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Laboratoire de Moirans
Z.I. Centr'Alp
170, Rue de Chatagnon
38430 MOIRANS - FRANCE

USER MANUAL

FCCID: 2BAB7IOSTAR
IO Star User Manual

Version 1.0

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Drotek
June 6, 2023



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2 Version

Version	Date	Amendments
0.0	06/2022	Creation
0.1	07/2022	Change of Warning Navigation Failure Removing RTCM XBee Updating GCS tabs name Alias manager warning
0.2	08/2022	Adding In-flight behaviors Updating Failsafes Updating dance parameters Adding RTL unicast Adding take-off in float Adding Spot me in alias Adding battery reference
0.3	10/2022	GCS view: delete XBee chart, delete Set Color Adding Color Test and Drones selection Heartbeat: Update references to XBee heartbeat RKS: Adding data for MOC-2511 Removing motors maintenance as it needs welding
0.4	02/2023	Update pictures with new propellers Update flight modes and failsafes Change "Heartbeat" page to "Datalink Management" Update Set Alt behavior Update GCS screenshots Add "Manual Selection" in "Upload Dance" section Removed Hardcage Complete rework of GCS' logs page Adding Fleet logs message section Updated In-flight behaviors
1.0	05/2023	Update format from Gitbook to PDF Update links from Drive to Docsend Complete overhaul of GCS Network section Adding payload and FCC subsections

3 Aircraft

3.1 Overview

The IO Star is a lightweight unmanned aircraft system (UAS) designed for Drones Light Shows. IO Star is a quadcopter that operates in swarm flights, by autonomously following pre-defined trajectories. In this document, these trajectories that drone follow are called "dance".

IO Star's main components are a powerful RGB LED, a high-precision positioning system (GNSS RTK), an independent and redundant Flight Termination System (FTS), and two radio-communication links: Wi-Fi on 5GHz frequency band, and XBee on 2.4GHz frequency band.

The IO Stars do not share their position with each other. They only follow pre-defined trajectories. The operator shall ensure that there are no collisions when designing the show.

IO Star works with a Ground Control Station (GCS) which allows the operation of several drones at once. The GCS is the main interface for the tele-pilot. It provides all the tools to set up and control the drones, such as dance upload, geocaging configuration, and in-flight commands.

3.1.1 Diagram

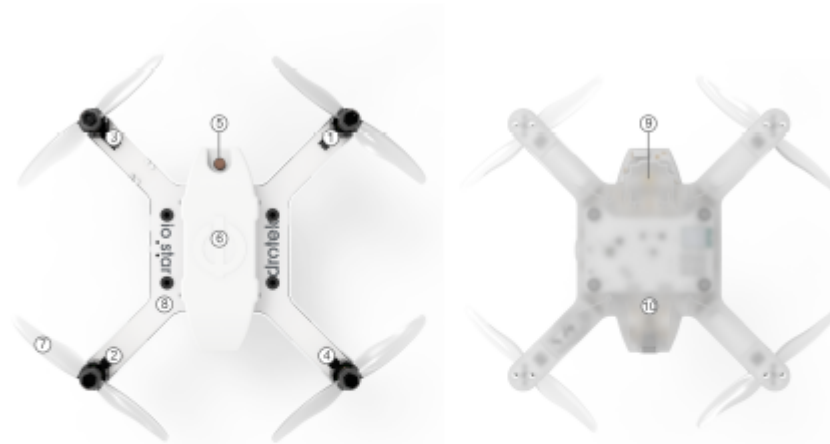


Figure 1: IO Star up and bottom views

1. Motor #1 (counterclockwise rotation)

2. Motor #2 (counterclockwise rotation)
3. Motor #3 (clockwise rotation)
4. Motor #4 (clockwise rotation)
5. User power button
6. Battery pack
7. 5126 propellers, 2 kinds depending on motor rotation
8. Frame
9. RGBW LED
10. Transparent shell



11. GNSS Antenna
12. Battery connector
13. Vibration damper
14. Former battery charge port

i On the first version of IO Star, the batteries were loaded thanks to the charge port. Its use is now prohibited as the charge function is discontinued. Please use a Drotek charger to charge your batteries.

3.1.2 Propellers

There are two kinds of propellers, with different rotation directions. Ensure that the propellers are at their place and not upside-down before each flight.

