M3508

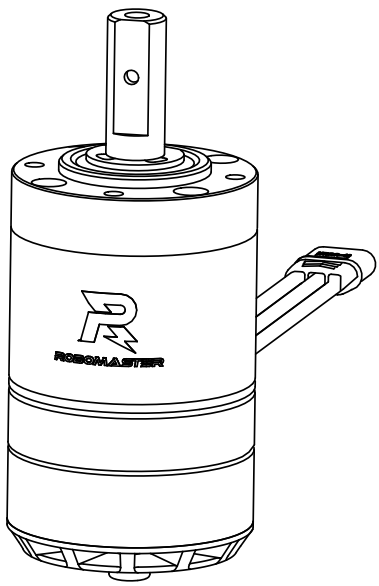
P19 Brushless DC Gear Motor

User Guide

使用说明

ユーザーガイド

V1.0 2017.08



ROBOMASTER

Disclaimer

Thank you for purchasing the RoboMaster M3508 P19 Brushless DC Gear Motor (hereinafter referred to as “product”). Read this disclaimer carefully before using this product. By using this product, you hereby agree to this disclaimer and signify that you have read it fully. Install and use this product in strict accordance with the User Guide. SZ DJI TECHNOLOGY CO., LTD. and its affiliated companies assume no liability for damage(s) or injuries incurred directly or indirectly from using, installing or modifying this product improperly, including but not limited to using non-designated accessories.

Warning

1. DO NOT let any foreign materials come into contact with the rotors, as it may negatively affect performance.
2. Ensure all the cables are correctly connected.
3. Ensure the motor is securely mounted.
4. Properly use the motor within the maximum allowable temperature range of the winding. Refer to the line graph in the “Performance” section of this guide for operating range when using RoboMaster C620 Brushless DC Motor Speed Controller. Avoid the motor from over-heating for a long period, or the motor may be permanently damaged when using other DJI electronic speed controller.
5. Avoid damage to the cables or wires, which may cause the motor to work improperly.
6. DO NOT touch the motor rotors, as doing so may cause injury.
7. The motor will heat when the output power is high. Although this is normal, take caution to avoid scalding.

Introduction

M3508 P19 Brushless DC Gear Motor is a high-performance servo motor, specially designed for small and medium-sized mobile platforms and robots. Compared with traditional square wave drive, the M3508 gear motor features sinusoidal drive used with RoboMaster C620 Brushless

DC Motor Speed Controller, which boosts higher efficiency, flexibility, and stability. The gear motor's reduction ratio is approximately 19:1.

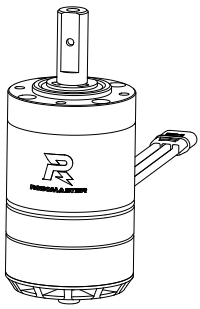
Features

- Position Feedback: The built-in positioning sensor provides location information.
- Temperature Detection: The built-in detecting sensor effectively prevents the motor from damage due to abnormal temperature.
- Information Storage: Saves the motor's calibration parameters, enabling easy changing of motors.

⚠ The M3508 gear motor is also compatible with DJI TAKYON™ Z650 and Takyon Z660 ESCs. Please note that the above features are not available with these models.

