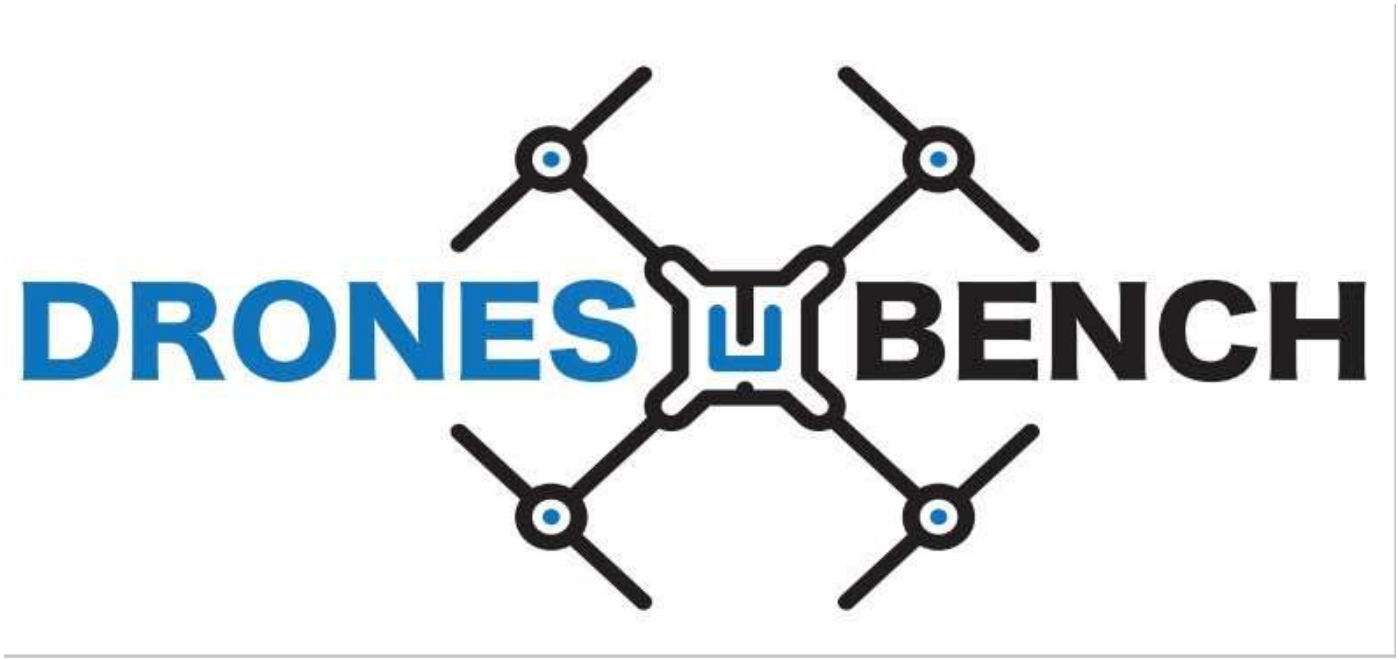

DRONES
BENCH

DPM Elettronica Srl:

Head office - Italy Year of Establishment - 1991
Expertise – Electronic Systems Research and Development, Domotics and Security sensors.

Drones Bench –

DronesBench is the first device in the world designed to ensure a strategic solution for the control and safe management of professional drones, which offers a series of integrated services of fundamental importance for the diagnosis, testing, setting and flight simulation.

Drones Bench Measures:

- The thrust provided by the drone
- Instantaneous power consumption of the drone
- Pitch, yaw and roll instantaneous angles

Objectives:

1) Evaluate and compare the technical quality of drones

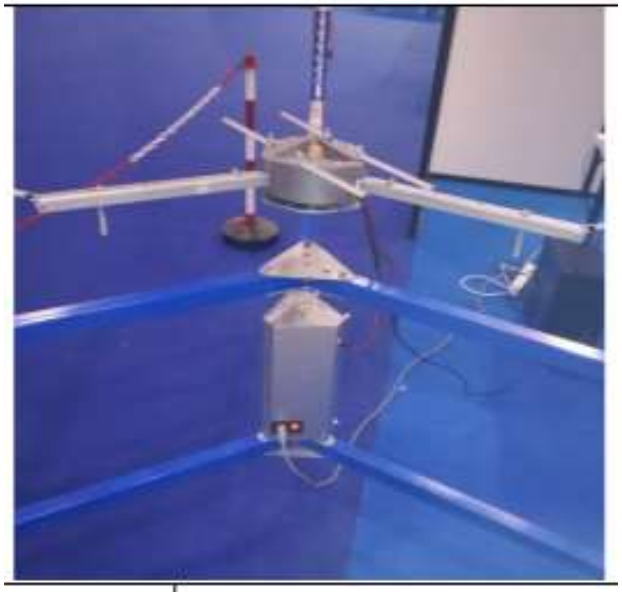
2) To improve the technical quality of their drones and certify their efficiency.

