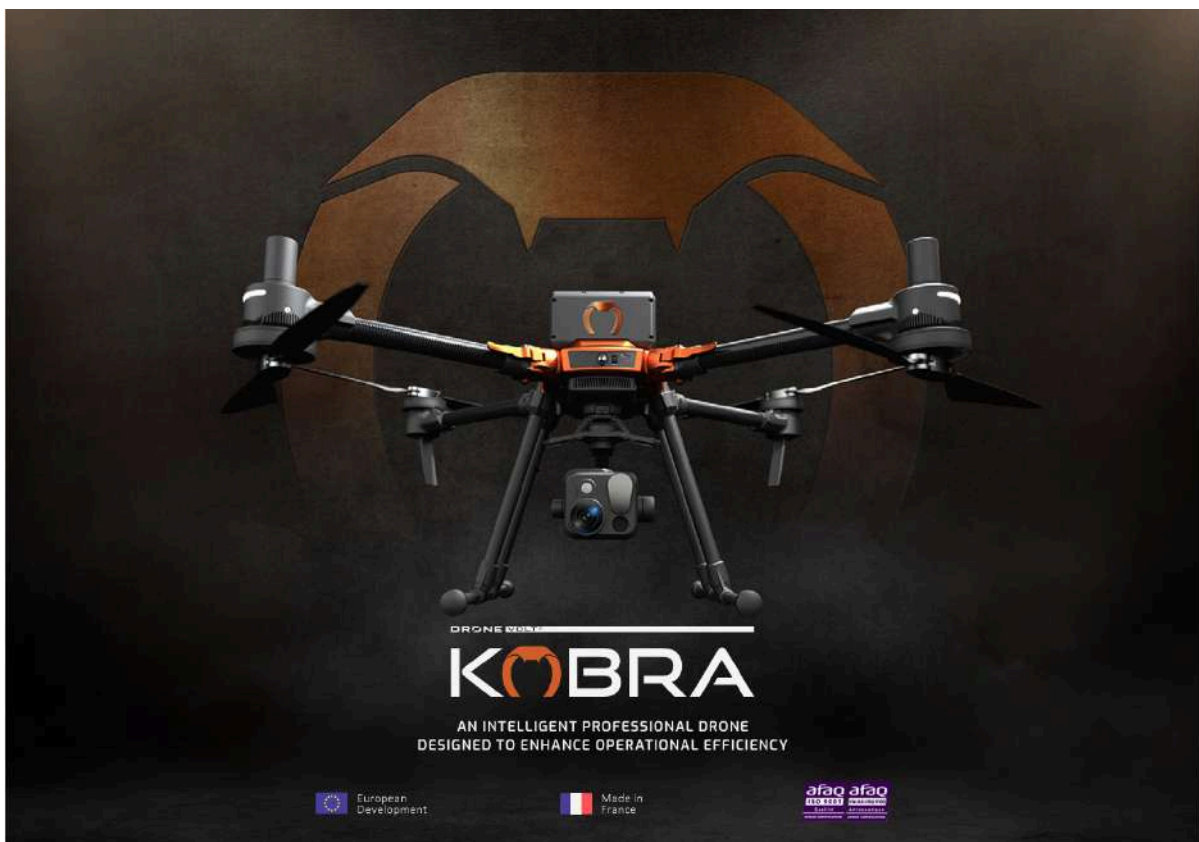


# KOBRA User Manual



## 0.1 Version Table

Version	Revision	Date	Author	Description
1.	1	08/10-2024	VKT	<u>Update:</u> UA Configurations, View of max. Characteristic, Label, Bank Angle, Tools and instruments, SW updates, Factory default procedure, Transportation specifications, Precipitation to include fog.
1.	2	23/10-2024	VKT	<u>Update:</u> C2 Link Loss Recovery, C2 Link Loss flight termination, Battery Low Level
1.	3	29/10-2024	VKT	<u>Update:</u> C2 Link Loss Recovery, altitude limitation during storage. Operation incl. Salt spray and fungus.
1.	4	31/10-2024	VKT	<u>Update:</u> C2 Link section updated to conformity requirements. Adjustment of version table and corrected cross-references throughout document.
1.	5	11/12-2024	VKT	<u>Update:</u> Battery Low Level Transmitter updated.
1.	6	02/01-2024	MHE	<u>Update:</u> Appendix IP Rating and sections Warranty Exclusions, KOBRA Requirement Specification, Flight Environment, Operational Limitations, and Risks related to UAS operations updated to reflect IP2X rating. Clarified in Flight Operations that Loiter is a common reference to Slow, Normal, and Fast modes.
1.	7	08/04-2025	VKT	<u>Update:</u> Dimensions and battery information updated based on feedback from Risk Analysis(CE). DoC statement updated.
1.	8	11/07-2025	VKT	<u>Update:</u> Section 2.8 updated to account for minimum selectable threshold. Section 2.5.2.2.1.1 updated to account for degraded geo awareness function and not configured geo awareness function.
1.	9	05/09-2025	VKT	<u>Update:</u> Section 2.5.2.5.5 updated to account for the minimum configurable altitude in waypoint missions (AUTO flightmode).
1.	10	17/09-2025	MHE, VKT	<u>Update:</u> Section 2.5.2.2.1.1 updated with information on the geo awareness function in DV Skylink.
1.	11	03/10-2025	VKT	<u>Update:</u> Section 2.8 updated with information on the time accuracy and synchronisation in relation to geo awareness logs and threshold distance.
1.	12	06/01-2026	VKT	<u>Update:</u> Section 2.3.1.2 updated with corrected label: sound power marking now in compliant dimensions.
1.	13	27/01-2026	VKT	<u>Update:</u> Minor correction to altitude statement on p. 11
2.	0	30/01-2026	VKT	<u>Update:</u> Section 2.2 updated with operating conditions, Section 2.11 updated with operating conditions accounting for flight envelope, section 2.9.3 updated to account for latest stable releases. Section 4 updated with updated contact information.

## 0.2 Table of Contents

0.1 Version Table	2
0.2 Table of Contents	3
0.3 Preamble	5
<b>1 TERMS AND CONDITIONS</b>	<b>6</b>
1.1 Guarantee	6
1.2 Request for Warranty Coverage	6
1.3 Warranty Exclusions	7
1.4 Declaration of Conformity	9
1.5 Limitations and Responsibilities	9
1.6 TERMS OF USE	9
<b>2 KOBRA</b>	<b>10</b>
2.1 Description of Use	10
2.2 KOBRA Requirement Specification	11
2.3 KOBRA Mechanical Drawings	13
2.3.1 Mechanical Overview	13
2.3.1.1 LED Positions & Schemes	17
2.3.1.2 Instructions on how to distinguish similar products	22
2.4 Approved Payloads	23
2.5 Equipment to control the UA remotely	26
2.5.1 Herelink	26
2.5.1.1 Radio Specification	26
2.5.1.2 How to use Herelink	27
2.5.1.3 Herelink control buttons	29
2.5.1.4 Radio Sticks	30
2.5.1.5 Android Handling on the Herelink	31
2.5.2 DV Skylink	36
2.5.2.1 Introduction to Application	36
2.5.2.2 Homepage	36
2.5.2.3 Flightview Page	47
2.5.2.4 Failsafes	51
2.5.2.5 Mission Planner	52
2.5.3 Sound Power Level	57
2.6 Operational Instructions	58
2.6.1 Crew Health Precautions	58
2.6.2 Ground Handling	58
2.6.2.1 Preparing the Aircraft	58
2.6.2.2 Equipment to control UA remotely	72

2.6.2.3	Cleaning and Refurbishment	72
2.6.2.4	Pre-flight Calibrations	73
2.6.3	Pre-Flight Operations	73
2.6.3.1	UA Operation Preparation	73
2.6.3.2	Pre-flight Checklist	75
2.6.4	Flight Operations	75
2.6.4.1	Contingency and Emergency Operations	76
2.6.4.2	Recommendations when updating SW	76
2.6.5	Operational Modes	76
2.6.6	Operational Conditions	78
2.6.7	Post-Flight Operations	79
2.7	Direct RemoteID	79
2.8	Geo-Awareness Function	80
2.9	Maintenance Procedures	81
2.9.1	Checklist	82
2.9.1.1	Tools and Instruments to be used	84
2.9.2	Recipient maintenance	84
2.9.3	Software configuration	84
2.9.4	Traceability procedures	85
2.10	Troubleshooting Procedures	86
2.11	Operational Limitations	87
2.12	Risks related to UAS operations	89
<b>3</b>	<b>Appendix</b>	<b>92</b>
3.1	IP Rating	92
3.2	C3 Certification	92
3.2.1	MTOM Specification	92
3.2.2	Direct Remote ID	93
3.2.3	List of Approved Equipment, including Qualified Accessories	93
3.2.4	Approved Spare Parts	95
3.2.5	C2 Link Warnings - Remote Controller Warnings	96
3.2.6	Geo Awareness	96
3.2.7	EASA Notice	97
3.3	DRONE VOLT KOBRA Smart Battery	98
3.4	EV-PEAK UD-1 Charger	110
<b>4</b>	<b>CONTACT</b>	<b>118</b>

## 0.3 Preamble

The purpose of this manual is to:

- Provide technical information.
- Provide clear operational procedures.
- Provide maintenance procedures.
- Provide troubleshooting procedures.

All in accordance with EU 2019/945 and ASD-STAN 4709 family.

**Please read the entire user manual for safety reasons.**

# 1 TERMS AND CONDITIONS

---

## 1.1 Guarantee

By using DRONE VOLT's products, software, and systems, you fully and unreservedly agree to the warranty and liability conditions stated below and to all other general conditions agreed upon between you and DRONE VOLT.

The manufacturer guarantees that this product is free from any manufacturing and material defects under normal conditions of use for a period of two (2) year from the date of the initial invoice. Shipping and handling costs are the responsibility of the customer. The manufacturer undertakes, at its discretion during the warranty period, to repair any material or manufacturing defects or to provide, in exchange, a repaired or refurbished product of equal value at no cost (excluding shipping, handling, packaging, return postage, and insurance costs, which will be borne by the customer). This repair or replacement is subject to verification of the defect or malfunction and proof of purchase, confirmed by the presentation of the serial number on the dated original invoice.

Any attempt to partially or completely modify your device, whether through hardware or by modifying the software or firmware, will result in immediate termination of the warranty.

The manufacturer guarantees the drone chassis (main body) against manufacturing and material defects for one year. The manufacturer guarantees defective firmware for one year.

## 1.2 Request for Warranty Coverage

All warranty claims must be filed by the consumer with the retailer of this product regarding any returns or warranty replacements. Please keep the invoices for at least 1 year.

### Claim Procedure:

Warranty claims for malfunctions must be made within TWO YEAR from the date of invoicing and must be authorised for return with an 'RMA' by simply calling the Dealer or the Sales Representative in charge of the customer or by directly emailing [aftersales@dronevolt.com](mailto:aftersales@dronevolt.com).

Claims for missing parts must be made within 60 calendar days of receiving the goods. In the case of on-site equipment withdrawal, a technical receipt and a detailed list of delivered items are prepared and signed by the customer and the representative or dealer on behalf of DRONE VOLT.

Any defective or malfunctioning merchandise must be returned in its original packaging. We reserve the right to specify that items must be returned to the original warehouse for inspection or be inspected by our representative in the field.

Photos are necessary to claim defective merchandise, along with a copy of the original invoice. If the claim is justified, the item(s) or parts will be repaired or replaced, or a credit note will be issued. Our policy is to replace parts whenever possible.

This warranty gives you specific legal rights.

## 1.3 Warranty Exclusions

**This warranty does not cover:**

1. Damages incurred when the user is intoxicated, under the influence of drugs, under the effect of medical anaesthesia, experiencing dizziness, fatigue, nausea, or any other condition, whether physical or mental, that may affect their ability to operate the drone safely.
2. Damages caused by misuse.
3. Damages caused by not following the manual instructions for assembling or operating the device.
4. Damages caused by retrofitting or replacement with accessories and parts not belonging to Drone Volt.
5. Damages caused by use without a functional data connection.
6. Damages caused by knowingly piloting a damaged or otherwise malfunctioning device.
7. Damages caused by the improper use of the battery and battery chargers provided by Drone Volt.
8. Damages when the device is in the following situations: collision, fire, explosion, floods, tsunamis, subsidence, trapped ice, avalanche, debris flow, landslide, earthquake, etc.

9. Damage caused by using the device in weather conditions outside the flight envelope, such as rain or excessive winds, snow, fog, hail, lightning, tornadoes, hurricanes, etc.
  - a. Water damages are likewise not covered in the warranty, and
  - b. Water damages in, or not in, relation to severe salty conditions are likewise not covered in the warranty, and
  - c. Operation, transport, or storage in high humid areas with or without fungi conditions are also not covered in the warranty.
10. Damages caused by flying in situations such as:
  - Flying in a magnetic interference zone.
  - Flying in a radio interference zone
  - Flying without authorization when required
  - Prohibited government-regulated flight zones (without agreement protocol).
11. Not having a clear line of sight to the device due to low visibility, obstructed view, or limited or poor visibility, unsuitable for operation, and other conditions that would prevent the safe operation of the device.
12. Damages caused by flying the device in abnormal conditions, such as:
  - Allowing the entry of water, oil, dirt, sand, and other unknown materials into the device.
  - Incomplete assembly.
  - Main components exhibit obvious defects, faults, or missing accessories.
13. Damages caused by mechanical failures due to neglecting to maintain the aircraft in an airworthy condition.
14. Damages caused by continuing the flight after the low voltage protection alert is triggered.
15. Any damages resulting from an attempt at partial or total modification of your device, whether in hardware, software, or firmware.
16. Any hardware or software updates not performed and/or validated by Drone Volt.
17. If the user has deliberately deleted flight logs stored internally on the complete Uncrewed Aerial System, UAS (Uncrewed Aircraft, UA & Ground Control Station, GCS).

## 1.4 Declaration of Conformity



Drone Volt Group declares that Kobra and Kobra Smart Battery are in conformity with the CE regulations.

Drone Volt Contact information can be seen in section [4 CONTACT](#).

## 1.5 Limitations and Responsibilities

Please carefully read this disclaimer before using the KOBRA drone. By using this drone, you acknowledge and agree to this disclaimer, and must have read it in its entirety.

Please read this user manual carefully and in full before using your KOBRA drone. If you have any questions, please contact DRONE VOLT's support service before the first flight - contact details are provided at the end of this document. By using this drone, you certify that you have read, understood, and accepted this disclaimer. You agree that from now on, you are solely responsible for your actions with this machine and for any direct or indirect consequences that may arise. You agree to use this machine only for appropriate purposes, in accordance with the rules of use described in this user manual, local regulations and airspace, as well as laws related to Privacy and Data Protection. It is recommended that any user pilot of the KOBRA should have undergone training by DRONE VOLT trainers.

**KOBRA brand devices are not recreational drones and must be used with great caution. Inappropriate use can result in damage to the drone or serious injuries to you or others, even leading to fatality. These devices should only be used by professional pilots who have undergone specific training in the use of this drone during practical training provided by DRONE VOLT.**

## 1.6 TERMS OF USE

Placeholder if needed.

## 2 KOBRA

---

### 2.1 Description of Use

The Drone Volt KOBRA drone is intended for mission critical tasks whether it be the optimal tool for first responders or the efficient tool for the service company inspecting critical infrastructure. The KOBRA is a multipurpose drone system meant to carry multiple payloads for a wide range of missions. The drone is manufactured in Europe and C3 certified, enabling the user to use this system for every possible operational scenario.

The intended operations includes, but are not limited to;

- Inspection Operations
- Mapping/Surveying
- Remote Sensing
- Intelligence, Surveillance, Target Acquisition, and Reconnaissance (ISR/ISTAR)
- Agricultural Operations
- Logistics Operations
- LTE Enabled BVLOS Operations
- Search And Rescue (SAR) Operations



Developed and produced by DRONE VOLT Group.

## 2.2 KOBRA Requirement Specification

UAS Class Label	<b>C3</b>
UAS Configuration	<b>Multicopter, Quadcopter</b>
Weight Capacity	<b>Empty Weight (excl. battery): 6.2kg</b> <b>Empty Weight (incl. battery): 10.7kg</b> <b>Payload Capacity: 5kg</b> <b>MTOM (Maximum Takeoff Mass): 15.7kg</b>
Dimensions	<b>Folded: 520x406x233mm (LxWxH)</b> <b>Unfolded: 825x815x460mm (LxWxH)</b> <b>Diagonal (excl. props): 1025mm</b> <b>Diagonal (incl. props): 1646mm</b>
Operating Temperature Range	<b>-15 °C to 40 °C (-5 °F to 104 °F)</b>
Temperature Range during Transport and storage	<b>-15 °C to 40 °C (-5 °F to 104 °F)</b>
Humidity and Icing Conditions	See section <a href="#">2.11 Operational Limitations</a> .
Battery System	<b>Semi Solid State Li-ion</b> <b>12S 22.000mAh</b> <b>Weight: 4.5kg</b>
FMU, Flight Management Unit	<b>Pixhawk based</b>
GNSS	<b>Ublox F9P</b> <b>Dual Antenna, Moving baseline</b> <b>GPS, GLONASS BeiDou, Galileo</b>
Hovering flight precision	<b>Vertical: ± 0.5 m (±1.6 ft)</b> <b>Horizontal: ±1.0 m (±3.3 ft)</b>
Maximum Attainable Height relative to takeoff position	<b>Default: 120m (AGL)</b>
Maximum Operating Altitude	<b>4km (ASL), MTOM 10.7kg</b> <b>3km (ASL), MTOM 13.2kg</b> <b>2.5km (ASL), MTOM 15.7kg</b>
Maximum Altitude during Transport	<b>Based on Commercial Manned Aviation, i.e.</b>

and Storage	<b>40.000 Feet</b>
Maximum Speed & Low Speed Mode	<b>Atti:</b> Up to 24 m/s (benign conditions) <b>Slow:</b> Up to 5 m/s, mild tuning. <b>Normal:</b> Up to 12 m/s, normal tuning. <b>Sport:</b> Up to 12 m/s, sporty tuning
Wind Resistance	<b>15m/s (wind gusts)</b>
Endurance	<b>Payload Endurance</b> <i>0kg Up to 55 min</i> <i>2.7kg Up to 40 min</i> <i>4kg Up to 33 min</i> <i>5kg Up to 30 min</i>
Propellers	Foldable 24.2 x 7.9L and 24.2 x 7.9R
Motor System	BLDC KV150
RC / C2 Link	<b>Herelink:</b> FCC: 3.5 km (2.17 miles) CE: 2 km (1.3 miles) AES-128 Encryption
Maximum Transmission Distances Radio Line of Sight (LOS)	<b>Herelink:</b> Up to 12 km
Ascend Speed	<b>5m/s</b>
Descend Speed	<b>3m/s</b>
Minimum Turn Radius	<b>N/A</b>
Maximum Bank Angle	<b>25°</b>
Descent speed in LAND/RTH (Return To Home) mode	<b>3.0 m/s above 5 m altitude</b> <b>0.4 m/s in LAND mode below 5 m altitude</b>
RTH Parameters	<b>Default 25 m altitude</b> <i>Can be changed depending on operational scenario</i>
C2 Link Loss	Default: <b>After max. 1.5 seconds, RTH</b>

Production Material	Carbon fiber Machined Aluminium Plastics
IP Rating	IP2X ( <a href="#">3.1 IP Rating</a> )

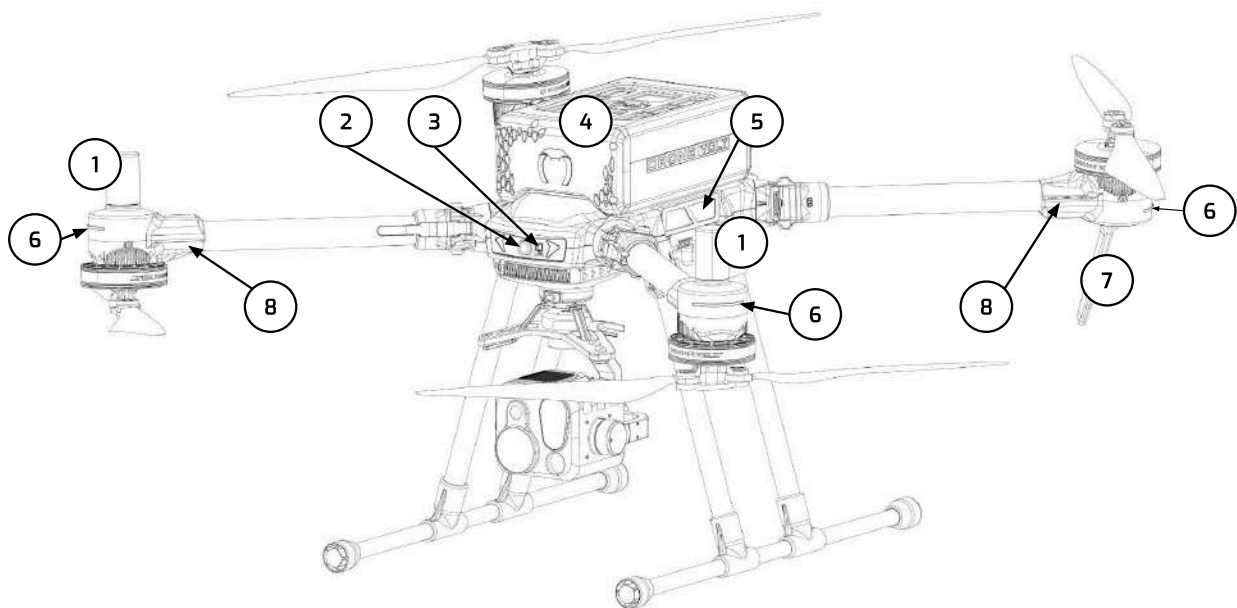
## 2.3 KOBRA Mechanical Drawings

### 2.3.1 Mechanical Overview

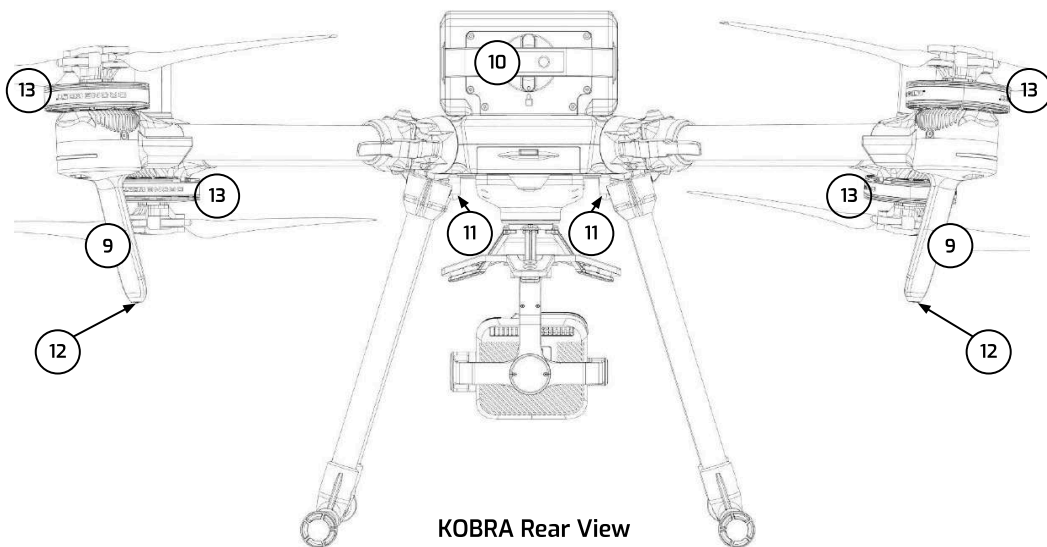
The following mechanical illustrations illustrate the exterior of the KOBRA including placement(s) of;

- Sensors
- LEDs
- Antenna(s)
- Equipment
- I/O Connector(s)

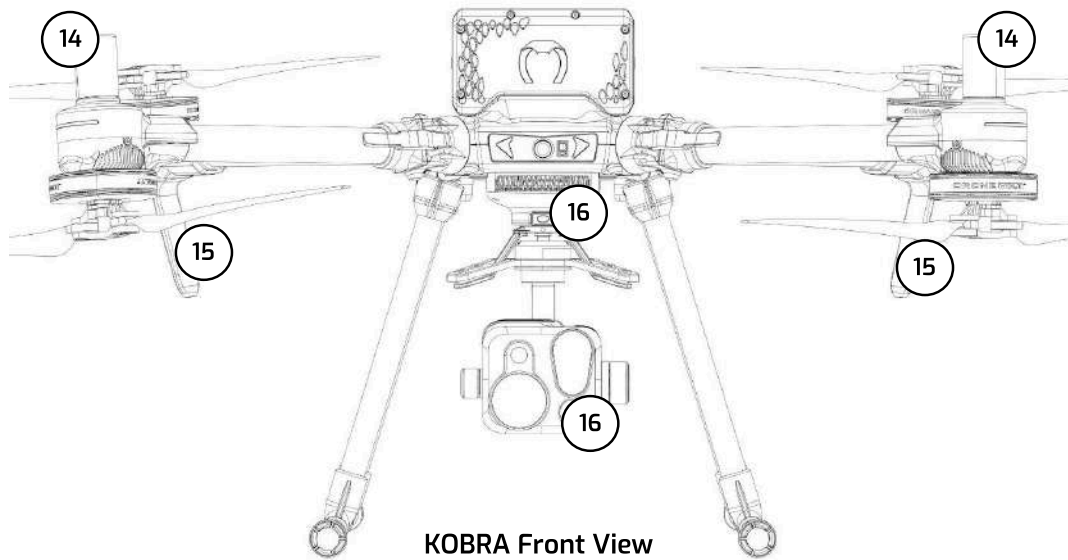
The illustrations include an overall illustration followed by rear, front, and a zoomed in view of the connector(s) behind the service hatch. Then the LEDs are described in detail, including the explanation of the LED modes. Lastly, the dimensions of the KOBRA are illustrated.



