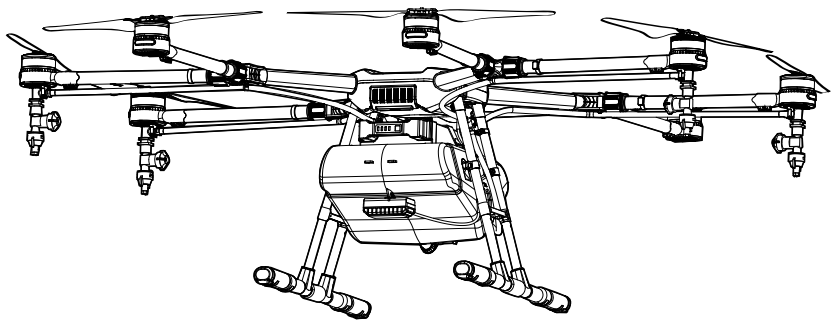
# AGRAS **MG-1**

## Quick Start Guide

V1.2



# Before Flight

1. Read the ***Disclaimer and Safety Guidelines*** and ***Quick Start Guide*** carefully.



2. Download the ***User Manual*** and the ***PC Assistant***.
   http://www.dji.com/product/mg-1/info#downloads


MG-1
Assistant

3. Watch the video tutorials about installation.
   http://www.dji.com/product/mg-1/info#video

4. Download the **DJI GO** app.
   Search for '**DJI GO**' on the App Store or Google Play, and install the app on your mobile device.

DJI GO
App

- The PC Assistant supports Windows XP or above.
- DJI GO is used to upgrade the remote controller firmware and link the remote controller to the aircraft. Refer to the User Manual to learn about more features.
- DJI GO supports iOS 8.0 (or later) or Android 4.1.2 (or later).

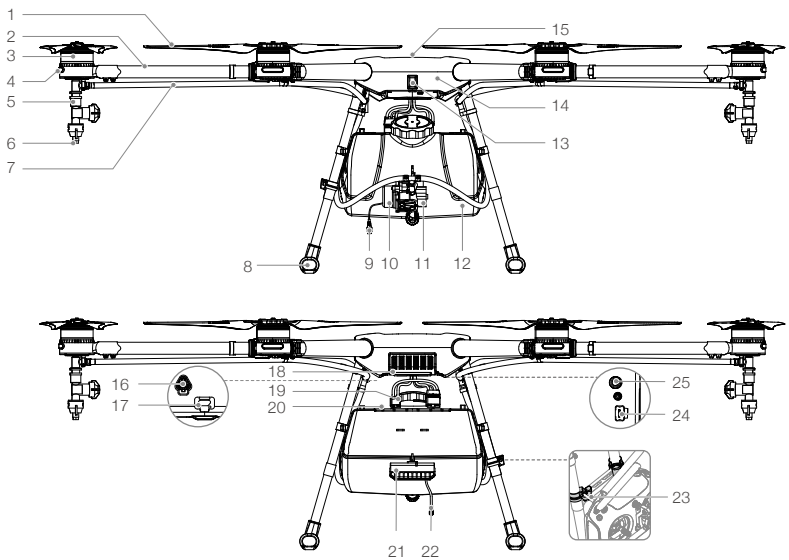
# Profile

The AGRAS™ MG-1 (abbreviated as "MG-1") is a battery-powered multirotor aircraft designed for agricultural applications in variety of environments and terrains, including fields, forests and orchards. It is dust-proof, water-proof (IP43 protection rating, IEC standard 60529) and made of anti-corrosive materials, allowing it to be rinsed clean.

Built in is DJI's industry-leading flight control system, providing three useful Operation Modes: Smart, Manual and Manual Plus. A microwave radar underneath the aircraft makes the MG-1 uniquely versatile across all sorts of terrain. The combined Altitude Stabilization System automatically maintains its distance from plants to ensure optimal spraying.

The remote controller features a Spraying Status Panel decorated with intuitive icons and a range of controls for navigation, mode and spraying. While the MG-1 does all the hard work in the fields, you keep full control over it in the palm of your hands.