DRONE LAB

Sl No.	Equipment Model	Capacity
1	Drone Scale	Up to 1 Kg Payload
2	DB M1/4	Up to 4 Kg Payload
3	DB M2/15	Up to 15 Kg Payload

DronesBench - DB M2/15

English	*Italian*	*Values*
Bench diameter	Diametro banco	1910 mm
Bench height	Altezza banco	1123 mm
Head diameter	Diametro testa	196 mm
Head weight	Peso testa	2879 gr
Total weight	Peso totale	34.089 gr
IE - DE	IE - DE	> 200 mm
IE + DE	IE + DE	< 1800 mm
Max drone weight	Peso max drone	15.000 gr
Max drone payload	Payload massimo drone	2800 gr 2800 + x gr (1)
Support base for fixing the drone	Base di appoggio drone	500x150mm
Max voltage of the battery (12S)	Massima tensione drone misurabile	50 V
Max current of the drone	Massima corrente drone misurabile	50 A
Connector for drone's battery	Connettore per collegamento alla batteria del drone	XT 60 maschio (male)
Connector for drone	Connettore per collegamento al drone	XT 60 femmina (female)
Capability to test	Capacità di test	1500 Drones/Year or one per hour)
(1) Adding weights of 3043g under the measure's head	(1) aggiungendo zavorre di 3043g sotto la testa di misura	X max = 3043x4 g
All the values may be changed without notice!		



Up to 15 Kg payload

DronesBench - DB M1/4

English	*Italian*	*Values*
Bench diameter	Diametro banco	1036 mm
Bench height	Altezza banco	1085 mm
Head diameter	Diametro testa	196 mm
Head weight	Peso testa	2449 gr
Total weight	Peso totale	26.316 gr
IE - DE	IE - DE	> 200 mm
IE + DE	IE + DE	< 900 mm
Max drone weight	Peso max drone	4000 gr
Max drone payload	Payload massimo drone	2400 gr 2400+x gr (1)
Support base for fixing the drone	Base di appoggio drone	500x150mm
Max voltage of the battery (12S)	Massima tensione drone misurabile	50 V
Max current of the drone	Massima corrente drone misurabile	50 A
Connector for drone's battery	Connettore per collegamento alla batteria del drone	XT 60 maschio (male)
Connector for drone	Connettore per collegamento al drone	XT 60 femmina (female)
Capability to test	Capacità di test	1500 Drones/Year or one per hour)
(1) Adding weights of 3043g under the measure's head	(1) aggiungendo zavorre di 3043g sotto la testa di misura	X max = 3043x4 g
All the values may be changed without notice!		