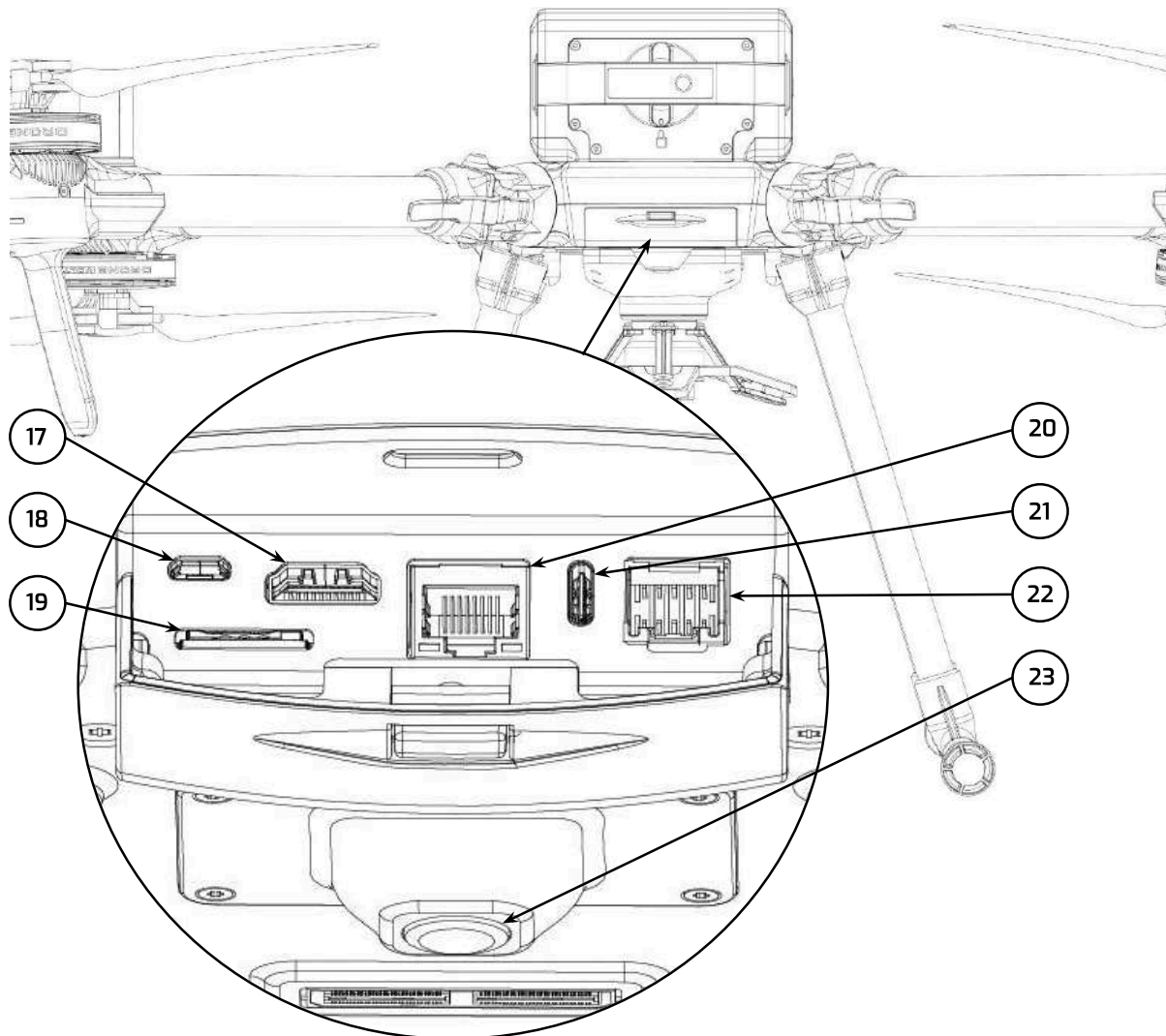
- |   |                         |   |                                       |
|---|-------------------------|---|---------------------------------------|
| 1 | GNSS Antenna(s)         | 5 | LTE Antenna (1 out of 2)              |
| 2 | FPV Camera              | 6 | LEDs for Controllability (3 out of 4) |
| 3 | Front laser rangefinder | 7 | C2 Link Antenna (1 out of 2)          |
| 4 | KOBRA main battery      | 8 | Motor Mounts (2 out of 4)             |



- |    |                                     |    |                      |
|----|-------------------------------------|----|----------------------|
| 9  | C2 Link Antennas (2 out of 2)       | 12 | LEDs for Conspicuity |
| 10 | KOBRA main battery handle           | 13 | Motors (4 out of 4)  |
| 11 | Wifi+Bluetooth Antenna (2 out of 2) |    |                      |



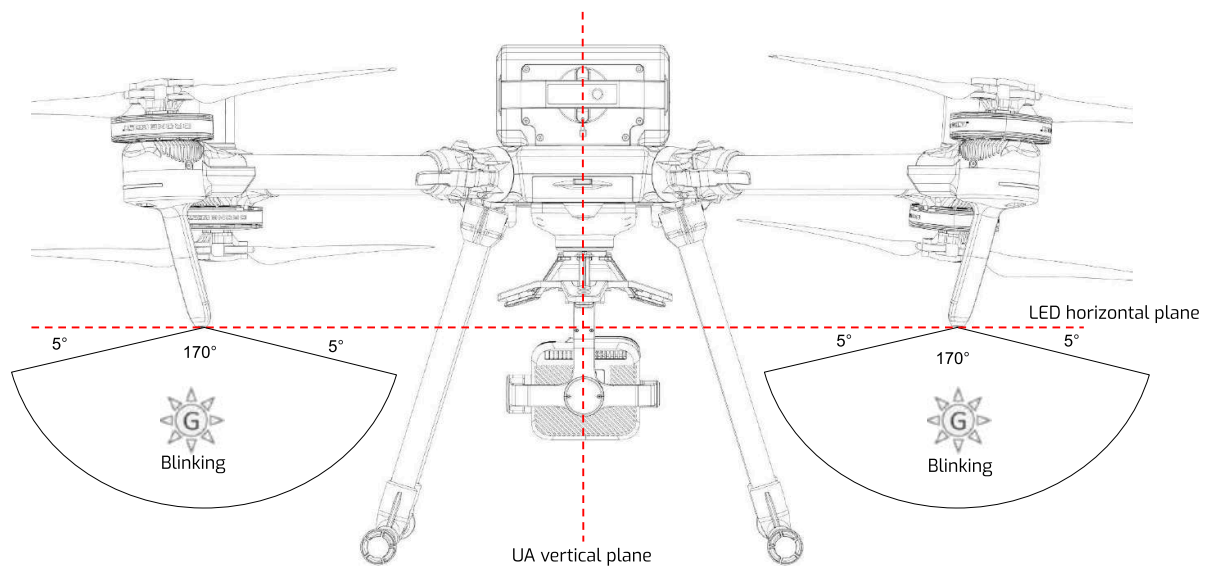
- 14 GNSS Antennas (2 out of 2)
- 15 C2 Link Antennas (2 out of 2)
- 16 Generic payload connector & payload



- |    |                          |    |                            |
|----|--------------------------|----|----------------------------|
| 17 | Onboard Computer<br>HDMI | 20 | Ethernet                   |
| 18 | Micro USB                | 21 | USB-C                      |
| 19 | SIM Card Slot            | 22 | Integration Port           |
|    |                          | 23 | Downwards<br>facing Camera |

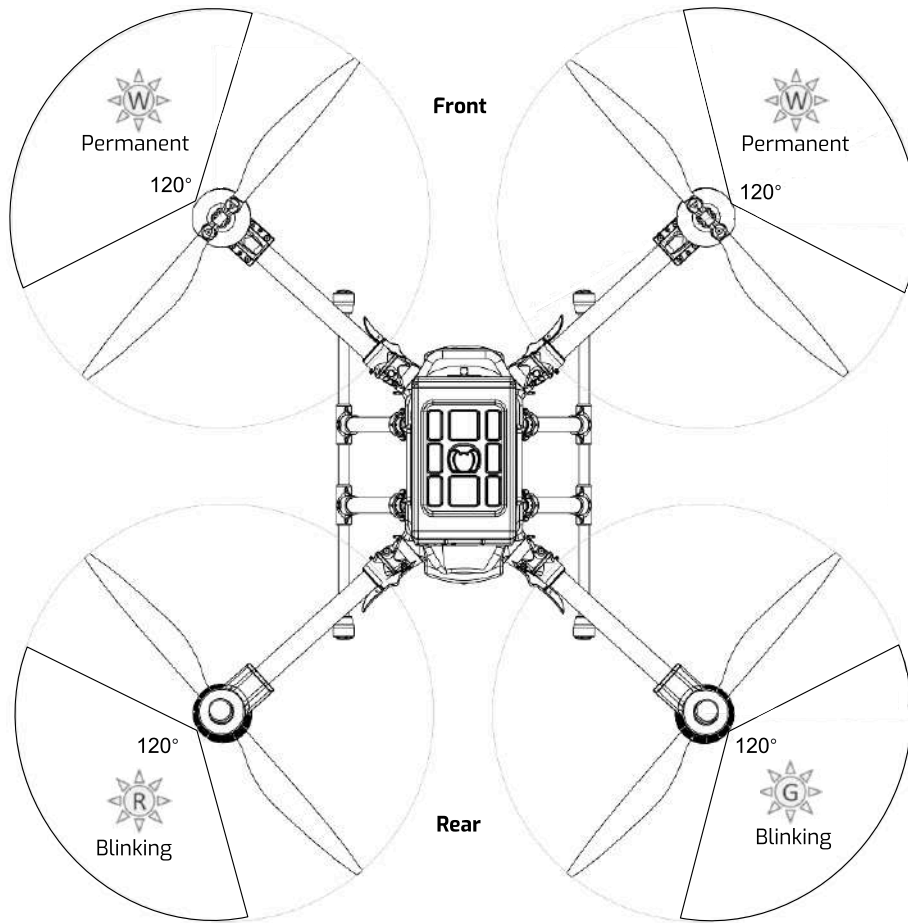
I/O	Description
Onboard Computer HDMI	HDMI connecting directly to the graphical user interface running on the onboard computer.
SIM Card Slot	Physical slot for push-push MicroSIM card. Used for LTE connection.
Ethernet	Ethernet connection to internal Ethernet switch onboard the drone.
Integration Port	Integration port intended for system integrators, UART and flight termination capabilities. <u>Reserved for future use.</u>
Micro USB	Debug USB, <u>should not be used unless instructed so by DV Group.</u> This interface is reserved as a service port for instructed personnel.
USB-C	This USB port connects to an internal USB hub, where the onboard computer acts as a host. <u>Reserved for future use.</u>

### 2.3.1.1 LED Positions & Schemes



**LEDs for Conspicuity positions**

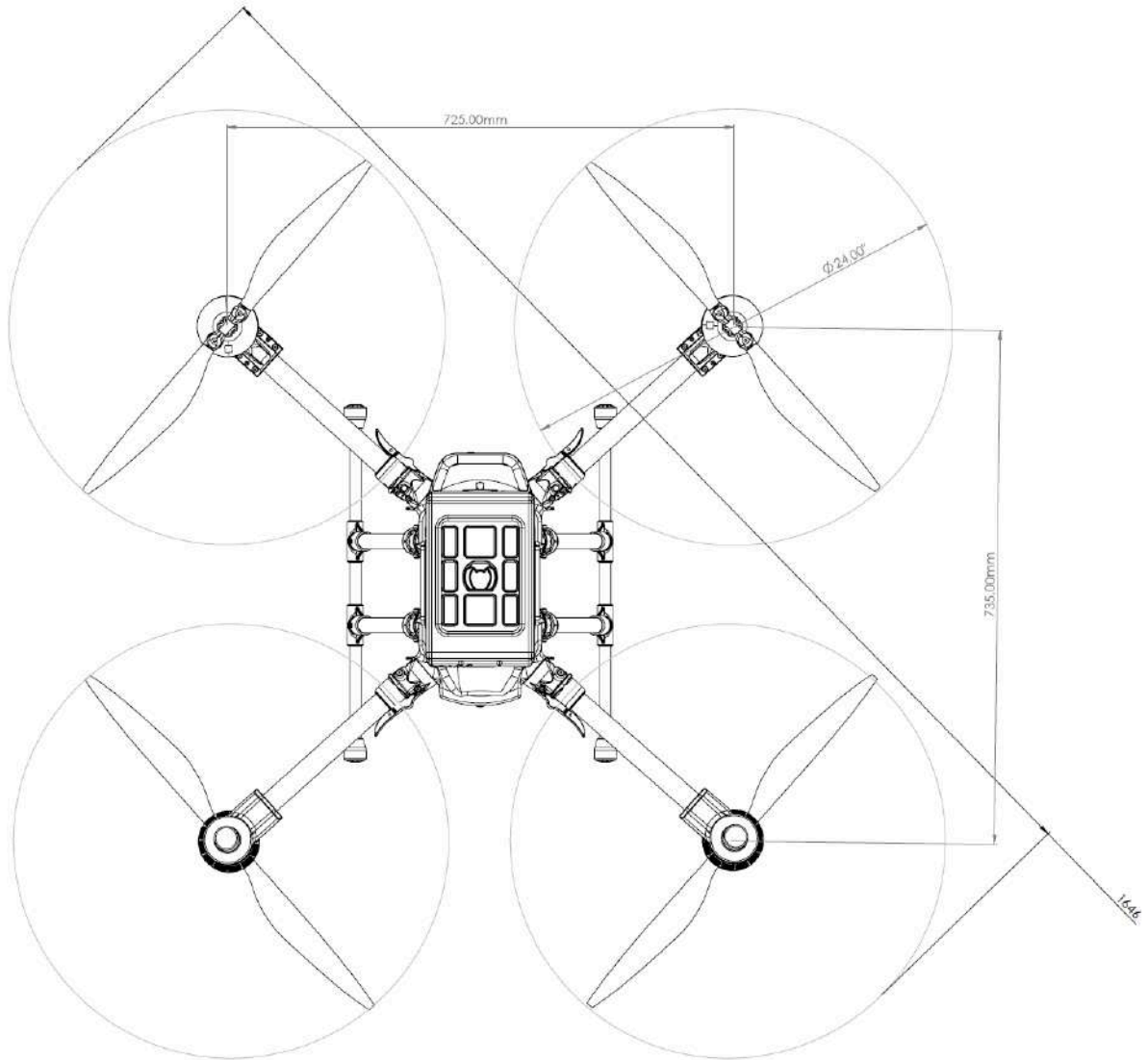
The LEDs for Conspicuity are automatically turned on once the drone is armed and in one of the selectable flight modes.

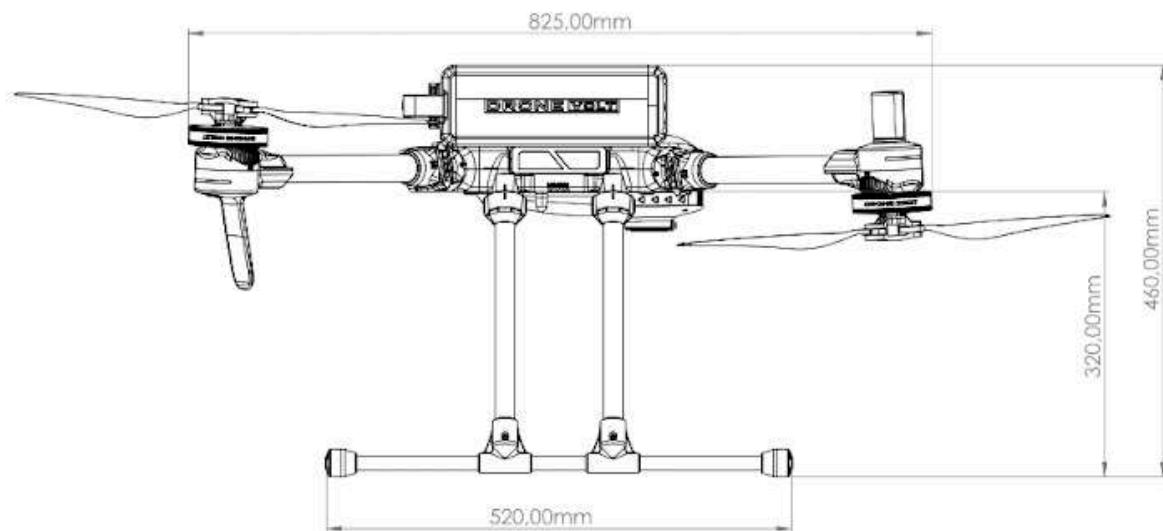
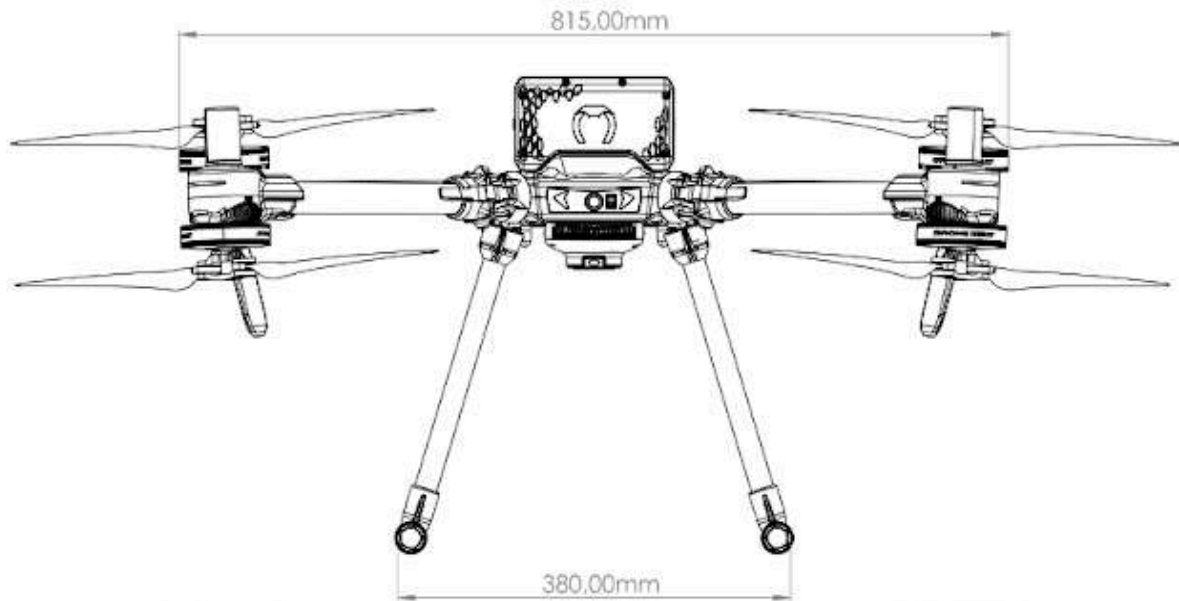


LEDs for Control positions

Drone State	Front LEDs (R & L)	Rear LEDs (R & L)
<b>Battery Handling, refer to <a href="#">2.6.2.1.5 Installing Battery</a></b>		
<i>Battery Hot Swap engaged</i>	R: Permanent Blue L: Permanent Blue	R: Permanent Blue L: Permanent Blue
<i>Turning drone on &amp; off</i>	R: Pulsating Yellow L: Pulsating Yellow	R: Pulsating Yellow L: Pulsating Yellow
<b>Drone Not Armed / motors turned off</b>		
<i>Waiting for Connection to FMU</i>	R: Blinking Yellow L: Blinking Yellow	R: Fast Blinking Yellow L: Fast Blinking Yellow
<i>State Error, reboot System if state persists, contact DV support</i>	R: Pulsating Red L: Pulsating Red	R: Pulsating Red L: Pulsating Red
<b>Prearm Failed / Not able to arm drone</b>	R: Fast Blinking Red	R: Pulsating Yellow


	L: Fast Blinking Red	L: Pulsating Yellow
<b>No C2 Link Connection / Transmitter not connected to drone</b>	R: Fast Blinking Red L: Fast Blinking Red	R: Fast Blinking Red L: Fast Blinking Red
<b>System Ready</b>	R: Pulsating Green L: Pulsating Green	R: Permanent Green L: Permanent Green
<b>Drone Armed / motors turned on</b>		
<b>Atti Mode</b>	R: Permanent White L: Permanent White	R: Blinking Green L: Blinking Red
<b>Slow, Normal, and Sport Mode</b>	R: Permanent White L: Permanent White	R: Blinking Green L: Blinking Red
<b>Auto Mode</b>	R: Permanent White L: Permanent White	R: Blinking Green L: Blinking Red
<b>LAND flight mode</b>	R: Permanent White L: Permanent White	R: Fast Blinking Red L: Fast Blinking Red
<b>RTH flight mode</b>	R: Permanent White L: Permanent White	R: Fast Blinking Red L: Fast Blinking Red
<b>Emergency while Drone Armed/Flying</b>		
<b>Failsafe -&gt; LAND</b>	R: Permanent White L: Permanent White	R: Fast Blinking Red* L: Fast Blinking Red*  *Out of phase with each other
<b>Failsafe -&gt; RTH</b>	R: Permanent White L: Permanent White	R: Fast Blinking Red* L: Fast Blinking Red*  *Out of phase with each other
<b>Additional Modes (Reserved)</b>		
<b>Service Mode</b>	R: Pulsating Yellow L: Pulsating Yellow	R: Permanent Yellow L: Permanent Yellow
<b>System Integrator Mode</b>	R: Pulsating Yellow L: Pulsating Yellow	R: Permanent Blue L: Permanent Blue





### 2.3.1.2 Instructions on how to distinguish similar products

To distinguish the DRONE VOLT Kobra from similar products the following unique label is placed inside the hatch on the backside of the drone (the hatch that protects the primary I/O). The label is illustrated below. The unique serial number is hence linked to the Remote ID serial number.





Read USER MANUAL  
before operating aircraft!


Serial Number (PSN)  
*Unique Serial Number*


Owner / Registration No.  
*Reserved space for customer*

Model DroneVolt Kobra V01


 LWA  
**105dB**







MTOW 15,7KG



**RoHS**  
COMPLIANT

**Internal Battery**  
2S Li-on battery,  
2800mAh  
Nominal Voltage 7.4V

**Main Battery**  
12S Solid state Li-on battery,  
22.000 mAh  
Nominal Voltage 44.4V

www.dronevolt.com

**DRONE VOLT**<sup>®</sup>

Made in EU

## 2.4 Approved Payloads

Manufacturer	Model	Dimensions (mm)	Weight (g)	MTOM (kg)
ViewPro	Winch	197x130x102mm	1295g + 3705g (Max. Load)	15.7kg
ViewPro	H30T	173.5x128.7x198.9mm	1084g	11.784kg
ViewPro	Q30T	121.5x166.5x130mm	876g	11.576kg
ViewPro	Q10F	86.2x108x140.6mm	431g	11,131kg
BRAVESTAR	SCORPIO	164x80x99mm	860g +/-10g	11.56kg ±0.01kg
NEXTVISION	Raptor	H: 128mm D: 100mm	640g	11.34kg
NEXTVISION	NightHawk2-UZ	H: 94mm D: 64mm	350g	11.05kg
NEXTVISION	NightHawk2-V	H: 94mm D: 64mm	320g	11.02kg
NEXTVISION	Night-Hawk 2	H: 94mm D: 64mm	250g	10.95kg
NEXTVISION	Colibri2	H: 53mm D: 81mm	180g	10.88kg
NEXTVISION	X80	L: 40mm W: 40mm H: 75mm	145g	10.845kg
NEXTVISION	DragonEye2	H: 65mm W: 40mm D: 40mm	125g	10.825kg
Gremsy	VIO-G1	173x148x159mm	854g	11.554kg
InairTech	LiAir X3-H	136x106x129mm	1250g	11.95kg
MÉRIO	Témis XL 3 axes	H: 195mm Diameter : 85mm	1150g	11.85kg

MÉRIO	Temis XL 16	H: 356.3mm Diameter : 250mm	XL16: 1700 g ±100g XL16 Z: 1800 g ±100g XL16 GS: 1800 g ±100g	XL16: 12.4kg ±0.1kg XL16 Z: 12.5kg ±0.1kg XL16 GS: 12.5kg ±0.1kg
MÉRIO	Temis Compact	H: 144mm Diameter : 85mm (min) 100 mm (max)	550g	11.25kg
MÉRIO	Temis L20	H: 309mm Diameter : 140mm (main body) 200 mm (max)	4200g	14.9kg
AVANTIX	MC41_V1	150 x 210 x 50 mm	2100g	12.8kg
CZI	TH4V2	N/A	320g + 4680g (Max. Load)	15.7kg
CZI	MP130 V2	140x140x125mm	570g	11.27kg
CZI	GL60 Plus	126x131x167mm	700g	11.4kg
Yellow Scan	Mapper	H: 149mm W: 87mm L: 143mm	1300g	12kg
Yellow Scan	Vx15 Series	H: 149mm W: 106mm L: 353mm	2400g	13.1kg
Yellow Scan	Explorer	H: 135mm W: 118mm L: 270mm	1800g	12.5kg
Yellow Scan	Navigator	H: 190mm W: 160mm L: 350mm	3700g	14.4kg
Yellow Scan	Mapper+	H: 132mm W: 104mm L: 150mm	1100g	11.8kg
Yellow Scan	Vx20 Series	H: 149mm W: 106mm L: 432mm	2850g	13.55kg

Yellow Scan	Surveyor Ultra	H: 117mm W: 113mm L: 153mm	980g	11.68kg
Yellow Scan	Voyager	H: 183mm W: 117mm L: 369mm	3500g	14.2kg
GDU	PQL-01 Quad	153.5x163x179.5mm	930g	11.63kg

## 2.5 Equipment to control the UA remotely

The KOBRA comes with the standard Cubepilot HereLink as the main C2 Link option. DV Skylink is the main C2 Link software. DV Skylink will be described in depth after introduction of the C2 Link hardware.

### 2.5.1 HereLink



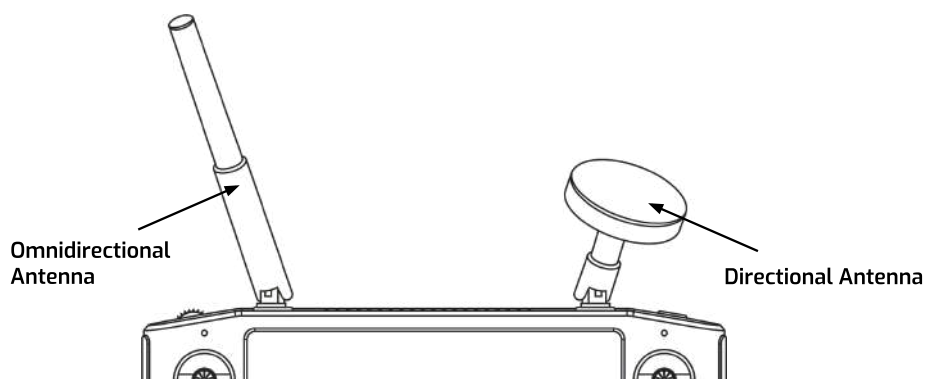
#### 2.5.1.1 Radio Specification

Maximum Transmission Distances Line of Sight (LOS)	<b>FCC: 20 km (12.4 miles) USA</b> <b>CE: 12 km (7.5 miles) EU</b>
Transmission Frequency	<b>2.4 GHz ISM</b>
Wireless Communication	<b>Bluetooth</b>

	<b>WiFi, 5.8GHz</b>
Screen Resolution & Brightness	<b>16x9 Aspect Ratio, 1080p 1000 nit</b>
Interface	<b>Micro USB Micro SD (up to 64Gb)</b>
Dimensions	<b>217x106.5x31 (LxWxH) excluding antennas and joysticks</b>
Weight	<b>536g</b>
Battery	<b>4950 mAh</b> <i>Charging through micro USB, 5V 2A</i>
Batterylife	<b>Up to 3 hours</b>
Video sharing locally	<b>RTSP Stream over WiFi hotspot</b>
Indicator Light (for feedback)	<b>Tricolour LEDs Upper right and left corner</b>
Encryption	<b>128-bit AES</b>

### 2.5.1.2 How to use Herelink

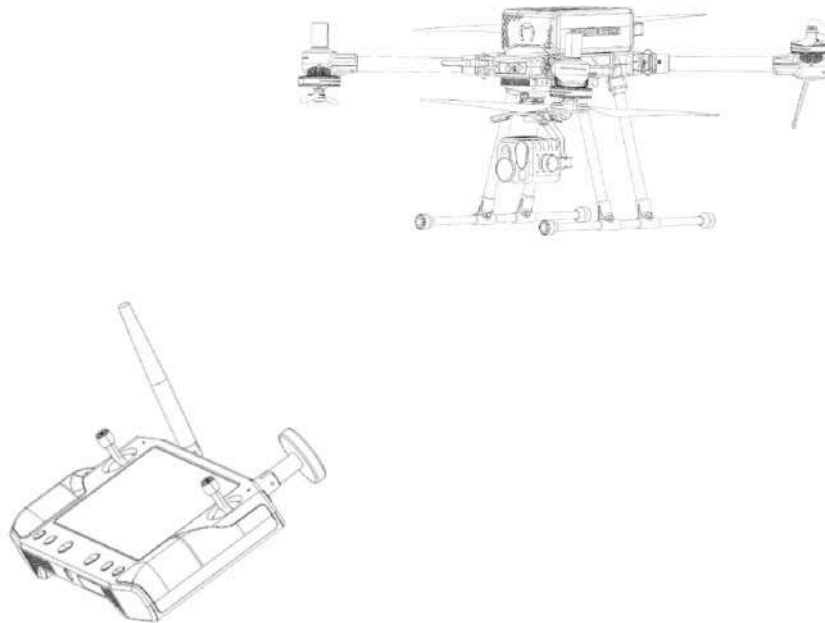
Installation of antennas on the Herelink.



**IMPORTANT! Make sure to place the antennas on the remote control before turning on the Herelink transmitter AND do only use the antennas that come with the equipment issued by DV Group.**

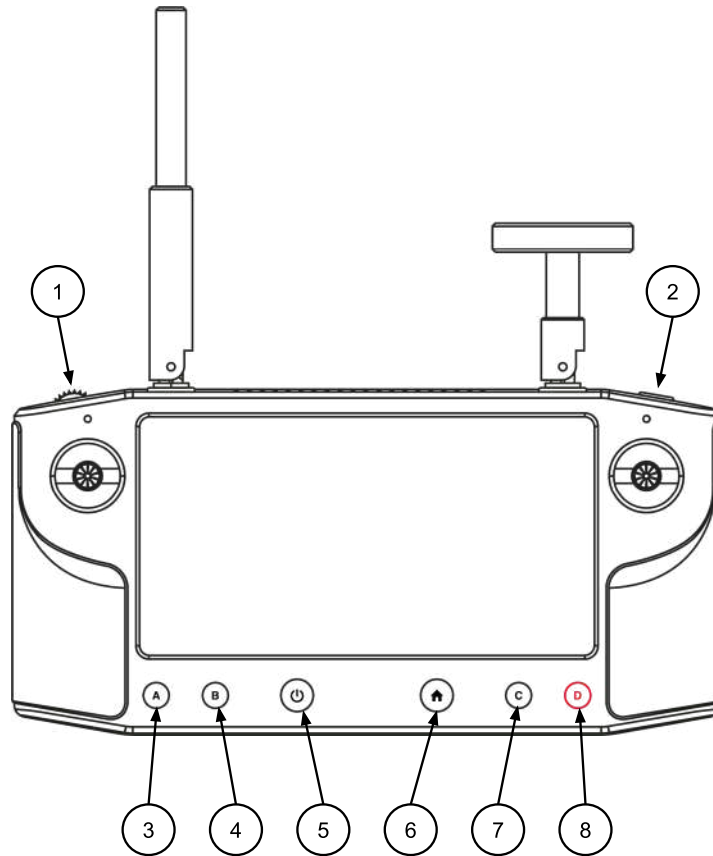
To attach the antennas, insert the antenna into the RC case receptacle, and then turn it a quarter turn clockwise. Once attached, they should bend towards you when you look at the controller screen.

The long omnidirectional antenna should be generally perpendicular to the drone (it should not point towards the drone). The Patch antenna should have its flat part as much as possible directed towards the drone.



Herelink antenna orientation relative to the drone.

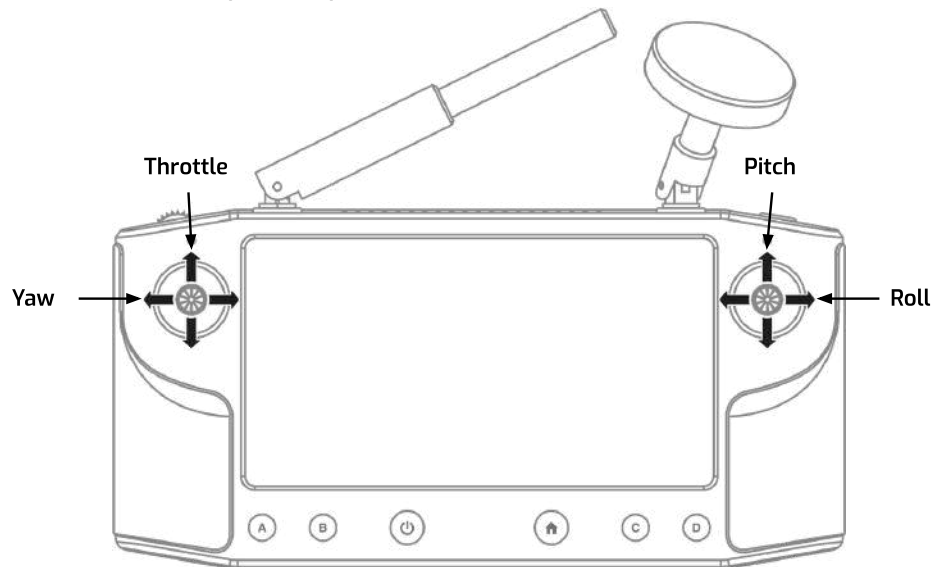
### 2.5.1.3 HereLink control buttons



- |                         |  |
|-------------------------|--|
| 1 Payload Pitch Control | 5 ON / OFF (Long Press)                            |
| 2 Payload Trigger       | 6 Return to Launch (RTL)                           |
| 3 Atti Mode             | 7 Short Press: Slow Mode<br>Long Press: Sport Mode |
| 4 Normal Mode           | 8 Long Press: Kill Switch                          |

### 2.5.1.4 Radio Sticks

Flight controls in Mode 2 (default).

