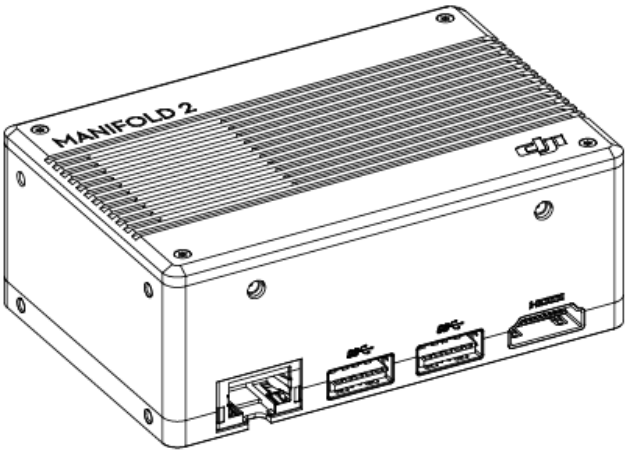
MANIFOLD 2 SERIES

User Guide

V1.0 2018.12



Disclaimer

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By using this product, you hereby signify that you have read this disclaimer and warning carefully and that you understand and agree to abide by the terms and conditions herein. You agree that you are solely responsible for your own conduct while using this product, and for any consequences thereof. You agree to use this product only for purposes that are proper and in accordance with all applicable laws, rules, and regulations, and all terms, precautions, practices, policies and guidelines DJI has made and may make available.

DJI accepts no liability for damage, injury or any legal responsibility incurred directly or indirectly from the use of this product. The user shall observe safe and lawful practices including, but not limited to, those set forth in this document.

Notwithstanding above, your statutory rights under applicable national legislation are not affected by this disclaimer.

Warning

1. Make sure to use DJI designated cables and connect external devices to the ports in strict accordance with specifications of these ports.

2. DO NOT disassemble the Manifold 2 and its accessories.

3. Ensure that the Manifold 2 and its components are free from contamination such as water, oil, soil, and sand.

4. Mount the Manifold 2 to an appropriate position for heat dissipation.

5. DO NOT touch or let your hands or body come in contact with any components as they may be hot during operation.

6. Avoid vibrations and impacts when using the Manifold 2 or during storage or transportation.

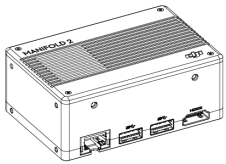
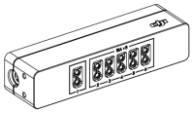
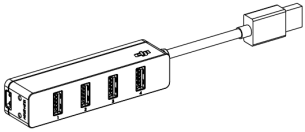
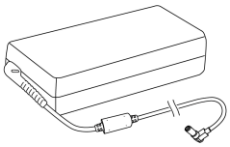
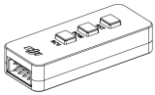
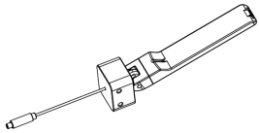
7. The USB 3.0 devices connected to the Manifold 2 may cause interference to the GNSS or Wi-Fi signals. Take electromagnetic shielding measures to reduce the interference if necessary.

Introduction

The Manifold 2 is DJI's second-generation microcomputer for Onboard SDK developers. There are two versions: Manifold 2-G (128G), Manifold 2-C (256G). The Manifold 2-G is equipped with an NVIDIA Jetson TX2 module for faster complex graphics processing and Wi-Fi for network connectivity. The Manifold 2-C has an Intel Core i7-8550U processor with excellent processing power and responsiveness. With a variety of ports to connect different external devices, the Manifold 2 is compatible with many of DJI flight platforms, flight control systems and other devices*, with greater flexibility and extensibility, to provide a rich and convenient development ways for developers.

* Support for DJI devices will be added as testing and development continues. Visit the Manifold 2 product page on dji.com for a complete list. http://www.dji.com/ground-station-pro http://www.dji.com/manifold2

In the Box

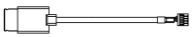
Manifold 2 × 1	Power Distribution Unit × 1	USB 3.0 Hub × 1
		