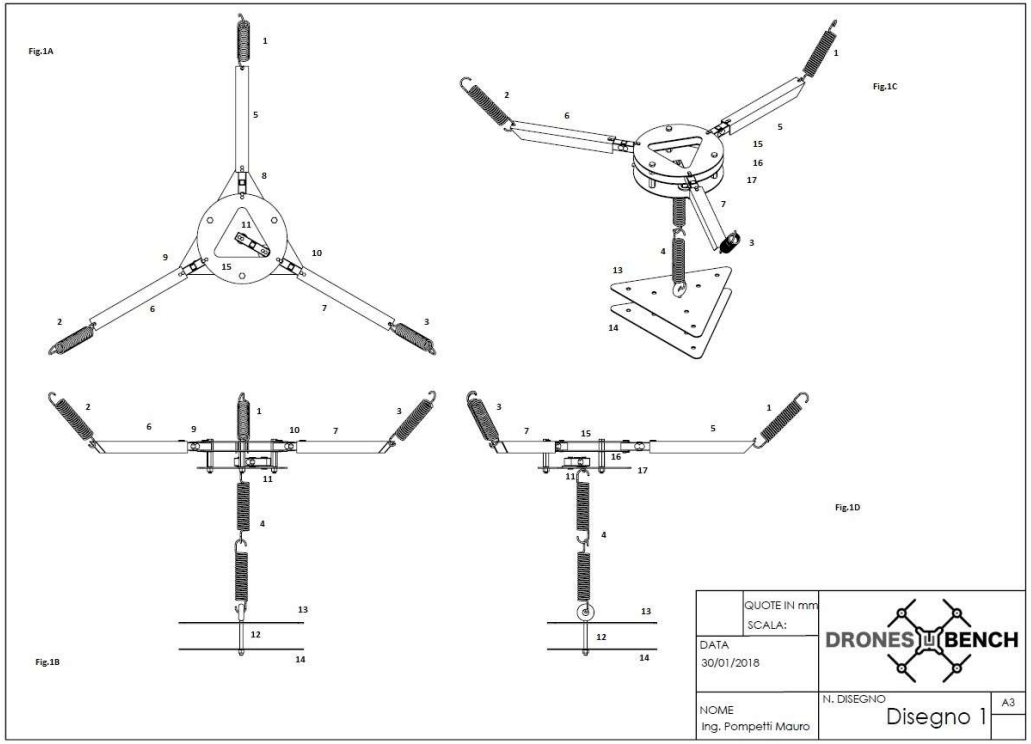
Up to 4 Kg payload

Drone Scale

Dronescale		
English	**Italian**	**Values**
Bench diameter	Diametro banco	880 mm
Bench height	Altezza banco	760 - 1300 mm
Head diameter	Diametro testa	40 mm
Head weight	Peso testa	1921 gr
Total weight	Peso totale*	3705 gr
Max drone weight	Peso max drone**	1000 gr
Max drone payload	Payload massimo drone	~2472 gr*** ~2472+x gr***
Support base for fixing the drone	Base di appoggio drone	240x240mm
Max voltage of the battery (12S)	Max tensione drone misurabile	50 V
Max current of the drone	Max corrente drone misurabile	100 A