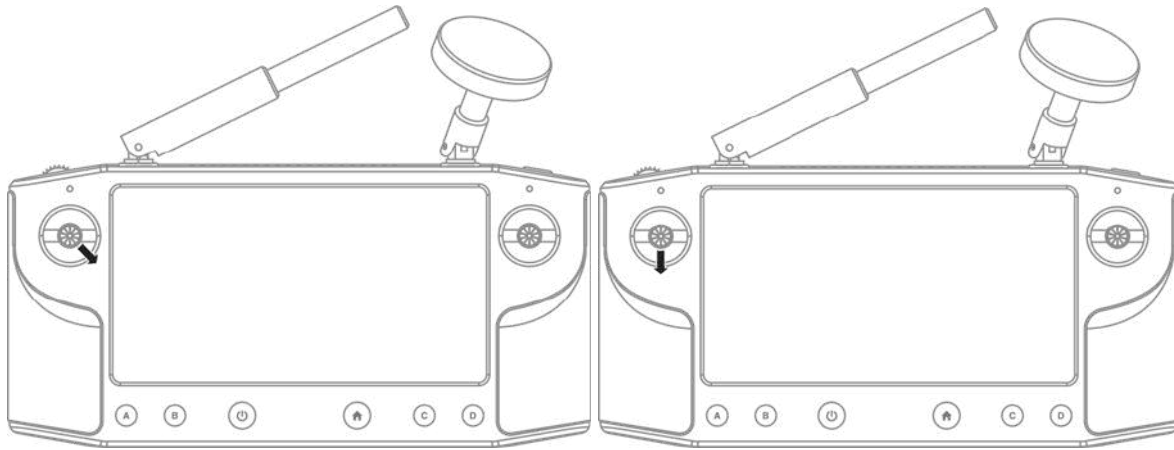


How to arm and disarm the KOBRA in Mode 2:

Arming: with the Pitch/Roll stick centered, pull the throttle stick to the bottom right corner and hold it until you hear "Armed". Then gently re-center the stick. See illustration below.

**IMPORTANT! Do not re-center the throttle stick too slowly or it will disarm!**

Disarming: after landing and with the Pitch/Roll stick centered, pull the throttle stick to the bottom and hold it until you hear "Disarmed". Then gently center the stick. See illustration below.



Arming

Disarming

**IMPORTANT! Never use any other application to control the drone or otherwise utilise the Herelink Transmitter. This includes interfering with the underlying Herelink radio settings application. The user should at all times use the DV Skylink application.**

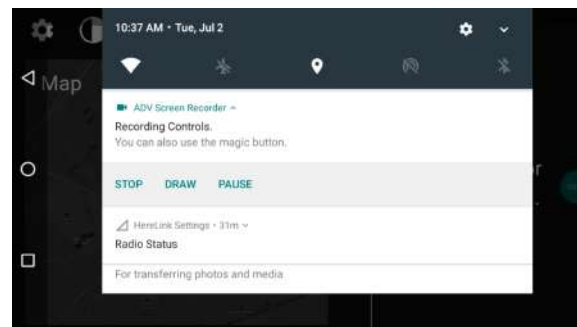
### 2.5.1.5 Android Handling on the Herelink

The DV Skylink application runs on the Android embedded in the Herelink transmitter. The following illustrations highlight the *normal* Android actions that the user can perform.

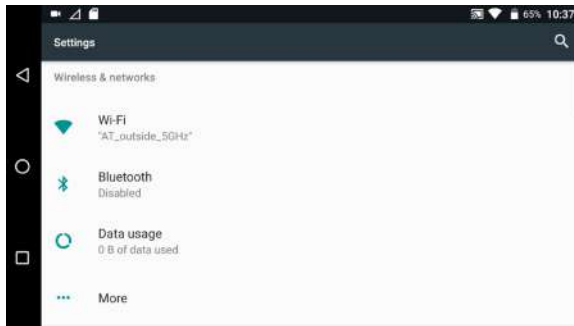
**IMPORTANT! Never perform these actions when the drone is armed or in air!**



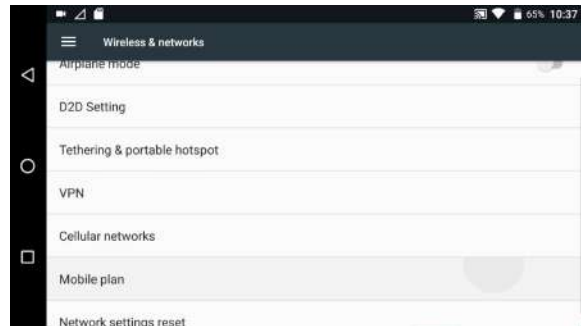
When you swipe from top to bottom or left to right, these symbols appear.



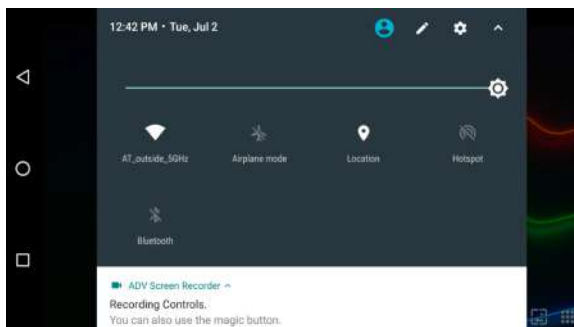
Swipe from top to bottom again and for this pull-down menu.



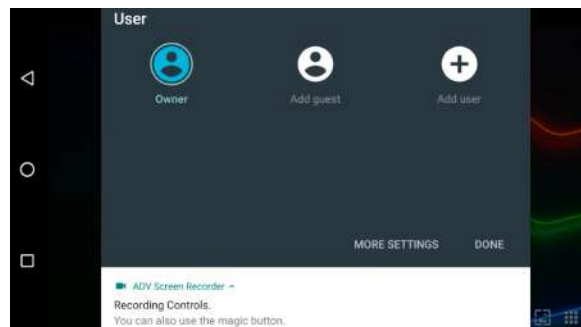
Pulldown menu settings.



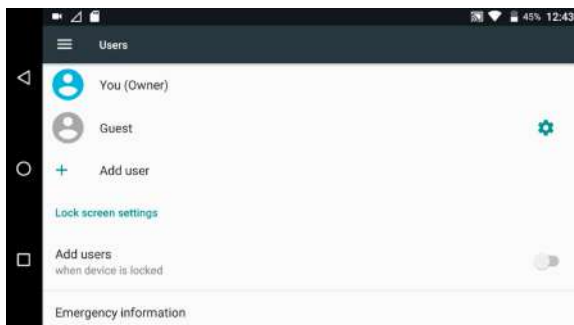
Pulldown menu settings three dots.



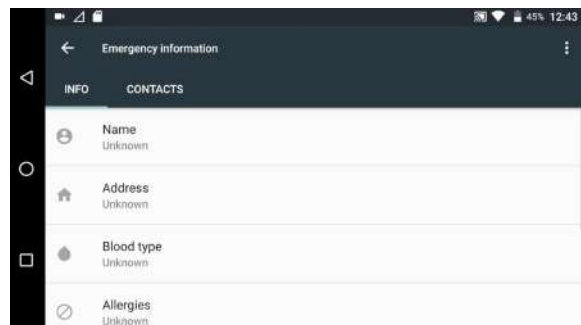
Arrow down from pulldown menu.



User accounts.



User accounts continued.

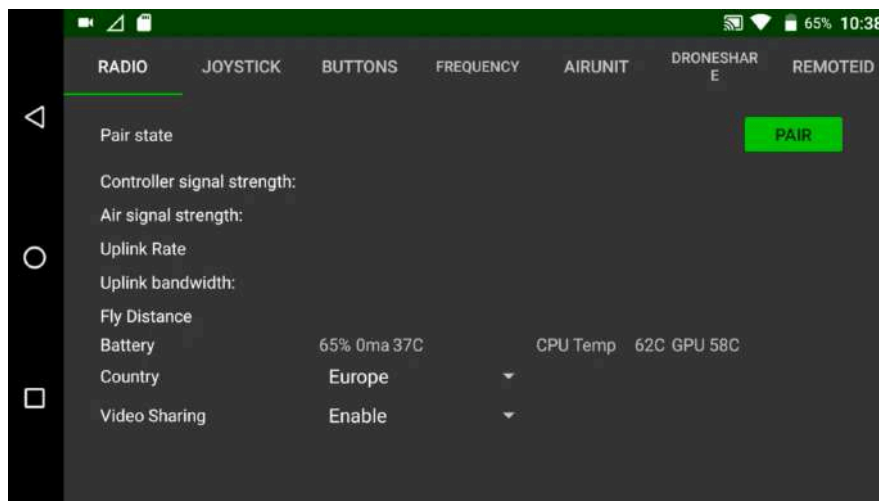


UAS operator information and emergency contacts accessible to all.

### 2.5.1.5.1 Herelink Radio Settings

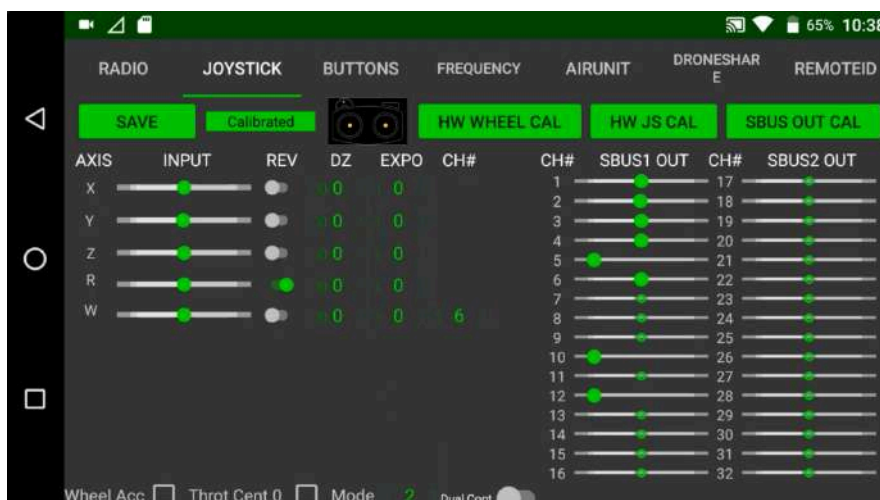
Beside the regular Android settings the other application running in the background is the Radio Settings application. **The user should never change any of these settings.** They are introduced here for reference only and if the user is directly instructed so by DV support.

The Radio Settings application handles the hardware interface, both the radio itself and the joysticks, wheels, and buttons.



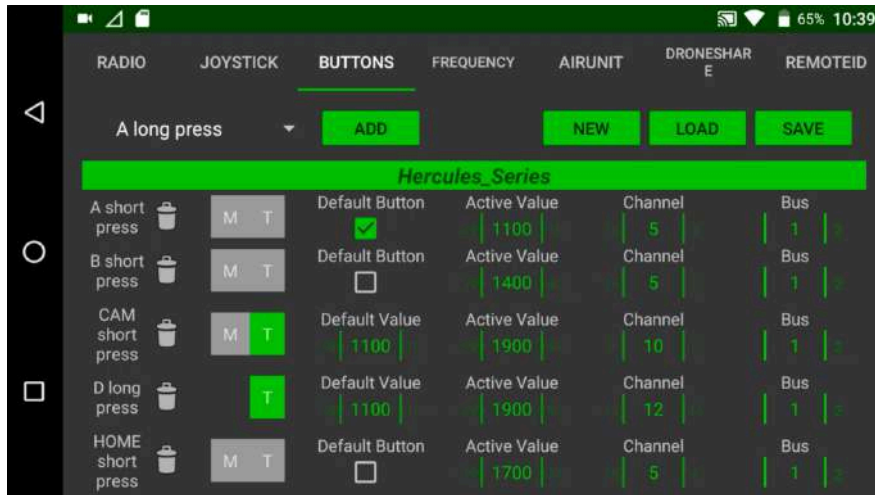
Radio status menu.

**IMPORTANT! DO NOT CHANGE ANY OF THE SETTINGS !**



Radio status joystick menu.

**IMPORTANT! DO NOT CHANGE ANY OF THE SETTINGS !**



Radio status buttons menu.

**IMPORTANT! DO NOT CHANGE ANY OF THE SETTINGS !**

2.5.1.5.2 Battery Low Level on Herelink Transmitter

The transmitter itself does not feature a battery low level function, however, DV Skylink features the appropriate user feedback in three stages; Caution: below 50%, Warning: below 30%, and Critical: below 15%.

DV Skylink	Description	Remote Pilot Action
Flashing Red and warning sound	Critical low battery Below 15%	LAND immediately
Solid Red and warning sound	Low battery power Below 30%	LAND at nearest possibility
Yellow Alert and warning sound	Medium battery power Below 50%	Proceed, but monitor transmitter battery power with caution

The low level alarms can be seen in DV Skylink in below illustrations.



When the Herelink is charging when the Micro USB is attached, the status LED highlighted in the image below indicates the current charge status. It will change from Red, Yellow to Green when fully charged. This LED will not turn on when the Herelink is discharging (turned on).



## 2.5.2 DV Skylink

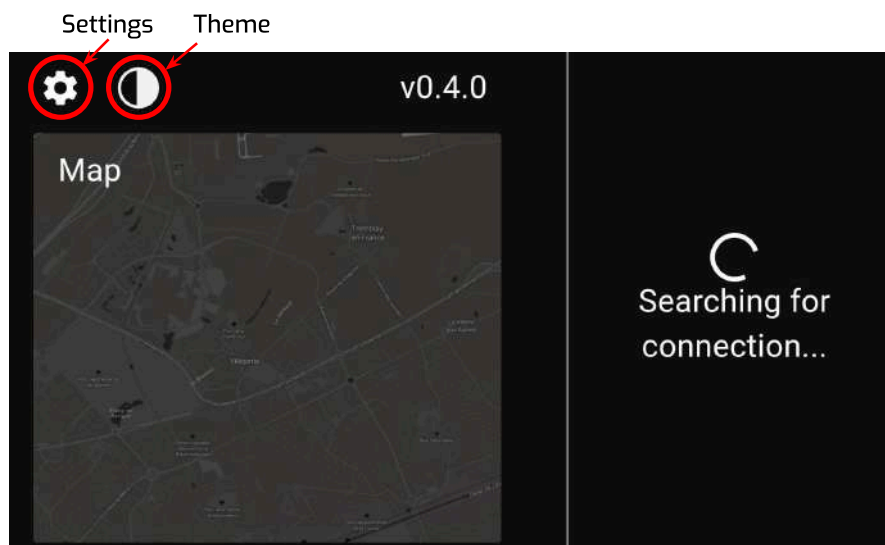
DV Skylink is the main application for controlling the DRONE VOLT KOBRA. However, certain functions such as updating the FW of the FMU, extracting flight logs, or updating the parameter list, can only be done using the Open Source software Mission Planner<sup>1</sup>. The user should only perform FW updates and parameter list updates when instructed so by DRONE VOLT, adhere to SW update instructions in [2.9.1 Checklist](#).

### 2.5.2.1 Introduction to Application

DV Skylink is a cross platform application that runs on the Herelink C2 Link option. DV Skylink is developed and maintained by DRONE VOLT. The rest of this section will describe all views of the application as well as the basic functionality.

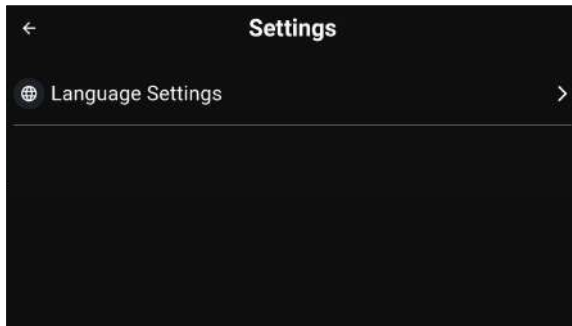
#### 2.5.2.2 Homepage

The first view of the application is the Connection page. Here you will be able to connect to a KOBRA drone, if the radio link is able to connect to the drone. Additionally, you can change the unit system and application language as well as change the theme from light and dark. These are the “Settings” and “Theme” buttons. The homepage also features a map. See illustrations below.

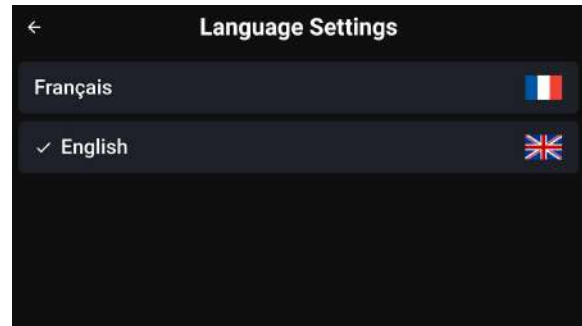


Main screen of “Homepage” with “Settings” and “Theme” button highlighted. Notice that this homepage view is trying to connect to the KOBRA drone.

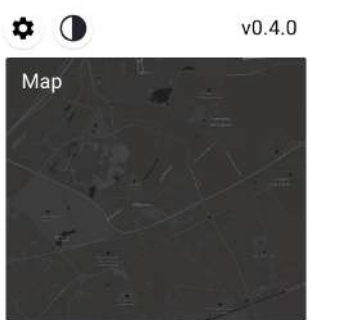
<sup>1</sup> Reference: <https://ardupilot.org/planner/docs/mission-planner-installation.html>



Settings menu.



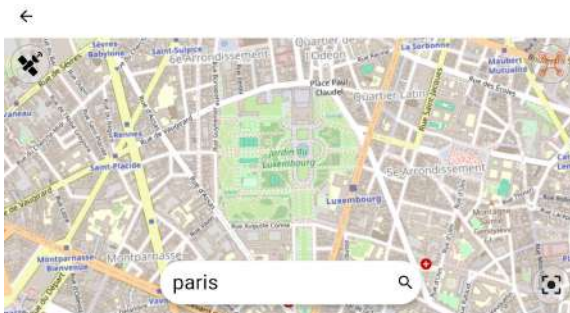
Language options.



Light Theme mode.



Pull-down menu.

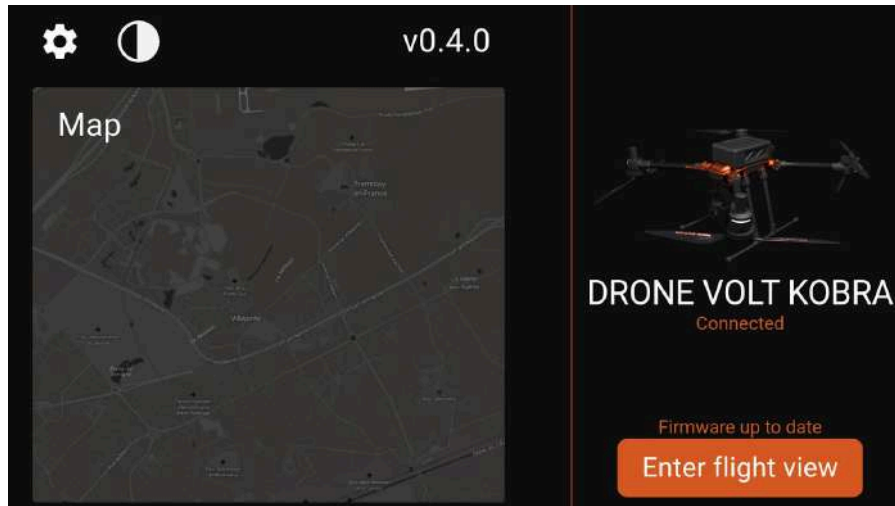


Map view.



Satellite view.

Once the application connects to the Kobra it will be possible to enter the drone. See below illustration. The application will keep trying to connect to the drone once it is active.



Home screen when connected to Kobra.

#### 2.5.2.2.1 Preflight Check Page

**C3 Compliance:** *In this section, the user will be able to interact with the Geo Awareness function setup, Maximum Attainable Height, Failsafe Settings/Actions, and Direct RemoteID.*

Before entering the Flight view, the first action for the user is to go through the Preflight Check page. This page prompts the user to 1) the current state of the system; Flight mode, Battery Voltage, and RSSI<sup>2</sup> of the C2 Link.

The main objective of the preflight page is for the user to choose the proper failsafe actions and conditions based on the specific flight operation.

The first action is what to program the KOBRA to do in the case of "Signal lost", i.e. C2 Link Loss, the options are Return to Home and Land. Below the user can choose at what altitude the KOBRA should fly in during Return to Home (RTH), this should be specific to the flight operation.

Below the altitude setting in RTH, the user can set the "Max", which corresponds to the maximum attainable height. Default maximum height is 120 m, if this needs to be increased, contact DV support (if the user is permitted to operate in altitudes exceeding this height limit).

The next action is an optional action; the maximum flight distance from the transmitter. This can be a good helpful tool to ensure that the user is not infringing regular VLOS requirements. Below the On/Off the user can put in the max distance in meters.

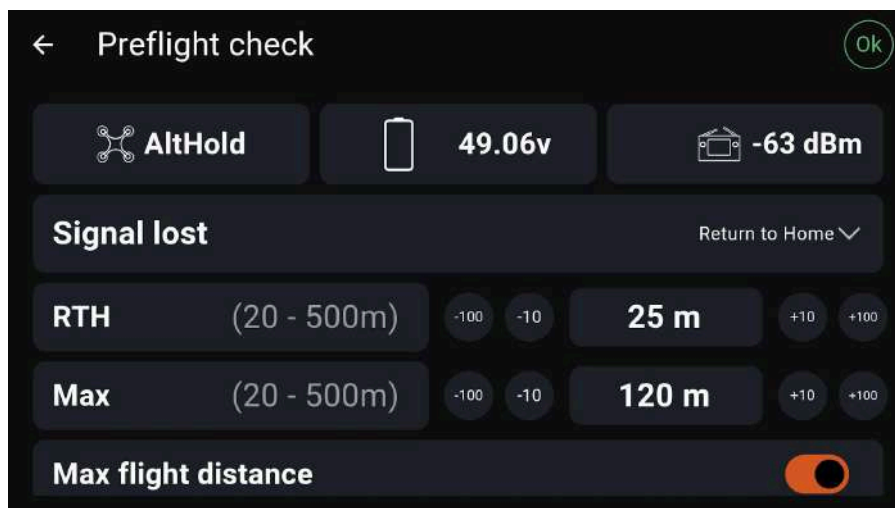
---

<sup>2</sup> Received Signal Strength Indicator (RSSI).

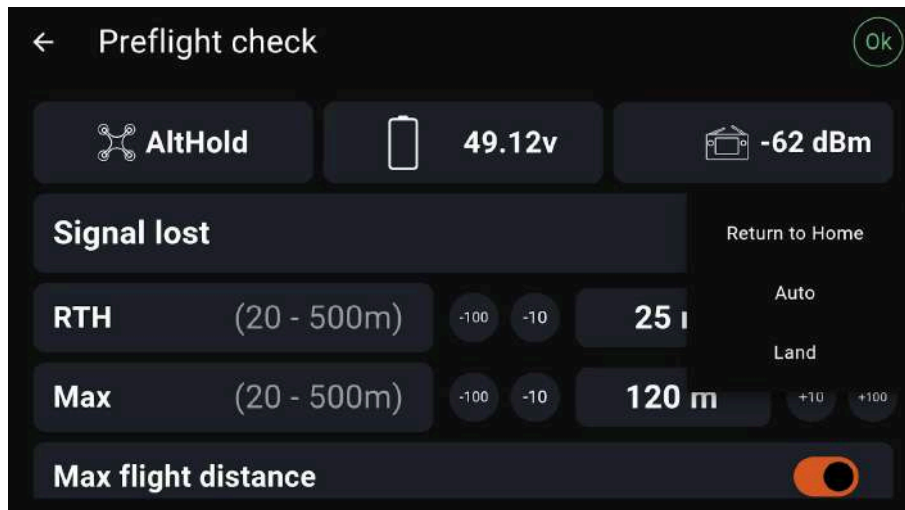
The next option is to choose the Battery Failsafe Action. There are two levels (in units of Volt), Critical and Low, there is a limit to how low the Critical limit can go, as this is determined by the ability for the KOBRA to land from the maximum height, 120 m. The user can freely choose the Low setting. Keep in mind that it is recommended to change with caution and it is highly up to the flight operation. Below the battery low level indications the user can choose what action to take when/if the failsafe occurs. This can be Return to Home or Land for both levels.

Lastly, the user needs to put in an Operator ID in order to activate the Remote ID, the user is permitted to submit a valid ID and the user cannot proceed without putting in this information.

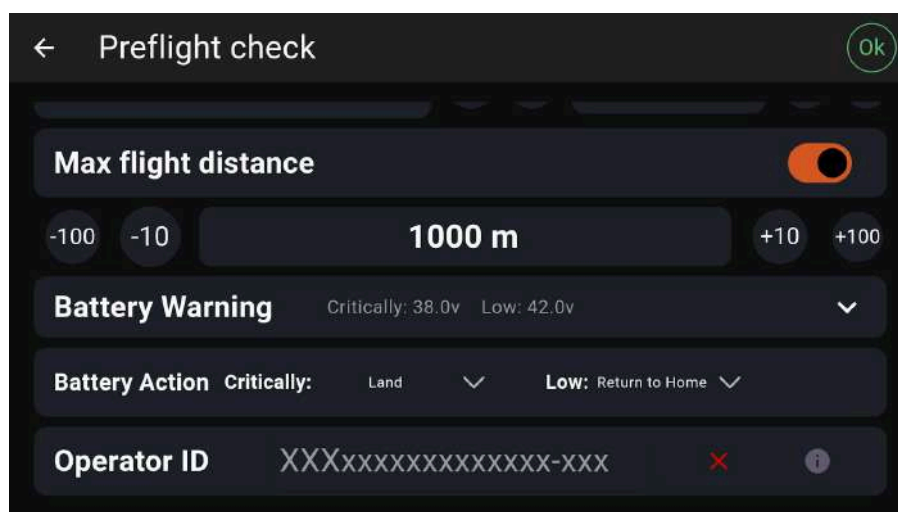
All Preflight Checks are illustrated in the next three images.



Fail safe settings menu top.



Signal Lost/C2 Link Loss Action options

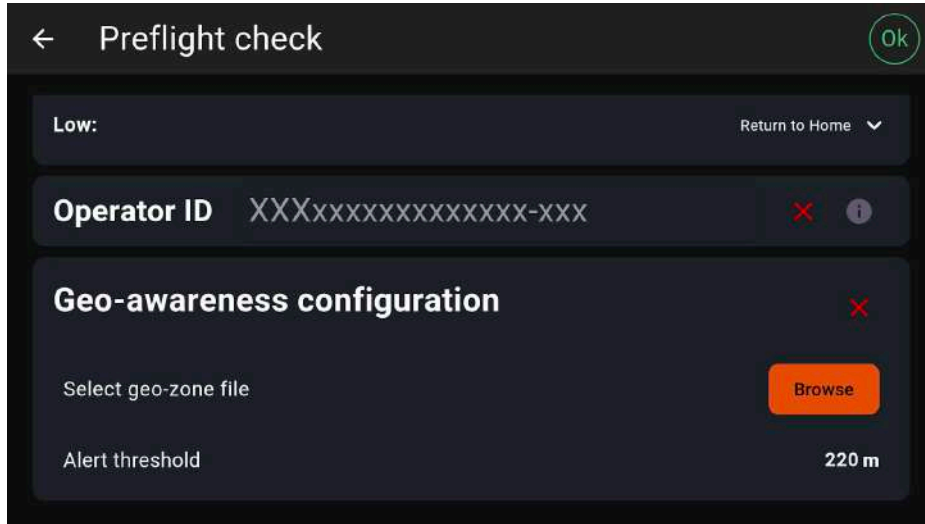


Fail safe settings menu bottom.

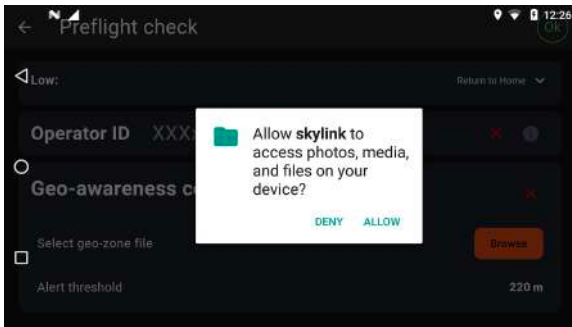
**2.5.2.2.1.1 Geo Awareness Function**

The Geo Awareness is the last check on the preflight check page. This, together with Operator ID (RemotelD), are mandatory in order to proceed to the Flightview and hence perform take off.