## Aircraft

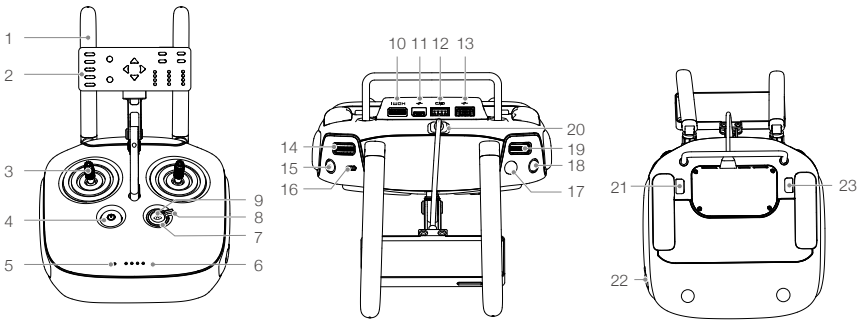



1 Propellers
2 Frame Arms
3 Motors
4 Orientation Indicators
5 Sprinklers
6 Nozzles
7 Hoses
8 Landing Gear
9 Pump Motor Cable
10 Pump Motor
11 Delivery Pump
12 Spray Tank
13 Aircraft Status Indicator (Aircraft's Rear)
14 Aircraft Body
15 GPS Module
16 Pump Motor Port
17 Flight Controller Data Port (Micro USB)
18 Intake Vent (Aircraft's Front)
19 Power Ports
20 Battery Compartment
21 Radar Module (Altitude Stabilization)
22 Radar Cable
23 Remote Controller Holder
24 Lightbridge 2 / iOSD Data Port (Micro USB)
25 Radar Port

- DO NOT obstruct the GPS module located at the center of the aircraft, as this will reduce the GPS signal strength.
- The MG-1 does not come with a battery. Please purchase the DJI approved MG-1 battery pack (Model: MG-12000).

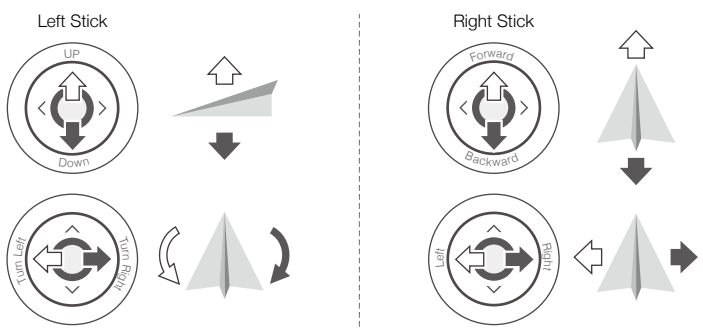
 

## Remote Controller




1 Antennas
2 Spraying Status Panel
3 Control Sticks
4 Power Button
5 Status LED
6 Battery Level LED
7 RTH Status LED
8 Operation Mode Switch
9 RTH Button
10 Mini HDMI Port
11 Micro USB Port
12 CAN Port
13 USB Port
14 Spray Rate Dial
15 Spray Button
16 Flight Mode Switch
17 Button A
18 Button B
19 Flying Speed Dial
20 Panel Cable
21 Back Right Button C2
22 Power Port
23 Back Left Button C1

The default flight control is known as Mode 2. The left stick controls the aircraft's altitude and heading, while the right stick controls its forward, backward, left and right movements.



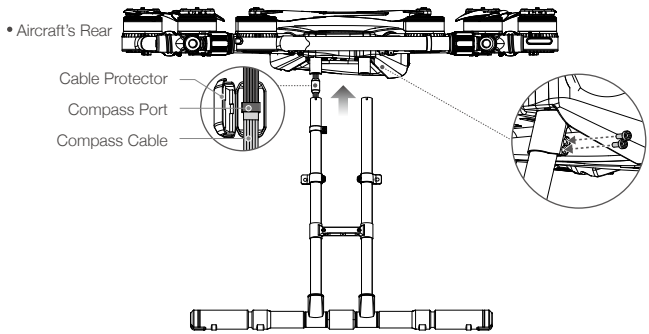

 

# Installation

- Threadlocker is required for installation. Apply threadlocker when mounting landing gear, spray tank, sprinklers and radar module. Ensure threadlocker is totally dry and solid before flight.
- Ensure that all installation and connection procedures are completed before powering on the aircraft.

## Mounting the Landing Gear

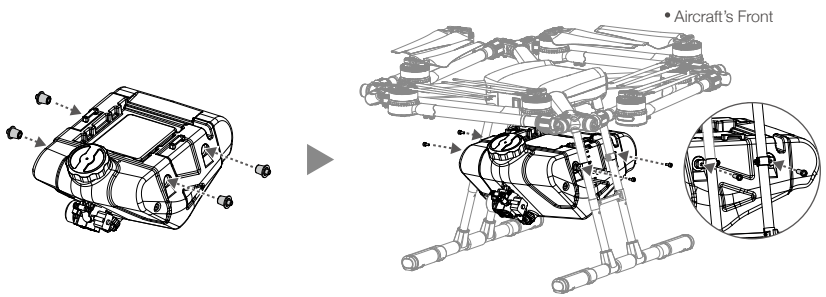
1. Identify the landing gear leg containing the compass cable.
2. Take out the cable protector from the landing gear leg and open it. Looking from the rear, connect the compass cable to the compass port on the right side of the aircraft body. Put the assembled cable into the cable protector slot and close it. Be careful not to damage the cable.
3. Place the cable protector and cable into the mounting position on the center frame then mount the right landing gear leg to the mounting position and tighten the M3×10 screws.