In the Box

M3508 P19 Brushless DC Gear Motor × 1

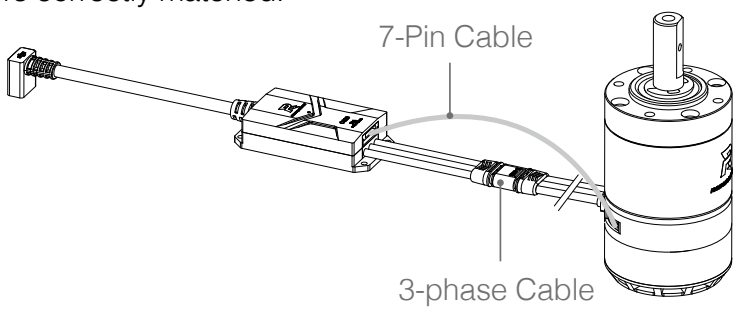


7-Pin Cable × 1

Connecting the Motor

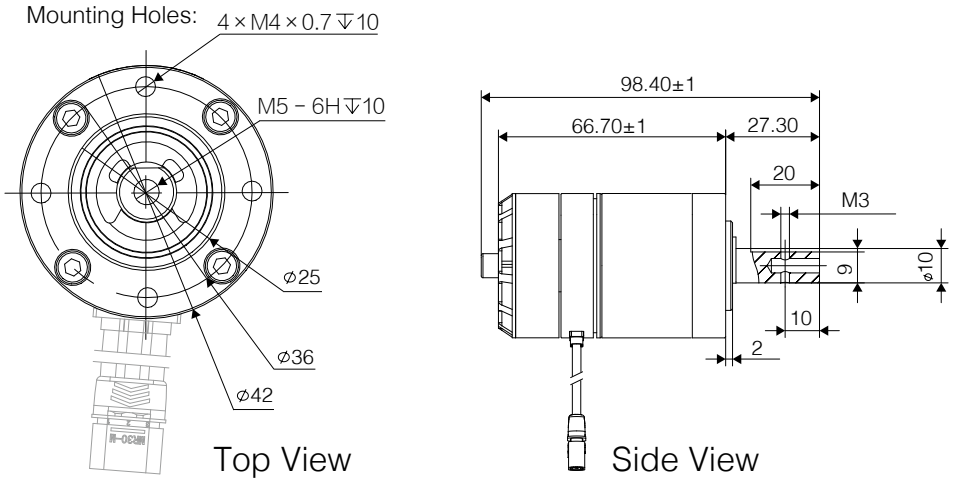
Example: RoboMaster C620 Brushless DC Speed Controller.

1. Connect the 7-pin ports of the gear motor and C620 with the 7-pin cable.
2. Connect the 3-phase cable of the gear motor to that of the C620. Ensure the cables are securely connected with the corresponding colors correctly matched.



Mounting the Motor

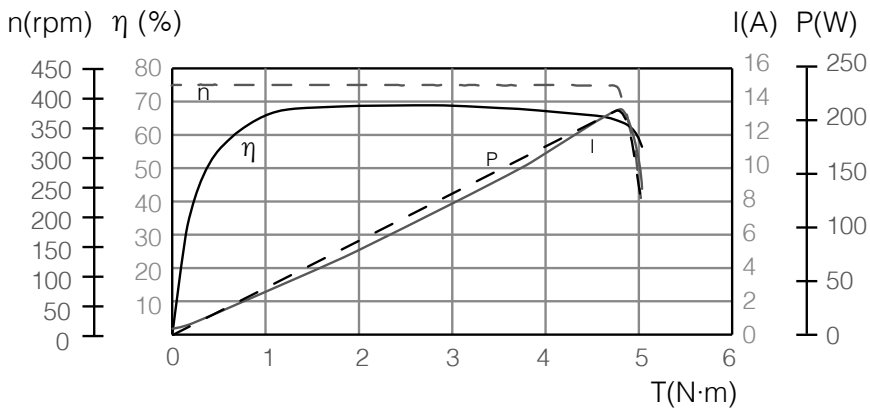
Refer to the dimensions below to mount the gear motor to a robot or mobile platform.



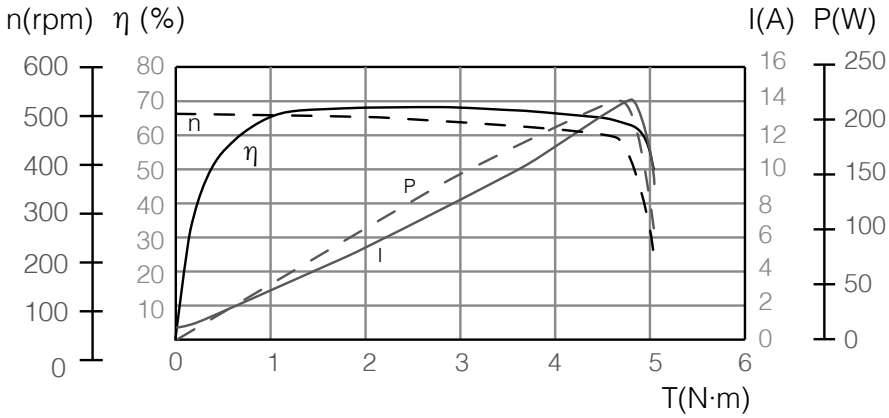
> ⚠ The gear motor is outfitted with M4 mounting holes at a depth of 10 mm. Use appropriately-sized screws to mount properly and avoid damage.