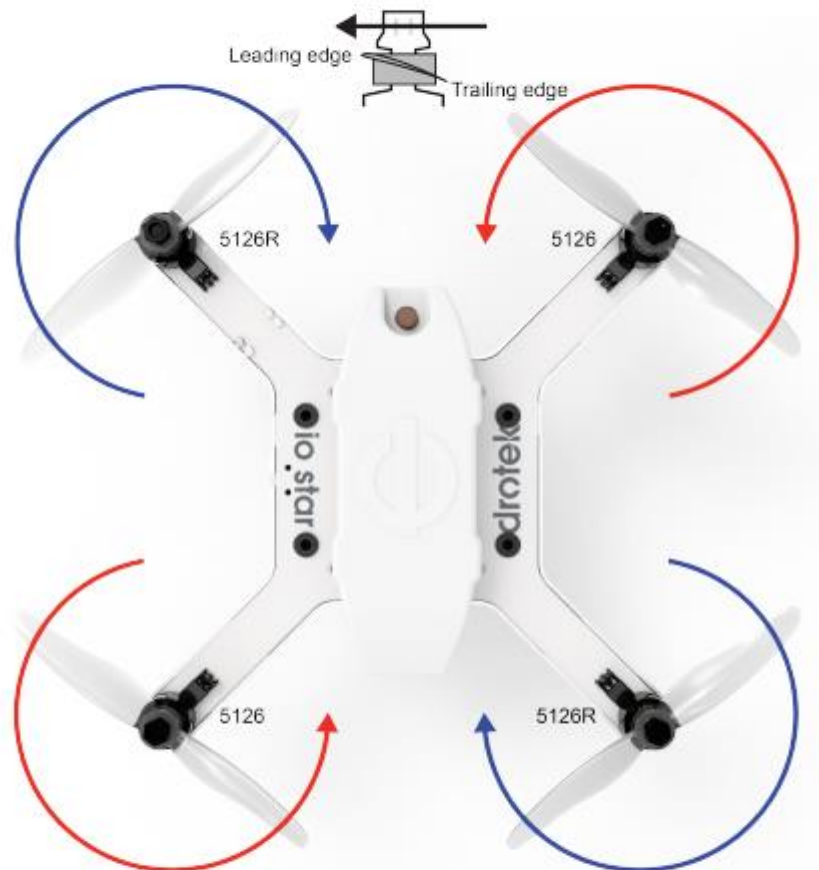


Figure 2: Propellers rotation direction

Warning !
Moving parts, stay away from propellers when moving.



3.1.3 Main characteristics

Name	Value
Dimensions W*L*H (no propellers)	190x190x52mm
Weight with batteries	283g (302g on the first IO Star version)
Flight duration	20mn*
Primary radio link	Wi-Fi 5GHz
Primary radio range	350 m**
Secondary radio link	XBee 2.4GHz
Secondary radio range	1000 m**
Operating temperature range	0 °C - 40 °C
Max show speed	5 m/s
Max show ascent speed	4 m/s
Max show descent speed	4 m/s
Recommended show speed	3.5 m/s
Max ascent speed (vertical)***	7 m/s
Max speed (horizontal)***	17,7 m/s

**in ideal conditions: dry and warm environment, with low wind*

***mainly depends on radio-frequency setup and interferences*

****maximum speed technically reachable, used for safety range calculus in case of FMU loss*

3.1.4 Payload

Optional payload can be mounted on the drone by the IO Star operator. A 6-pin JST-GH connector is available under the GNSS antenna, for CAN communication and power supply:

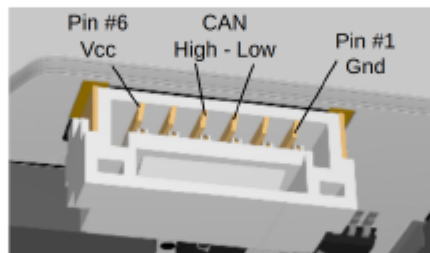


Figure 3: Payload CAN connector pinout. 1/2:GND, 3:CANL, 4: CANH, 5/6:VCC



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3.7.5 Compliance Information

- ⓘ** Caution: the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The IO Star 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 instruction, 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 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 circuit different from that to which the receiver is connected.
- Contact after-sales service or an experienced radio/TV technician for help.

The IO Star complies with FCC RF radiation exposure limits set forth for general population. This device must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.



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