4. Mount the left landing gear leg and tighten the M3×10 screws.

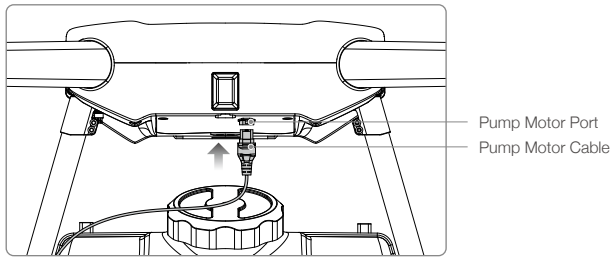
## Mounting the Spray Tank

1. Insert the four spray tank plugs into the sides of the spray tank.
2. Place the spray tank between the landing gear legs with the delivery pump at the rear of the aircraft. Align the mounting holes and tighten the four M5×18 screws.



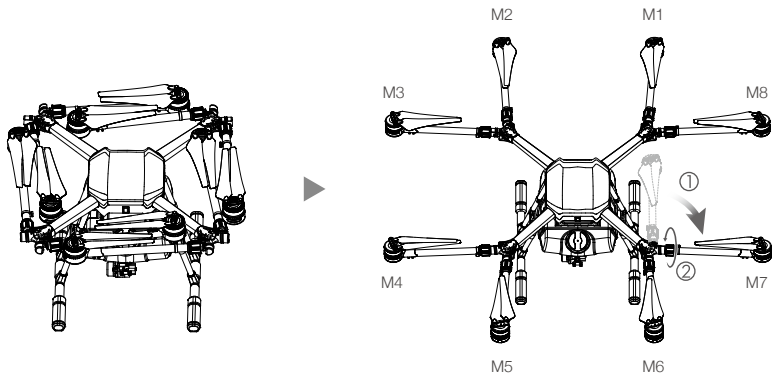

 

3. Connect the motor cable to the aircraft body. Be sure the plug is correctly positioned and you hear a click indicating a proper connection.




## Unfolding the Frame Arms

1. Unfold the frame arms ① and tighten the two arm sleeves at each of the junctions ②.
2. Identify the position and rotational direction of the motors. The top view shows motors M1 to M8 arranged in a counter-clockwise order, with motors M1 and M2 at the front of the aircraft, and motors M5 and M6 at the rear. Motors M1, M3 M5 and M7 rotate counter-clockwise as indicated by the “CCW” mark, while motors M2, M4, M6 and M8 rotate clockwise as indicated by the “CW” mark.




## Mounting the Sprinklers

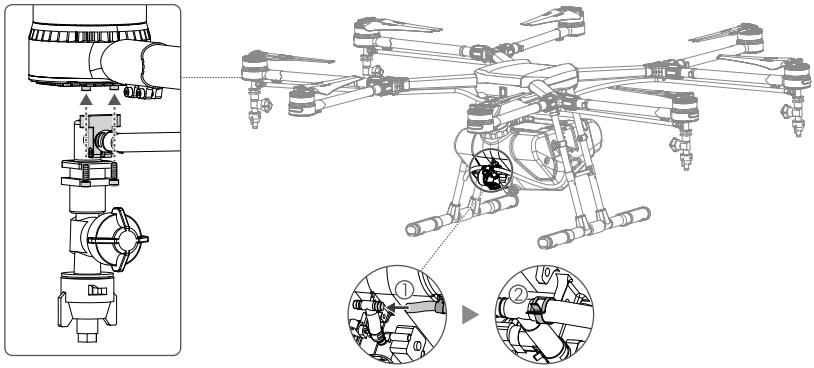
**Tools required:** A pair of pliers

1. Mount one pair of sprinklers under the left motors (M3 and M4) and the other pair under the right motors (M7 and M8), and then tighten the M3x6 screws.
2. Connect the sprinklers to the delivery pump.

   ① Thread the open ends of the hoses through hose clamps A (use pliers to open up the hose clamp if necessary). Connect the hoses to both sides of the delivery pump’s T-shape outlet.

   ② Press the hose clamps so that they grip the outlet firmly.