Performance

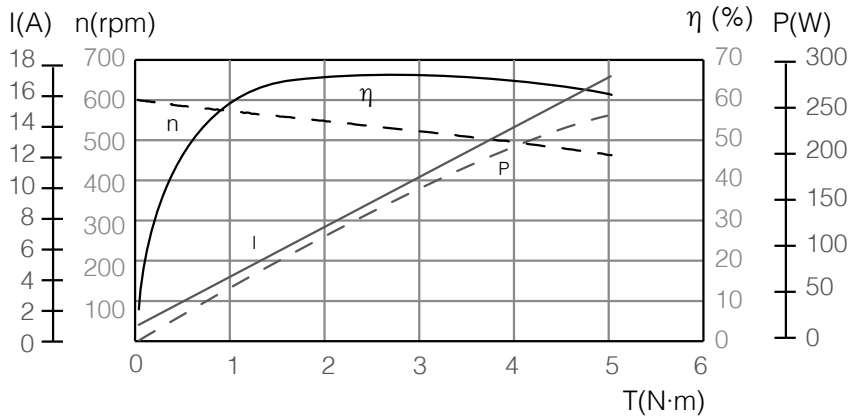
Load characteristics (Closed Loop Speed Control Using RoboMaster C620 Speed Controller)



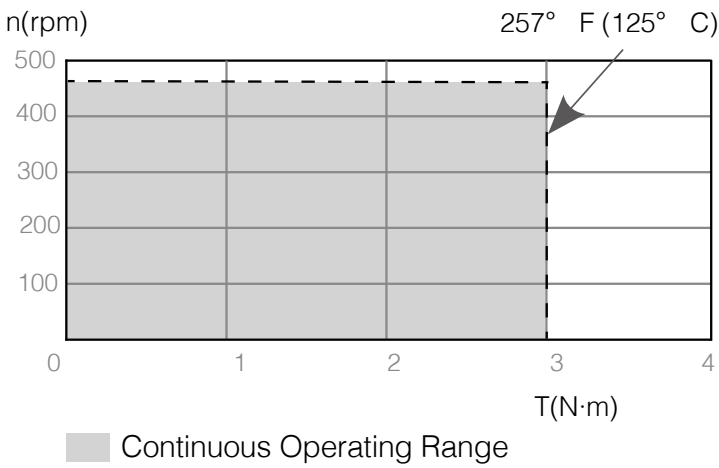
Load characteristics (Closed Loop Current Control Using RoboMaster C620 Speed Controller)



Load characteristics (using DJI Z650 ESC)



Operating Range



η – Electrical Efficiency, T – Thrust, I – Current, P – Output Power, n – Rotational Speed

The data above was generated in a laboratory setting with a C620 speed controller output of 24 V, at the temperature of 77° F (25° C), and under normal dissipation conditions. These figures should be used for reference only. Make sure to control running time properly in accordance with actual working temperature, dissipation, etc.

Characteristic Parameters

Refer to the parameters below to make proper use of your motor.

Using C620 Speed Controlled at rated voltage	
Rotational Speed (without payload)	482 rpm
Current (without payload)	0.78 A
Rated Rotational Speed	469 rpm
Rated Torque (max continuous torque)	3 N·m
Rated Current	10 A
Max Efficiency	70 %
Stall Torque	4.5 N·m
Stall Current	2.5 A

* Tested in a lab environment using a C620 Speed Controller.
  The above current refers to the input current of speed controller and the efficiency refers to the whole system.

Using Z650 ESC at the rated voltage	
Rotational Speed (without payload)	589 rpm
Current (without payload)	0.98 A
Rated Rotational Speed	469 rpm
Rated Torque (max continuous torque)	4.6 N·m
Rated Current (max continuous line current)	15.7 A
Max Efficiency	67 %

* Tested in a laboratory setting using the DJI Z650 ESC. Please go to visit DJI official website for detailed information of the DJI Z650 ESC.
  The above current refers to the input current of speed controller and the efficiency refers to the whole system.