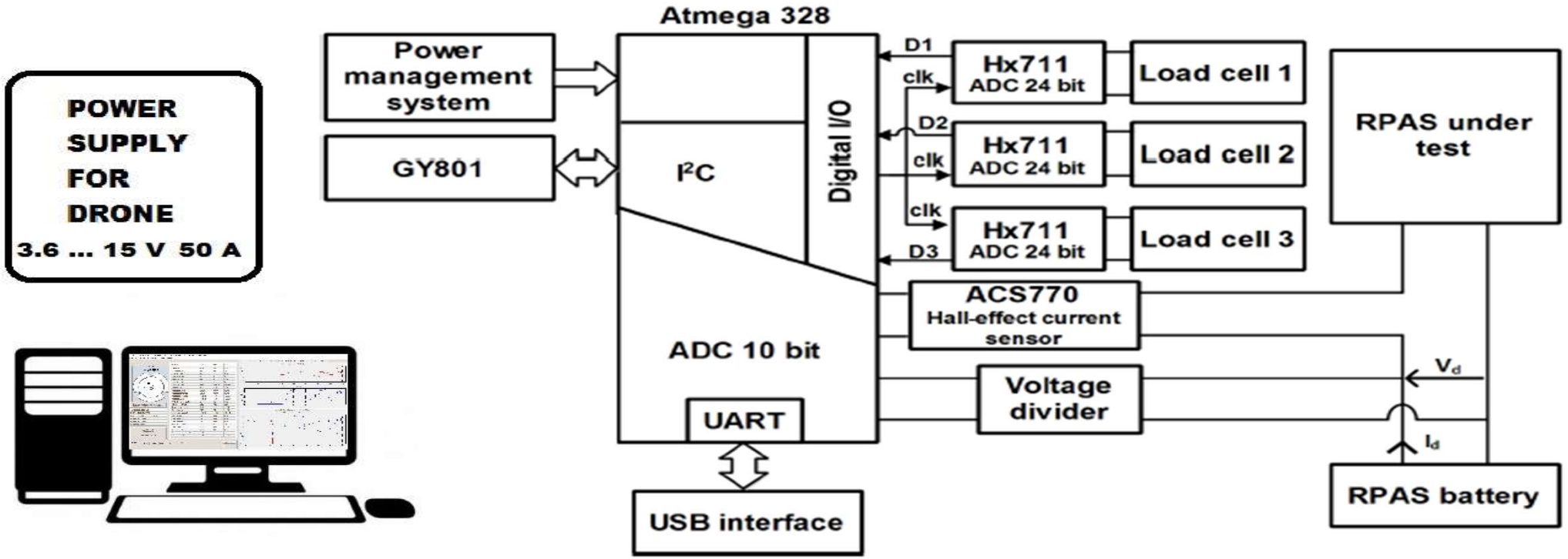
Up to 1 Kg payload

DronesBench Architecture



The Fourth Spring Measure

DronesBench Block Diagram



RS485 Port

Wifi **connection**

Drone Power Supply

From The Desk	From The Battery
To be used when doing spot or continuous operations on the drone.	To be used for the production of the drone certificate or to evaluate the residual efficiency of the battery.

- Connect the cable from the power supply to the measuring head.
- Set the power supply knob to the voltage suitable for the 4.2V (1S) 8.4V (2S) 12.6V (3S) 16.2V * (4S) drone and check in the program under Voltage.

The power supply generates at most about 15V therefore allows measures of the DB index in the simulation of batteries up to 3S. From the 4S up use more power supply connected together.

DronesBench Index

DBI depends on the different levels of thrust and speed of the propellers.

The DBI is evaluated at the take-off of the drone (t0):

$$DBI = \frac{F2(t_0)}{V_d(t_0)\, I_d(t_0)}, \qquad (1)$$

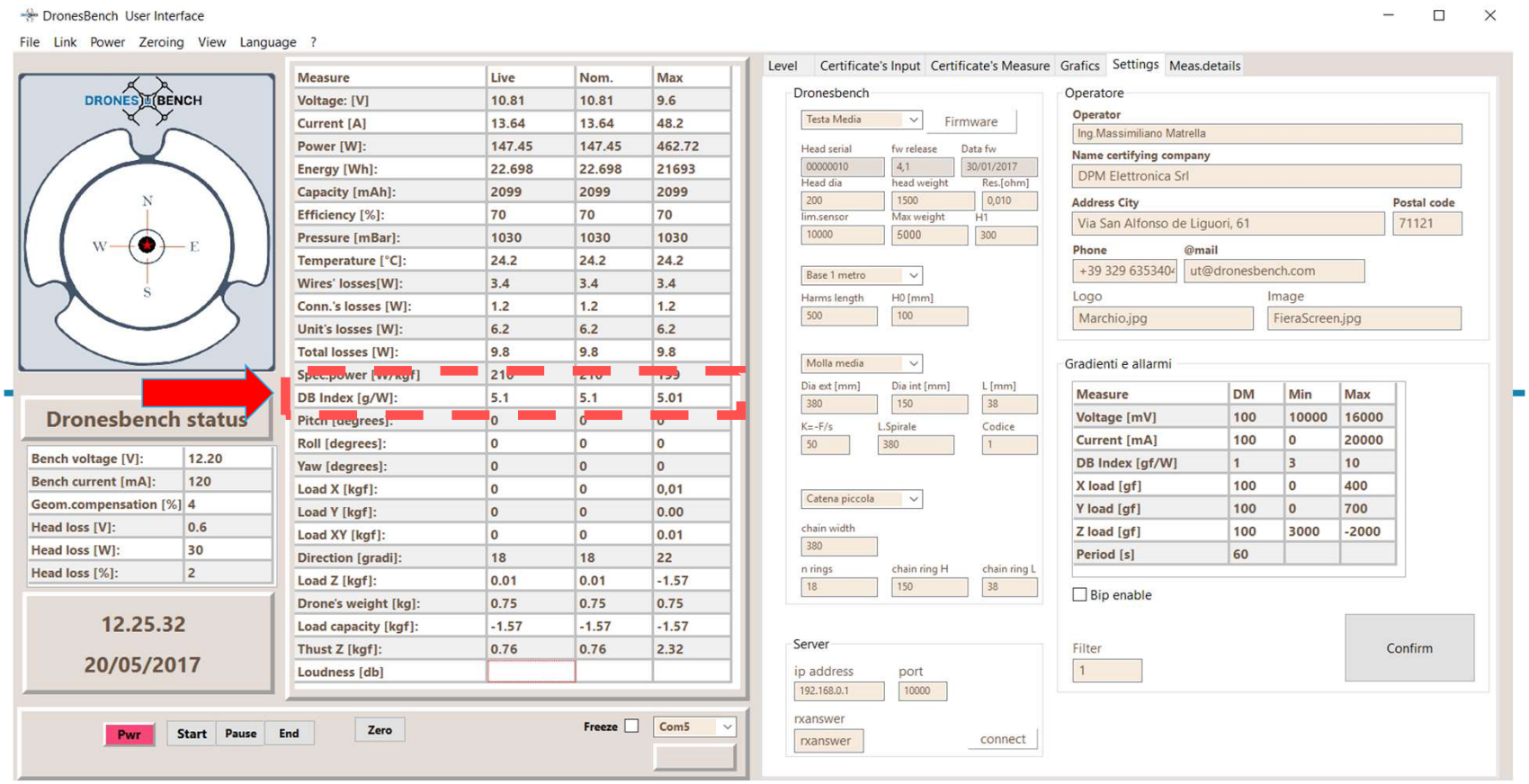
Where:

F2 (t) vertical force produced by the drone

Vd (t) voltage on the battery terminals

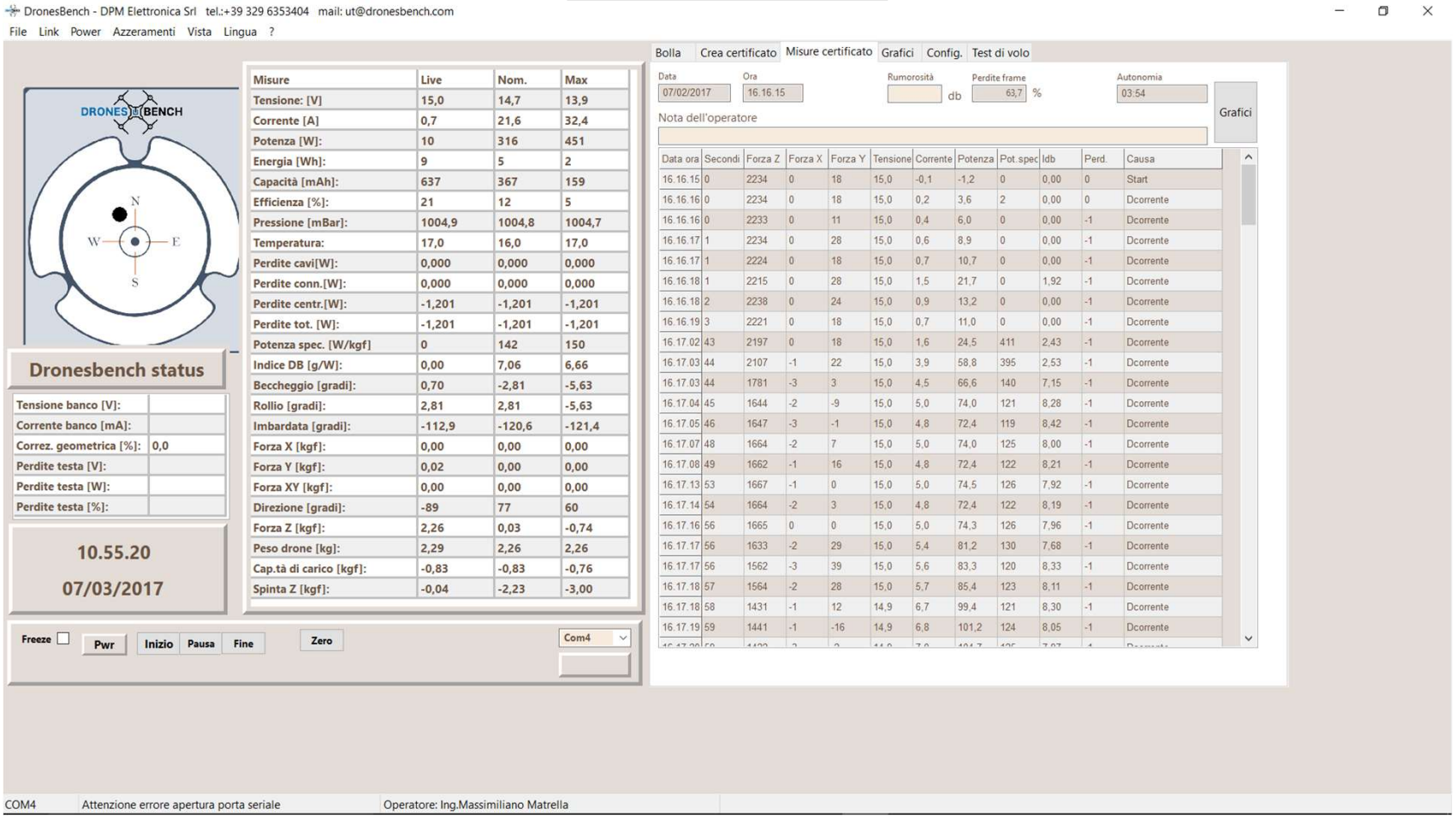