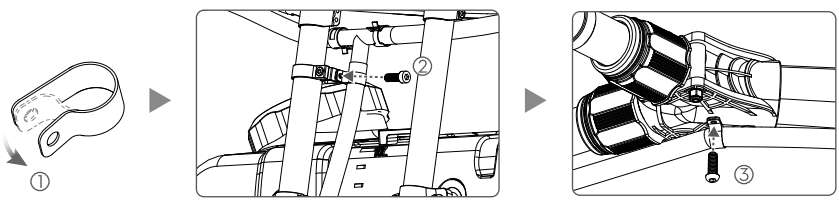

3. Fix the hoses to the landing gear and frame arms.

   Prepare hose clamps B, M3×6 screws and M3×8 screws (self-tapping) to fix the hoses to the arms and landing gear.

   ① Clip hose clamps B around the hose at positions that need to be fixed. The hoses should be fixed to the landing gear and at each frame arm junction that leads to a sprinkler.

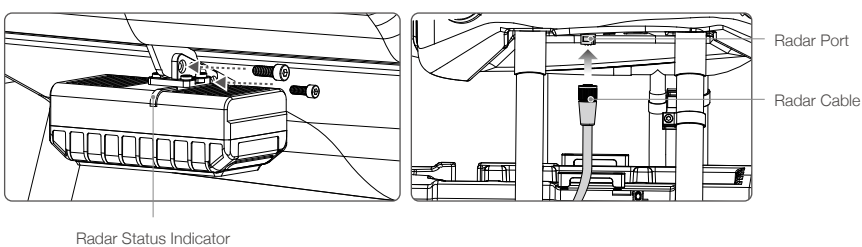
   ② Attach the hose clamp to the bracket on the landing gear leg and tighten the M3×6 screw.

   ③ Attach the hose clamp to the bottom of the frame arm junction and tighten the M3×8 screw (self-tapping).




## Mounting the Radar Module

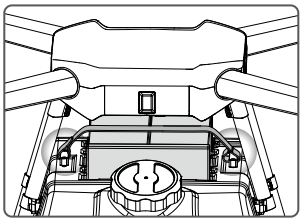
1. With the Radar Status Indicator facing outwards, align the mounting holes and tighten the M3×8 screws.
2. Connect the radar cable to the radar port on the aircraft body. Be sure to insert the plug in the correct orientation and tighten its ring to secure.

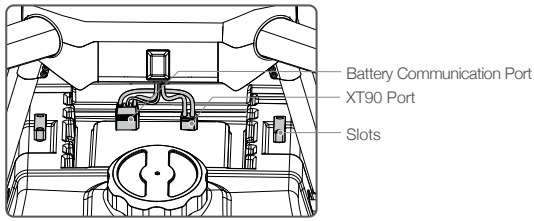


## Mounting the Battery

Place the battery into the recessed area above the spray tank. Pull the Velcro strap through the slots and around the battery to secure.



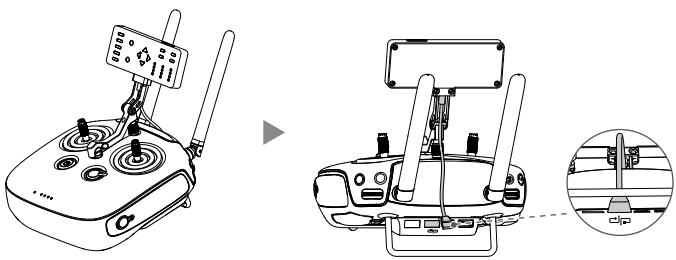



- The MG-1 does not come with a battery. Please purchase the DJI approved MG-1 battery pack (Model: MG-12000).
- The voltage on the aircraft can reach 50.4 V. Read the battery's safety guidelines and take necessary precautions when handling the battery to ensure your own safety.

## Mounting the Spraying Status Panel

1. Unfold the Spraying Status Panel.
2. Plug the screw lock into the screw hole and tighten.
3. Insert the slotted screw through the metal loop and tighten.


4. Tilt the Spraying Status Panel to the desired position. Adjust the antennas as shown.
5. Connect the panel cable to the CAN port on the back of the remote controller.



# Fly Safe

It is important to understand some basic flight guidelines, both for your protection and for the safety of those around you.

1. Fly in Open Areas: Do not fly near or above people or animals, or near buildings, power lines and other obstacles.
2. Maintain Control at All Times: Always keep your hands on the remote controller and maintain control of your aircraft when it is in flight, even when using intelligent functions such as Smart Operation Mode and Smart Return-to-Home.
3. Maintain Line of Sight: Maintain a line of sight to your aircraft at all times and avoid flying behind buildings or other obstacles that may block your view.
4. Monitor Your Altitude: For the safety of full-sized aircraft and other air traffic, always fly at altitudes less than 164 feet (50 meters) or according to local laws and regulations.

Visit **http://www.dji.com/fly-safe/category-mc** for more information on critical safety features such as No Fly Zones.