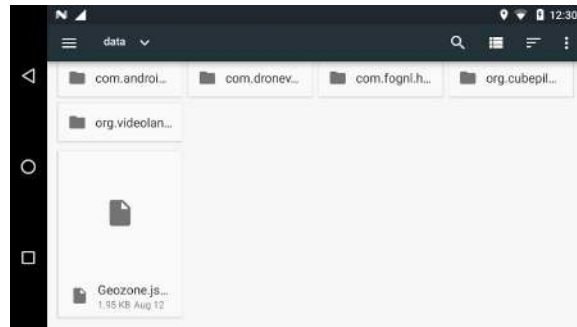
The mandatory fields are; a geo-zone file (UGZ), and the Alert Threshold (in units of meters). See below four illustrations for this setup.



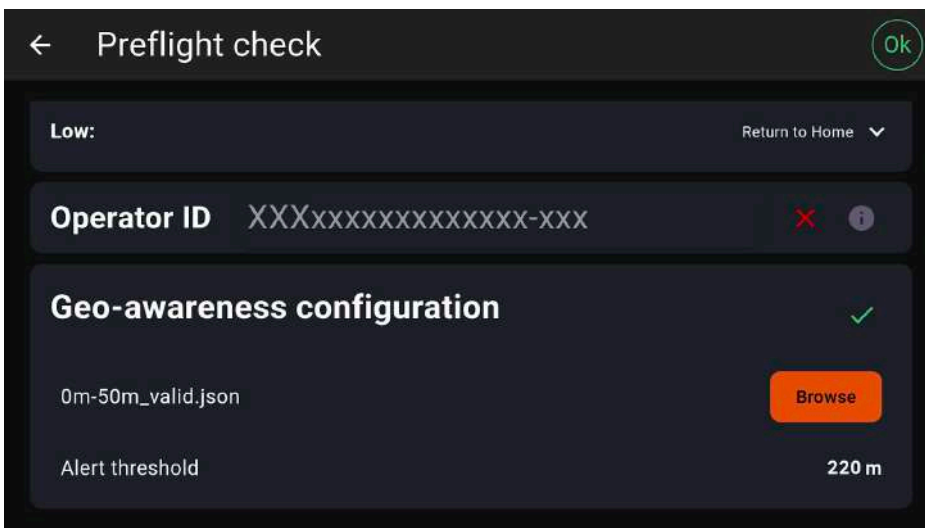
Geo awareness function when no input is given.



View once "Browse" is pushed.



File explorer view.



Geo awareness function when all inputs are defined.

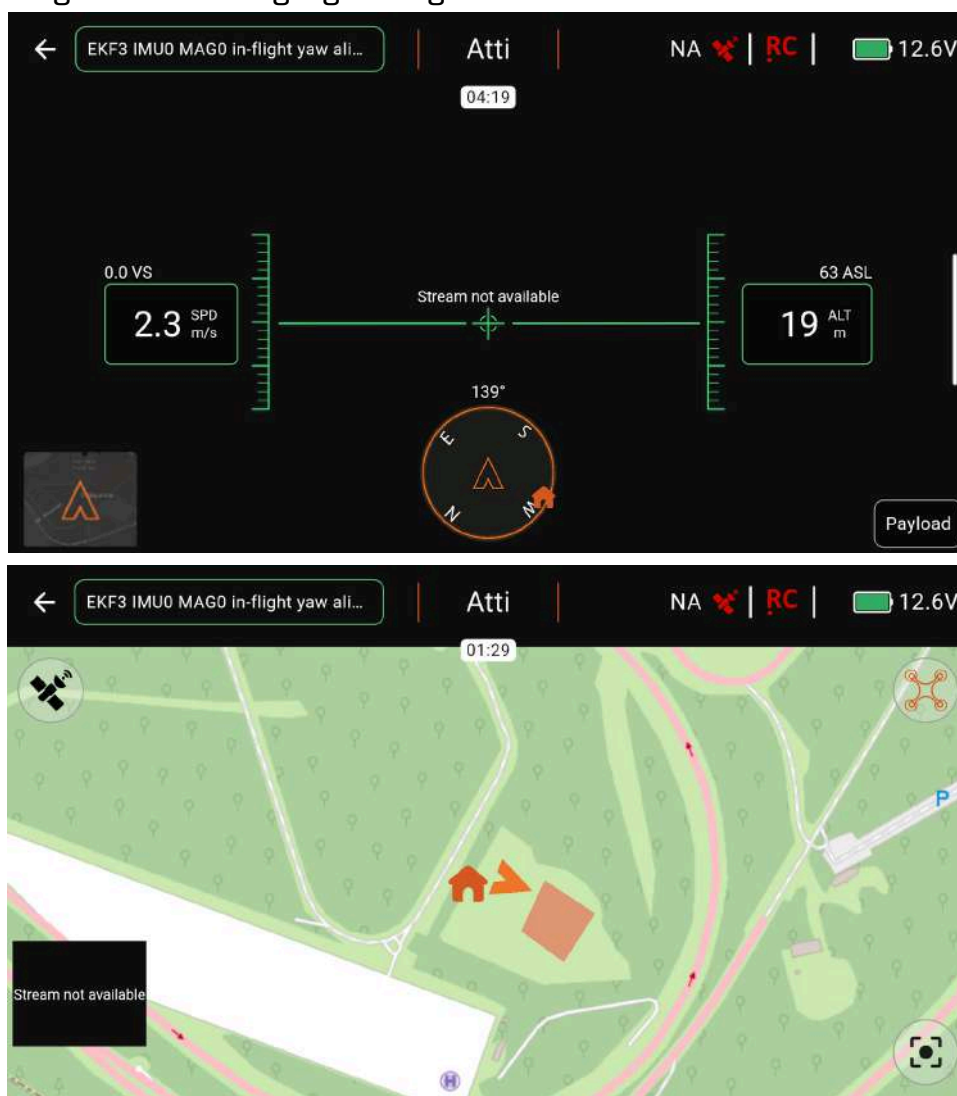
The recommended way of transferring the files to the C2 Link Transmitter is by using a Micro SD Card, save the file from a computer to the SD Card, and insert it in the C2 Link Transmitter.

Once loaded the geo awareness function will be active and alert the user upon:

- Warning based on the Alert threshold, Yellow Warning in DV Skylink.
- Breach of UGZ, Red Warning/Alert in DV Skylink.

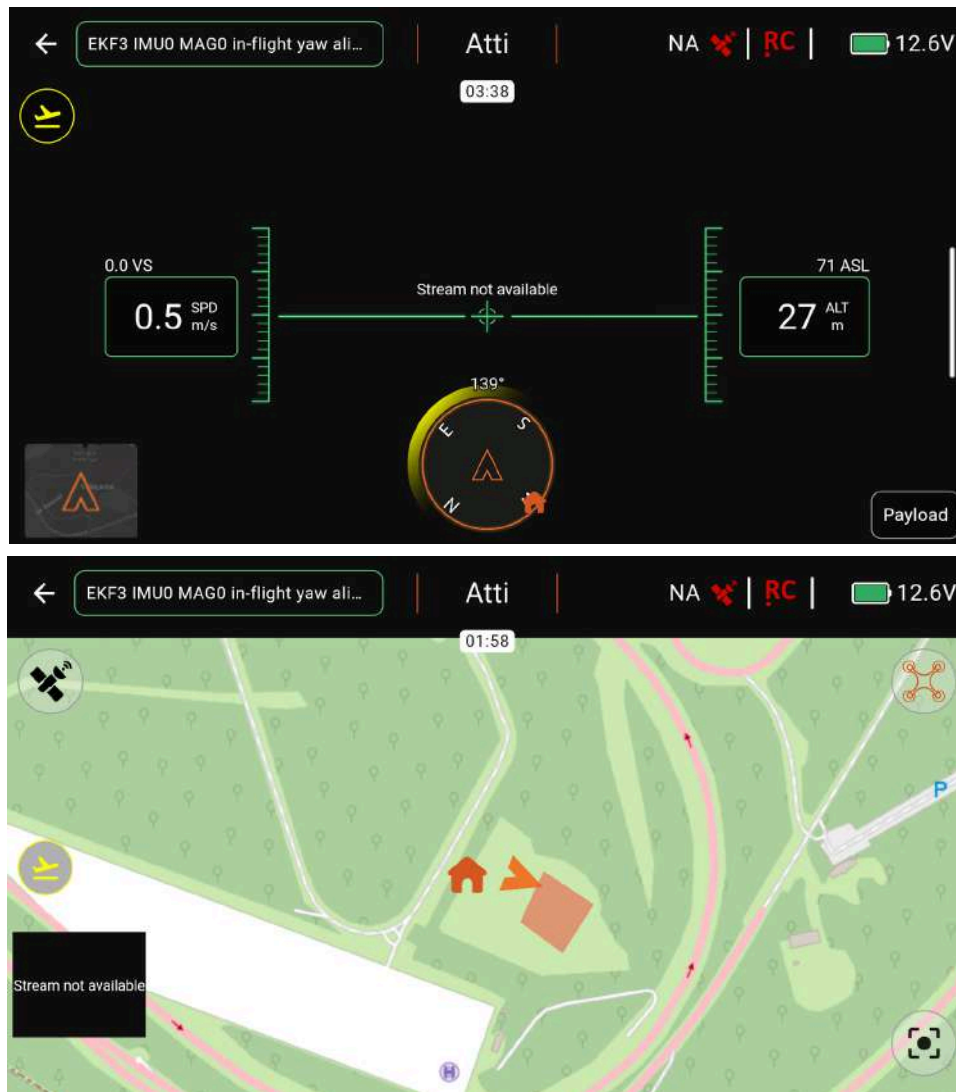
For further information on how the geo awareness function the user is referred to [2.8 Geo-Awareness Function](#), this includes recommendations to Threshold setting.

The following illustrations highlight the geo awareness function active in the flight view.

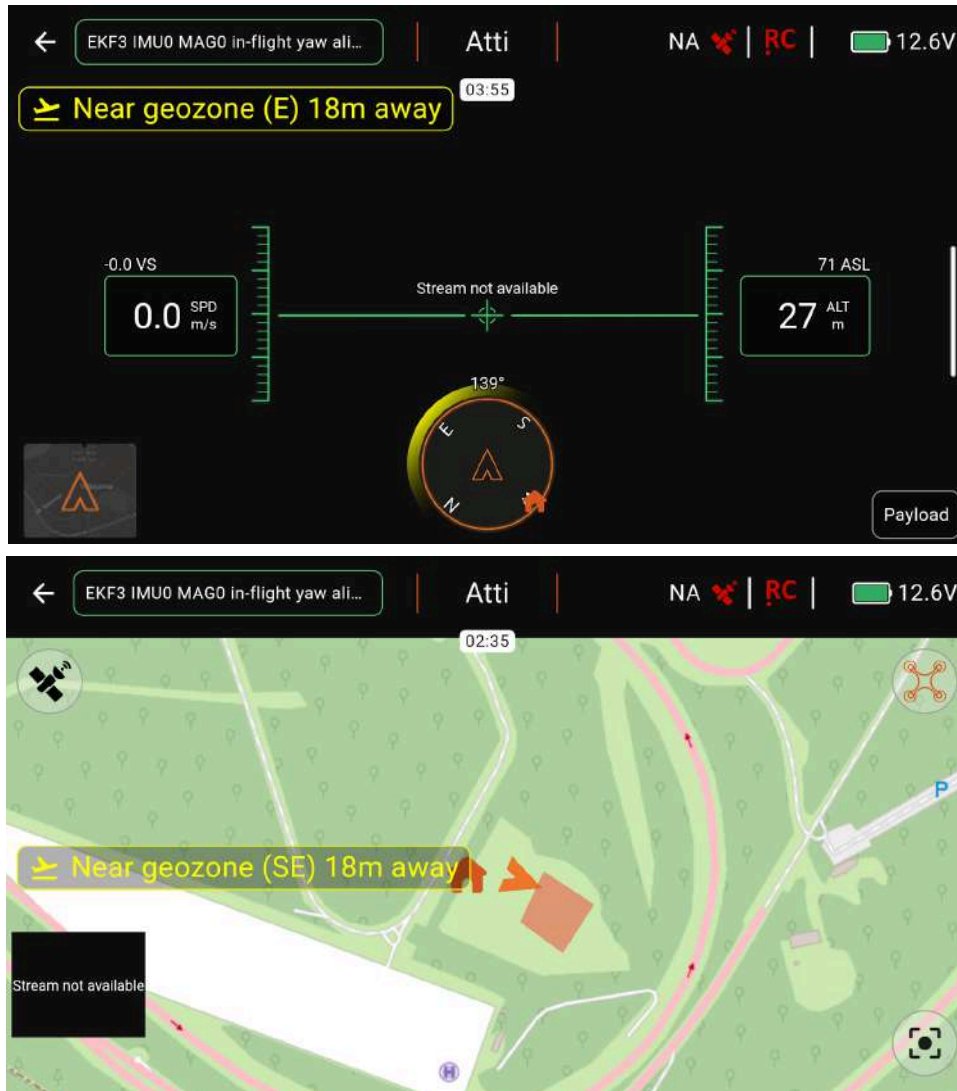


Flight view (in FPV and map view, respectively) when Kobra is not within the Alert Threshold. The UGZ zone is illustrated in the map view with a red box.

When the Alert Threshold is breached the flightview changes to the following view.

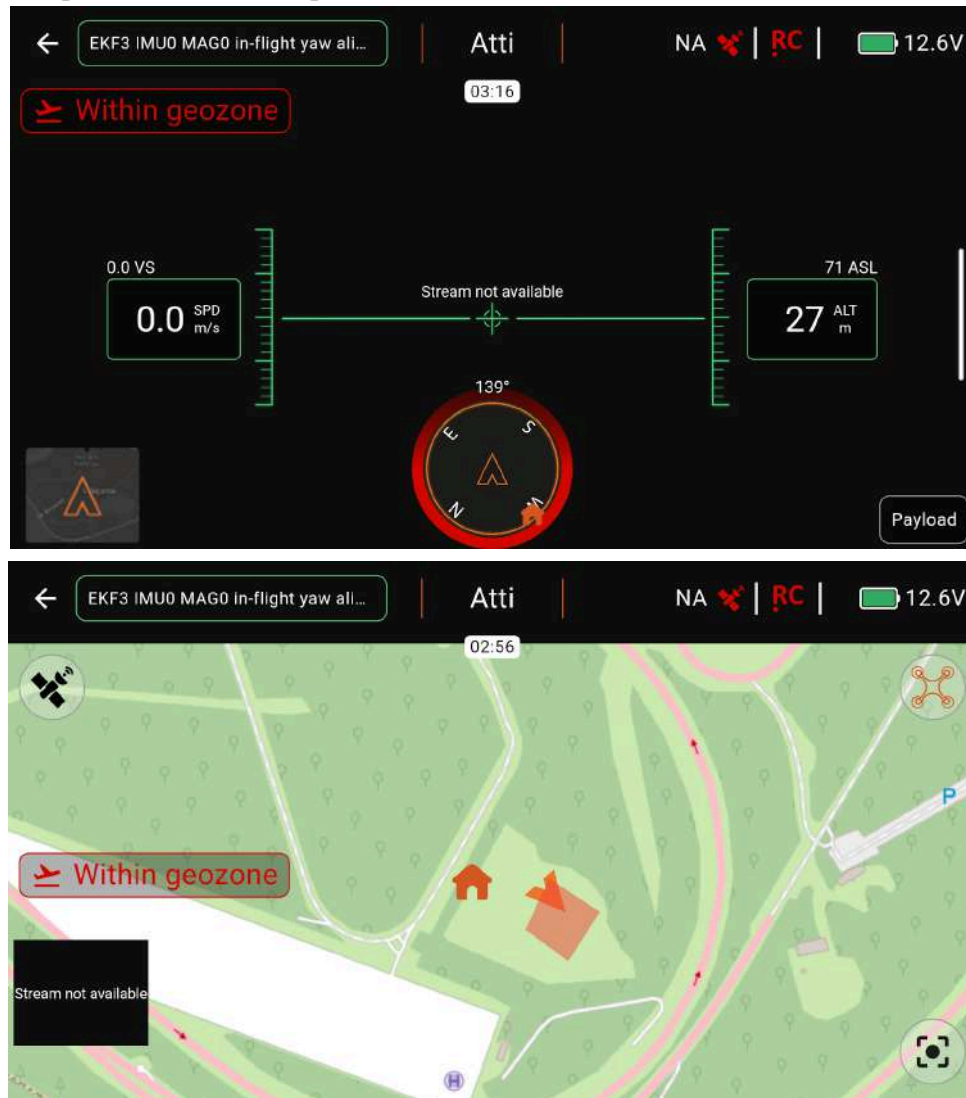


Flight view (in FPV and map view, respectively) when the alert threshold is breached, the warning message is closed. Notice the direction of geozone highlighted in the Navigation Display (described in next section).



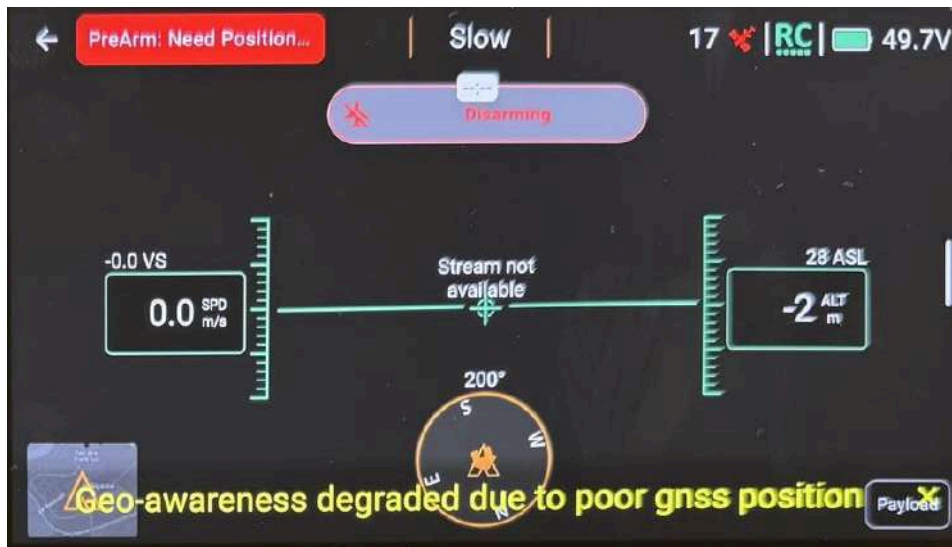
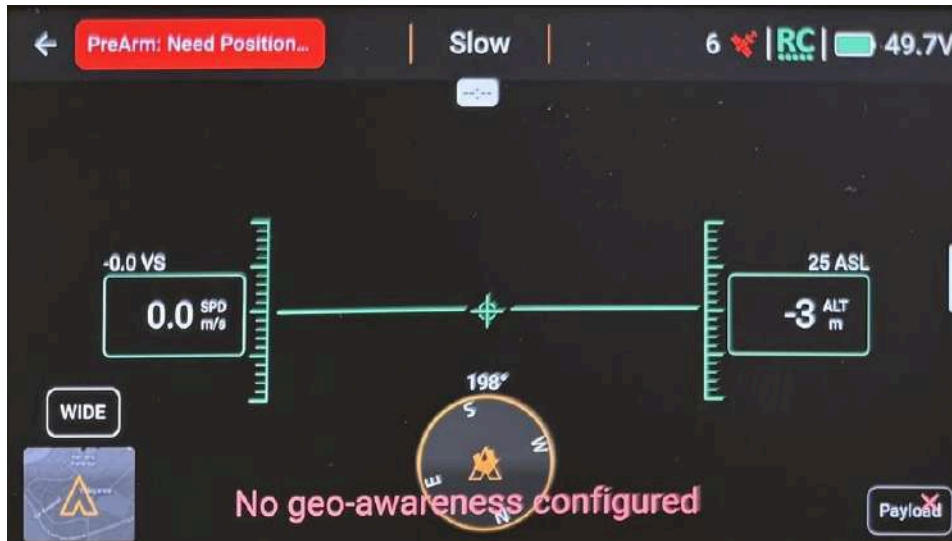
Flight view (in FPV and map view, respectively) when the alert threshold is breached, the warning message is opened. Notice the direction of geozone highlighted in the Navigation Display (described in next section).

The following illustrates the flightview upon breach of UGZ.



Flight view (in FPV and map view, respectively) when the UGZ is breached, the warning message is always open and cannot be closed.. Notice the direction of geozone highlighted in the Navigation Display (described in next section).

If the geo awareness function is not defined or otherwise degraded, the user is prompted in Skylink with aural sounds and a pop up upon entering the flight view. See illustrations below.



Flight view where the geo awareness is not configured (no files loaded in Skylink) and flight view if the geo awareness function is degraded due to poor GNSS quality.

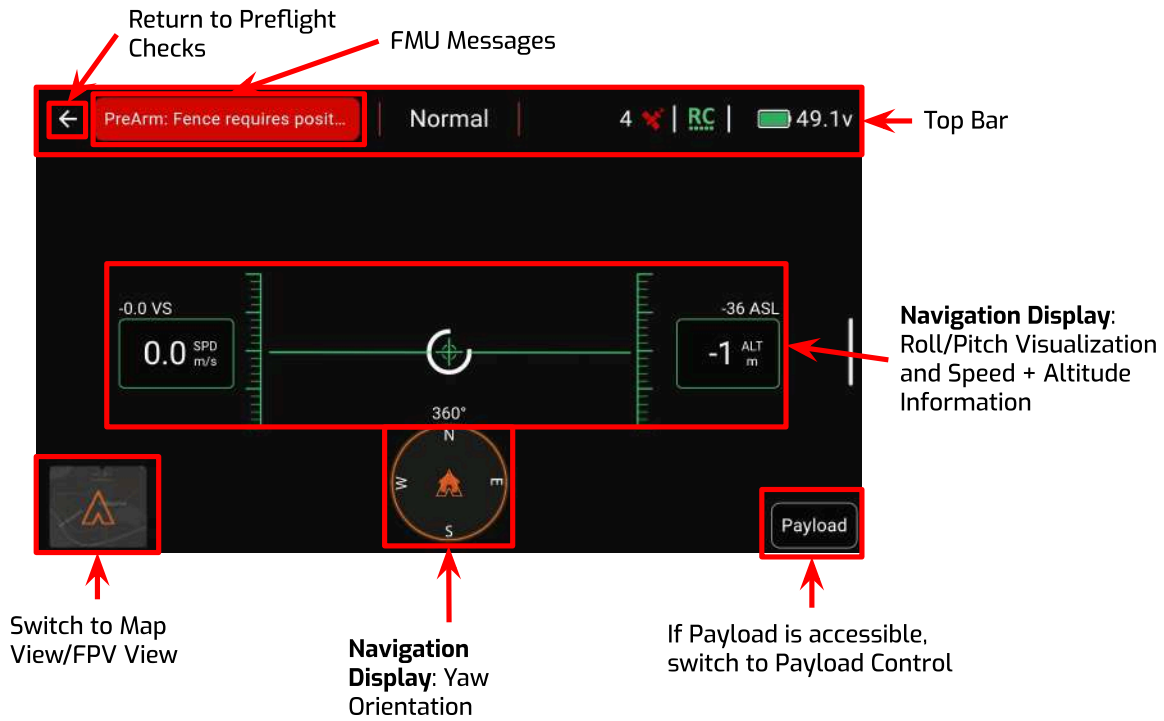
The geo awareness degraded message is prompted in the event of GNSS signal failure.

#### 2.5.2.2.2 Preflight Checklist

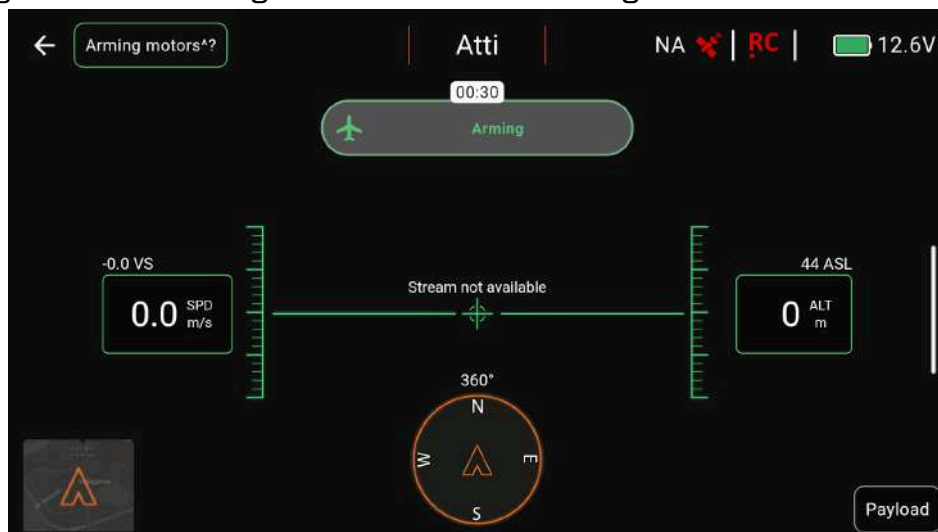
It is recommended that together with the DV Skylink preflight checklist to follow and adhere to the recommended pre-flight planning defined in [2.6.3 Pre-Flight Operations](#).

### 2.5.2.3 Flightview Page

Once all Preflight checks are completed and the user has clicked “Ok”, the application switches to the main Flight View. The below illustration highlights the main parts of the flightview. Each part will be described in the following sections.



Important to note that once armed and take off is performed, the KOBRA will automatically fly up to 2 meters relative altitude (AGL) and hover. Upon arming and disarming the KOBRA the flightview shows the following;



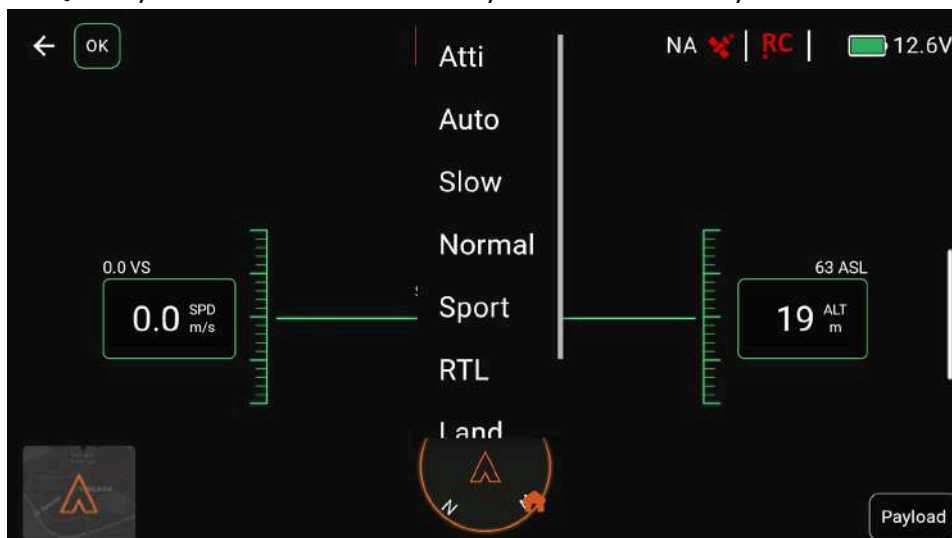
Arming message.



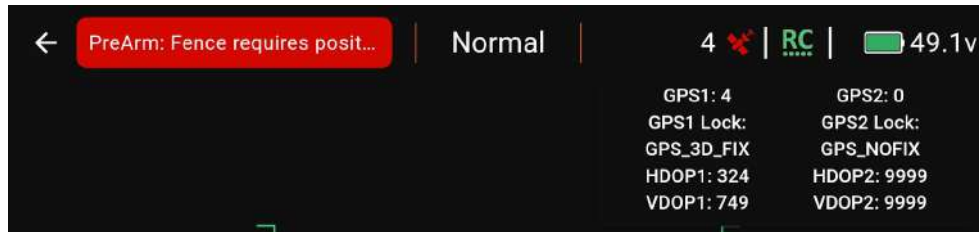
Disarming message.

### 2.5.3.3.1 Top Bar

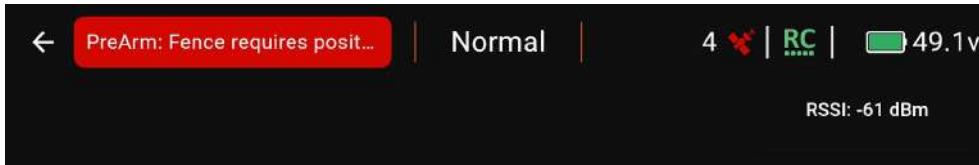
The first part is the Top bar View. There are four main user information sources, Flight Mode, GNSS Quality, C2 Link RSSI, and Battery Information. They are illustrated below.



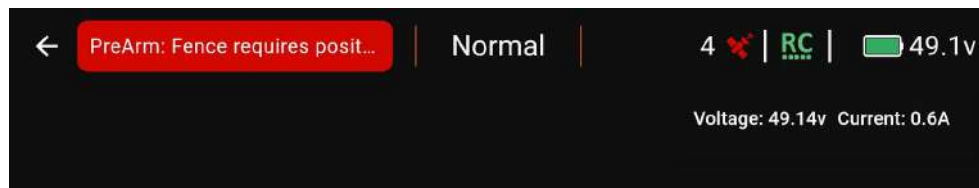
Flight Mode menu/selection.



GNSS info.



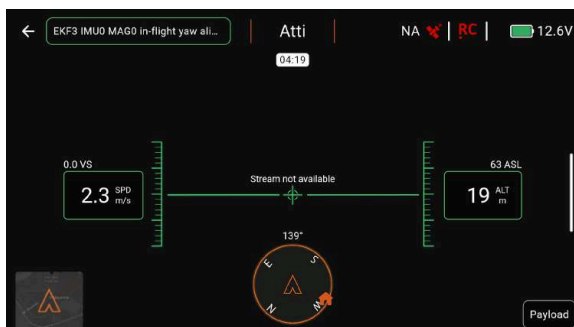
C2 link RSSI info.



