

# Series 1520 thrust stand datasheet

## Typical use

- Inrunner and outrunner brushless motor characterization (0-40A)
- Propeller characterization
- Servo testing and control
- Battery endurance testing



## Features list

- Direct measurements
  - Thrust
  - Voltage
  - Current
  - Rotations per minute
- Derived measurements
  - Overall efficiency (g/W)
- USB interface
- ESC manual control
- Three servo control ports
- Automatic control
- Powerful scripting
- Output data to CSV files
- Real-time sensor plots

## Technical specifications

**Table 1:** Design specifications of the RCbenchmark motor testing tool.

Specification	Min.	Max.	Tolerance	Unit
Thrust	-5	5	0.5%	kgf
Voltage	0	35	0.5%	V
Current	0	40	1%	A
Angular speed*	0	190k	-	eRPM

\*Electrical RPM, divide by the number of motor poles to obtain true mechanical RPM.

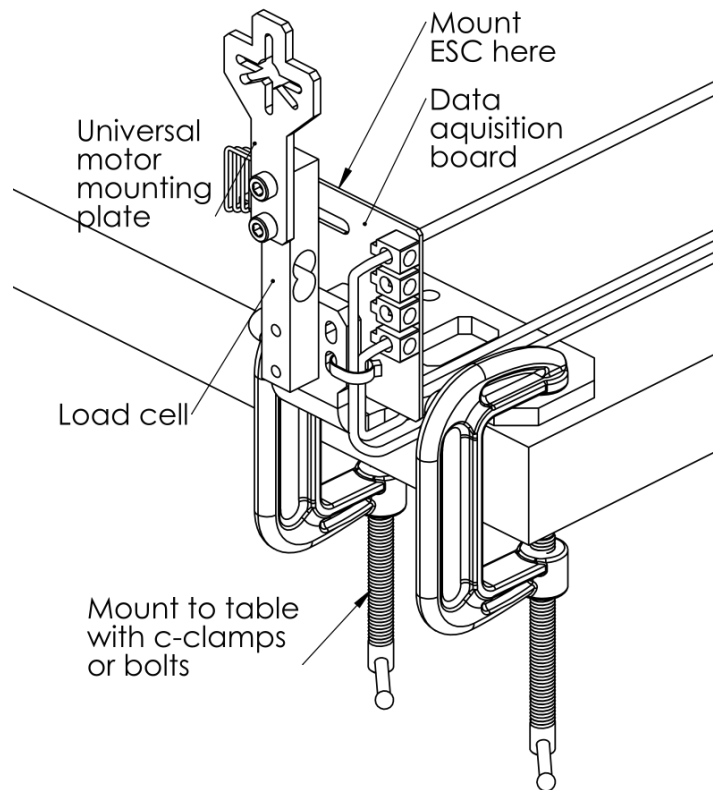
Sampling rate depends on your computer (up to ~50Hz) and is lower for the load cell (~8Hz)

## Software features list

- Real time graphs
- Manual motor control
- Manual servo control
- Calibration wizard
- Safety cutoffs based on any measured data
- CSV export
- Automated test
  - Ramps
  - Steps
  - Measure Kv
  - Measure the number of poles
  - And more...
- User scripts with documentation

## Hardware

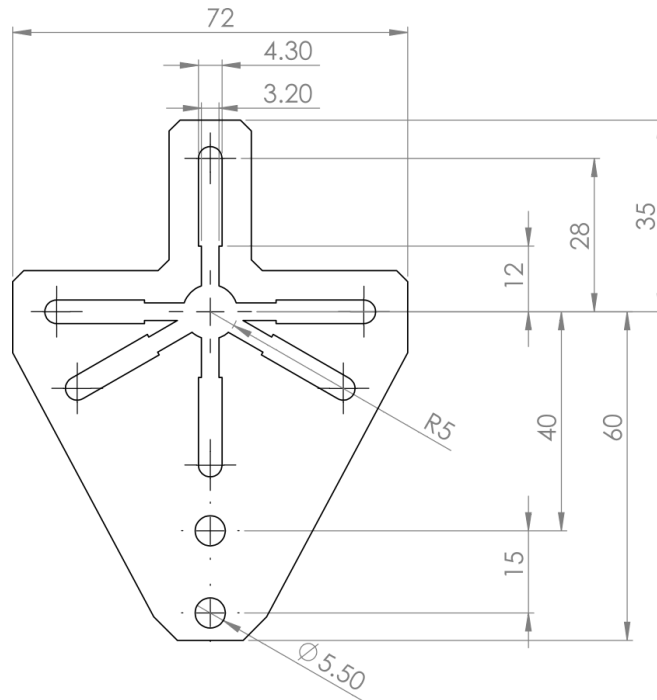
The RCbenchmark Series 1520 thrust stand is designed to greatly reduce the time required for characterizing and testing brushless motors while obtaining precise and accurate results. See the manual for details on assembly. Figure 1 shows an overview of the important components of the tool.