### Calibrating the Compass

Ensure the compass is calibrated before every flight. Failure to do so may lead to unexpected flight behavior.

1. DO NOT attempt to calibrate your compass where there is a chance of strong magnetic interference, including areas near massive metal objects, parking lots, underground steel reinforcements or under bridges.
2. DO NOT carry ferromagnetic materials, such as keys and mobile phones, with you during compass calibration.
3. The compass should always be calibrated when moving from indoor spaces to outdoor spaces.
4. If the Aircraft Status Indicator is blinking green and yellow alternately after placing the aircraft on the ground, the compass has detected magnetic interference. Change your location.
5. If the Aircraft Status Indicator is blinking red, compass calibration has failed. Please recalibrate.

### Flying Considerations

1. DO NOT use the aircraft in adverse weather conditions such as heavy rain (precipitation rate exceeding 25 mm or 0.98 inches in 12 hours), high winds exceeding 17 mph (28 kph), fog, snow and lightning.
2. Only fly in open areas. Tall buildings and steel structures may affect the accuracy of the onboard compass and GPS signal.
3. Avoid flying in area with high levels of electromagnetism, including near mobile phone base stations and radio transmission towers.
4. Aircraft and battery performance is subject to environmental factors such as air density and temperature. Be very careful when flying over 6,560 feet (2 km) above sea level as the battery and aircraft performance may be reduced.
5. The aircraft cannot operate in P-Mode within the Earth's polar regions.
6. Ensure that there is a strong GPS signal in the Smart or Manual Plus operation mode.

### P-Mode

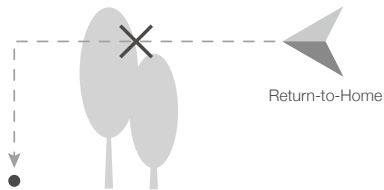
The aircraft uses GPS to pinpoint its position and stabilize flight. The Return-to-Home feature is available. To enable P-mode, toggle the Flight Mode Switch to "P".

### Return-to-Home

It is important to take off with a strong GPS signal to ensure that the Home Point is recorded by the aircraft. The aircraft will automatically return to the Home Point in the following cases.
**Smart RTH:** You press the RTH button.
**Failsafe RTH*:** Remote controller signal is lost.

Always set an appropriate RTH altitude that goes above nearby buildings before takeoff. When the aircraft is returning to the Home Point, you should guide it with the control sticks.




* The Failsafe RTH must be enabled in the PC Assistant. If not enabled, aircraft will hover in place when remote controller signal is lost.

### Pesticide Usage

1. Pesticides are poisonous and can pose serious risks to human safety. Use them in strict accordance with their specifications.
2. Residue on the equipment caused by splashes or spills when pouring and mixing the pesticide can irritate your skin. Be sure to clean the equipment after mixing.
3. Use clean water to mix the pesticide to avoid blocking the strainer. Clear any blockages before using the equipment.
4. Wear protective clothing to prevent direct body contact with the pesticide. Always rinse your hands and skin after handling pesticides. Clean the aircraft and remote controller after applying the pesticide.
5. Effective use of pesticides relies on pesticide density, spray rate, spray distance, aircraft speed, wind speed and wind direction. Consider all factors when using pesticides, but NEVER compromise the safety of people, animals and the environment in doing so.
6. DO NOT contaminate rivers and sources of drinking water.

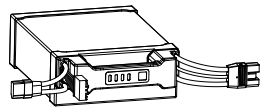
It is important to understand basic flight guidelines, for the safety of both you and those around you. Do not forget to read the *Disclaimer and Safety Guidelines*.

# Using MG-1

## Preparing the Flight Battery

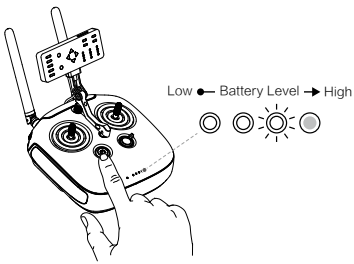
Only use DJI approved flight batteries (Model: MG-12000). Check battery level before flying and charge according to instructions provided by the manufacturer.



Model: MG-12000

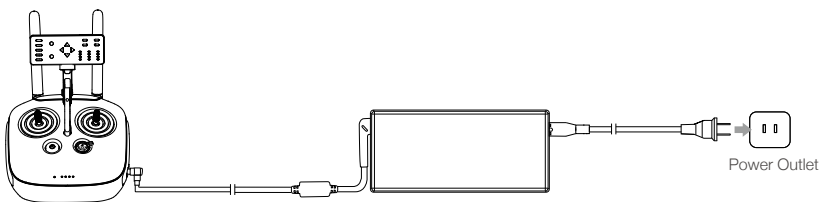
## Preparing the Remote Controller

### Check Battery Level




Press once to check the battery level.
Press once, then again and hold to turn on/off.