Id (t) current supplied by the battery

Software View

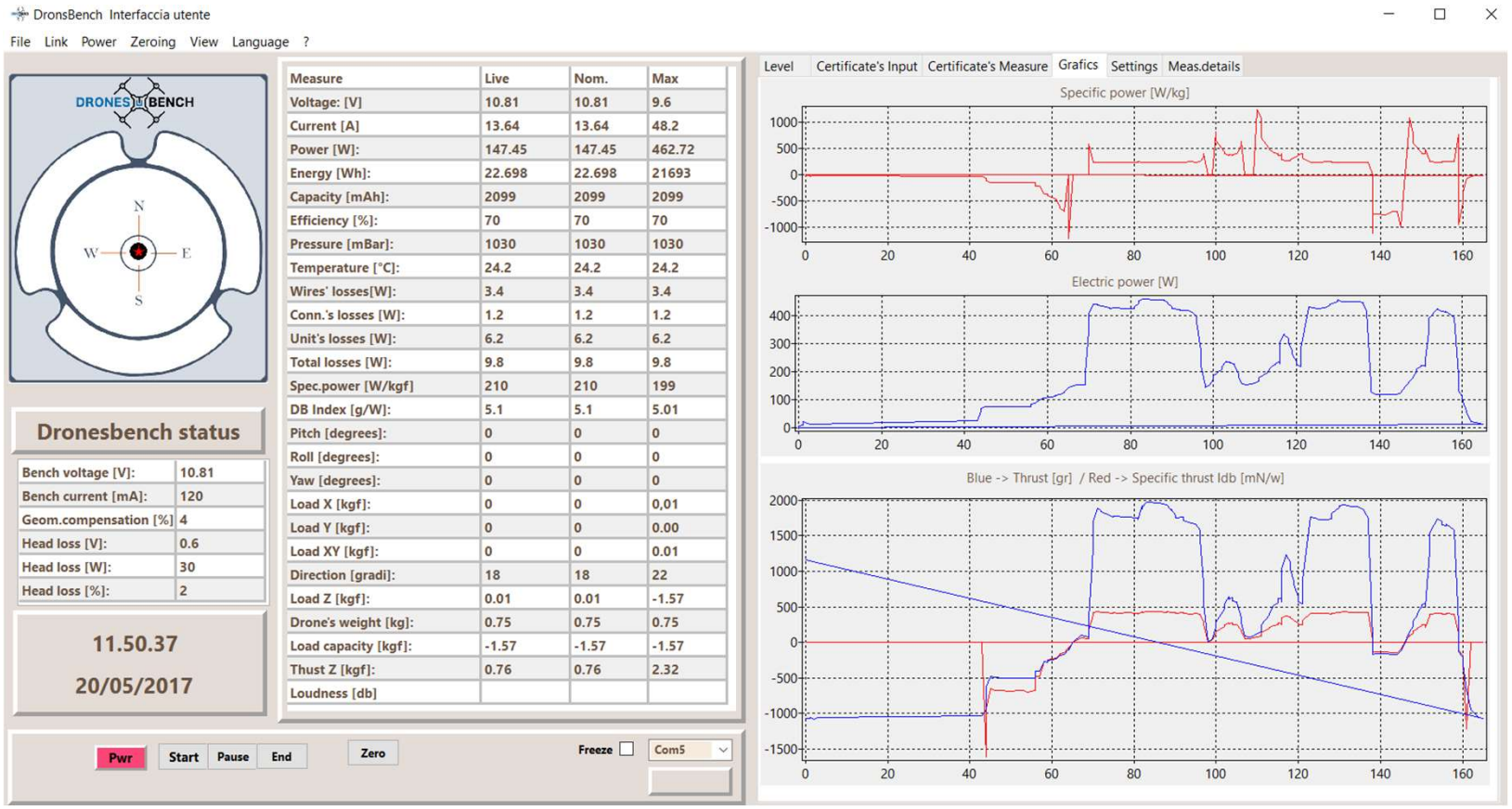


The GUI of "DronesBench"