Characteristic Parameters	
Rated Voltage	24 V
Torque Constant	0.3 N·m/A
Speed Constant	24.48 rpm/V
Speed/Torque Gradient	72 rpm/N·m
Mechanical Time Constant	49 ms
Phase Resistance	0.194 Ω
Phase Inductance	0.097 mH
Operating Temperature Range	32°~122° F (0°~50° C)
Max Permissible Winding Temperature	257° F (125° C)
Number of Pole Pairs	7
KN	2700 N
Weight	365 g
Reduction Ratio	3591/187

免责声明

感谢您购买 RoboMaster™ M3508 直流无刷减速电机（以下简称电机）。在使用之前，请仔细阅读本声明，一旦使用，即被视为对本声明全部内容的认可和接受。请严格遵守手册、产品说明和相关的法律法规、政策、准则安装和使用该产品。在使用产品过程中，用户承诺对自己的行为及因此而产生的所有后果负责。因用户不当使用、安装、改装造成的任何损失，DJI™ 将不承担法律责任。

DJI 是深圳市大疆 ™ 创新科技有限公司及其关联公司的商标。本文出现的产品名称、品牌等，均为其所属公司的商标。本产品及手册为大疆创新版权所有。未经许可，不得以任何形式复制翻印。

关于免责声明的最终解释权，归大疆创新所有。

产品使用注意事项

1. 避免杂物进入转子内部，否则会导致转子运行异常。
2. 使用前请确保接线正确。
3. 使用前请确保电机安装正确、稳固。
4. 请在绕组最大允许温度范围内使用电机。搭配 RoboMaster C620 无刷电机调速器使用时，参照本文工作范围曲线；配合 DJI 其他电调使用时，请避免电机长时间过热，以防电机被损坏。
5. 使用时请避免损伤线材，导致电机运行异常。
6. 使用时请勿触摸电机转子部分，避免割伤。
7. 电机大功率输出时，会出现发热的情况，请注意避免烫伤。

简 介

M3508 直流无刷减速电机是专为中小型移动平台和机器人等量身打造的高性能伺服电机，可搭配 RoboMaster C620 电调实现正弦驱动，相比传统方波驱动具有更高的效率、机动性和稳定性。本产品减速箱减速比约为 19:1。

产品特性

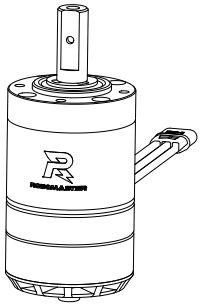
- 位置反馈：电机自带位置传感器，可提供位置的反馈。
- 温度检测：电机自带温度检测传感器，可有效防止电机因温度异常被损坏。

• 信息存储：存储电机校准参数，支持电机的快速更换。

⚠ M3508 直流无刷减速电机支持搭配 DJI TAKYON™ Z650 电调和 Takyon Z660，但只可作为一般动力电机使用，不具备上述功能。

物品清单

电机 ×1

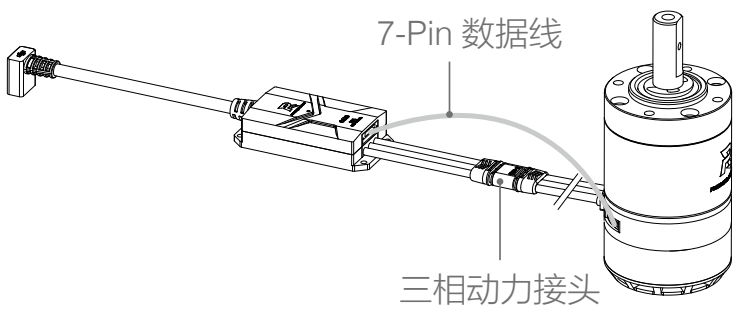


7-Pin 数据线 ×1

电机电调连线

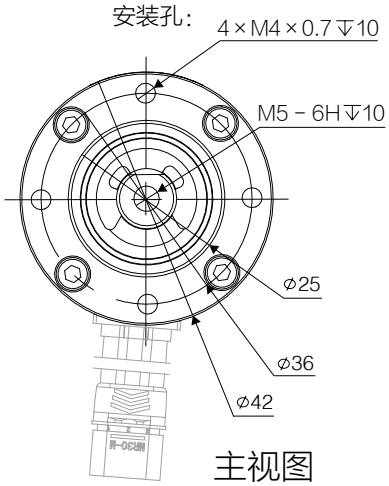
下面以搭配 RoboMaster C620 电调为例，介绍连线方式：

1. 用 7-Pin 数据线分别插入电调和电机的 7-Pin 数据端口，连接电调和电机。
2. 将电机的三相输入接头与电调三相动力线接头相连接，连接时请确保电调与电机连线正确（相同颜色的接线匹配连接，并且保证不可逆接头正确匹配连接），切勿接错。