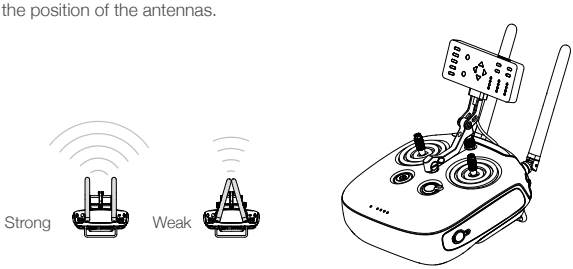
### Charging the Battery




• When charging is complete, the battery level indicators will automatically turn off. The charge time is about 3.5 hours.

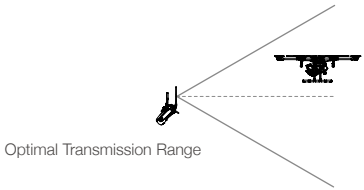
### Adjusting the Antennas

Ensure that the Spraying Status Panel is unfolded and the panel cable is connected to the CAN port on the back of the remote controller. Adjust antennas. The strength of the remote controller signal will fluctuate depending on the position of the antennas.



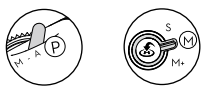
Try to keep the aircraft inside the optimal transmission range. If the signal is weak, adjust the antennas or fly the aircraft closer.




• Avoid using wireless devices that use the same frequency bands as the remote controller.

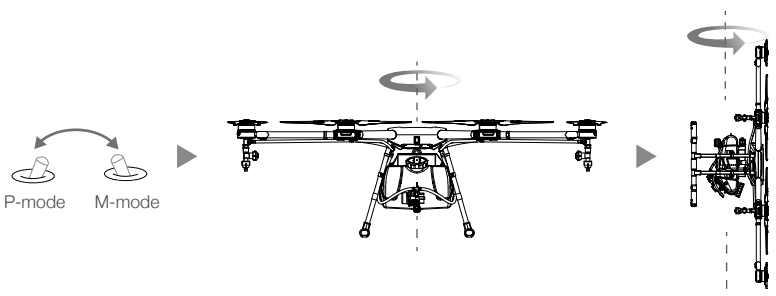
## Getting Ready for Takeoff

1. Place the aircraft on an open, flat ground with the Aircraft Status Indicator facing towards you.
2. Unfold propellers and check that they are unfolded and mounted onto the motors securely. Unfold frame arms and tighten arm sleeves firmly. (Refer to Page 6 for how to unfold the frame arms.)
3. Toggle the Flight Mode Switch to P-mode.
4. Toggle the Operation Mode Switch to Manual mode.
5. Power on the remote controller.
6. Connect the battery to the communication port and then the XT90 port.



## Calibrating the Compass

1. Flip the Flight Mode Switch back-and-forth at least 6 times, until the Aircraft Status Indicator becomes solid blue.
2. Hold the aircraft upright and rotate it 360 degrees along the central axis, until the Aircraft Status Indicator changes from solid blue to solid green.
3. Hold the aircraft with its nose facing up and rotate 360 degrees along the central axis.




4. The Aircraft Status Indicator shows the current flight mode when calibration is complete. If the Aircraft Status Indicator becomes blinking red, repeat the steps above to recalibrate the compass.

## Flight

Ensure the Flight Mode Switch is in the “P” position and wait for a strong GPS signal. Ensure the Operation Mode Switch is in the “M” position, or else the motors cannot be started.

### Takeoff

Perform the Combination Stick Command (CSC) and then slowly push the throttle stick up to takeoff.


### Landing

To land, pull down on the throttle stick down to descend until the aircraft touches the ground. There are two methods to stop the motors.

1. When the aircraft has landed, push the throttle stick down, then perform the CSC command to stop the motors. Release both sticks once the motors have stopped.

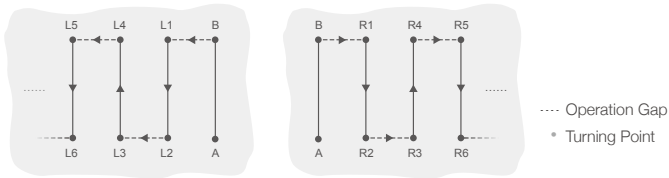

2. When the aircraft has landed, push the throttle down and hold. The motors will stop after 3 seconds. (In M-mode, when “M” is set as Manual mode in the PC Assistant, use method 1 to stop the motors.)