AC Power Adapter × 1	Button I/O Extension Unit × 1	Wi-Fi Antenna × 2
		

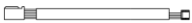
Cables

 AC Power Cable × 1

 XT30 Power Cable × 3

 XT60 to XT30 Power Cable × 1

 UART Cable for A3/N3 Flight Controller × 1

 UART Cable for M210 Series × 2

 CAN/UART Cable × 2

 I/O Cable × 1

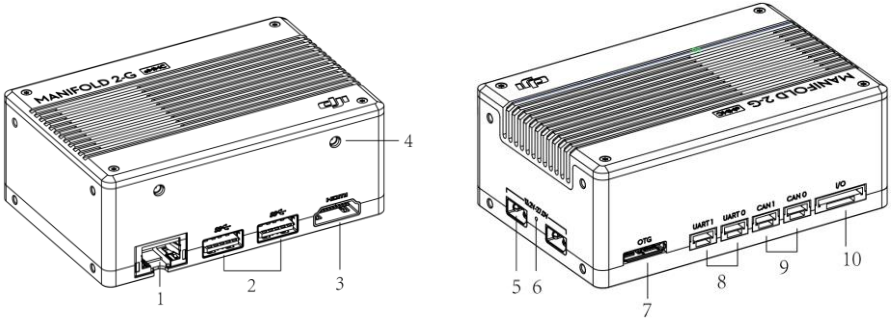
 OTG Cable × 1

 Micro USB Cable × 1

Overview

Manifold 2

The illustrators below take the Manifold 2-G as an example. Unless otherwise specified, the descriptions apply to Manifold 2 series.



1. Ethernet Port (RJ-45)

Connect a network cable to the port to have access to the Internet.

2. USB 3.0 Ports

Connects to an external device supporting USB3.0.

3. HDMI Output Port

Connects to a display device.

4. Antenna Ports (for the Manifold 2-G only)

Mount the Wi-Fi antennas to the ports to have access to the Internet via Wi-Fi. Make sure that the two antennas are vertical to each other or towards to the signal source. DO NOT block the antennas with metal objects.

5. Power Ports

Connects to an external power source to supply power for the Manifold 2. The ports are standard XT30 ports with an input voltage of 13.2 - 27 V and independent from each other. When connecting power source to both ports, the Manifold 2 will automatically choose the power source with a higher voltage.

6. Power Indicator

The indicator is on when powered on, and off when powered off.

7. OTG Port

The OTG port on the Manifold 2-G allows it to be used as both a host and a device. When used as a host, connect the OTG cable to the Manifold 2-G and then connect a USB device to the other end of the OTG cable. When used as a device, connect the Manifold 2-G to a host using a Micro USB cable for system image backup and recovery.

The OTG port on the Manifold 2-C is same as a USB 3.0 port to allow the Manifold 2-C to be used as a host. Connect the OTG cable to the Manifold 2-C and then connect a USB device to the other end of the OTG cable.

8. UART Ports

The operating level is 3.3 V TTL. For the Manifold 2-C, there is only one UART port available, and the other port is marked with N/A indicating not available. These ports cannot supply power.

Pins description:

1	2	3	4
GND	RXD	TXD	N/A

⚠	The UART0 port is for the debug terminal with a baud rate of 115200. DO NOT connect it to the DJI SDK API Port or any other non-stream input port. Access UART0 from ttyS0 in the kernel of the operating system, while access UART1 (for the Manifold 2-G only) from ttTHS2 in the kernel of the operating system. The UART ports of the Manifold 2-G support a baud rate up to 3M. The baud rate of 921600 is a rated value. The actual baud rate is 910000. As a result, the UART ports may be unavailable to communicate with other devices such as OSDK devices that have a baud rate with bias when using a baud rate of 921600. The UART port of the Manifold 2-C supports a baud rate up to 115200.

9. CAN Ports (for the Manifold 2-G only)

Only the Manifold 2-G has CAN ports. The ports on the Manifold 2-C are marked with N/A indicating not available. The operating level of the CAN ports are 3.3 V TTL. The max transmission speed is 2 M. These ports cannot supply power.

Pins description:

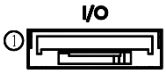
1	2	3	4
GND	CANH	CANL	N/A

10. I/O Port

Connects to the Button I/O Extension Unit using the I/O cable to control some specific functions of the Manifold 2. DO NOT hot swap the devices connected to the I/O port to avoid damage to the devices.

