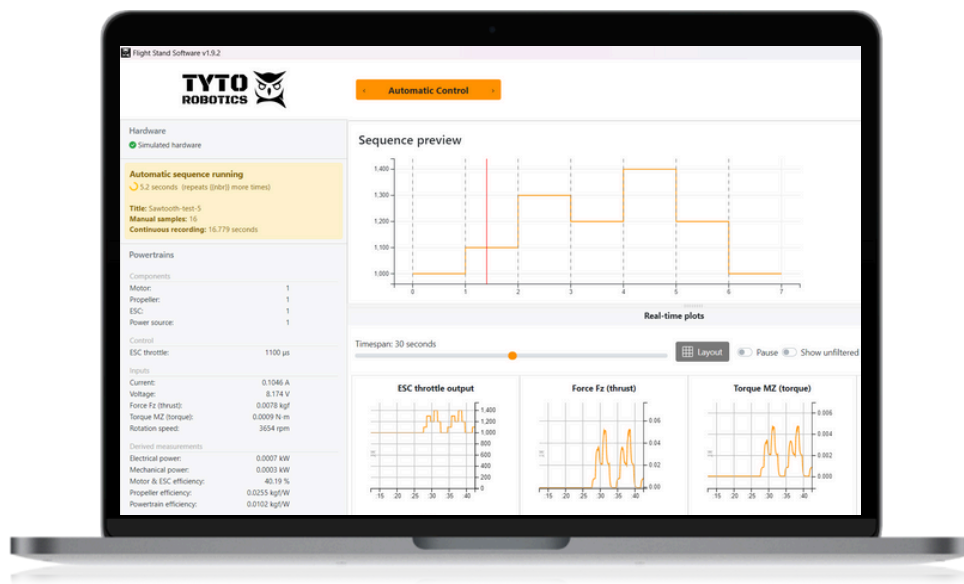
### Servos:

Standard PWM: 50, 100, 200,

300, 400, 490 Hz

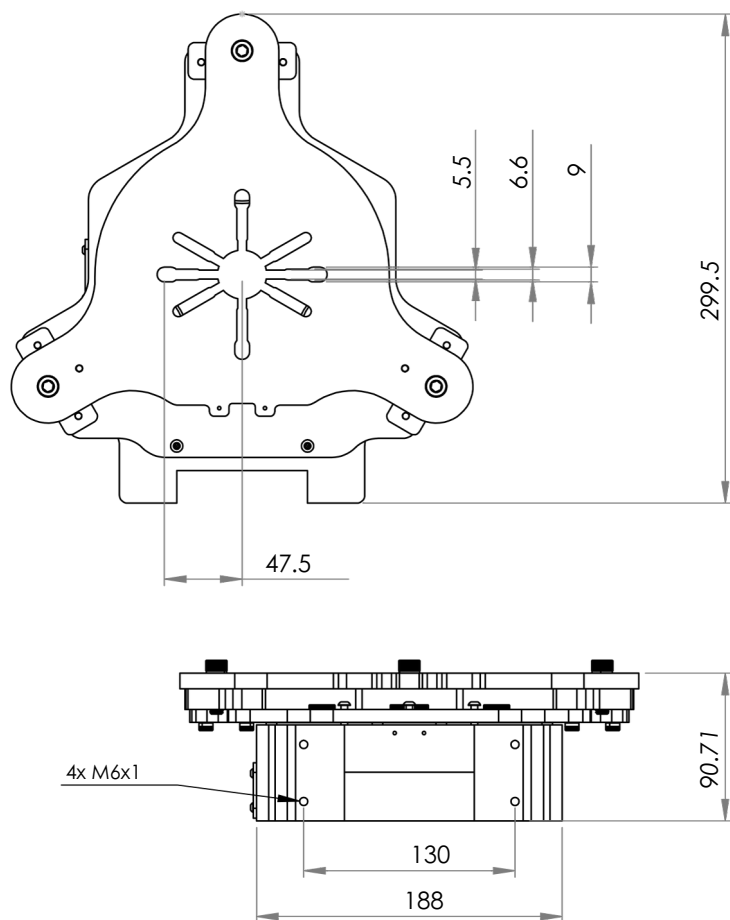
With the Flight Stand Software you can:

- Run manual tests and view live data as it is recorded
- Automate tests with an easy-to-use interface that requires no programming
- Control the system with our Python API
- Balance propellers
- Connect external analog sensors with the Input Transformations tab
- Upload .CSV files from your flight controller to perform flight replay tests
- Save tests directly in the software and/or export them as .CSV files
- Re-sample data for smaller files and adjust sensor noise filtering
- Map and test up to 8 powertrains simultaneously (DEP testing)

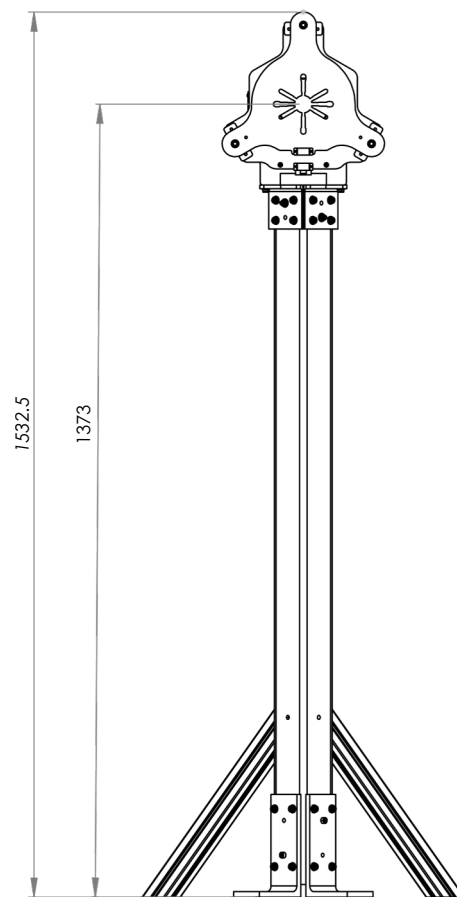


## Technical Drawings

**Force Measurement Unit:**



**Stand Structure:**



**Electrical Measurement Unit:**