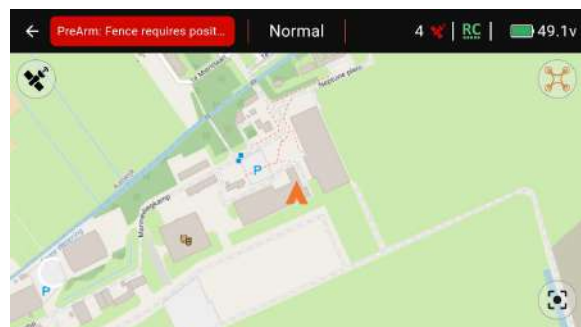
Battery information.

### 2.5.2.3.1 Map View / FPV Camera View / Primary Flight View

Upon clicking the “Map View / FPV View” button in the lower left corner, the user can switch between the Map or FPV Camera view. See Illustration below.



FPV View.

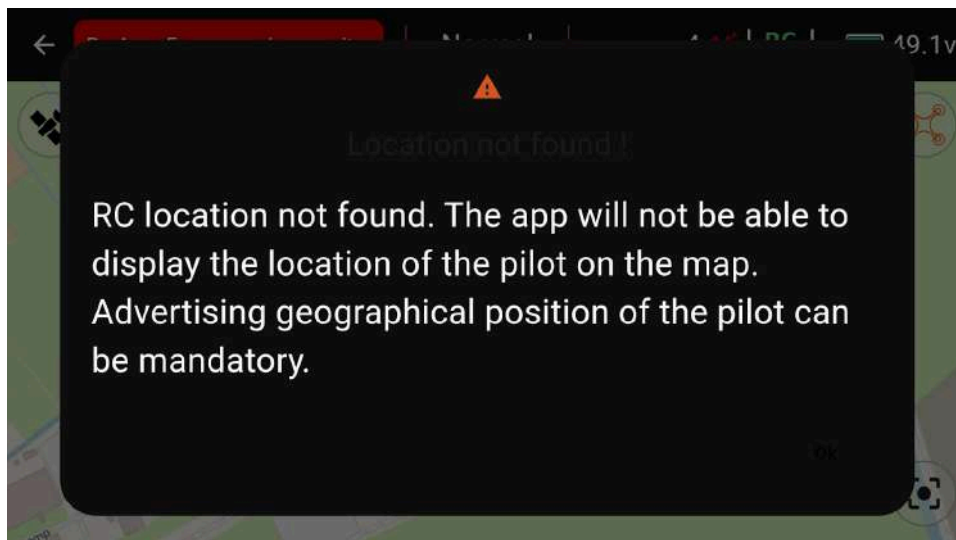


Map view.

Once clicking the FPV view, the user has the ability to change between the front facing and downwards facing camera, this looks like this;



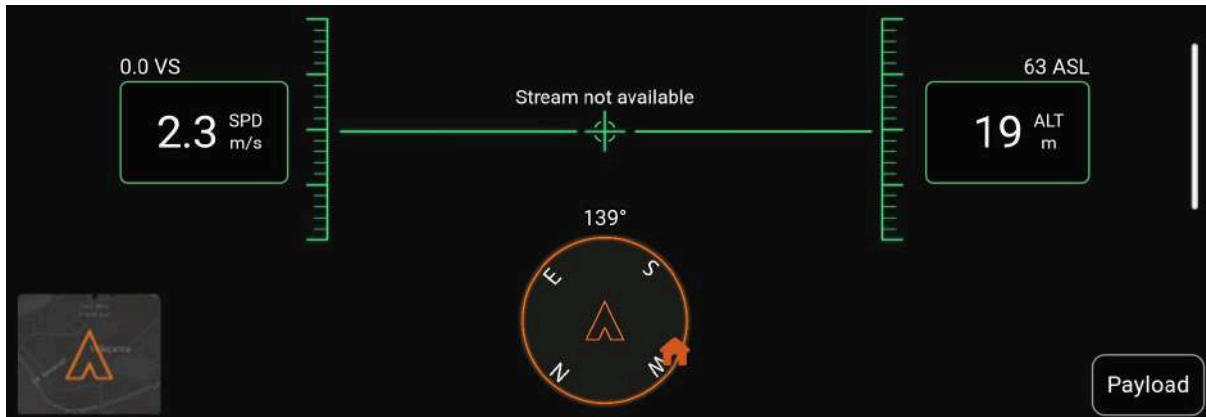
If RC (transmitter) position cannot be determined, then the following error message is depicted on the Flight View.



GCS no positioning.

#### 2.5.2.3.2 Navigation Display

The Navigation display is an overlay in the Flight View providing the user with intuitive and easy to understand navigation information. This includes the attitude (Roll, Pitch, Yaw), the speed in m/s (in vertical, VS, and horizontal plane), and altitude (both the AGL, Above Ground Level, and ASL, Above Sea Level, altitudes are depicted). See illustration below.



### 2.5.2.4 Failsafes

The failsafes can be adjusted in the Preflight Check page. However, there is a limit the user cannot exceed, which ensures that for example the battery low level cannot jeopardise the safety of the operation. The overall failsafes are explained in more detail in this section.

#### 2.5.2.4.1 Battery Failsafe

The KOBRA is equipped with two levels of battery failsafe, the description and setup can be seen in [2.5.2.2.1 Preflight Check Page](#).

The limit that the user cannot change is the lower limit to the critical failsafe, this is experimentally determined by what is needed to perform LAND with maximum MTOM from 120 meters relative altitude, in benign conditions.

The user will be prompted with audible and visual cues when/if the failsafe occurs.

Failsafe actions related to the C2 Link, i.e. the transmitter itself should be reviewed in section [2.5.1.5.2 Battery Low Level on Herelink Transmitter](#).

#### 2.5.2.4.2 Loss of C2 Link

The KOBRA is equipped with a monitoring function where, in case of a C2 link loss, an audible and visual "Signal Lost" warning will occur on the GCS and an user programmable Failsafe Action will be activated. The setup of this can be seen in [2.5.2.2.1 Preflight Check Page](#).

If the C2 link is lost, an *automatic flight termination* function is triggered as the default recovery function, with a delay time of max 1.5 seconds. The default Fail safe action is set to RTH, Return To Home, and can be set to LAND. If C2 link is regained during

termination, the termination function will still be completed as a default. If the Failsafe Action is activated during a period of GNSS denied flight, the default action would be LAND.

#### 2.5.2.4.3 EKF Failsafe

The EKF(Extended Kalman Filter) failsafe monitors the health of EKF (the position and attitude estimation system) to catch problems with the vehicle's position estimate (often caused by GPS glitches or compass errors) and prevent "flyaways".

The EKF failsafe-action is by factory default set to ATTI flight mode and cannot be changed by the user.

In case of an EKF failsafe event, a warning is shown in the top left message box and the flight mode will be automatically changed to ATTI.

This failsafe is not something that the user can change or otherwise interfere with, but will run automatically all times during flight. The user can however see warning and/or error messages relating to this. Adhere at all times to what the message states, and if warning appears, proceed with caution, best case abort the operation. If an error occurs, attempt to land the drone as safely as possible.

#### 2.5.2.5 Mission Planner

The normal application used to interact with the KOBRA is DV Skylink. However, there are certain features where the user is permitted to use the open source application Mission Planner, the user is permitted to only use Mission Planner for these defined purposes, infringing this will cause non compliance with this manual as well as the warranty of the system in general.

**IMPORTANT! The user should only use Mission Planner in situations defined by DV, infringing this will lead to non compliance with the manual and warranty claim.**

##### 2.5.2.5.1 Connection to KOBRA

There are two overall connection types, wired and wireless. Wired connection is used for FW updating and optionally mission planning for operating KOBRA in Auto Mode. Connecting wirelessly is mainly intended for conducting calibrations, but the user can also plan missions with this connection scheme.

###### 2.5.2.5.1.1 Wired Connection

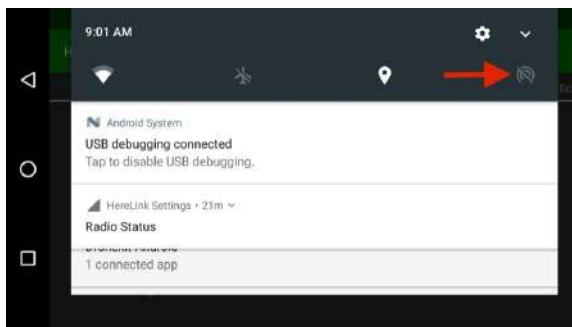
To connect is simply to connect a computer to the Micro USB port followed by powering on the KOBRA.

**IMPORTANT! When powering on the KOBRA while connected to a computer, operate with caution, it is recommended to disattach the propellers.**

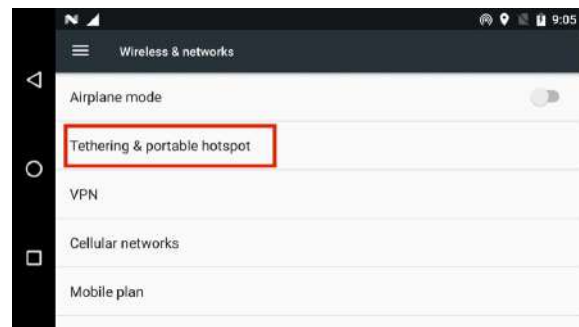
Once connected to the computer, choose the correct COM port, which should be visible in "Device Manager" on a Windows machine, select "115200" as baud rate and click connect.

**2.5.2.5.1.2 Wireless Connection**

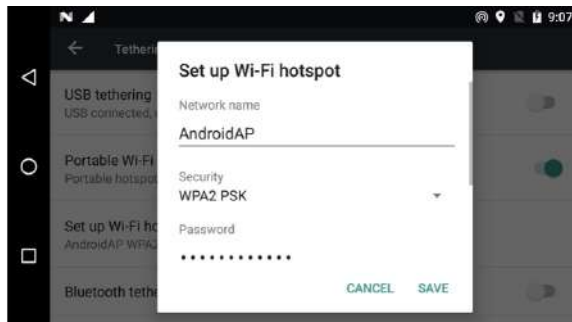
Wireless connection requires some preparations, firstly the C2 Link must be set to Hotspot mode, where a computer can connect to the C2 Link hotspot and connect to the FMU with a UDP connection. The step-by-step instructions are as follows<sup>3</sup>.



From the App Launcher slide down the notification drawer from the top.



Press and hold Wifi option in Notification drawer and select settings.



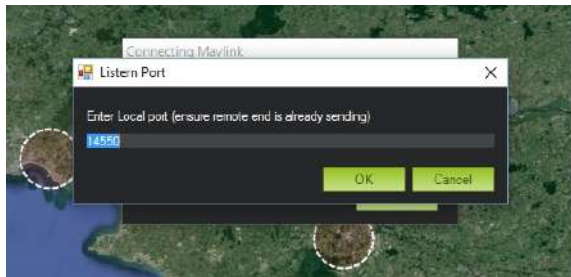
Then under Set up Wifi hotspot configure name and password for the hotspot.



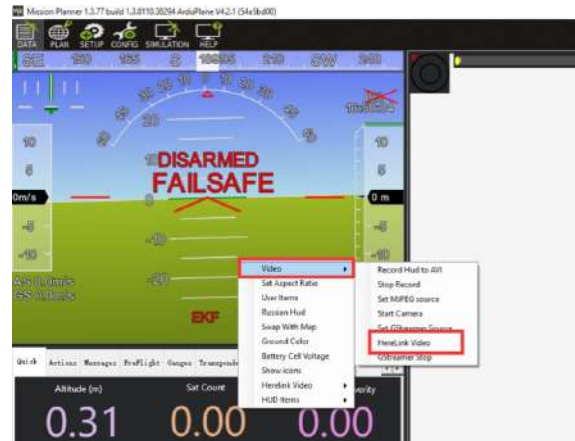
Connect Computer to hotspot, video stream will be available at `rtsp://192.168.43.1:8554/fpv_stream`. Open Mission planner, Set Port to "UDP", Click Connect.

<sup>3</sup> Reference:

<https://docs.cubepilot.org/user-guides/herelink/herelink-user-guides/share-video-stream#connect-over-wifi-hotspot>



Enter local port “14550”, and then connection should be established.



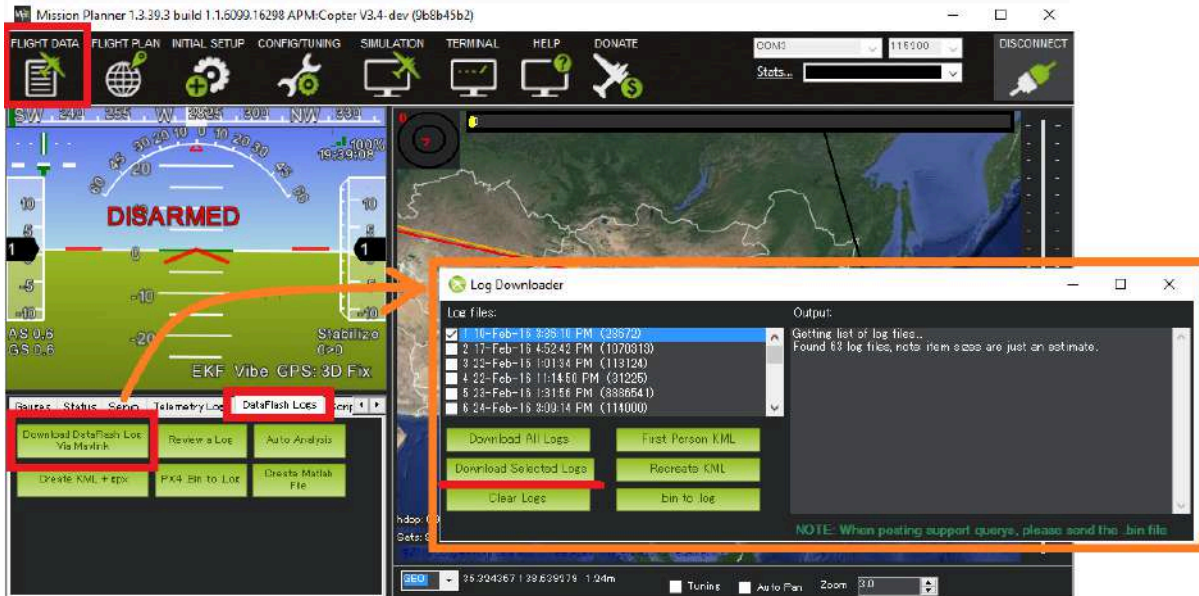
Optionally: If Camera view is needed, Right click on HUD screen to enter Video menu, choose HereLink Video then a IP input window will pop up. Paste “192.168.43.1”.

#### 2.5.2.5.2 Extract Flight Logs

Once connected to Mission Planner<sup>4</sup>, open the “Flight Data” screen, on the bottom left, Navigate to “DataFlash Logs” and click “Download DataFlash Log Via Mavlink”. This should open a pop-up window, select the log and click “Download Selected Logs”. See illustration below. It is recommended to have a wired connection for this task.

<sup>4</sup> Reference:

<https://ardupilot.org/planner/docs/common-downloading-and-analyzing-data-logs-in-mission-planner.html#downloading-logs-via-mavlink>

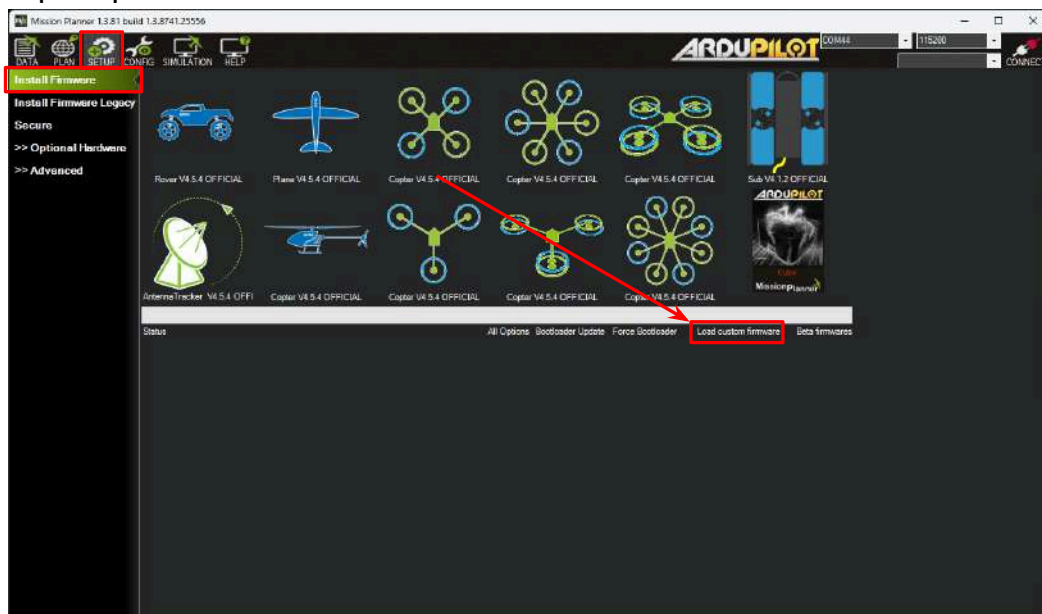


2.5.2.5.3 FW Update

**IMPORTANT! If instructed so by DV support, the user can update the FW running on the FMU**

The instructions are as follows.

Connect a computer with a wired connection to the KOBRA. Select the proper COM port and baud rate "115200". Navigate to "SETUP" and click on the menu icon "Install Firmware". Click on the "Load custom firmware", this will open a file explorer window, navigate to the DV issued FW file, and click "Open". Follow the instructions that Mission Planner prompts. See illustration below.



#### 2.5.2.5.4 Performing Calibrations

The KOBRA comes from the factory pre-calibrated, and should only be calibrated when the user encounters errors and warnings in DV Skylink regarding sensor data inconsistencies and/or errors. If the user is in doubt, it is recommended to contact DV support for troubleshooting.

In order to perform calibrations the user must connect to the KOBRA wirelessly and reach out to DV support who will guide in the process of calibration given what the user has encountered of error/warning indication in DV Skylink.

#### 2.5.2.5.5 Mission Planning

**IMPORTANT! Never set the KOBRA in Auto mode if a mission has not been planned, the KOBRA will initiate the last saved mission regardless of relative position to it.**

**IMPORTANT! If the user has set the KOBRA unintentionally into Auto mode, Auto mode can be disabled by changing to ATTI and back to Normal mode.**

If the user has an operational need for conducting preprogrammed missions in Auto mode, then adhere to the Ardupilot Mission Planner Framework<sup>5</sup>.

The most basic mission planning is a waypoint and events mission, here the user defines 3D points with associated commands.

**IMPORTANT! The minimum configurable altitude for waypoint missions is 3m AGL, excluding the Takeoff and Land commands. This boundary is defined out of a safety aspect.**

The list of commands can be found at:

<https://ardupilot.org/copter/docs/mission-command-list.html>

Guides on how to perform waypoint missions can be found at:

<https://ardupilot.org/copter/docs/common-planning-a-mission-with-waypoints-and-events.html>

Please keep in mind that the mission planning does not take battery level into account, if the battery failsafe is encountered during Auto mode, then the appropriate failsafe action will occur.

The pre-programmed mission can be transferred to the KOBRA using either wired or wireless connection. If the user does not have an operational need for conducting

---

<sup>5</sup> Reference: <https://ardupilot.org/copter/docs/common-mission-planning.html>

missions, it is recommended to verify that there is no waypoint mission saved to the KOBRA by:

1. Connecting through Mission Planner.
2. Navigate to the "Plan" tab.
3. Make sure you have an internet connection so Mission Planner can load the map.
4. Click "Read" on the right hand side of the window and anticipate the saved mission file loaded.
5. Right click anywhere in the map view and click "Clear Mission".
6. Navigate on the map to the location where you safely can make a new Home point and right click there. Then click "Set Home Here".
7. Upload the empty mission by clicking "Write" on the right hand side of the window.
8. The deletion can be confirmed by navigating to a different tab and back to "Plan", and clicking "Read" once more, there should be no waypoints nor commands.

**IMPORTANT! The pre-programmed mission will be initiated once the KOBRA is set into Auto mode.**

If the user wants to create Rally Points, the guide can be found at:

<https://ardupilot.org/copter/docs/common-rally-points.html>

For more description of Rally Points, the user is referred to [2.6.5 Operational Modes](#) under RTH Description.

If the user has an operational need for pre-programmed missions but does not know how best to plan and perform these in practice, reach out to DV Support for questions regarding the mission planning functionality and guidance.

### 2.5.3 Sound Power Level

The KOBRA is in compliance with the C3 certification and has the following sound power level specification.

UA Class Label	<b>C3</b>
Sound Power Level	<b>105 dB</b>
Maximum Propeller RPM	<b>3700 RPM (Hover, 15.7 Kg MTOM)</b>

## 2.6 Operational Instructions

### 2.6.1 Crew Health Precautions

In order to operate the KOBRA the remote pilot needs to be in compliance with the local UAS regulations, both in terms of certification and the intended area of operation. Furthermore, the remote pilot needs to be capable of operating the system. In general, the remote pilot should adhere to the requirements of the national CAA as well as being fit to operate (**IMSAFEE**):

**I** - Illness: Symptoms

**M** - Medication: Prescription or over the counter

**S** - Stress: Job, Finances, Family, Health

**A** - Alcohol: 12 hours

**F** - Fatigue: Adequately rested

**E** - Emotions: Can emotions affect the integrity of the drone operation

**E** - Eating: Adequately nourished

It is a requirement for the remote pilot to at least hold a valid A3 certificate, if operating the KOBRA in EASA member states.

### 2.6.2 Ground Handling

#### 2.6.2.1 Preparing the Aircraft

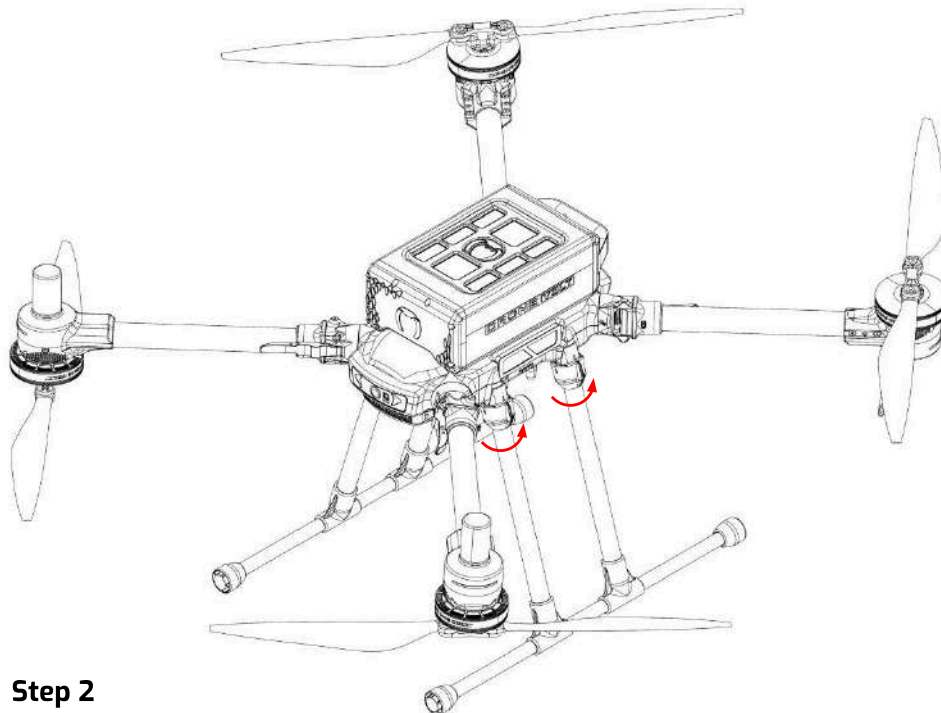
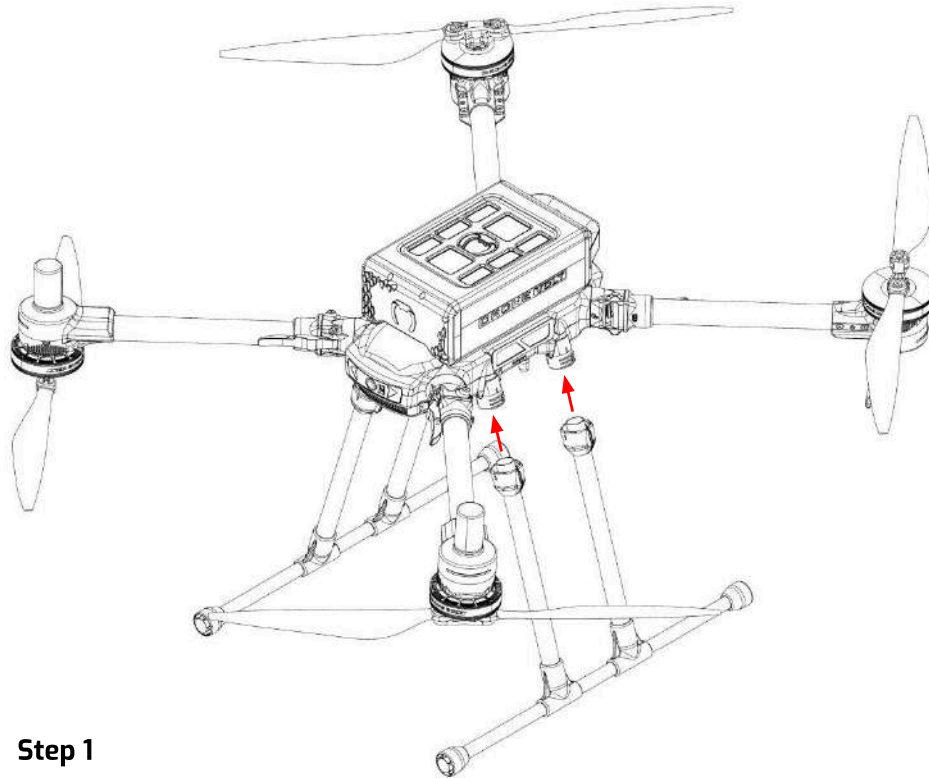
This section describes and illustrates the basic handling procedures of the KOBRA drone, that is, installing the landing gears, unfolding the aircraft, mounting a payload, and installing the battery system. Additionally, the basic interaction with the battery system is also described together with the instructions to use the battery system and the charger for the KOBRA.

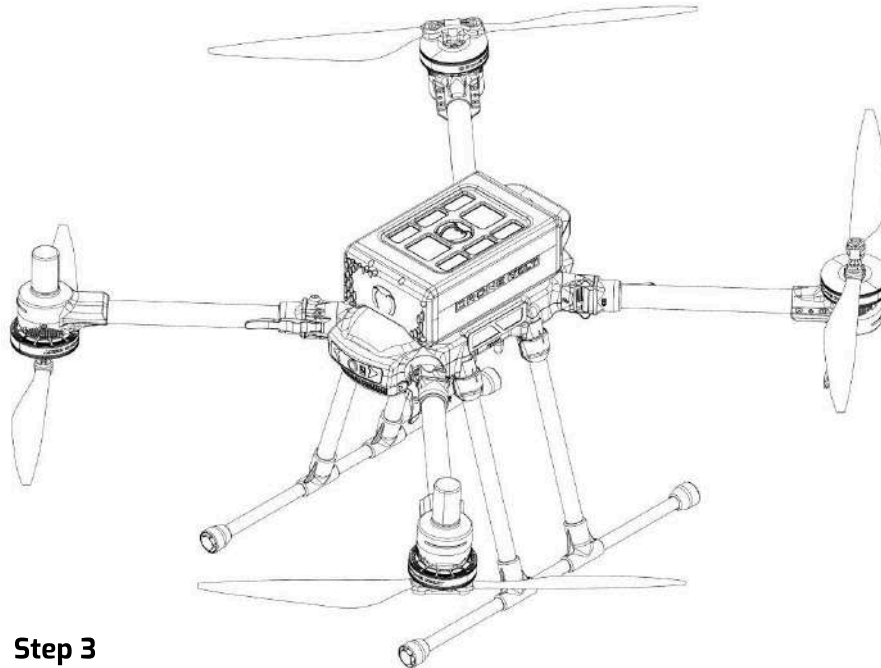
##### 2.6.2.1.1 Installing the Landing Gears

The installation of landing gears are parted into 3 steps;

- 1) Align and Insert.
- 2) Turn locking mechanism  $\frac{1}{4}$  revolution.
- 3) Gear safely installed, it should now not be possible to disconnect the landing gear with unlocking the locking mechanism.

The procedure is illustrated in the next three illustrations.