Pins description:

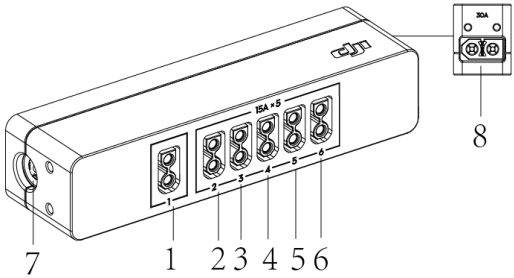
1	2	3	4	5
RST	PWR	RCV	SPI:MOSI	SPI:MISO
6	7	8	9	10
SPI:CS	SPI:CLK	GND	I2C:SCL	I2C:SDA



Pins 1, 2, and 3 are mapped to the RST, PWR, and RCV buttons on the Button I/O Extension Unit respectively.

Power Distribution Unit

Connect the Power Distribution Unit to a power source to power the connected Manifold 2 and other external devices for debugging. Make sure to connect corresponding devices in strict accordance to the specifications of the ports.



1. Low Power Output Port (XT30)

The max continuous current is 15 A and the max peak current is 30A. The power input of this port is from Port 7 (Power Adapter Input Port).

2-6. High Power Output Port (XT30)

The max continuous current is 15 A and the max peak current is 30A. The five ports are parallel with power input from Port 8 (High Power Input Port).

7. Power Adapter Input Port

Connect the power adapter to the port, connect the power adapter to the AC power source (100 - 240 V, 50/60 Hz), and then Port 1 can supply power to the Manifold 2 continuously. Many of DJI's power adapters are available for this port. Refer to the Specifications for details.

The following situation is an example to use this port. Connect this port to a power source, and connect Port 1 to the power port of the Manifold 2. The Manifold 2 will keep powering on even when replacing the input battery connected to Port 8 on the Power Distribution Unit.

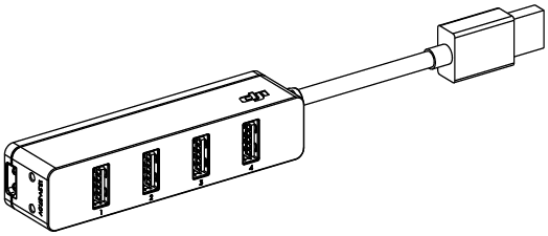
8. High Power Input Port (XT60)

Connects to a 4S - 6S LiPo battery to supply power to the Manifold 2 and other devices through Port 2 - 6 on this unit. The max continuous current is 30 A and the max peak current is 60A.

	Connect Port 1 and one of Port 2 - 6 to the two power ports on the Manifold 2 simultaneously to supply power to the Manifold 2 independently. It is recommended to use the Power Distribution Unit for power management since the optimal electromagnetic compatibility can reduce interference to the GPS or Wi-Fi signal from the power supply. Connect devices of high power to Port 2 - 6 in sequence according to their power, from low to high, to avoid potential heat.

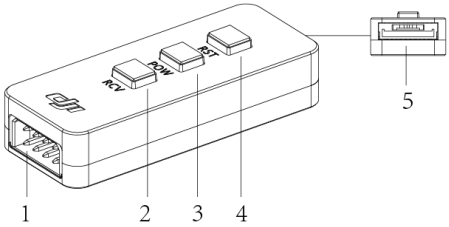
USB 3.0 Hub

The USB 3.0 Hub includes four USB 3.0 ports and one XT30 port. Connect a 4S - 6S LiPo battery to supply output current of up to 1 A for each USB port.



Button I/O Extension Unit

Connect the Button I/O Extension Unit to the I/O port on the Manifold 2 to control some specific functions of the Manifold 2.



1. Extension Port

Pins description:

1	2	3	4	5	6	7	8
N/A	SPI:CLK	GND	SPI:CS	I2C:SDA	SPI:MISO	I2C:SCL	SPI:MOSI

2. RCV Button

This recovery button is only available for the Manifold 2-G. When using with the RST button, the Manifold 2-G can enter Recovery Mode. Refer to System Image for details.

3. PWR Button

Power button. Press once to power on/off the Manifold 2. Press and hold for 10 seconds to force the Manifold 2 to power off.

4. RST Button

Reset button. Press once to reset the Manifold 2.

5. I/O Port

Connects to the I/O port on the Manifold 2 using the I/O cable.

System Configuration

Perform basic setup in the terminal interface.

Basic Configuration

The Manifold 2 comes with pre-installed Ubuntu 16.04 operating system. Users can log in with the information below when connecting a monitor with a HDMI port, mouse and keyboard after powered on.