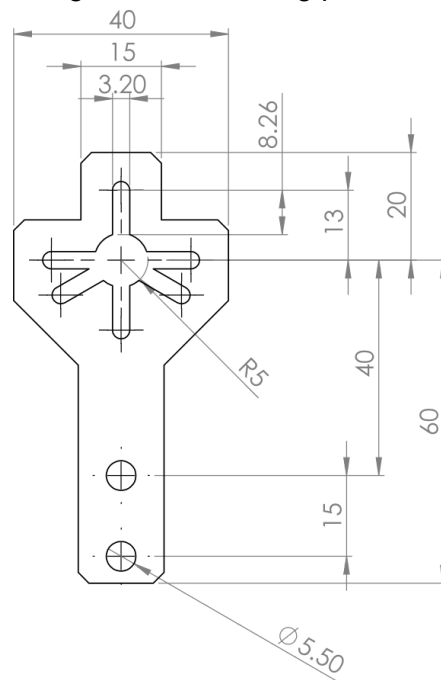
**Fig. 1:** Important components

### Calibration

The load cell is factory calibrated. Users can optionally calibrate the load cell using their own test weight and the calibration wizard built-in the App.



**Fig. 2: Large motor mounting part dimensions**

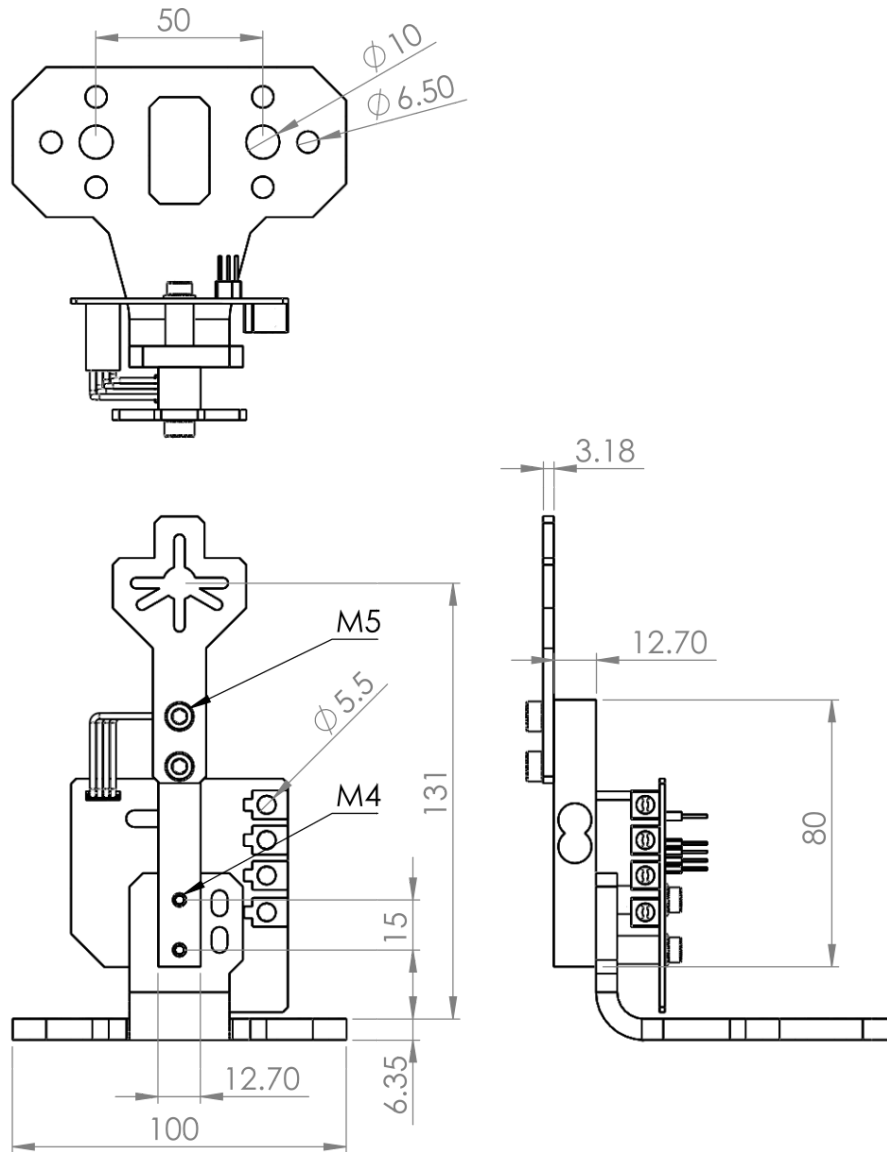


**Fig. 3: Small motor mounting part dimensions**

The test device can accept most inrunner and outrunner brushless motors with M2 to M4 screws and screw spacing of up to 56mm. Use the smaller motor mount if it fits your motor.