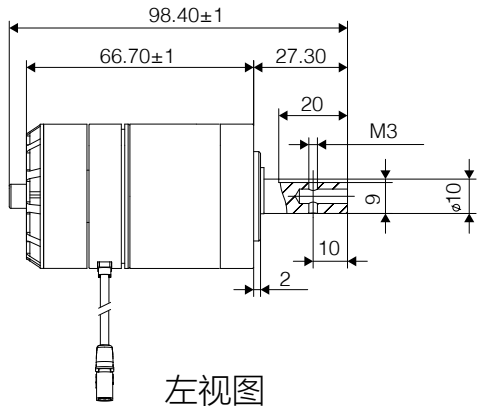


安装电机

请参考电机安装孔尺寸和位置将电机安装至移动平台或机器人等结构上。



主视图



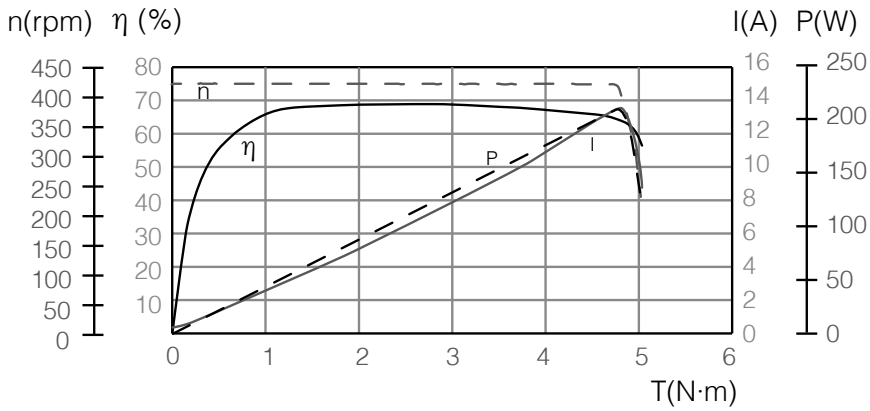
左视图

1:2　　单位 : mm

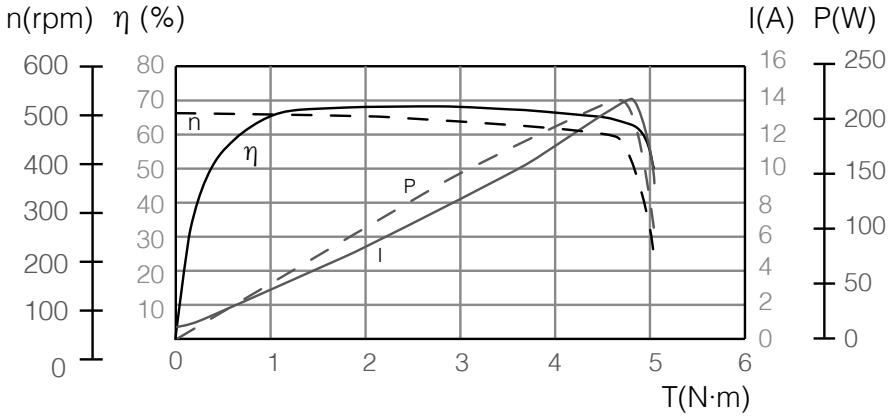
⚠ 电机安装孔为 M4 螺纹孔，深度 10mm，请勿使用过长的螺丝，否则可能会顶到电机的减速箱外齿圈从而损坏电机。