User name: dji Password: dji

Network Configuration

Access the Internet using a network cable or Wi-Fi (for the Manifold 2-G only). The Manifold 2 will be assigned with an IP address automatically, if DHCP service is available on the connected network. Otherwise, run the following commands to obtain an IP address:

Wired Network

```
$ sudo ifconfig eth0 xxx.xxx.xxx.xxx

$ ifconfig
```

Wireless Network

```
$ sudo ifconfig wlan0 xxx.xxx.xxx.xxx

$ ifconfig
```

xxx.xxx.xxx.xxx is the IP address that you wish to use. The commands above can also be used to check if the configuration is correct.

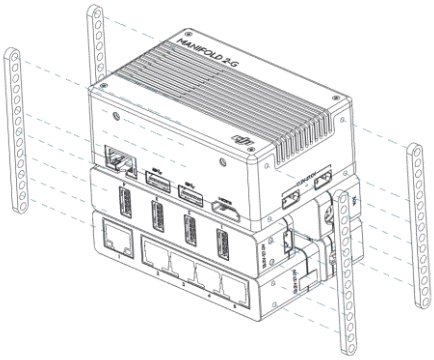
Software Installation

The Manifold 2-G and Manifold 2-C come with the following pre-installed software. Users can install other software according to different applications.

	Manifold 2-G	Manifold 2-C
JetPack 3.2	√	X
Ubuntu 16.04	√	√
CUDA 9	√	X
OpenCV 3.0	√	√
ROS	√	√
CMake	√	√
Git	√	√
htop	√	√
Terminator	√	√
Eigen3.3	√	√
Ceres	√	√
GCC 7.2	√	√

Installation and Connection

1. It is recommended to use the Power Distribution Unit, USB 3.0 Hub included and an optional Manifold 2 Mini Network Switch with the Manifold 2, and assemble them as shown using the Assembly Bar Set.

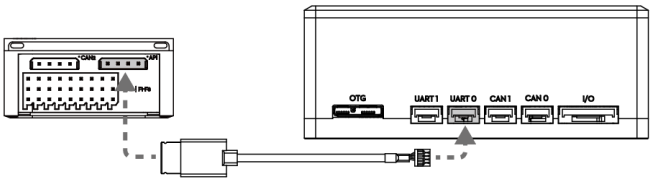


2. When using with DJI flight platforms, mount the Manifold 2 and other external devices to the flight platform using a compatible mounting bracket.

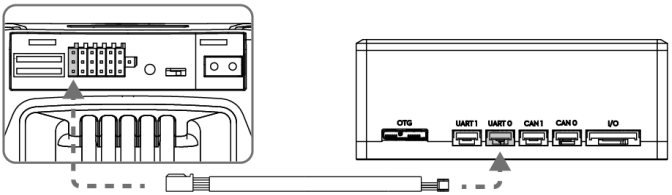
⚠	The size of the screw holes on the Manifold 2 is M2.5 with a thread depth of 5 mm. The size of the screw holes on the accessories is M2.5 with a thread depth of 3.5 mm. DO NOT use screws that are too long to avoid damage to the inner components.

3. Connection:

When using with the A3 or N3 flight controller or the M600 series flight platforms, connect the API port on the flight controller to the UART port on the Manifold 2. Make sure to use the UART Cable for A3/N3 Flight Controller included.



When using the M210/M210 RTK flight platforms, connect the OSDK port on the left of the expansion ports on the aircraft to the UART port on the Manifold 2. Make sure to use the UART Cable for M210 Series included.

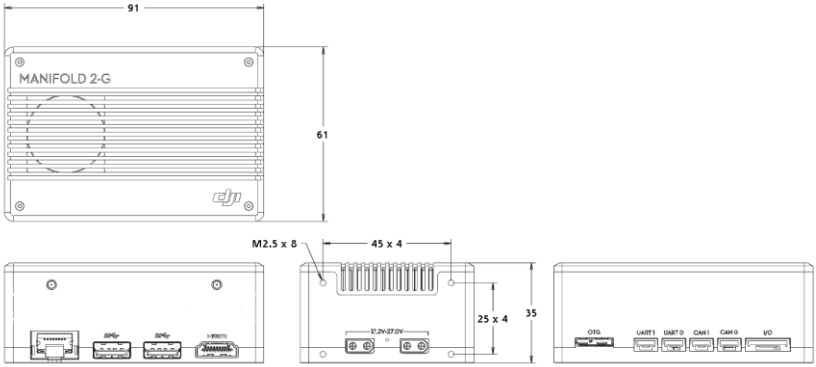


Specifications

Manifold 2

Name	Manifold 2-G	Manifold 2-C
Model	MF2G	MF2C
Weight	220 g	220 g
Dimensions	91×61×35 mm	
Processing Unit	NVIDIA TX2	Intel Core i7 8550U
RAM	8GB 128 bit，DDR4 1333 MHz	8GB 64 bit，DDR4 2400 MHz
eMMC	32 GB (approx. 28 GB available)	N/A
SATA-SSD	128 GB	256 GB
Network	Gigabit Ethernet RJ-45 Port Wi-Fi Transmission Standard:	Gigabit Ethernet RJ-45 Port