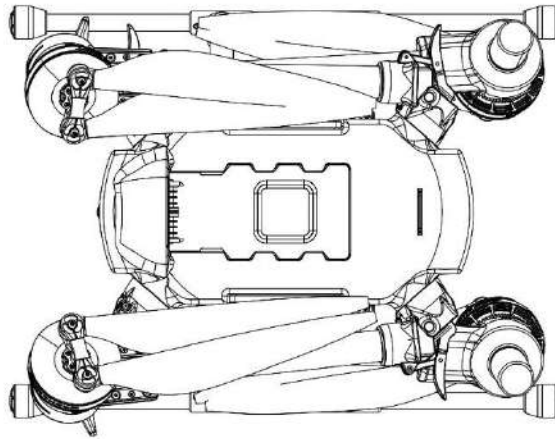
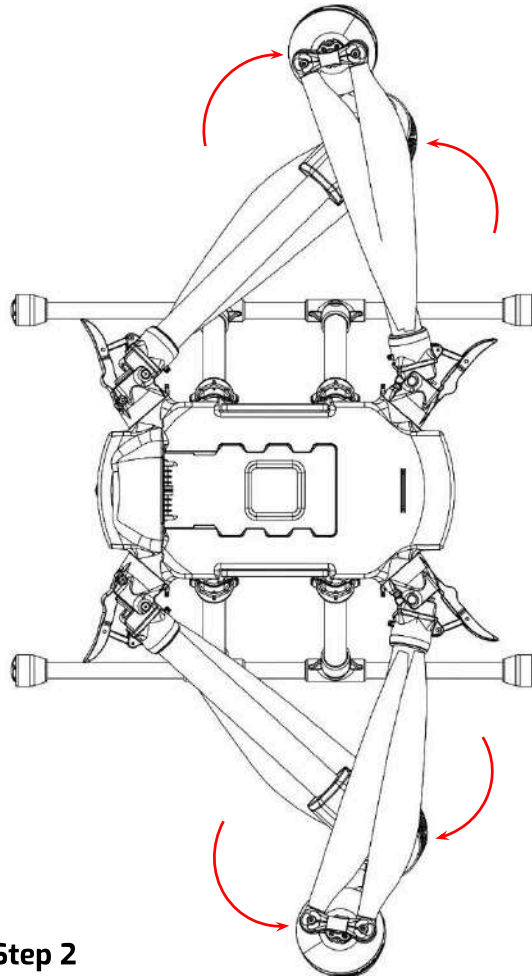


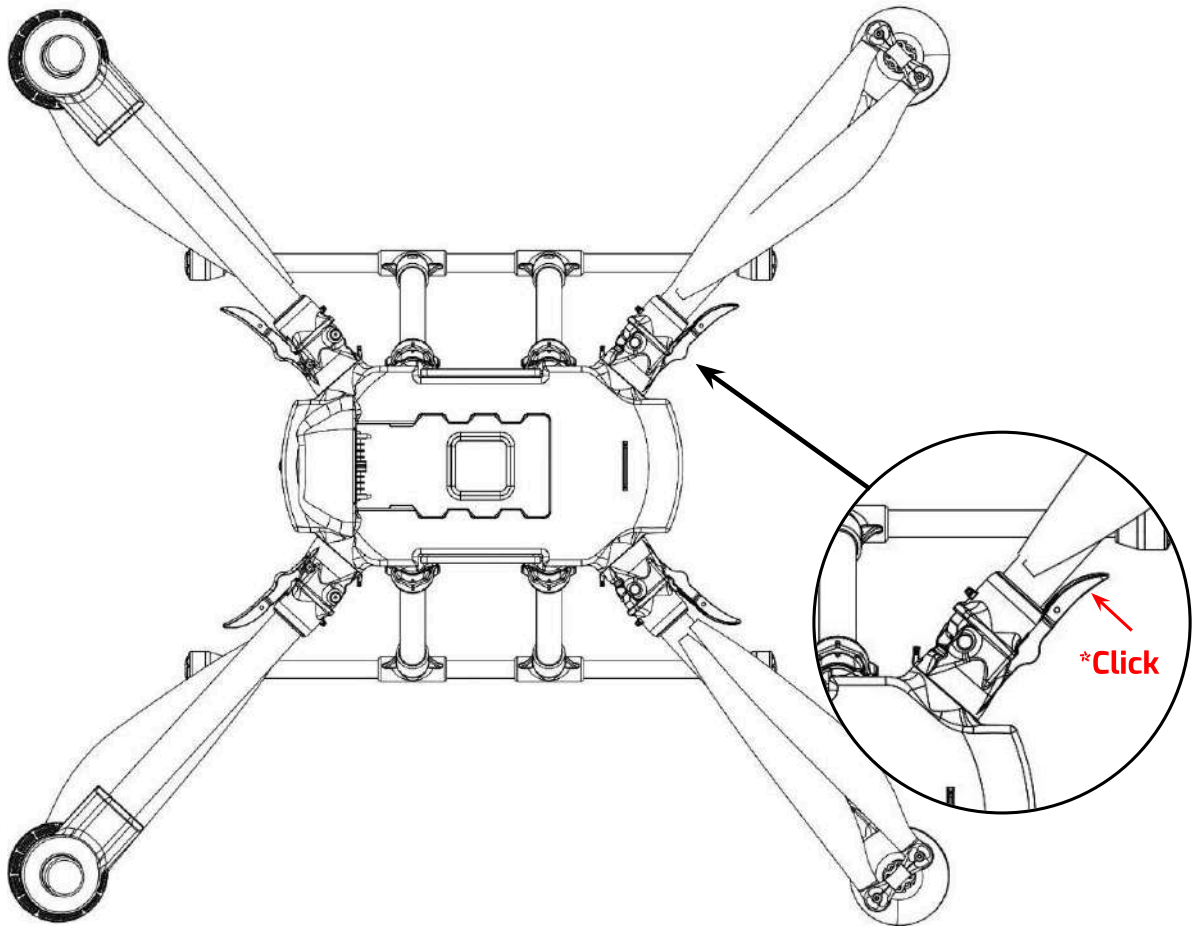
#### 2.6.2.1.2 Unfolding the Aircraft

In order to unfold the aircraft correctly, the user must follow these instructions.

- 1) In the folded state, unfold the rear arms over the front arms slightly.
- 2) Ensure that the C2 Link antennas are clear from the front arms and the GNSS antennas can go underneath the rear arms.
- 3) When an arm is unfolded, push the lock mechanism. When an audible “Click” can be heard, the arm is firmly and securely locked in place.

The steps are illustrated in the illustrations below.

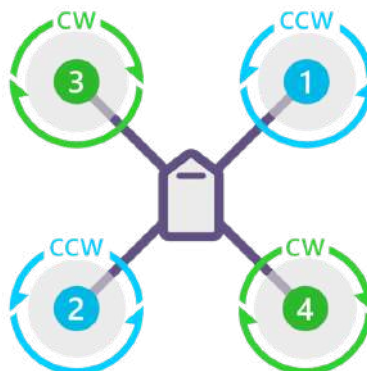
**Step 1****Step 2**



**Step 3**

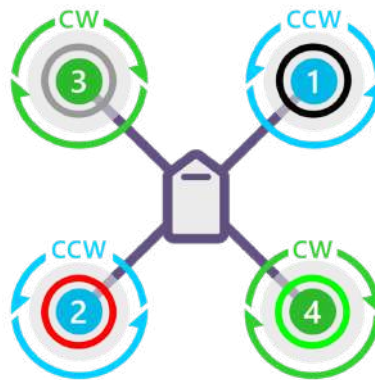
**2.6.2.1.3 Attaching/Replacing Propellers**

The KOBRA comes with pre attached propellers, however, in order to mount the propellers correctly the user must understand how the orientations work on the KOBRA:



The propellers must be attached according to the relative rotation direction of the motor, failure to do so will result in the inability to perform take off followed by (very likely) a flip of the KOBRA resulting in damages to the KOBRA (propellers, landing gear, etc.). Additionally, it is important to use Loctite when attaching/replacing propellers, the recommendation is to use Loctite 243.

The KOBRA comes with a set of push propellers and a set of pull propellers. The motor to propeller colour coordinated, according to the illustration below;



The mounting point on the motor indicated the corresponding colour;



When the propellers are attached correctly, the DRONE VOLT logo will appear on visible from above (additionally, notice that the logo are placed on the leading edge of the propeller in all scenarios);



Front side of the KOBRA.



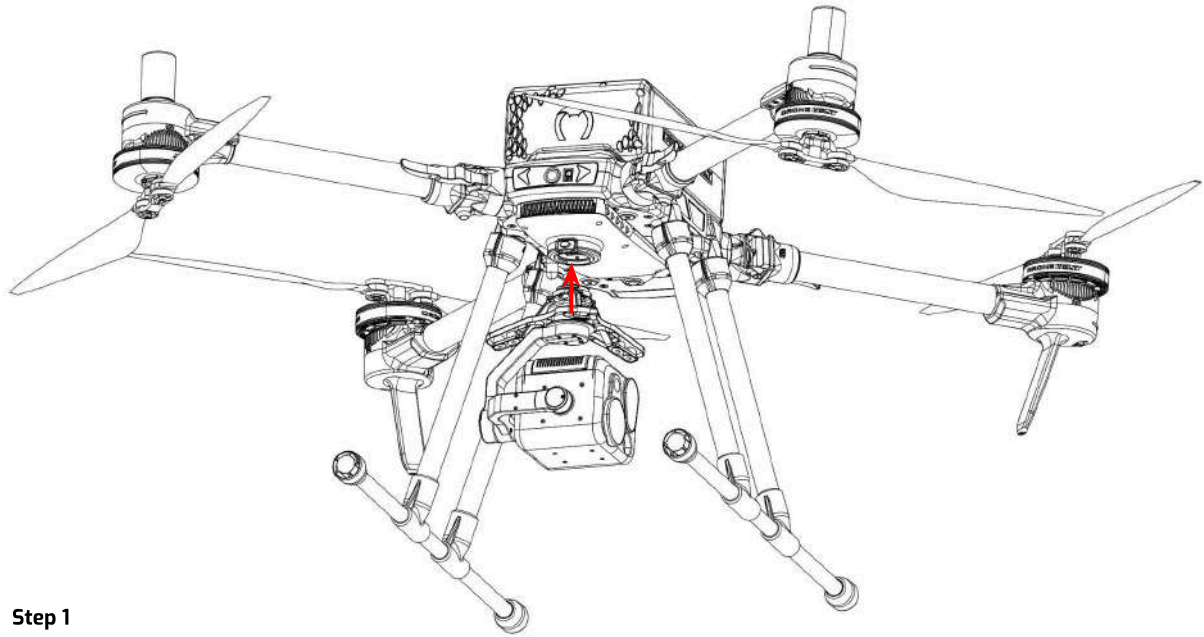
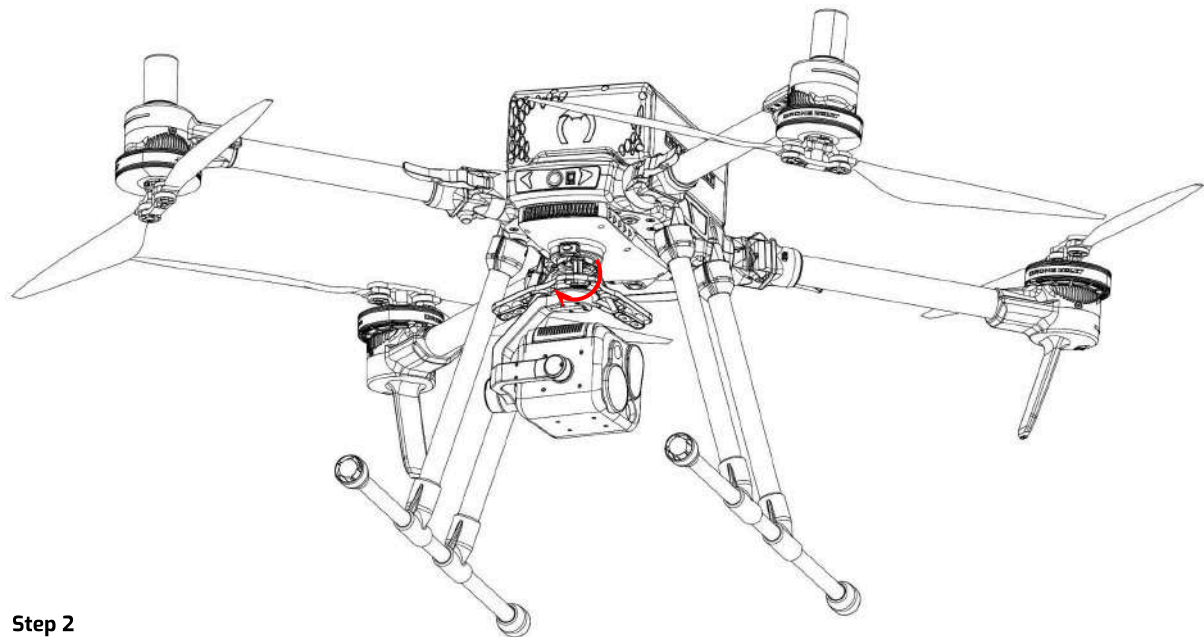
Rear side of the KOBRA.

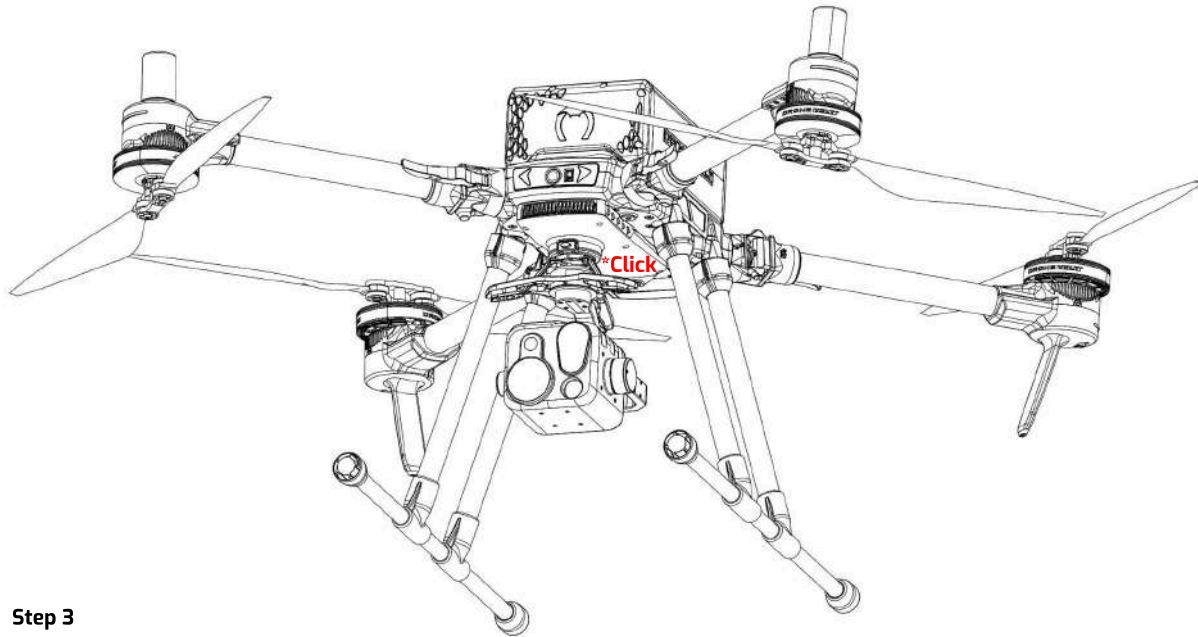
#### 2.6.2.1.4 Mounting Camera Payload(s)

In order to install cameras and other approved payloads, the user must use the appropriate payload attachment mechanism corresponding to the specific payload, as the individual payloads have their own quick release connector. The basic way to attach a quick release connector can be parted into three steps;

- 1) Place the payload connector in the "Open" or "Unlocked" position inside the quick release connector on the drone.
- 2) Twist the payload connector towards the "Locked" or "Closed" position.
- 3) Upon an audible click and the "Locked" or "Closed" button becoming active as a lock, the payload is properly attached to the drone quick release connector.

The three steps are illustrated below.

**Step 1****Step 2**

**Step 3**

There will follow a specific instruction to mount each approved payload, as mounting instructions will differ based on the specific payload option. This instruction will be delivered together with this user manual.

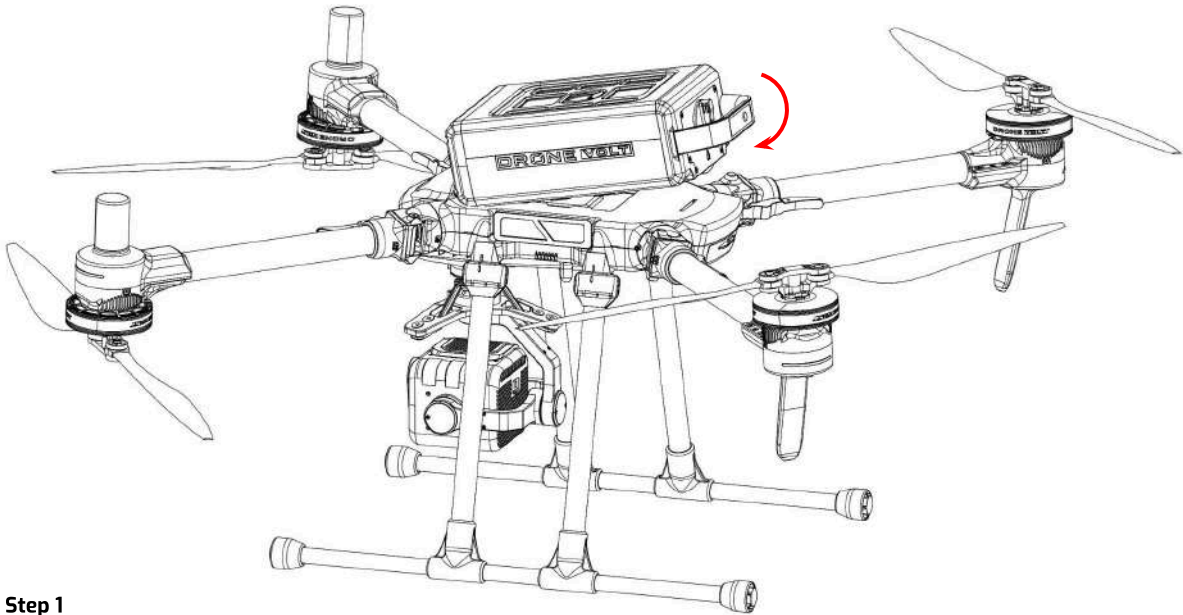
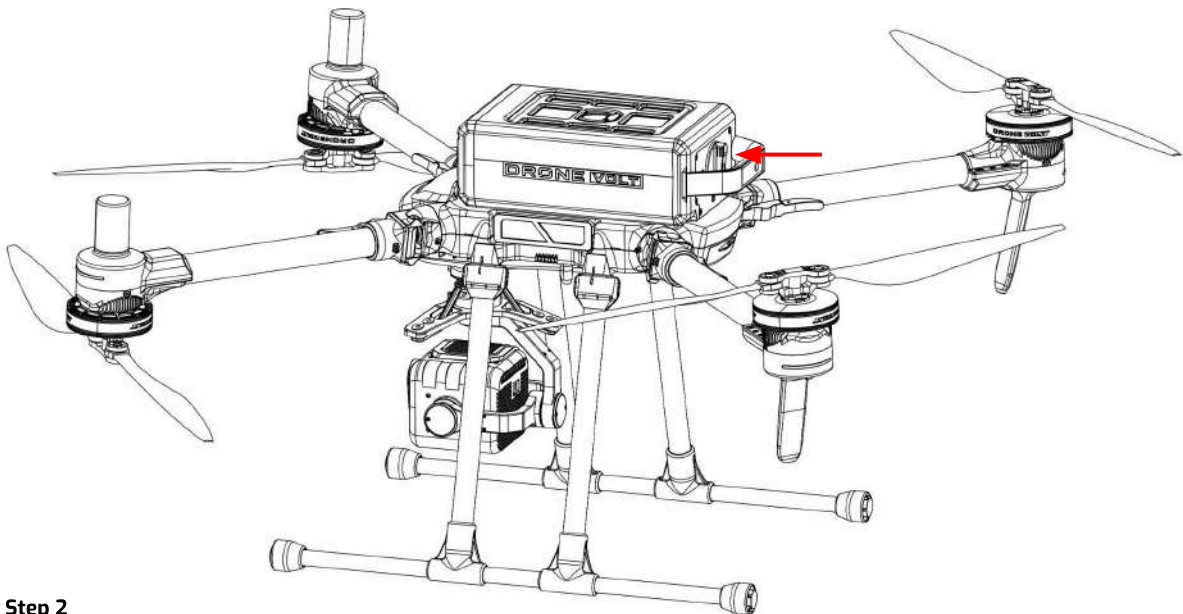
**2.6.2.1.5 Installing Battery**

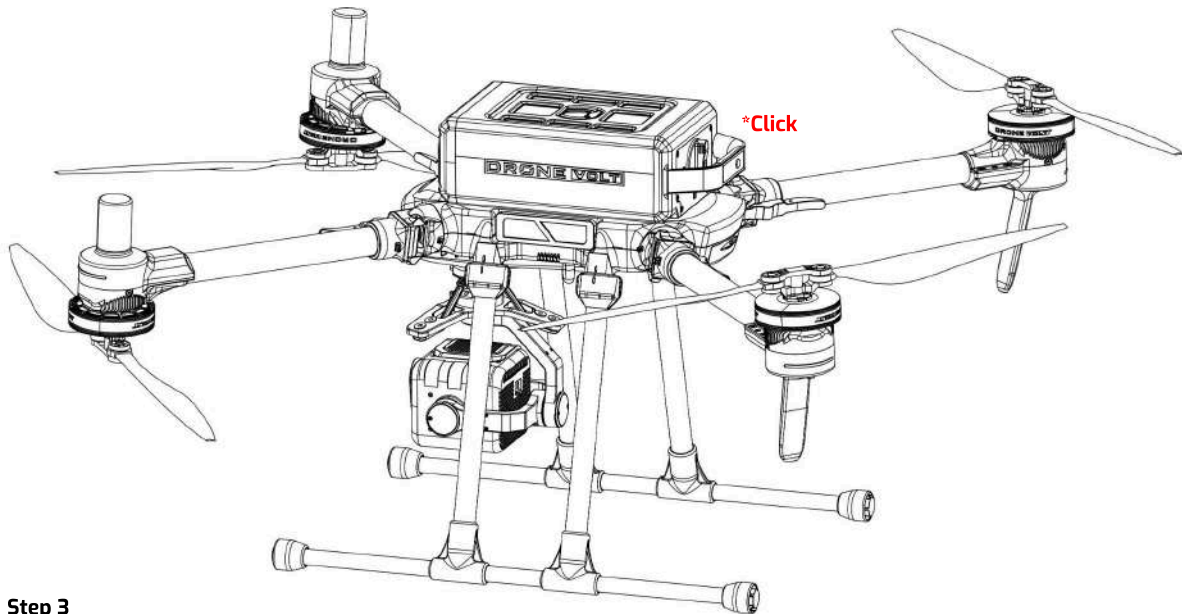
Insert battery into the slide mechanism, slide the battery all the way until the battery connection is established and twist the screw to lock the battery in place. The installation of the battery is defined in three steps;

- 1) Insert battery front first into the battery rails, let the front of the battery drop down.
- 2) When interfacing teeth are aligned, let the battery drop down into the rail interface while turning the locking knob to the "open lock" position.  
**NOTE: the battery will not fall all the way down until the knob is turned.**
- 3) With the battery flat in the bottom of the rail system, push the battery forward until the locking mechanism engages, an audible "click" should be heard, and the locking knob is in the "locked" position.

**IMPORTANT! Check the battery locking knob is in "locked" position and battery fully forward before flying the drone.**

The three steps are additionally illustrated below.

**Step 1****Step 2**



Step 3

#### 2.6.2.1.6 Storage of UA and batteries instructions

The KOBRA has one main battery and has the capability of hot swapping the battery system with its built-in system battery that lasts up to 30 seconds before turning the KOBRA system critical components off. The user is instructed to adhere and follow these instructions in order to be in compliance with the user manual.

##### 2.6.2.1.6.1 Battery System

The KOBRA comes with the DRONE VOLT APP10374126 Smart battery, and the battery user manual can be seen at [3.3 DRONE VOLT KOBRA Smart Battery](#).

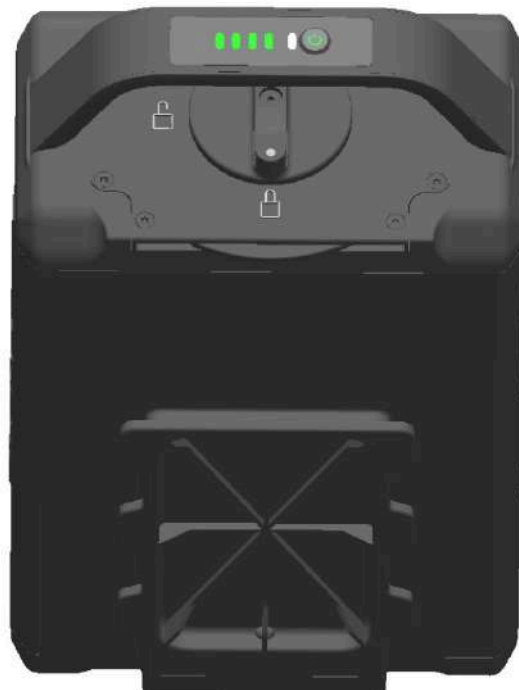
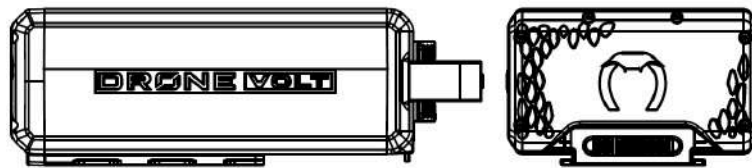
The KOBRA battery is a smart battery and by pressing the button on the handle the user can interact with it. The different pressing actions are defined as;

- Short Press: < 0.5 seconds
- Long Press > 1 second

The different modes of the battery are;

- Power on/off, 1 Short press followed by 1 Long press
- Battery Status, 1 Short press
- Hotswap Mode, 4 Short presses

**IMPORTANT! It is important to power off the drone with the power on/off button on the battery and DO NOT simply disconnect the battery, this will result in improper activation of the internal UPS system inside the KOBRA. If this happens, the KOBRA will be kept turned on for 60 seconds and will unnecessarily drain the UPS batteries.**



**Battery Specifications**

Type	<b>Semi Solid State Li-ion Lithium Nickel Cobalt Manganese</b>
Capacity	<b>22.000mAh</b>
Cells	<b>12S</b>
Continuous Discharge	<b>3C</b>
Temperature Range	<b>Operating Range: -5°C - 45°C Charging Range: 0°C - 45°C</b>
Storage and Transportation Temperature Range	<b>Short Term (1 month): -20°C - 45°C Long Term (6 months): -10°C - 35°C</b>
Charge	<b>1C</b>
Energy	<b>976.8 Wh</b>
Weight	<b>4.5Kg</b>
Weather Rating	<b>IP54</b>
Dimensions	<b>300x155x98mm (LxWxH) incl. handle</b>
Warranty Use Time Limitation	<b>300 Cycles / 12 Months (whichever comes first)</b>
Standards	<b>IEC62619:2022 UN38,3 RoHs/REACH</b>

More information about the KOBRA Smart Battery, see the datasheet of the battery in [3.3 DRONE VOLT KOBRA Smart Battery](#).

Beside the main battery, the KOBRA also includes internal UPS batteries for supporting the hot swap capability with only one main battery. Once the main battery is put into hot swap mode, and the user can switch the battery, the user has up to 30 seconds to swap the main battery. The instructions of performing this can be found at [3.3 DRONE VOLT KOBRA Smart Battery](#).

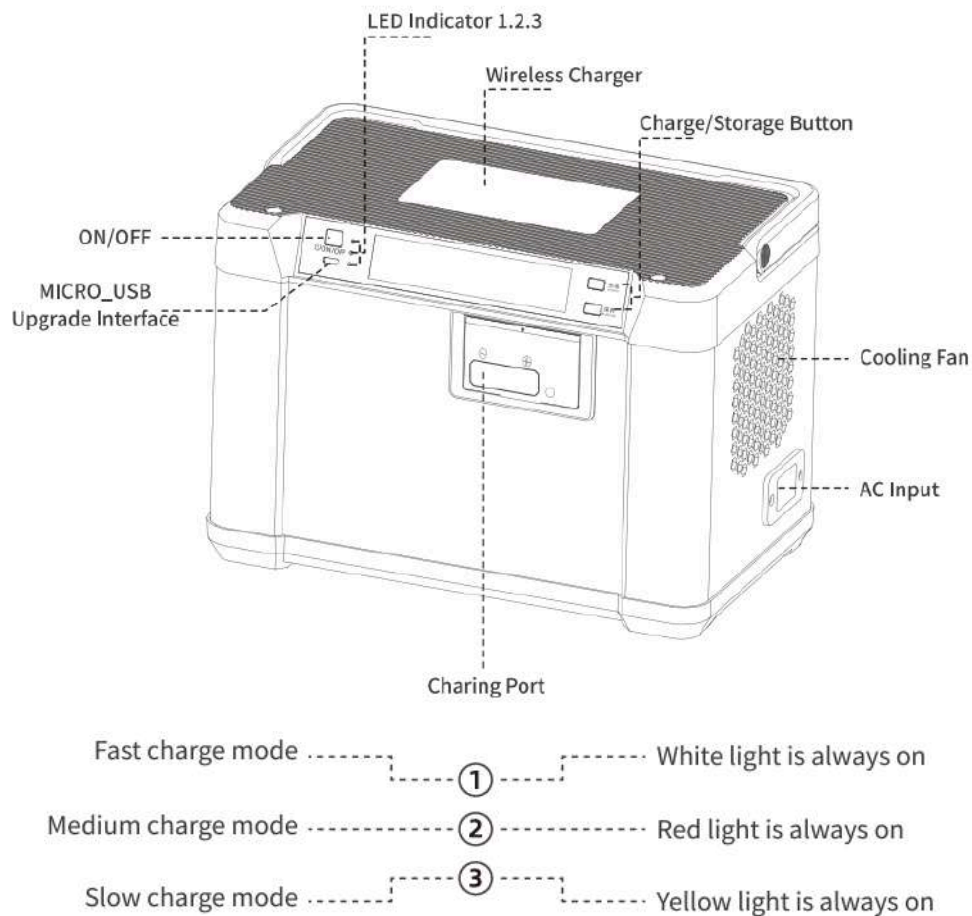
The UPS batteries charge up during normal flight operation, and the maintenance can be reviewed in [2.9 Maintenance Procedures](#). Under normal operation, the UPS batteries will conduct a full charge in approximately 1 hour.

