Protocol n. 1 del 02/03/2019

This document is the technical report that analyzes, describes and certifies the tests and measurements carried out on the drone according to the CE standard and according to the best practice conducted by DPM Elettronica for tests that are not yet regulated.

The manual that accompanies the DronesBench certificate explains in detail the tools, methods and calculations used during the tests.

DronesBench certificate V.1.0

DPM Elettronica

www.dronesbench.it

# Introduction

The purpose of this document is to objectively describe the technical characteristics of the drone in multiple operating conditions in order to verify if it is suitable for marketing in the reference countries and to calculate with accuracy the class and operational area according to the most recent European regulations.

It also incorporates the use of existing legislation for electromagnetic compatibility and is proposed as a best practice with regard to the rules and standards not yet present.

The manual that accompanies the DronesBench certificate explains in detail the tools, methods and calculations used during the tests.

Always be careful to match the version of the manual to the same version of the certificate.

# Customer ID

This technical report was commissioned **VAT number 02422080719** by **DPM Elettronica srl** in **via SANT’ALFONSO DE ’LIGUORI 61** represented by **Ing. Mauro Pompetti** born in **FORLI** on **08/28/1961** and resident in **FOGGIA tax code PMPMRA61M28D704S** in the figure of **ADMINISTRATOR**.

# Environment, operators and spectators

The tests began on **02/04/2019** at **10:14** am with a temperature of **26 ° C** and with a pressure of **1008 mbar** and with a humidity of **30%.**

The test site is the **DPM Elettronica test laboratory**, in **via Sant’Alfonso de ’Liguori, 61 Foggia**.

They are present during the tests:

|  |  |  |  |
| --- | --- | --- | --- |
| Nominative | Fiscal Code | Role | Signature |
| **GIANMARCO D’URSO** | **DRSGMR91M24D643B** | **MISURISTA** |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

# Drone features

The drone is named **Kit M1 S600**

|  |  |  |  |
| --- | --- | --- | --- |
| Diameter between rotor axes [mm] | **595** | Minimum battery voltage [V] | **11.1 [3S]** |
| Frame diameter [mm] | **655** | Battery capacity [mAh] | **4400** |
| Frame width [mm] | **22** | Propellers lead [in] | **5.5** |
| Propellers diameter [mm] | **390** | Drone battery C | **30C** |
| Alleged payload [g] | **2000** | Battery weight [g] | **293** |
| Drone weight (with battery and maximum equipment) [g] | **1739** | Number of propellers | **4** |

|  |  |
| --- | --- |
| **Components** | **Model e version** |
| Frame | **S600 CUSTOM** |
| Imu | [**PIXHAWK**](https://www.google.com/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=2ahUKEwidrtm45-PgAhVHalAKHadrAUoQjhx6BAgBEAM&url=https%3A%2F%2Fwww.robotistan.com%2Fapm26-ardupilot-mega26-flight-controller&psig=AOvVaw0mzieTQZolN9e7nJyoeX8N&ust=1551628150891658) **2.4.8** |
| Esc | **JMT 40A BRUSHLESS ESC** |
| Motors | **HYD 3508 700KV 198W** |
| Propellers | **15x5.5 3K CARBON FIBER** |
| Receiver | **AT9-R9DS 2.4GHz** |
| Transmitter | **AT9S 2.4GHz** |
| GPS | **NEO-7M 7M GPS MODULE WITH COMPASS** |
| Radio control | **RADIOLINK AT9S 10CH** |
| Video transmitter | **-** |

**Front and side photo**



**Photo from the top and from the maximum pitch angle**



# 5. Methodology

## 5.1 Preliminary procedures

The DronesBench model M1 with the RMS tester suitable for the characteristics of the drone being tested is used for the following certificate.

The drone is analyzed in all its parts in order to recognize the components to compile this certificate and to search for any anomalies: uninsulated electrical parts, parts not secured to the structure, correct tightening of the propellers, structure integrity.

First of all the calibration of the DronesBench measuring instrument is verified: the weight measurement with a sample weight and the measurement of the voltage and current by imposing a known absorption.

DronesBench is reset to zero with the RMS tester on the head and then, with power off, the drone rests on the bench's measuring head.

The position of the drone's center of gravity is centered on the base of the bench.

The feet of the drone are secured on the measuring head with the laces supplied, to then feed the drone through the RMS tester with:

* 13.4 V power supply capable of supplying a maximum current of 50 A;
* 11S V 3S battery that provides up to 12.6 V and a maximum current of 54 A.

## 5.2 Drone test for DronesBench certification

With the engines off, the weight of the drone is measured.

The drone is connected and powered with the supplied cables and the electrical parameters such as voltage, current and power are detected. The absorbed power is recorded as that consumed by the electronics in its basic functions.

Once the stopwatch has been reset, the drone is armed, gradually bringing it to the weight of the throttle, for at least 30 hovering measurements recorded by the software.

The electrical and mechanical parameters are measured with the DronesBench in the moments in which the thrust equals the weight with a tolerance of 10 g.

It is also verified that the drone remains balanced during the thrust increase maneuver.

The motors are then pushed to the maximum for a couple of seconds so that all the measurements are acquired at the moment of maximum current absorption.

## 5.3 Electromagnetic compatibility tests

As regards the electromagnetic compatibility tests, refer to the directive 2004/108 / EC.

No electromagnetic compatibility tests have been performed.

# 6. Conclusion

The following data is provided for the license plate and the drone manual:

* Brand and model **Kit M1 S600**
* Weight **1739 g**
* DBIs **92.0 mN/W**
* Standard thrust / Weight **203 %**
* Max power **580.26 W**
* Battery features **3S 11,1V 4400 mAh 30C**
* Drone class **C2**
* Operational area **A2**
* Maximum transferable kinetic energy **91 J**
* Maximum speed **10.25 m/s**
* Standard and maximum noise **79,2 dBm 86,4 dBm**

The "CE" symbol must be affixed as compatibility has not yet been verified.

The measurements have shown that the drone, characterized by the indicated measurements, is fully functional and ready to fly.

The technician The supervisor