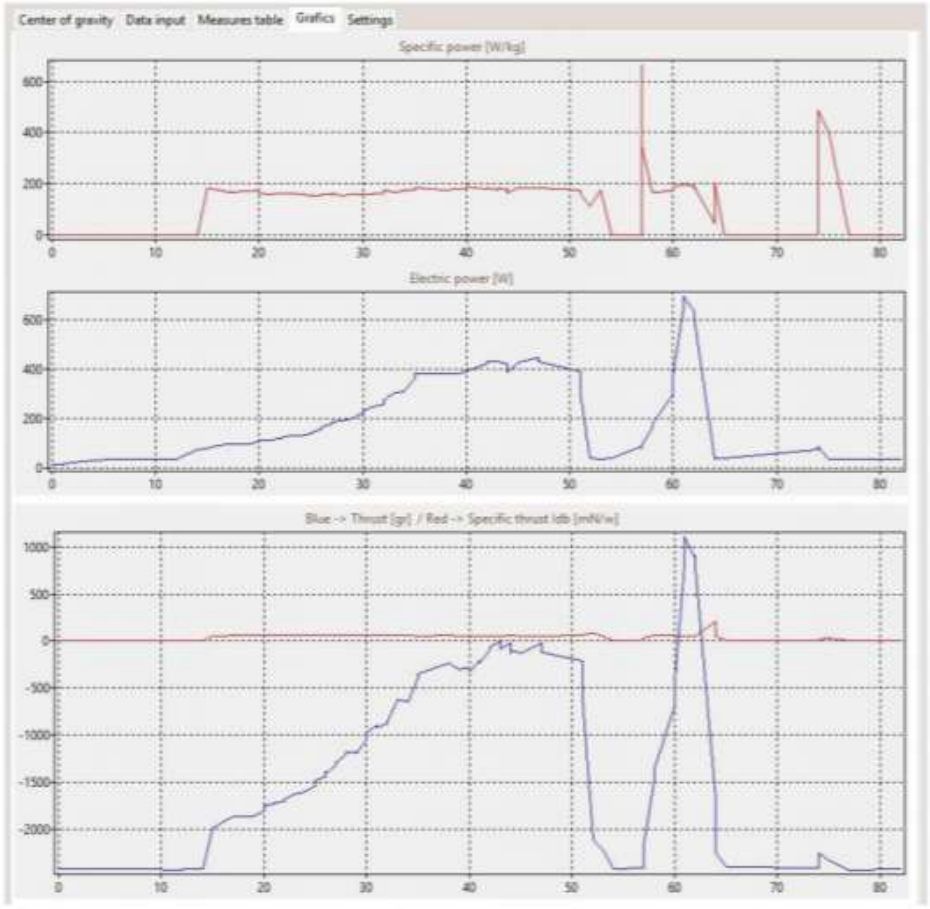
Software View



Software View



Test Results



CE	Builder: Flytop, Roma	Model: Flysmart 2.0
Date check: 26 giu 2016	Weight: 2400 g	Battery: Lipo 4s 6c 10 Ah
DBI (DronesBench Index): 75,41 mN/W	Minimum DBI at take-off: 60,31 mN/W	Max power: 722 W

DronesBench Index (DBI) indicates the power efficiency of the drone as a whole.

Performance Evaluation

- Weight transportable in safety
- Horizontal forces
- Autonomy
- Efficiency Idb
- Powered required for take-off
- Maximum power
- Losses
- And more others that you may see in the certification report

DronesBench Videos

Measurement Laboratory & Certification

https://www.youtube.com/watch?v=ol2F2gIiEz0

The first DronesBench

https://www.youtube.com/watch?v=uq6dT2nTA3c

The Webinar with Indus Institute of Technology, Indus University

http://www.dronesbench.it/en/indus-institute-of-technology-and-dronesbench-webinar/

THANK YOU

Let's FLY TOGETHER

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