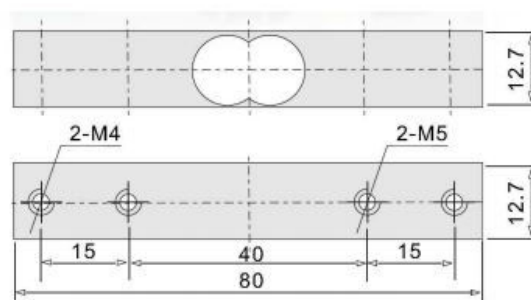
Use the drawing in Figure 2 to check if you can install your motor on the device. The pattern fits almost all standard motors. Otherwise, you can make a wood adapter, or design your own motor mounting part using the dimensions in the drawing.

General dimensions are shown in Figure 4.



**Fig. 4:** General dimensions of the tool

Load cell dimensions are shown in Figure 5 and wiring information is shown in Table 2. The load cell can be read with an instrumentation amplifier.



**Fig. 5:** General dimensions of the load cell

**Table 2:** Wiring information of the load cell

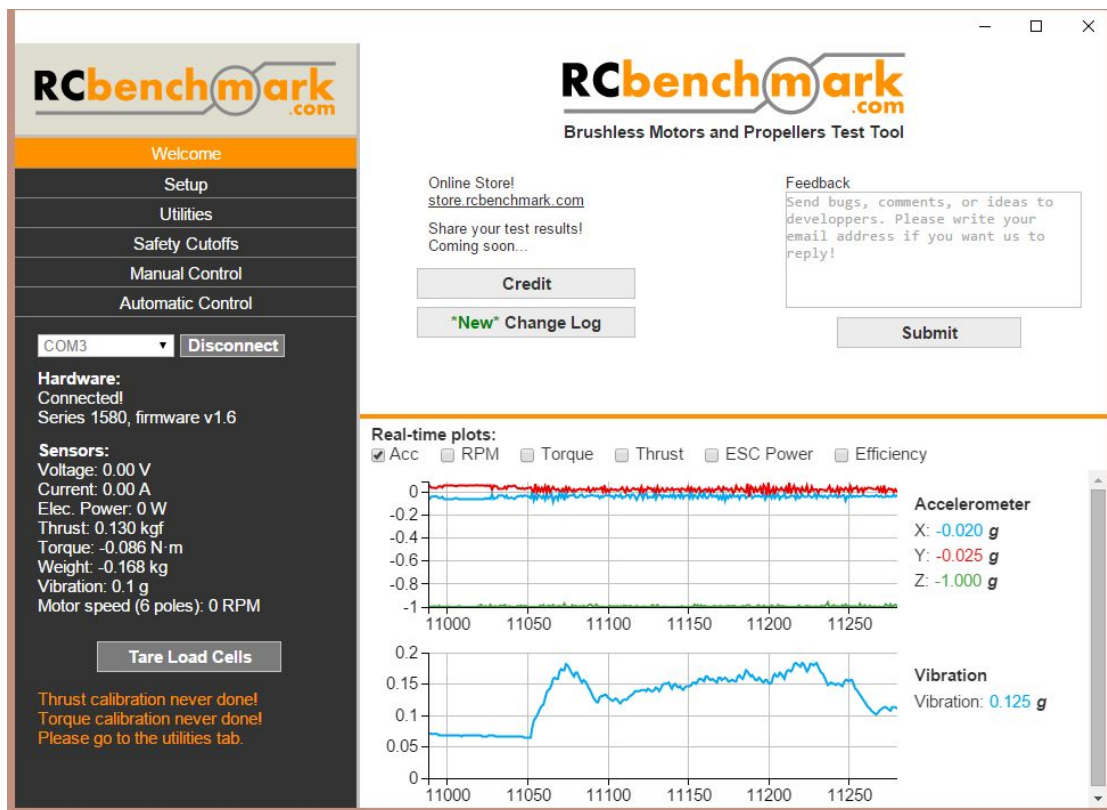
Wire colour	Wire description
Red	Power input + / 5V
White	Signal 1
green	Signal 2
Black	Power input - / GND

## Safety

Fast spinning propellers and motors can potentially cause harm to the user. Safety goggles must always be worn when testing. The software has automatic cutoffs based on the specifications of the device. These cutoffs can be further limited by the user to, for example, prevent a propeller from spinning too fast or a motor from using too much current.

## Software

The software allows the user to control the motor and up to three servo-motors. It displays the sensor information in text and graphical form. The user can record all of the measured data with a single click, or record continuously. The output is a CSV file, which can be easily opened with spreadsheet software or many other software packages.



**Deployment and custom use**

The software is open source. It is a Chrome app that runs Windows, Linux, Mac and Chrome OS. An internet connection is required to download the software. It features a script editor which can control the logging and the motor using the power of Javascript. Example scripts can be used as is, and a complete documentation of the API is available in the software.