	IEEE 802.11a/b/g/n/ac Max Transmission Speed: 866.7 Mbps Operating Frequency: 2.4000 - 2.4835 GHz; 5.150 - 5.250 GHz; 5.250 - 5.350 GHz EIRP: < 20dBm (5.150 - 5.250 GHz) < 23 dBm (5.250 - 5.350 GHz)	
USB	USB 3.0 Port × 2, USB 3.0 OTG Port × 1	USB 3.0 Port × 2, USB 3.0 OTG Port × 1
I/O	CAN Port × 2, UART Port × 2, I2C Port × 1, SPI Port × 1	UART Port × 1
Power	3 - 25 W	5 - 60 W
Operating Temperature	-13° to 113° F (-25° to 45° C)	
Input Power	13.2 - 27.0 V Power Port × 2, independent power supply	



AC Power Adapter

Model	A14-057N1A
Voltage	17.4 V
Rated Power	57 W

FCC Compliance Notice

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.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.

RF Exposure Information
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20cm during normal operation.

ISED Warning

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions: (1)This device may not cause interference.(2)This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :(1)L'appareil ne doit pas produire de brouillage; (2)L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment. End user must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.The device is designed to meet the requirements for exposure to radio waves established by the ISED.

Cet équipement est conforme aux limites d'exposition aux rayonnements ISED établies pour un environnement non contrôlé. L'utilisateur final doit suivre les instructions spécifiques pour satisfaire les normes. Cet émetteur ne doit pas être co-implanté ou fonctionner en conjonction avec toute autre antenne ou transmetteur. Le dispositif portatif est conçu pour répondre aux exigences d'exposition aux ondes radio établie par le développement énergétique DURABLE.

This equipment complies with RSS‐102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Cet équipement est conforme aux limites d'exposition aux radiations CNR‑102 établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps.

KCC Warning Message

"해당무선설비는 운용 중 전파혼신 가능성이 있으므로 인명안전과 관련된 서비스는 할 수 없습니다."
"해당 무선설비는 운용 중 전파혼신 가능성이 있음"

NCC Warning Message

低功率電波輻射性電機管理辦法
第十二條 經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。
第十四條 低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應改善至無干擾時方得繼續使用。前項合法通信，指依電信法規定作業之無線電通信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

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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

Declaración de cumplimiento UE: SZ DJI TECHNOLOGY CO., LTD. por la presente declara que este dispositivo cumple los requisitos básicos y el resto de provisiones relevantes de la Directiva 2014/53/EU.
Hay disponible online una copia de la Declaración de conformidad UE en www.dji.com/euro-compliance

Dirección de contacto de la UE: DJI GmbH, Industriestrasse 12, 97618, Niederlauer, Germany

EU-verklaring van overeenstemming: SZ DJI TECHNOLOGY CO., LTD. verklaart hierbij dat dit apparaat voldoet aan de essentiële vereisten en andere relevante bepalingen van Richtlijn 2014/53/EU.
De EU-verklaring van overeenstemming is online beschikbaar op www.dji.com/euro-compliance

Contactadres EU: DJI GmbH, Industriestrasse 12, 97618, Niederlauer, Germany

Declaração de conformidade da UE: A SZ DJI TECHNOLOGY CO., LTD. declara, através deste documento, que este dispositivo está em conformidade com os requisitos essenciais e outras disposições relevantes da Diretiva 2014/53/EU.
Existe uma cópia da Declaração de conformidade da UE disponível online em www.dji.com/euro-compliance

Endereço de contacto na UE: DJI GmbH, Industriestrasse 12, 97618, Niederlauer, Germany

Dichiarazione di conformità UE: SZ DJI TECHNOLOGY CO., LTD. dichiara che il presente dispositivo è conforme ai requisiti essenziali e alle altre disposizioni rilevanti della direttiva 2014/53/EU.
Una copia della dichiarazione di conformità UE è disponibile online all'indirizzo Web www.dji.com/euro-compliance