**2.6.2.1.6.2 Battery System Charger and storage instructions**

The charger that comes along with the KOBRA is the EV-PEAK UD1. The manual of the charger can be seen at [3.4 EV-PEAK UD-1 Charger](#). In order to operate the charger the user must connect the charger to a power supply. Turn on the charger by long pressing the “main switch key”, and select charging mode by short pressing the main switch key. Chosen charging mode can be fast, medium or slow charging. The mode is indicated via the LEDs. The three charge modes are:

- Slow: 15A.
- Normal: 20A.
- Fast (Reserved for future use): Limited to 20A.

Connect the battery with the charging port with the charging cable that comes along with the KOBRA system and the charging process will automatically start. Short press the “Charging” button to stop and/or change the channel to where the battery is connected. Long press the “Charging” button to start charging.



For storage charging, power on the smart battery first and then connect it to the charger. Now short press the "Maintenance" button on the charger to stop the automatic charging. Then long press the "Maintenance" button to start storage charging. The user should "Power on" the battery according to the definition in [2.6.2.1.6.1 Battery System](#).

**IMPORTANT! In order to comply with the user manual, the user must use the KOBRA charger cable when operating the EV-PEAK UD1 charger.**



When the battery is not in use it is recommended to actively storage charge the battery with the accompanying UD-1 charger in order to maintain the lifespan of the battery. All specific recommendations and requirements for handling and safekeeping the battery, the user should adhere to [3.3 DRONE VOLT KOBRA Smart Battery](#). The user should also adhere to [3.4 EV-PEAK UD-1 Charger](#) in order to be compliant to this user manual.

### 2.6.2.2 Equipment to control UA remotely

When the equipment is not in use, the Herelink should be stored safely in the storage case for the KOBRA. For all instructions related to the C2 Link the user is referred to [2.5.1 Herelink](#).

### 2.6.2.3 Cleaning and Refurbishment

It is recommended to verify/validate that the exterior sensors of the KOBRA are sufficiently cleaned in order to work properly, this is one of the steps in the recommended pre-flight checklist, [2.6.3.2 Pre-flight Checklist](#).

The user should always adhere to the procedures and specifications of the C2 Link defined in this manual, section [2.5 Equipment to control the UA remotely](#) and [2.5.2 DV Skylink](#). The user is responsible for maintaining the KOBRA's ability to perform under normal conditions, so it is highly recommended to perform periodic maintenance checks of the drone in order to ensure system integrity.

It is the responsibility of the user to perform the adequate maintenance of the equipment which maintains the integrity of the system. This includes cleaning and hardware inspection of the entire system, including sensors on the drone as well as buttons etc. on the C2 Link. This is typically done as a part of the post-flight procedures, it is recommended to adhere to [2.6.7 Post-Flight Operations](#).

### 2.6.2.4 Pre-flight Calibrations

In order to perform flights in compliance with this manual and certification of the KOBRA, the user must perform the following pre-flight calibrations when prompted so. Adhere to the calibration procedure in section [2.5.2.5.4 Performing Calibrations](#).

## 2.6.3 Pre-Flight Operations

It is recommended that the remote pilot prior to operating the KOBRA has obtained adequate training and knowledge of the UA and equipment. Additionally, before initiating any flight operations, please ensure that the operational area are in accordance with local restrictions. Furthermore, the KOBRA has been set to the default maximum attainable height of 120 metres (400 ft) relative to the ground, exceeding this limit would potentially lead to noncompliance with local restrictions.

### 2.6.3.1 UA Operation Preparation

It is recommended that the user, prior to flight operation, clearly defines the operation and operates in accordance with local legislation.

There are a number of various things that need to be considered in the preparation of flight operation, and the system does not let the user perform takeoff before these are addressed. They are parted into failsafe settings and operational restrictions. For failsafes, the user is referred to [2.5.2 DV Skylink](#).

#### 2.6.3.1.1 Flight Environment

- Operate the KOBRA in visual line of sight (VLOS) to ensure flight safety.
- Do not use the drone in weather conditions which exceed what is defined in [2.2 KOBRA Requirement Specification](#) and [2.11 Operational Limitations](#).
- Make sure that lights for Controllability are operational and if operating during night; Lights for Conspicuity are functional.
- Make sure that the takeoff and landing site are flat, unobstructed, surfaces.
- Make sure that the battery is fully charged before flight.
- DO NOT operate the KOBRA in near areas that infringe local restrictions and/or legislation.
- ONLY attempt to perform flight operations when flight planning has been performed.
- ONLY attempt to operate the KOBRA from stable ground, i.e. DO NOT perform take off from moving surfaces such as from cars, vessels or similar.
- If operating in GNSS denied areas, fly with caution.
- Make sure that the temperature and humidity does not exceed that of KOBRA or payload specifications.

Additionally, the user should adhere with the warranty exclusions defined in [1.3 Warranty Exclusions](#).

**2.6.3.1.2 Maximum attainable height and distance**

The maximum attainable altitude can be set in the DV Skylink app. This is a mandatory setting which should be set prior to flight. The default value is set to 120 metres relative to ground. The user is referred to the following illustration for explanation on how to change the value. Upon reaching the user defined maximum attainable altitude, the KOBRA will stop and a maximum attainable altitude warning will be displayed.

The setup of the maximum attainable height can be seen in [2.5.2.2.1 Preflight Check Page](#).

The flight behaviour of the KOBRA in terms of maximum attainable height is highly related towards the signal integrity of the GNSS system. The flight behaviour is summarised in the table below.

<b>GNSS Denied Flight Operation (Atti Mode)</b>		
	<b>Limitation</b>	<b>DV Skylink</b>
Maximum Attainable Height	KOBRA cannot exceed the user-defined maximum attainable altitude. The default value is 120 metres AGL.	Warning prompted in DV Skylink. The KOBRA cannot exceed the altitude and the only action is to reduce altitude. The data source for the altitude is purely based on barometric data.
<b>GNSS Enabled/Available Flight Operation (All modes except Atti)</b>		
Maximum Attainable Height	KOBRA cannot exceed the user-defined maximum attainable altitude. The default value is 120 metres AGL.	Warning prompted in DV Skylink. The KOBRA cannot exceed the altitude and the only action is to reduce altitude. The data source for the altitude is based on barometric and GNSS data.

### 2.6.3.2 Pre-flight Checklist

This checklist should be used as a reference for what can be used for normal daily operations.

1. Make sure that KOBRA main battery and transmitter are fully charged.
2. Perform mechanical checks;
  - a. Visual inspection of broken cables and connectors, and bent propellers.
  - b. Visual inspection of cracks, dents, and loose screws.
  - c. Visual inspection of antennas, both on KOBRA and transmitter.
3. Ensure that the remote pilot is fit to operate: IMSAFEE (Adhere to [2.6.1 Crew Health Precautions](#)).
4. Make sure that firmware and software on KOBRA (both flight controller and companion computer) and transmitter are up to date to the latest official version issued by Drone Volt.
5. Verify that payload is attached properly and that it is operational.
6. Clean FPV camera on KOBRA.
7. Place KOBRA on a flat surface prior to turning equipment on.
8. Adhere to pre-flight checks prompted in DV Skylink.
9. Verify that Geo Awareness is working properly.
10. Verify that Remote ID setup has been done and is working properly.
11. Verify that KOBRA calibrations are up to date, if not, reperform them.

### 2.6.4 Flight Operations

In order to operate KOBRA the user must operate the drone in one of the three overall flight modes, ATTI, Loiter (subdivided in Slow, Normal, and Fast with different speed and control profiles as described in [2.6.5 Operational Modes](#)), or Auto mode. Additionally, automatic flight modes such as Return to Home (RTH) and LAND can also be used. Refer to [2.6.5 Operational Modes](#) for further details.

**IMPORTANT! The user shall at all times only use DV Skylink to control the KOBRA.**

It is recommended to perform flight operations based on the following checklist.

1. Perform proper flight planning, ensuring that drone operational area is in accordance with local restrictions, i.e. legislation.
2. Perform proper pre-flight check as proposed in [2.6.3.2 Pre-flight Checklist](#).
3. Place the drone on an even/flat surface in accordance with flight planning.
4. Turn on the transmitter followed by the drone.
5. Launch DV Skylink and attempt to connect to the drone.
6. Follow the instructions in the app.
7. When pre-flight checks in DV Skylink are completed, proceed to the flight view and verify that the FPV stream is working.
8. Advise people inside the operational area about take off.

9. Perform take off. The KOBRA will automatically take off to 2 meters height AGL and hover.
10. When flight operation is done, position the drone above the landing site and slowly pull down on the throttle stick to descend. Keep the throttle stick pulled down when landed to disarm the drone.
11. Turn off the drone followed by the transmitter.

### 2.6.4.1 Contingency and Emergency Operations

During normal operation the user is prompted to define what contingency and emergency actions that the KOBRA should automatically perform upon occurrence.

The user is referred to [2.5.2 DV Skylink](#) for detailed information and walkthrough of the settings prompted in DV Skylink. These settings additionally define the default and user selectable failsafe options, these are a part of the pre-flight checklist and include; Battery Low and Critical levels (Contingency and Emergency) and C2 Link Loss. For extended description the reader is referred to [2.5.1 Here link](#) for in detail description of the C2 Link and for the preflight checks (setup of failsafes), [2.5.2.2.1 Preflight Check Page](#).

### 2.6.4.2 Recommendations when updating SW

Upon performing mandatory software updates issued by Drone Volt, the user is recommended to perform a test flight in accordance with the test flight description in [2.6.4 Flight Operations](#).

**IMPORTANT! DO NOT try to upload custom or otherwise non compliant / non original software issued and maintained by Drone Volt.**

The user is referenced to [2.9 Maintenance Procedures](#) for SW updating frequency and procedure.

### 2.6.5 Operational Modes

The KOBRA has the following list of flight modes accessible for the user.

Flight mode	Description
Atti Mode	This is the default, lowest, flight mode selectable by the user. <ul style="list-style-type: none"> <li>• Throttle is automatically controlled to maintain the current altitude (middle position keeps it in hover).</li> <li>• Pitch and Roll lean angles are controlled by pilot</li> </ul>

	<p>control input and when the user releases the roll/pitch stick the drone automatically tries to level itself.</p> <ul style="list-style-type: none"> <li>● Yaw rate of change of heading is controlled by pilot control input, if the user releases the yaw stick the drone automatically stops and maintains the current heading.</li> <li>● When the drone enters a GNSS denied state, Atti mode is the default fallback. Additionally, if operating in GNSS denied areas is Atti mode the only usable flight mode<sup>6</sup>.</li> <li>● Altitude is estimated purely on barometric data.</li> </ul>
<p>Slow Normal Sport</p>	<p>GNSS enabled flight which is the recommended flight mode for most users and serves as the most user friendly flight mode. It is parted into three, Slow, Normal, and Sport. Normal is recommended for normal use.</p> <ul style="list-style-type: none"> <li>● Slow/Normal/Sport mode automatically attempts to maintain current location, heading, and altitude.</li> <li>● The user may operate the drone as if it were in a more manual flight mode, but as soon as the user releases the sticks the drone will stop and hold the current position.</li> <li>● The position in the horizontal plane can be controlled by the Roll/Pitch control inputs.</li> <li>● Altitude can be controlled with the throttle control input, if throttle stick is released the throttle will centre and remain at current altitude setpoint.</li> <li>● Yaw controls the heading similar to Atti mode.</li> <li>● Speed modes:             <ul style="list-style-type: none"> <li>○ Slow: Up to 5 m/s, milder tuning.</li> <li>○ Normal: Up to 12 m/s, normal tuning.</li> <li>○ Sport: Up to 12 m/s, sporty tuning.</li> </ul> </li> </ul>
<p>Auto Mode<sup>7</sup></p>	<p>Auto mode is intended for pre-programmed missions. These missions are defined as a list of <i>navigation</i> commands (waypoints) and <i>do</i> commands. The normal use-case scenario</p>

<sup>6</sup> The KOBRA is not capable of performing take off in GNSS denied areas, this is due to the default setting of the Direct RemoteID, for operating in GNSS denied areas (such as indoor flight operation), contact DV Support.

<sup>7</sup> Auto Mode is currently only available when a mission list is planned using the open source application Mission Planner.

	<p>is however to use higher level mission planning features such as polygon missions. This feature is not yet a part of DV Skylink, hence the user is referred to the open source application Mission Planner, see <a href="#">2.5.2.5 Mission Planner</a> and <a href="#">2.5.2.5.5 Mission Planning</a>.</p>
<p>Return to Home, RTH</p>	<p>Return to Home, RTH, will command the KOBRA return to the Home Position or the nearest user-defined Rally Point.</p> <ul style="list-style-type: none"> <li>• RTH will command the drone to return to the home position, meaning that it will return to the location where it was armed. Therefore, the home position is always supposed to be the drone's actual GPS takeoff location, unobstructed and away from people. The home position is the location the drone was in when it was armed. This means if you activate RTH, the KOBRA will return to the location where it was armed.</li> </ul> <p>Ordinarily when the KOBRA goes into RTH (typically triggered by an autopilot failsafe), the default behaviour is to return to the Home position (as defined earlier), but there are often cases when that can be undesirable. Should the drone enter RTH and Rally Points<sup>8</sup> have been defined then the drone will proceed to the closest Rally Point, rather than proceeding to the Home position.</p>
<p>LAND</p>	<p>If this mode is activated the KOBRA will initiate to land at the current position. This is equivalent to the landing procedure in Auto Mode. KOBRA will descend with vertical speed in two stages;</p> <ul style="list-style-type: none"> <li>• From Maximum Attainable Height down to 5 m relative to ground: 3.0 m/s.</li> <li>• From 5 m down to 0 m relative to ground: 0.4 m/s.</li> </ul>

## 2.6.6 Operational Conditions

In order to operate the KOBRA in compliance with this manual the user is instructed to at all times operate the KOBRA within the limitations specified in this manual.

Adhere to the instructions stated in [2.6 Operational Instructions](#) and specifically for pre-flight; [2.6.3 Pre-Flight Operations](#) in order to be compliant with this manual. For overall limitations, adhere to [2.11 Operational Limitations](#). In order to comply with this

---

<sup>8</sup> Rally Points are defined as a part of mission planning in Mission Planner.

manual, maintenance needs to be in accordance with [2.9 Maintenance Procedures](#). For troubleshooting, see [2.10 Troubleshooting Procedures](#).

**IMPORTANT! When transporting the KOBRA and equipment, ensure only to use the transportation case that the KOBRA is delivered with.**

## 2.6.7 Post-Flight Operations

The user is responsible for performing post-flight procedures in order to safekeep and guarantee the lifetime of the KOBRA. The user is recommended to follow these post-flight checks, or incorporate into the user's existing post-flight procedure.

1. When KOBRA is landed, turn off aircraft and safely uninstall batteries.

**IMPORTANT! It is important to power off the KOBRA with the power on/off button on the battery and DO NOT simply disconnect the battery, this will result in improper activation of the internal UPS system inside the KOBRA.**

2. Turn off C2 Link.
3. Check KOBRA visually for obvious damages and missing hardware.
4. Check KOBRA for mechanical wear and tear;
  - a. Visual inspection of broken cables and connectors, and bent propellers.
  - b. Visual inspection of KOBRA in general; sensors, knobs, etc. clean for potential dirt and debris.
  - c. Visual inspection of the C2 Link, including functionality and cleaning.
5. Check battery Depth of Discharge, DOD.
6. Extract flight logs from KOBRA
  - a. Adhere to [2.5.2.5.2 Extract Flight Logs](#).
7. In order to maintain battery integrity; storage charge the KOBRA battery with the accompanying KOBRA charger.
8. Store KOBRA along with equipment in flight case, for safe storage. Otherwise, verify UAV safely stored at user/operator facilities.
  - a. If equipment is wet or otherwise affected by the flight operation, let the system(s) dry at safe storage facilities.

## 2.7 Direct RemoteID

In accordance with ASD-STAN 4709:002 the direct RemoteID specifications are;

**Transmission Type** → **WiFi Beacon**

Method for uploading the UAS Operator Registration Number to the drone:

- Navigate to DV SkyLink**
- **Direct RemoteID tab in Preflight View (bottom of Preflight Checks)**
  - **UAS Operator ID**
  - **Type in UAS Operator Registration Number**

For setup of Direct RemoteID the user should adhere to [2.5.2.2.1 Preflight Check Page](#) for the Operator ID procedure.

## 2.8 Geo-Awareness Function

The Geo-Awareness function in the KOBRA is developed in accordance with ASD-STAN EN4709-003, and hence the definitions and methodologies adhere to said standard specification as applicable means of compliance.

The geo awareness function works by alerting the remote pilot upon being either close to or breached a UGZ, UAS Geographical Zone, either in the horizontal or vertical axis.

Upon potential breach, the remote pilot will get a clear alert from DV Skylink, the user is referred to [2.5.2.2.1.1 Geo Awareness Function](#).

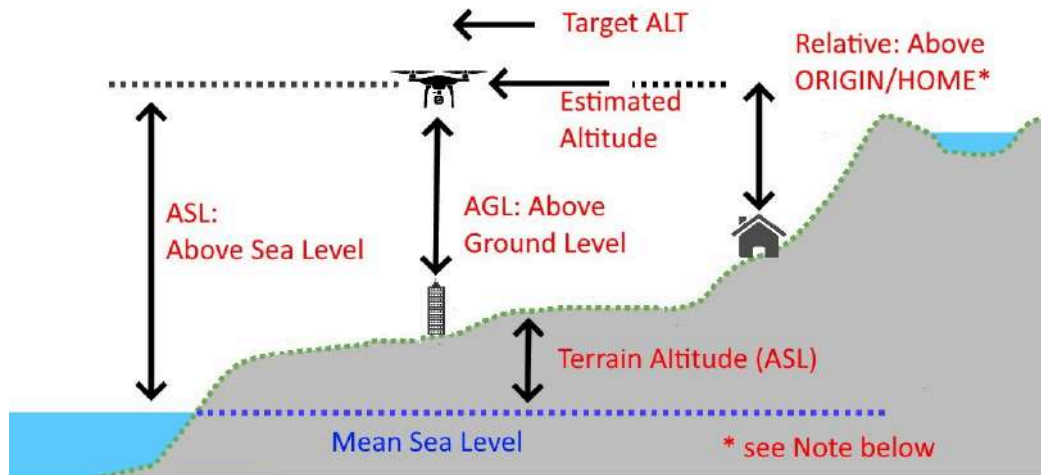
The threshold / time to alert is determined by the worst case scenario, flight operation in ATTI mode, where the KOBRA is capable of maximum speed up to 24 m/s. From ASD-STAN EN 4709-003 Annex A the following recommended response time for manual intervention (reaction time) is 5 seconds and as a safety margin with adding an additional reaction time of 4 seconds leads to a minimum threshold of 220m (rounding up). The user can change this threshold but not reduce this minimum boundary.

**IMPORTANT! The time synchronisation on the C2 Link is under the sole responsibility of the user. It is paramount that the remote pilot ensures that time is correctly defined in the underlying Android Operating system before performing drone operations.**

The geo awareness function computes logs of the geo awareness events in real time. However, the accuracy of the data entries are in seconds. It is likely that due to this timing accuracy that actual threshold distances may deviate from the selected threshold. It is recommended for the user to select a threshold distance from a worst case perspective in relation to the drone operation and select a higher threshold purely from a risk based perspective. It is the responsibility of the remote pilot to ensure the threshold distance is adequate in relation to the operation.

Procedures for uploading can be seen in [2.5.2.2.1.1 Geo Awareness Function](#), the user should notice that DV Skylink has implemented the mandatory manual upload function for UGZ files. The user remains responsible for not breaching the vertical and horizontal limits of the UGZ.

In order to understand and adhere correctly to the vertical limits, the user should know the distinguishing between the altitude estimates and their definitions;



Altitude definitions in the scope of KOBRA<sup>9</sup>.

## 2.9 Maintenance Procedures

This section introduces the recommended maintenance procedures and frequency of performing those. To begin, an overall frequency table for the maintenance checks, this is followed by a description of each maintenance checklist. The user should also adhere to the recipient maintenance as well as the software configuration and traceability procedures including the lifecycle of the KOBRA.

Maintenance Schedule	Every flight	Every operation	Every 50 hours	Every 150 hours	Every 300 hours	Every 500 hours	If required by DV Group
Visual check	x		x				
Propeller check	x						

<sup>9</sup>Illustration reference: [copter/docs/common-understanding-altitude.html](#)

Propeller replaced				X			
Check hot swap		X					X <sup>10</sup>
Check Motors	X		X				X
Check Battery		X					X
Update SW							X
Replace GNSS and Wifi antennas						X	X
Replace Battery					X		X

### 2.9.1 Checklist

This section will describe the instructions for maintaining each section mentioned in the table above. Each section will detail the maintenance steps, as well as describe when extensive checks or replacements are needed. Only replace parts with certified parts directly from DroneVolt, if any parts are replaced with parts not recognized by DroneVolt it will result in failure to comply with the user manual.

A full 3D viewing of the KOBRA including components and dimensions can be found in [2.3.1 Mechanical Overview](#).

Visual check:

- Every flight:
  - Look around the airframe for any visible cracks, dents, fractures and other potential damages.
  - Look for any potential deformation in the airframe.
  - Check every fixture is fixed to the arms.
  - Check that the motors and motor mounts are properly secured.
  - Check that the GNSS antennas are properly secured.
  - Check landing gear are fastened.
  - If any excessive or potential dangerous damage to the operation is found, replace any damaged parts if possible, or contact DRONE VOLT Support.
- Every 50 hours flight time:

<sup>10</sup> Included up to 2 times per year, if functionality is fully gone.

- Do an extensive visual check of the entire KOBRA, to ensure there are no hidden damages present.

#### Propeller check:

- Every flight:
  - Check propellers for any visual cracks, dents or damages.
  - Check that the propeller hub and blade screws are secured.
  - Check the friction and play of the propeller blades.
  - If any damage is present, do not perform any operations and replace damaged propellers immediately.
  - Check for any potential icing on propellers.
  - If any icing has occurred, remove icing, check for damages and check weather conditions, to ensure the operation is still done within the recommended weather conditions.
- If a replacement is needed, make sure to use Loctite 243 for the propeller hub screws.

#### Check hot swap:

- Every operation:
  - Check if hot swap functionality work as intended
  - If hot swap is not working as intended, contact DroneVolt for support.
- The internal UPS batteries can be changed up to 2 times per year. free of charge by DV Group, if hot swap functionality is completely depleted.

#### Check Motors:

- Check motors for potential corrosion, dents, or other damages.
- Check the radial and axial ball bearing play.
- Spin the motor to hear if anything is preventing it from freely rotating
  - Potential blockers can be excessive dust, grains of sand and dirt etc.
- If motors are not working as expected, contact DroneVolt for support.

#### Check battery:

- Every flight:
  - Before flight: Ensure battery is fully charged
  - Before flight: Ensure the battery is correctly attached.
- Check for potential puffing, leakage and other damages:
  - If this is true, adhere to [2.9.2 Recipient maintenance](#).

#### Update SW:

- Only perform when instructed so by DV Group. The customer should reach out to DV Support twice a year for inquiring about SW updates.
- Adhere to [2.5.2.5 Mission Planner](#) and [2.5.2.5.3 FW Update](#)

#### Replace GNSS and Wifi antennas:

- For every 500th hour, the GNSS and Wifi antennas should be replaced with new ones.
  - The antennas are easily replaced by unscrewing the respective antenna (both GNSS and Wifi antennas are attached with the same kind of SMA

threaded connector).

Return to service after storage:

- If the KOBRA has been in long-term storage, before performing any operation conduct a visual inspection of the KOBRA, including:
  - Visual check
  - Battery check
  - Propeller check
  - Motor check
  - Hotswap check (allow the UPS batteries to fully charge first)

### 2.9.1.1 Tools and Instruments to be used

To perform maintenance on the KOBRA, the following tools and instruments should be used, but are not coming along with the product;

- Standard HEX Key set
  - Used for Propeller replacement.
  - Used for Payload replacement.
- USB A - Micro USB Cable
  - Used to connect a computer to the KOBRA.
  - Used to connect the KOBRA main battery to a computer, if instructed by DV Support to perform a SW update on the battery.
- Cloth
  - Cloth needed to clean the exterior of KOBRA, LiDAR, camera(s), etc.

### 2.9.2 Recipient maintenance

KOBRA will be included with spare parts for propellers. When replacing propellers, unscrew the damaged propellers hub screws, making the motor ready for the new propeller replacement. There are also colour indications on the propeller and motor to guide which propeller fits what motor. To replace the landing gear follow the described procedure in section [2.6.2.1.1 Installing the Landing Gears](#) to uninstall and install new landing gear.

For instructions on proper cleaning and refurbishment follow [2.6.2.3 Cleaning and Refurbishment](#).

### 2.9.3 Software configuration

The KOBRA is fitted with a predefined and approved set of SW configurations. The KOBRA must under no circumstances be fitted with any software configurations not approved by Drone Volt. The approved list of SW configurations are as followed:

- Skylink - Version v1.1.4

- Onboard FW Version v1.4.0
- Ardupilot flightstack - Version ArduCopter v4.5.1

When updating the software configurations of the KOBRA, follow the **Update SW** check in [2.9.1 Checklist](#). If the C2 Link SW, DV Skylink, needs update, contact DV support and adhere to the instructions from DV support.

**IMPORTANT! The user should only perform SW updates to the system when instructed so by DRONE VOLT Group.**

DV Group issues release notes on all compliant software releases.

## 2.9.4 Traceability procedures

It is recommended for the customer to keep a Drone Logbook on all activities and actions the KOBRA has undergone. All official DV parts come with unique serial numbers and are kept in production logs at DV Group.

If software updates are issued by DV Group the customer will be contacted. It is recommended that the customers reach out to DV support twice a year to inquire about updates and similar and subscribe to DV newsletter about updates to our products.

The user shall adhere to any local regulations related to electronic devices when disposing of the aircraft and transmitter. It is important to note that the drone has built-in lithium batteries (for the hot swap capability).



The user should conduct a complete discharge of the batteries before disposing of them at the proper recycling facility.

**DO NOT dispose of the batteries as regular trash. Follow local regulation when disposing and recycling batteries.**

Dispose the battery immediately if it is unusable after an over discharge. If there are any mechanical issues with the battery, such as the button and/or LED indicator, contact DV support.

The user must at no time during the lifespan of the KOBRA delete the flight logs logged internally in the drone. This information is mandatory when the drone is subject for

maintenance done by DV approved service facility. See warranty exclusions in [1.3 Warranty Exclusions](#).

## 2.10 Troubleshooting Procedures

The user should adhere to the following troubleshooting procedures, failure to do so will result in non-compliance with this user manual. The user should adhere to the battery manual, [3.3 DRONE VOLT KOBRA Smart Battery](#), and charger manual, [3.4 EV-PEAK UD-1 Charger](#), for handling the equipment.

1. Cannot perform takeoff due to invalid preflight checks in the FMU(Flight Management Unit) related to sensor errors and/or warnings.
  - a. Contact DV Support.
2. Cannot perform takeoff due to improper Operator ID for Direct RemoteID.
  - a. Incorrect user Operator ID, adhere to identifier delivered by the National Aviation Authority, upon UAS operator eRegistration procedure.
3. Cannot perform takeoff due to invalid UGZ file input.
  - a. Contact DV Support.
4. Cannot perform takeoff due to invalid calibration reported by the FMU(Flight Management Unit).
  - a. Contact DV Support for instructions to perform calibration according to Mission Planner.
5. Payload issues.
  - a. Contact DV Support.
6. No function.
  - a. Check the main battery and the C2 Link has power. If the issue persists contact DV Support.
7. Power-on and start-up problems (no connection to C2 Link, LEDs not working, etc.).
  - a. Check the main battery has adequate power. If yes, Contact DV Support.
  - b. If issues with C2 Link, adhere to instructions defined in this manual on handling of the C2 Link incl. Antenna instructions. If the issue persists, contact DV Support.
  - c. If LEDs are not working: Contact DV Support.
8. Shut-down and power-off problems (no functional disarming, main battery not turning off, etc.).
  - a. Adhere to battery manual, if issue is not resolved: Contact DV Support.
9. Built-in UPS issues including no functionality or inability to turn off UPS function.
  - a. Contact DV Support.
  - b. DV supports up to two changes of the internal UPS batteries pr. year.
10. SW updates and update issues.

- a. Contact DV Support.
11. How to detect careless handling or incorrect storage conditions.
  - a. Contact DV Support.
12. Procedure to reset complete system to factory defaults, or last known working configuration.
  - a. Contact DV Support.

## 2.11 Operational Limitations

### Remote pilot competency

In order to operate the KOBRA in compliance with this manual and to its C3 certification it is mandatory to adhere to [2.6.1 Crew Health Precautions](#) in order to comply with basic remote pilot competency.

### UA Mass and balance

It is only permitted to operate the KOBRA in configurations defined by DV Group and retrofitting custom accessories is strictly not permitted. It is mandatory to reach out to DV Group if the customer wants to develop custom payload integration, DV Group will be able to guide and perform custom integrations. Operating the KOBRA with custom accessories is in non compliance with its C3 Certification, and is the sole responsibility of the customer.

### Speed and height limitations

KOBRA comes with speed limitations based on flight mode stated in [2.2 KOBRA Requirement Specification](#). Additionally, it is in SW restricted to operate up to 120 meters relative altitude (AGL), and setting of maximum attainable height can be seen in [2.5.2.2.1 Preflight Check Page](#). The customer shall reach out to DV Group if the customer is authorised to operate in higher altitudes (i.e. specific category in EU member states).

Maximum height limitations and maximum temperature ratings during transportation and storage (whether it be short term or long term storage) can be seen in [2.2 KOBRA Requirement Specification](#).