- Take off immediately after the motors are spinning, or else the aircraft may drift and injure nearby people.
- Rotating propellers can be dangerous. DO NOT start the motors in narrow spaces or when there are people nearby.
- Always keep your hands on the remote controller when the motors are spinning.
- Never stop the motors mid-flight unless in emergency situations when doing so can reduce the risk of damage or injury.
- After landing, power off the aircraft before turning off the remote controller. Disconnect the cable from the XT90 port and then the battery communication port.

## Smart Operation

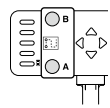
The aircraft will travel along pre-designated square zig zag route after the turning Points A and B have been recorded. The altitude difference between the aircraft and vegetation is maintained under optimal working conditions. The aircraft will spray liquid automatically while flying along the route and stop spraying liquid while hovering at the turning points. The length of the dotted lines, which are called Operation Gaps, can be adjusted in the PC Assistant. It is recommended to fly in Smart Operation Mode when the spray area is large and in a rectangular shape.




Ensure that Flight Mode Switch on the remote controller is toggled to the “P” position and a strong GPS signal is present. In addition, ensure that the Operation Mode Switch on the remote controller is toggled to the “M” position.

**1. Record Points A and B in Order**

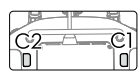
Fly the aircraft to the starting point, depicted as Point A (B), hover, and then press Button A (B) on the remote controller. The Point A (B) LED on the Spraying Status Panel will become solid green and the Aircraft Status Indicator will blink red (green) after the starting points have been recorded.




- Update Point B by flying the aircraft to a new position and record this position. Note that if a Point A has been updated, then Point B is also required to be updated accordingly.
- It is recommended to keep the direction of Point A to B parallel to one side of the rectangular spray area for optimal effect.

**2. Select the Route**

Press Back Left Button C1 or Back Right Button C2 on the remote controller to select the operating pattern. Press Back Left Button C1 for Route L and Back Left Button C2 for Route R. The Orientation LED on the Spraying Status Panel will blink to show that the selection has been made. The default route pattern is Route R, if no selection has been made.



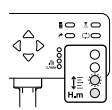

**3. Adjust the Aircraft Altitude**

Adjust the aircraft altitude to the desired altitude by using the throttle stick before entering Smart Operation Mode, and the Altitude Stabilization System will start working automatically and maintain the spraying distance between the aircraft and the vegetation.

Instructions:

a. Fly the aircraft above the vegetation and adjust the spraying distance between the aircraft and the vegetation.

b. Confirm the desired spraying distance by observing the Height LEDs on the Spraying Status Panel.



- The optimal detection range for the spraying distance is between 1.5 to 7 meters. Always operate the aircraft above vegetation within this range while adjusting aircraft altitude.
- Ideal spraying distance should fall within the working range (2-3.5 meters) for altitude stabilization.
- Refer to the User Manual for more information about the working conditions of the Altitude Stabilization System.

Refer to the table below for Height LED descriptions. (The bottom of the Height LED on the panel is LED1 and the top is LED4.)

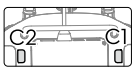
| LED1 | LED2 | LED3 | LED4 | Spraying Distance |
|---|---|---|---|---|
| ☼ | ○ | ○ | ○ | < 2 m |
| ● | ○ | ○ | ○ | 2 - 2.5 m |
| ● | ☼ | ○ | ○ | 2.5 - 3 m |
| ● | ● | ○ | ○ | 3 - 3.5 m |
| ● | ● | ☼ | ○ | 3.5 - 4 m |
| ● | ● | ● | ○ | 4 - 4.5 m |
| ● | ● | ● | ☼ | 4.5 - 5 m |
| ● | ● | ● | ● | > 5 m |
| ☼ | ☼ | ☼ | ☼ | Data not used. Enter Manual Operation Mode to adjust spraying distance to within the working range (2 - 3.5 m) and return to Smart Operation Mode. |
| ○ | ○ | ○ | ○ | Invalid data, adjust the spraying distance to within the detection range (1.5 - 7 m). Or abnormal radar cable connection, check the connection. |

**4. Using Smart Operation Mode**

Ensure that the Flight Mode Switch on the remote controller is toggled to the “P” position and a strong GPS signal is present, then toggle the Operation Mode Switch to the “S” position to enable Smart Operation Mode. The aircraft will align with the line between Point A and Point B with its heading pointing toward Point B.


**5. Start the Operation**

a. Press the Back Left Button C1 and Back Right Button C2 on the remote controller simultaneously to have the aircraft traverse from Point B to L1 (R1). The aircraft will then hover at Point L1 (R1) and wait for further commands.




b. Enable Continuous Smart Operation Mode by pressing and holding the Back Left Button C1 and Back Right Button C2 for 2 to 4 seconds when the aircraft is hovering at any given turning point. The aircraft will follow the square zig zag route continuously. To exit Continuous Smart Operation Mode, press the Back Left Button C1 and Back Right Button C2 and hold for 2 to 4 seconds. The aircraft will fly to the next turning point and hover.