Indirizzo di contatto UE: DJI GmbH, Industriestrasse 12, 97618, Niederlauer, Germany

Déclaration de conformité UE : Par la présente, SZ DJI TECHNOLOGY CO., LTD déclare que cet appareil est conforme aux principales exigences et autres clauses pertinentes de la directive européenne 2014/53/EU.
Une copie de la déclaration de conformité UE est disponible sur le site www.dji.com/euro-compliance

Adresse de contact pour l'UE : DJI GmbH, Industriestrasse 12, 97618, Niederlauer, Germany

EU-Compliance: Hiermit erklärt SZ DJI TECHNOLOGY CO., LTD., dass dieses Gerät den wesentlichen Anforderungen und anderen einschlägigen Bestimmungen der EU-Richtlinie 2014/53/EU entspricht.
Eine Kopie der EU-Konformitätserklärung finden Sie online auf www.dji.com/euro-compliance.

Kontaktadresse innerhalb der EU: DJI GmbH, Industriestrasse 12, 97618, Niederlauer, Germany

CAUTION: RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE. DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS

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.

Umweltfreundliche Entsorgung

Elektro-Altgeräte dürfen nicht mit gewöhnlichem Abfall entsorgt werden und müssen separat entsorgt werden. Die Entsorgung an kommunalen Sammelstellen ist für Privatpersonen kostenlos. Die Eigentümer der Altgeräte sind für den Transport zu den Sammelstellen verantwortlich. Durch diesen geringen Aufwand können Sie zur Wiederverwertung von wertvollen Rohmaterialien beitragen und dafür sorgen, dass umweltschädliche und giftige Substanzen ordnungsgemäß unschädlich gemacht werden.

Tratamiento de residuos responsable con el medio ambiente

Los aparatos eléctricos viejos no pueden desecharse junto con los residuos orgánicos, sino que deben ser desechados por separado. Existen puntos limpios donde los ciudadanos pueden dejar estos aparatos gratis. El propietario de los aparatos viejos es responsable de llevarlos a estos puntos limpios o similares puntos de recogida. Con este pequeño esfuerzo estás contribuyendo a reciclar valiosas materias primas y al tratamiento de residuos tóxicos.

Mise au rebut écologique

Les appareils électriques usagés ne doivent pas être éliminés avec les déchets résiduels. Ils doivent être éliminés séparément. La mise au rebut au point de collecte municipal par l'intermédiaire de particuliers est gratuite. Il incombe au propriétaire des appareils usagés de les apporter à ces points de collecte ou à des points de collecte similaires. Avec ce petit effort personnel, vous contribuez au recyclage de matières premières précieuses et au traitement des substances toxiques.

Smaltimento ecologico

I vecchi dispositivi elettrici non devono essere smaltiti insieme ai rifiuti residui, ma devono essere smaltiti separatamente. Lo smaltimento da parte di soggetti privati presso i punti di raccolta pubblici è gratis. È responsabilità del proprietario dei vecchi dispositivi portarli presso tali punti di raccolta o punti di raccolta analoghi. Grazie a questo piccolo impegno personale contribuirete al riciclo di materie prime preziose e al corretto trattamento di sostanze tossiche.

Milieuvriendelijk afvoeren

Oude elektrische apparaten mogen niet worden weggegooid samen met het restafval, maar moeten afzonderlijk worden afgevoerd. Afvoeren via het gemeentelijke inzamelpunt is gratis voor particulieren. De eigenaar van oude toestellen is verantwoordelijk voor het inleveren van de apparaten op deze of vergelijkbare inzamelpunten. Met deze kleine persoonlijke inspanning lever je een bijdrage aan de recycling van waardevolle grondstoffen en de verwerking van giftige stoffen.

Eliminação ecológica

Os aparelhos elétricos antigos não podem ser eliminados juntamente com os materiais residuais. Têm de ser eliminados separadamente. A eliminação no ponto de recolha público através de entidades particulares é gratuita. É da responsabilidade do proprietário de aparelhos antigos levá-los a estes pontos de recolha ou a pontos de recolha semelhantes. Com este pequeno esforço pessoal, contribui para a reciclagem de matérias-primas úteis e para o tratamento de substâncias tóxicas.

BE	BG	CZ	DK	DE	EE
IE	EL	ES	FR	HR	IT
CY	LV	LT	LU	HU	MT
NL	AT	PL	PT	RO	SI
SK	FI	SE	UK	TR	NO
CH	IS	LI			