电机参数

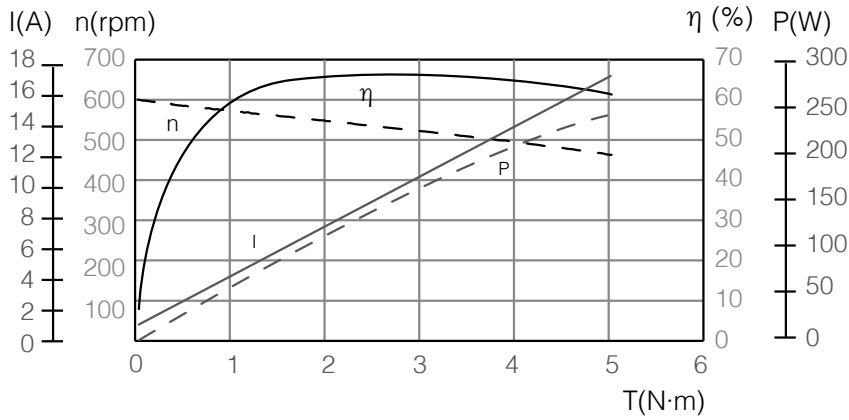
负载特性曲线（使用 RoboMaster C620 电调做速度闭环控制）



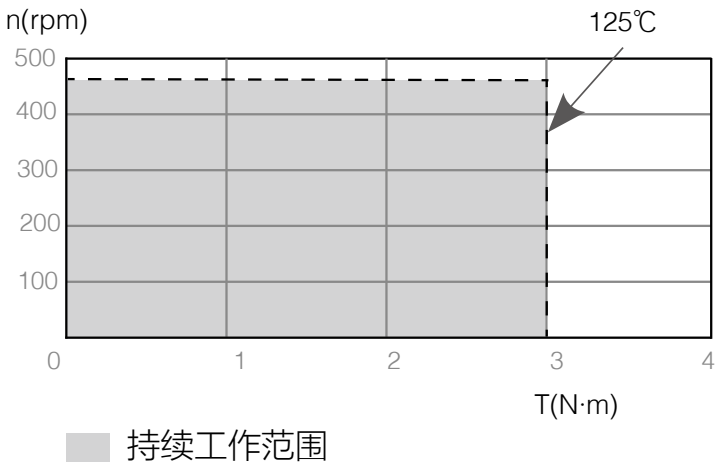
负载特性曲线（使用 RoboMaster C620 电调做电流闭环控制）



负载特性曲线（使用 DJI Z650 电调）



工作范围图



P- 输出功率，I- 电流， η - 效率 ，T- 扭矩，n- 转速

以上数据均为使用 C620 电调，输入电压 24V，带减速箱在 25℃ 室温和正常散热实验环境下测得，仅供参考。实际使用时，请根据工作环境温度、散热条件等实际情况来控制减速电机运行时间。

特征参数

请根据以下参数合理使用电机。

搭配 C620 电调在额定电压下的电机参数	
空载转速	482 rpm
空载电流	0.78 A
额定转速	469 rpm
额定转矩（最大连续转矩）	3 N·m
额定电流	10 A
最大效率	70%
堵转扭矩	4.5 N·m
堵转电流	2.5 A

* 以上数据是配合 C620 电调在实验环境下测得。
  以上电流均为电调的输入端电流；效率为电机和电调整个系统的效率。

搭配 Z650 电调在额定电压下的电机参数	
空载转速	589 rpm
空载电流	0.98 A
额定转速	469 rpm
额定转矩（最大连续转矩）	4.6 N·m
额定电流（最大连续线电流）	15.7 A
最大效率	67%

* 以上数据是配合 DJI Z650 电调在实验环境下测得。
  以上电流均为电调的输入端电流；效率为电机和电调整个系统的效率。DJI Z650 电调参数详见 DJI 官网。

电机特征值	
额定电压	24 V
转矩常数	0.3 N·m/A
转速常数	24.48 rpm/V
转速转矩梯度	72 rpm/N·m
机械时间常数	49 ms
相电阻	0.194 Ω
相电感	0.097 mH
使用环境温度	0℃至 50℃
绕组最高允许温度	125 ℃
极对数	7
最大径向载荷（动载荷）	2700 N
减速电机重量	365 g
减速比	3591/187

FCC Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.
Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

EU Compliance Statement: SZ DJI TECHNOLOGY CO., LTD. hereby declares that this device is in compliance with the essential requirements and other relevant provisions of the Directive 2014/30/EU.
A copy of the EU Declaration of Conformity is available online at www.dji.com/euro-compliance

EU contact address: DJI GmbH, Industriestrasse. 12, 97618, Niederlauer, Germany

CE

Environmentally friendly disposal

Old electrical appliances must not be disposed of together with the residual waste, but have to be disposed of separately. The disposal at the communal collecting point via private persons is for free. The owner of old appliances is responsible to bring the appliances to these collecting points or to similar collection points. With this little personal effort, you contribute to recycle valuable raw materials and the treatment of toxic substances.

IC Compliance

This device complies with ICES-003 standard. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

WWW.ROBOMASTER.COM

Printed in China.