- Use the control sticks to control the aircraft to avoid obstacles when it is in operation, however, the heading of the aircraft cannot be adjusted. The aircraft will resume to operation route automatically upon releasing the control sticks. Release the control sticks only after the aircraft is far away from the obstacle, or else the aircraft may still hit obstacles when it is resuming its operation route.
- If you press Button A or B when in operation, data for Point A and B of the current route will be erased and the aircraft will hover in place.

## Manual and Manual Plus Operation

Refer to the *User Manual* for details about the two operation modes.

## More Function

Operation Resumption

System Data Protection

Empty Tank Warning

Refer to the User Manual for details.

# Specifications

| | |
|---|---|
| **Airframe** | |
| Diagonal Wheelbase | 1520 mm |
| Frame Arm Length | 625 mm |
| Dimensions | 1471 mm × 1471 mm × 482 mm<br>(Frame arms unfolded, propellers removed)<br>780 mm × 780 mm × 482 mm (Frame arms folded) |
| **Propulsion System** | |
| **Motors** | |
| Stator Size | 60 × 10 mm |
| KV | 130 rpm/V |
| Max Thrust | 5.1 kg/rotor |
| Max Power | 770 W |
| Weight (With cooling fan) | 280 g |
| **ESCs** | |
| Max Allowable Current (Continuous) | 25 A |
| Operating Voltage | 50.4 V (12S LiPo) |
| Signal Frequency | 30 - 450 Hz |
| Drive PWM Frequency | 12 kHz |
| **Foldable Propeller** | |
| Material | High-performance engineered plastics |
| Diameter × Pitch | 21 × 7 inch |
| Weight | 58 g |
| **Spraying System** | |
| **Spray Tank** | |
| Volume | 10 L |
| Standard Operating Payload | 10 kg |
| Max Battery Size | 151 mm × 195 mm × 70 mm |
| **Sprinklers** | |
| Model | XR11001 |
| Quantity | 4 |
| Max Spray Speed | 0.43 L/min (Single nozzle, using water) |
| Spray Width | 4 - 6 m (4 nozzles, 1.5 - 3 m above plant) |
| Droplet Size | 130 - 250 μm<br>(Depending on operating environment and spraying speed) |
| **Altitude Stabilization System** | |
| Detection Range | 1.5 - 7 m (Varies when flying above different kinds of vegetation) |
| Working Range | 2 - 3.5 m |
| Detection Accuracy | < 10 cm |

| Flight Parameters | |
|---|---|
| Total Weight (Excluding battery) | 8.8 kg |
| Standard Takeoff Weight | 22.5 kg |
| Max Takeoff Weight | 24.5 kg (At sea level) |
| Max Thrust-Weight Ratio | 1.81 (Takeoff weight of 22.5 kg) |
| Battery | DJI approved battery pack (Model: MG-12000) |
| Max Power Consumption | 6400 W |
| Hovering Power Consumption | 3250 W (Takeoff weight of 22.5 kg) |
| Hovering Time* | 24 min (Takeoff weight of 12.5 kg)<br>10 min (Takeoff weight of 22.5 kg) |
| Max Operating Speed | 8 m/s |
| Max Flying Speed | 22 m/s |
| Operating Temperature | 32° to 104° F (0° to 40° C) |

*At sea level and in wind speeds under 3 m/s

| Remote Controller | |
|---|---|
| Model | GL658C, GL690B (Japan only) |
| Operating Frequency | 920.6 MHz to 928 MHz (Japan)<br>5.725 GHz to 5.825 GHz<br>2.400 GHz to 2.483 GHz |
| Max Transmission Range | 1 km (Unobstructed and free of interference) |
| EIRP | 10 dBm @ 900M<br>13 dBm @ 5.8G<br>20 dBm @ 2.4G |
| Built-in Battery | 6000 mAh, 2S LiPo |
| Output Power | 9 W |
| Operating Temperature | 14° to 104° F (-10° to 40° C) |
| Storage Temperature | Less than 3 months: -4° to 113° F (-20° to 45° C)<br>More than 3 months: 72° to 82° F (22° to 28° C) |
| Charge Temperature | 41° to 104° F (5° to 40° C) |
| **Remote Controller Charger** | |
| Model | A14-057N1A |
| Voltage | 17.4 V |
| Rated Power | 57 W |

DJI Support
**http://www.dji.com/support**

Download the user manual for more information:
http://www.dji.com/product/mg-1

※ This Quick Start Guide is subject to change without prior notice.