### Type of approved operations

The checklist for approved operational conditions are defined in [2.6.3.1 UA Operation Preparation](#). The KOBRA is equipped with LEDs for Conspicuity (nighttime operation) and will automatically turn on once the drone is arming and performing takeoff. The C2 Link will automatically alert the remote pilot if the drone is experiencing any sensor inconsistencies or similar (which could be related to the flight environment; power lines, large antenna structures, etc.) and the remote pilot should always terminate the flight

operation in the safest manner possible if this happens. In general, should the remote pilot always adhere to local restrictions/regulation when operating the drone.

It is also recommended to perform and adhere to [2.6.3.2 Pre-flight Checklist](#) and [2.6.4 Flight Operations](#).

### Wind limits

The drone is rated to operate in winds of up to 15 m/s, and it is the responsibility of the remote pilot to perform the necessary preflight checks ([2.6.3.1.1 Flight Environment](#)) in order to operate within the limits of the KOBRA.

The boundary of 15m/s has been empirically justified and the remote pilot is prohibited from exceeding this limitation.

### Temperature Range

The drone is rated to operate in ambient temperature ranges of -15°C - 40°C. This boundary has been empirically justified and the remote pilot is prohibited from exceeding this limitation.

### Performance limitations

When operating the equipment, it is important to adhere to all manuals, this user manual, incl. C2 Link, but also [3.3 DRONE VOLT KOBRA Smart Battery](#). When in doubt about operating the KOBRA with an approved payload, contact DV Support for assistance.

### Environmental limitations

It is mandatory to adhere to any environmental limitations stated for the [3.3 DRONE VOLT KOBRA Smart Battery](#) and [2.2 KOBRA Requirement Specification](#). Additionally, KOBRA will be certified with an IP2X rating, [3.1 IP Rating](#), it is the responsibility of the customer to upkeep this protection defined in [3.1 IP Rating](#). Exclusions to the warranty of the product can be seen in [1.3 Warranty Exclusions](#).

### Humidity and Icing Conditions

For drone operations icing-conductive conditions are assumed to exist when ambient temperature is within the nominal icing range and relative humidity exceeds conservative thresholds. Risk of icing during drone operations with KOBRA based on the ambient temperature and relative humidity thresholds are summarized in the table below.

Ambient Temperature [°C]	Relative Humidity [%]	Icing Risk Rationale
-15°C ≤ +5°C	RH > 75%	Potential risk of moisture presence near freezing supports icing onset. 75% is used

		as a safety margin
-15°C ≤ 0°C	RH ≥ 80%	Environment likely supports supercooled water droplets: high icing risk at RH > 80%
-15°C ≤ -5°C	RH ≥ 70%	At colder temperatures supercooled water droplets can still exist.
-15°C ≤ -10°C	RH ≥ 90%	At colder temperatures higher humidity is required to maintain liquid water. This is a conservative protective limit.

**From this we can define the following limitation:** Kobra operations are prohibited when ambient temperature is  $-15^{\circ}\text{C} \leq +5^{\circ}\text{C}$  and visible moisture is present, including but not limited to:

- Cloudy conditions
- Fog or mist
- Precipitation (rain, snow, freezing drizzle)

**IMPORTANT! The user should always assess local weather conditions that could sustain icing outside of these thresholds. Exceeding these limitations will with high likelihood sustain icing formation, but icing conditions can form earlier under local weather conditions.**

### Maximum Operating Altitudes

The maximum operating altitude is defined based on the MTOM of the KOBRA. The altitudes are expressed in above sea level (ASL<sup>11</sup>), for further explanation of ASL (and AGL) see end of section [2.8 Geo-Awareness Function](#). The altitudes are defined as the following

MTOM	Maximum Operating Altitude at -15°C
10.7kg	4km ASL
13.2kg	3km ASL
15.7kg	2.5km ASL

<sup>11</sup> ASL (Above Sea Level) and AMSL (Above Mean Sea Level) are often used interchangeably, the two measures describe the same.

### General limitations

The KOBRA comes with internal UPS batteries in order to achieve the hot swap capability. This feature will degrade over time, and the customer can contact DV Support twice per year to get them replaced, if the functionality is fully degraded. The customer is referred to [3.3 DRONE VOLT KOBRA Smart Battery](#) and [3.4 EV-PEAK UD-1 Charger](#) for general handling and limitations to the main battery and charger.

## 2.12 Risks related to UAS operations

It is recommended for the operator/user to have defined their own operational manual with detailed procedures for conducting drone operations. To ensure the safety of people involved in the drone operation, the following procedures should at least be adhered to before, during and after the operation.

Risk mitigation during Pre-flight and Post-flight:

1. Ensure that the [2.6.3 Pre-Flight Operations](#) and [2.6.7 Post-Flight Operations](#) are followed.
2. Ensure that everyone within the operation area, both involved and uninvolved, is informed about the operation. This includes, flight area, duration, general pathing and heading.
3. If flying at night, to your best ability, ensure that the area and flight geography is known before flight.
4. Check the battery for potential puffing, leakage and other signs of damage before and after use.
5. Ensure that weather conditions are optimal and abort operation if weather checks fail. This includes rain, fog, severe salty conditions, fungous conditions, sudden changes in weather; thunderstorms, sandstorms.

Risk mitigation during flight operations:

1. Ensure that the [2.6.4 Flight Operations](#) are followed.
2. Keep a lookout for any potential birds, planes, UA's etc. to minimise the risk of airborne collisions. If a situation where a potential airborne collision presents itself, act accordingly.
3. Ensure that weather conditions are optimal at all times during the operation, and abort operation if abrupt changes in weather presents itself. This includes rain, fog, severe salty conditions, fungous conditions, sudden changes in weather; thunderstorms, sandstorms.

Risk mitigation during maintenance operations:

1. Follow [2.9 Maintenance Procedures](#), to ensure the promised flight performance.

2. If during an operation the hot-swap functionality stops working, contact maintenance support.
3. If the KOBRA is not used for operations for long periods longer than 7 days, ensure that the battery is placed in storage mode, to maintain battery performance.

Risk mitigation during transportation:

1. Ensure that the KOBRA is properly secured before transport, to properly minimise potential damages during transport.
2. Ensure that the KOBRA is at all times only transported in the original transportation case.

Risk mitigation during shelf storage:

1. Ensure that [2.6.2.1.6 Storage of UA and batteries instructions](#) and [2.6.2.1.6.2 Battery System Charger and storage instructions](#) are followed.
2. Ensure storage area stays within specified temperatures at all times, see [2.6.2.1.6.1 Battery System](#)
3. When storing for longer periods of time, ensure the KOBRA and all its components are stored within the respective transportation case.

The KOBRA is equipped with over the air encryption, using minimum AES-128 for [2.5.1 HereLink](#).

It is recommended that the user ensures that any operation where sensors are able to capture personal data, follows local data protections legislation.

During any operation it is the user's own responsibility to ensure that the surrounding area and all personnel are safe. When ensuring personnel, the following Personal Protective Equipment, PPE, is recommended:

1. High visibility working clothes.
2. Safety helmet.
3. Safety goggles or glasses.
4. Safety gloves.
5. Ear protection.

## 3 Appendix

---

### 3.1 IP Rating

Under stable laboratory conditions, the KOBRA achieves an IP2X protection rating in accordance with IEC62368 when equipped with the main battery and accessories. The rating only covers the Kobra and not individual payloads.

The following is mandatory in order to maintain the IP protection:

1. DO NOT fly in excessive weather conditions such as rain and fog.
2. Make sure the battery connector on the drone, battery, hinge and payload connector are dry before use.
3. Before packing the drone in its transportation case, make sure to wipe and dry the system completely.
4. Product warranty does not cover water damage or otherwise using the product in conditions defined in [1.3 Warranty Exclusions](#).

The KOBRA does not achieve the specified IP rating in the following configurations:

- The arms are not closed in the locked position.
- The KOBRA is suffering from improper handling, broken platform, dents to main chassis, cracks/dents in motor mounts or glands/sealing broken or improperly attached payloads.

### 3.2 C3 Certification

The DRONE VOLT KOBRA is in compliance with the C3 class. When operating the KOBRA in EU member countries the user must adhere to this manual and only use the original hardware and software issued by Drone Volt Group.

UAS Class	<b>C3</b>
Sound Power Level	<b>105 dB</b>

#### 3.2.1 MTOM Specification

The MTOM of DRONE VOLT KOBRA, including main battery, payload, propellers, and any other approved accessory, is not larger than 15.7 kg in order to comply with the manufacturer instructions and hence the C3 certification.

**DO NOT use any unauthorised third party accessory or replacement part on the DRONE VOLT KOBRA**

**DO NOT attempt to retrofit accessories to the drone that is not in accordance with the manufacturer instructions**

**DO NOT perform take off with the DRONE VOLT KOBRA with an MTOM larger than 15.7 kg**

### 3.2.2 Direct Remote ID

In accordance with ASD-STAN 4709:002 the direct RemoteID specifications are:

**Transmission Type** → **WiFi Beacon**

Method for uploading the UAS Operator Registration Number to the drone:

**Navigate to DV SkyLink** → **Direct RemoteID tab in Preflight View (bottom of Preflight Checks)**

→ **UAS Operator ID**

→ **Type in UAS Operator Registration Number**

In order to be compliant to the DRI requirement, the user must input a valid Operator Registration Number, otherwise the DRONE VOLT KOBRA cannot perform take off.

### 3.2.3 List of Approved Equipment, including Qualified Accessories

Manufacturer	Model	Dimensions [mm]	Weight [g]	MTOM [kg]
ViewPro	Winch	197x130x102mm	1295g + 3705g (Max. Load)	15.7kg
ViewPro	H30T	173.5x128.7x198.9mm	1084g	11.784kg
ViewPro	Q30T	121.5x166.5x130mm	876g	11.576kg
ViewPro	Q10F	86.2x108x140.6mm	431g	11,131kg
BRAVESTAR	SCORPIO	164x80x99mm	860g +/-10g	11.56kg ±0.01kg

NEXTVISION	Raptor	H: 128mm D: 100mm	640g	11.34kg
NEXTVISION	NightHawk2-UZ	H: 94mm D: 64mm	350g	11.05kg
NEXTVISION	NightHawk2-V	H: 94mm D: 64mm	320g	11.02kg
NEXTVISION	Night-Hawk 2	H: 94mm D: 64mm	250g	10.95kg
NEXTVISION	Colibri2	H: 53mm D: 81mm	180g	10.88kg
NEXTVISION	X80	L: 40mm W: 40mm H: 75mm	145g	10.845kg
NEXTVISION	DragonEye2	H: 65mm W: 40mm D: 40mm	125g	10.825kg
Gremsy	VIO-G1	173x148x159mm	854g	11.554kg
InairTech	LiAir X3-H	136x106x129mm	1250g	11.95kg
MÉRIO	Témis XL 3 axes	H: 195mm Diameter : 85mm	1150g	11.85kg
MÉRIO	Temis XL 16	H: 356.3mm Diameter : 250mm	XL16: 1700 g ±100g XL16 Z: 1800 g ±100g XL16 GS: 1800 g ±100g	XL16: 12.4kg ±0.1kg XL16 Z: 12.5kg ±0.1kg XL16 GS: 12.5kg ±0.1kg
MÉRIO	Temis Compact	H: 144mm Diameter : 85mm (min) 100 mm (max)	550g	11.25kg
MÉRIO	Temis L20	H: 309mm Diameter : 140mm (main body) 200 mm (max)	4200g	14.9kg
AVANTIX	MC41_V1	150 x 210 x 50 mm	2100g	12.8kg

CZI	TH4V2	N/A	320g + 4680g (Max. Load)	15.7kg
CZI	MP130 V2	140x140x125mm	570g	11.27kg
CZI	GL60 Plus	126x131x167mm	700g	11.4kg
Yellow Scan	Mapper	H: 149mm W: 87mm L: 143mm	1300g	12kg
Yellow Scan	Vx15 Series	H: 149mm W: 106mm L: 353mm	2400g	13.1kg
Yellow Scan	Explorer	H: 135mm W: 118mm L: 270mm	1800g	12.5kg
Yellow Scan	Navigator	H: 190mm W: 160mm L: 350mm	3700g	14.4kg
Yellow Scan	Mapper+	H: 132mm W: 104mm L: 150mm	1100g	11.8kg
Yellow Scan	Vx20 Series	H: 149mm W: 106mm L: 432mm	2850g	13.55kg
Yellow Scan	Surveyor Ultra	H: 117mm W: 113mm L: 153mm	980g	11.68kg
Yellow Scan	Voyager	H: 183mm W: 117mm L: 369mm	3500g	14.2kg
GDU	PQL-01 Quad	153.5x163x179.5mm	930g	11.63kg

### 3.2.4 Approved Spare Parts

Part Name	Model No.
DRONE VOLT KOBRA Propeller 24" Pull CCW	KDV1-P0155

DRONE VOLT KOBRA Propeller 24" Pull CW	KDV1-P0156
DRONE VOLT KOBRA Propeller 24" Push CCW	KDV1-P0157
DRONE VOLT KOBRA Propeller 24" Push CW	KDV1-P0159
DRONE VOLT Smart Battery	APP10374126
DRONE VOLT KOBRA Landing Gear	KDV1-A0011
DRONE VOLT KOBRA Right Front Arm	KDV1-A0009
DRONE VOLT KOBRA Left Front Arm	KDV1-A0006
DRONE VOLT KOBRA Right Rear Arm	KDV1-A0008
DRONE VOLT KOBRA Left Rear Arm	KDV1-A0007
DRONE VOLT KOBRA GNSS Antenna	KDV1-P0029
DRONE VOLT KOBRA WIFI Antenna	KDV1-P0087

### 3.2.5 C2 Link Warnings - Remote Controller Warnings

The DRONE VOLT KOBRA will indicate a C2 Link disconnection with a 'Fast Blink Red' indicator on all four arms. Additionally, the C2 Link transmitter (both options) will with audible feedback indicate that there is no connection. The system attempts during all time to auto connect.

**Please reduce any interference between the transmitter and the drone, it is imperative to maintain radio line of sight, LOS, in order to ensure signal integrity.**

**The user is responsible for doing so, as well as ensuring that the transmitter can be used under the local conditions, i.e. in sunlight, dusk, etc.**

### 3.2.6 Geo Awareness

DRONE VOLT Group is obligated and committed to develop and produce tools for safe flight operations. This includes the maintenance and support adhering to European regulations and enabling geo awareness functionality defined by UAS Geographical Zones defined by EASA and EU member states.

DRONE VOLT Groups commitment stands in the assurance of correct interaction with UGZs defined in EUROCAE ED-318. Additionally, the system also supports the predecessor format, EUROCAE ED-269.

The geo awareness functionality features the mandatory manual method for uploading UGZ files, however, it is DRONE VOLT Groups commitment to develop an automatic service built-in the KOBRA which will download the UGZ based on the respective EU member state. This will ease the use of the KOBRA for the end-user significantly, in the meantime, if the end-user has any difficulties with the manual method, DRONE VOLT Support will be able to aid in achieving the proper files for maintaining flight operations throughout the EU.

It is always the user's responsibility to adhere to any local restrictions beside the UGZ defined by the respective EU member state.

### **3.2.7 EASA Notice**

Make sure to follow EASA and local restrictions when operating the DRONE VOLT KOBRA, for more information for EASA member states;

<https://www.easa.europa.eu/en/document-library/general-publications/drones-information-notices>

### 3.3 DRONE VOLT KOBRA Smart Battery

User guide

### Smart Battery

**DRONE VOLT**<sup>®</sup>



Thank you for  
your purchase

APP10374126

Made by ADV-POWER

**Contents****Packaging**

01-Disclaimers	03
02-Reading tips	03
03-Introduction	04
04-Warnings	05
05-Battery function	08
05.1-LED indications	08
05.2-Start button options	09
05.3-Intelligent communication	13
05.4-Charging	15
06-Battery storage and transport	17
07-Connector	18
08-Maintenance	15
09-Recycling	20
10-Technical specifications	21
11-Notes	18
12-Packaging	19

**Included:**


- User guide
- Quick start
- Battery
- Connector cover

**Notes**



If there is a short circuit/the power-on current is too high, unplug the battery and check whether there is any foreign matter at the connection between the battery and the drone. If the power-on voltage is too low, the battery needs to be charged before use.

For other abnormalities, after troubleshooting (excessive charging current, overcharged battery voltage, overcharged device voltage), please press the power button to cancel the LED light protection prompt, and re-plug the charging device to resume charging.

 Smart batteries must be charged with special charging equipment approved by ADVANTELEC and DRONE VOLT.

ADVANTELEC will not be responsible for any consequences caused by charging equipment not offered by ADVANTELEC.

When charging, please place the battery and charging equipment on the ground without flammable or combustible materials around cement. Please monitor the battery charging to prevent accidents. In order to ensure the safety of charging, the distance between the battery and the charger, and the distance between two batteries must be greater than 30 cm during charging, so as to avoid the failure of the charger or battery caused by concentrated heat, or even cause serious consequences such as fire.

The charging environment temperature of the battery is 0 °C to 45 °C, and the ideal charging environment temperature (22 °C to 28 °C) can greatly prolong the service life of the battery.

**Disclaimers**

Thank you for purchasing a product from ADV-POWER<sup>®</sup>. Before using this product, please read and follow this document and all safety and compliance guidelines provided by ADV-POWER<sup>®</sup>. Otherwise it may cause harm to you and the people around you, and damage the product or other surrounding items. Once you use this product, you are deemed to have read this document carefully, understood, recognized and accepted all the terms and contents of this document and all related documents of this product. You undertake to use this product only for legitimate purposes. You promise to take full responsibility for the use of this product and possible consequences. ADV-POWER<sup>®</sup> is not responsible for any damage, injury or any legal responsibility caused by the direct or indirect use of this product. The final interpretation right of this document and all related documents of this product belongs to ADV-POWER<sup>®</sup>. Subject to update without notice. Please visit : [www.adv-power-lyon.com](http://www.adv-power-lyon.com) official website for the latest product information.

**Reading tips**

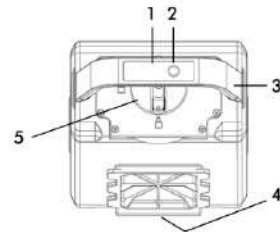
This notice uses the following terms to classify the potential hazards that may be caused by improper operation.



This product is relatively complex, and it needs to be familiar with for a period of time before it can be used safely, and it needs to have some professional knowledge before it can be operated. Without a strong sense of safety, improper operation may result in product damage and property loss, and even cause serious injury to yourself or others. This product is strictly prohibited for use by persons under the age of eighteen. Do not use unofficially provided or recommended components, and must strictly follow the official guidelines to install and use the product. This documentation contains safety, operation and maintenance instructions. Be sure to read all instructions and warnings in these instructions carefully prior to assembly, setup, and use.

**Introduction**

APP10374126 smart battery adopts high-energy-density cells and advanced BMS to provide sufficient power and safety guarantee for the drone. The APP10374126 smart battery has a capacity of 22000mAh and a nominal voltage of 44.4 V.



**1-LED indicators**

Indicates the battery level and other relevant information of the battery . cf page 8

**2-Power button**

On/off switch and command button.

**3-Handle**

The battery can be lifted by the carrying handle.

**4-Power connector**

For connection to drone (electrical device) or charger.

**5-Locking knob**

Battery's lock and unlock knob on the drone

**Technical specifications**

Parameters	APP10374126 Smart Battery (12S22Ah)
Nominal voltage	44,4 V
Battery type	Li-ion
Battery chemistry systems	Lithium nickel cobalt manganese
Discharge rate	3.0C
Operating temperature	-5°C~45°C
Charging temperature	0°C~45°C
Storage temperature	Short term storage (1 month) -20~45°C Long term storage (6 months) -10~ 35°C
Warranty use time limit	300 cycles or 12 months (whichever comes first)
Capacity	22,000 mAh @25°C
Energy	976.8 Wh
Maximum charging rate	0,9C (20A)
Compatible with charging devices	APCH3000X2 3000W Smart Charger APCH3000X4 3600W Smart Charger
Full time per battery	Use Adaptive Charging Device: 70 minutes @ 1C (0-45°C)   90 minutes @ 0.5C (0-45°C)
Weight	Approx. 4,5 kg
IP	54
Standard	IEC62619:2022 UN38,3 ROHS/REACH

## Recycling



## Warnings



Batteries are hazardous chemicals and must not be disposed of in ordinary trash. Please follow the local laws and regulations on battery recycling and disposal.

**Before using the battery, please read and understand carefully this user guide**

Do not use bulging, leaking or damaged batteries. If the above situation occurs, please contact the agent for further processing.

Before installing or removing the battery from the drone, please power off the battery. Do not plug or unplug the battery when the battery power is turned on, otherwise the power interface may be damaged.

The battery should be used at an ambient temperature between -5°C and 45°C. If the temperature is too high (higher than 50 °C), the battery may be severely damaged. If the temperature is too low (lower than -5 °C), the performance of the battery will be severely reduced and cannot meet the requirements of normal use. It can be used normally after returning to normal temperature.

Do not use the battery in a strong static or magnetic field environment. Otherwise, the battery protection board may be abnormal, resulting in a serious failure of the drone.

Do not disassemble or pierce the battery with sharp objects in any way. Otherwise, it will cause the battery to catch fire or even explode.

The liquid inside the battery is highly corrosive, if it leaks, please stay away. If the internal liquid splashes into the human skin or eyes, please rinse it with clean water immediately and seek medical attention immediately.

If the battery is dropped from the drone or hit by external force, it cannot be used again.

If the battery accidentally falls into water during flight or other circumstances, it cannot be used again.

If the battery catches fire, it is recommended to use fire extinguishing equipment in the following order: water or water mist, sand, fire blanket, dry powder, carbon dioxide fire extinguisher.

Do not place batteries in microwave or pressure cooker.

Do not use wires or other metal objects to short-circuit the positive and negative poles of the battery

Do not hit the battery. Do not place heavy objects on the battery or charging device.

If there is dirt on the battery interface, wipe it off with a dry cloth. Otherwise, it will cause poor contact, which will cause energy loss or failure to charge.

Please avoid continuing to fly when the battery power is lower than 20%, otherwise it will cause battery damage or cause flight accidents.

It is forbidden to reversely connect the positive and negative poles of the battery, otherwise the battery may be overheated, explode or catch fire if it is charged abnormally. Do not use unofficially recommended chargers. If you need to replace it, please contact the after-sales service or the designated agent. Battery accidents and flight failures caused by the use of unofficial chargers shall be borne by the user.

When handling the battery, be sure to hold the battery handle.

When placing the battery, it is necessary to confirm that the ground is flat to prevent sharp objects from poking the bottom of the battery.

Batteries are classified as dangerous goods. It is forbidden to pile up other items on the battery, or use the battery and the package containing the battery as a cushion, otherwise it may cause damage to the battery or even cause danger.

The battery is heavy, please place it carefully to prevent the battery from falling over and causing damage to the side of the battery. If the battery is dumped and damaged, please place the battery in an open area immediately, away from combustibles and people. After half an hour, soak the battery in water for more than 24 hours. Make sure the battery is completely exhausted before disposing of it.

## Maintenance

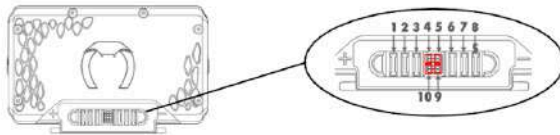
Do not wash the battery with water.

Do not store batteries at temperatures above 45°C or below -20°C.

If the battery is idle for a long time, its performance will be affected.

Recharge and discharge every 3 months or so to maintain battery activity.

## Connector



N° PIN	Name	Description
1-3	P+	Battery Positive
4	CAN signal	CAN bus
5	CAN signal	CAN bus
6-8	P-	Battery Negative
9	GSS	Signal Ground
10	Drone presence detection	Logical detection for connection to drone or not

## Bluetooth

The battery is equipped with a Bluetooth module intended just for professional maintenance purposes.

When the battery is not installed in the drone, pressing the button on the battery activates the Bluetooth module. This activation occurs simultaneously with the battery level LEDs turning on. The Bluetooth module automatically disables itself after several minutes of being active.

Additionally, the Bluetooth function is disabled whenever the battery is installed in the drone.

**!** If the battery is stored for a long time (more than 3 months), it must be placed in an environment with a temperature of  $-10^{\circ}\text{C}$  to  $35^{\circ}\text{C}$ , and it is recommended to use a battery-specific safety bag for storage

Do not store the battery for a long time after it has been fully discharged, to avoid the battery entering an over-discharge state, causing damage to the battery cell, and it will not be able to resume use.

If the battery power is seriously low and the idle time is too long, the battery will enter deep sleep mode. If you need to wake up the battery from deep sleep, you need to charge the battery.

If long-term storage is required, the battery must be disconnected from the drone

It is forbidden to immerse the battery in water. If the battery is damaged due to the battery being immersed in water, the consequences shall be borne by the user.

Do not charge the battery near a heat source, such as in direct sunlight or inside a car on a hot day, a fire or a stove.

Frequently check the battery interface, plug and other components. Never use alcohol or other flammable agents to clean the charging device. Never use a damaged charging device.

Make sure the battery is charged in a dry state.

### Battery function

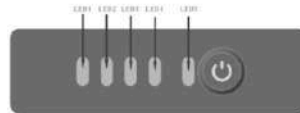
APP10374126 intelligent flight battery has the following functions:

**Battery level display:** The battery has its own indicator light, short press the battery switch to view the current battery level.

#### LED indications

The power indicator light can be used to display the power and status of the battery during charging and discharging. The indicator lights are defined as follows:

- Indicates that the LED light is always on during the indication process
- Indicates that the LED light flashes regularly during the indication process
- Indicates that the LED light is off



#### Check the battery level

In the battery sleep state, short press the power button to check the current power.

LED1	LED2	LED3	LED4	LED5	SOC
●	●	●	●	○	88%-100%
○	●	●	●	○	76% - 87%
○	●	●	●	○	63% - 75%
○	○	●	●	○	51%-62%
○	○	●	●	○	38%-50%
○	○	○	●	○	25% - 37%
○	○	○	●	○	20% - 25%
○	○	○	●	○	13% - 19%
○	○	○	○	○	<13%

### Battery storage and transport

After each use, after disconnecting the battery from the drone, please check whether there is debris on the battery power interface, and if so, please clean it in time.

**⚠** When transporting, please ensure that the battery power is turned off and disconnect the battery from the drone or other equipment

Please keep the battery out of the reach of children. If a child accidentally swallows a part, seek medical attention immediately.

If the battery prompts that the battery is seriously low after the flight, it needs to be charged to about 30% for storage. Otherwise, long-term storage may cause damage to the battery.

Do not place the battery near a heat source, such as in direct sunlight or in a car on a hot day, a fire or a stove.

The environment for storing batteries should be kept dry. Do not put the battery in water or where it may leak.

It is forbidden to store or transport batteries together with metal objects (such as glasses, watches, metal necklaces, hair clips, etc.) or flammable and explosive items.

Do not ship a damaged battery or a battery with a charge above 70%. Please discharge the battery before transportation according to your country's transportation regulation.

Do not ship a damaged battery or a battery with a charge above 30%. Please discharge the battery to about 30% before transportation.

When placing the battery, it is necessary to confirm that the ground is flat to prevent sharp objects from poking the bottom of the battery.

**⚠** Please, always refer to your country's laws in force

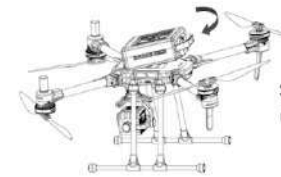
**Different charging modes**

Nb of batteries	Initial voltage	Charge mode	Charge method	Charge current each channel
1	/	Slow	/	Max. 15A
		Standard	/	Max. 20A
		Fast	/	Max. 20A
2	Different	Slow	Charge the lower battery first, then simultaneously charge once the initial voltage became same	Max. 15A
		Standard	Charge the lower battery first, then simultaneously charge once the initial voltage became same	Max. 20A
		Fast	One by one	Max. 20A
		Slow	Simultaneously	Max. 15A
		Standard	Simultaneously	Max. 20A
3	Different	Slow	Charge the lower battery first, then simultaneously charge once the initial voltage became same	Max. 15A
		Standard	Charge the lower battery first, then simultaneously charge 2 batteries once the initial voltage became same, then charge the 3rd battery	Max. 20A
		Fast	One by one	Max. 20A
		Slow	Simultaneously	Max. 15A
		Standard	Charge 2 batteries first then 1	Max. 20A
4	Different	Slow	Charge the lower battery first, then simultaneously charge once the initial voltage became same	Max. 15A
		Standard	Charge the lower battery one by one, then simultaneously charge two by two once the initial voltage became same	Max. 20A
		Fast	One by one	Max. 20A
	Same	Slow	Simultaneously	Max. 15A
		Standard	Two by two	Max. 20A
		Fast	One by one	Max. 20A

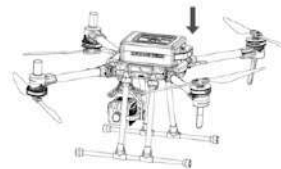
**Battery function**

**How to insert battery into the drone**

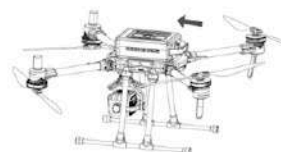
**⚠ IMPORTANT:** Always to check the battery is in on turn-off state before install.



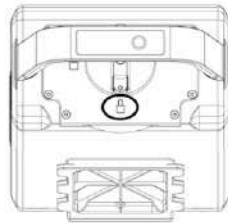
**STEP 1:** Insert battery front first in to the battery rails, let the front of the battery drop down.



**STEP 2:** When interfacing teeth are aligned, let the battery drop down in to the rail interface while turning the locking knob to the "open lock" position.



**STEP 3:** With the battery flat in the bottom of the rail system, push the battery forward until the locking mechanism engages, an audible "click" should be heard, and the locking knob is in the "locked" position.



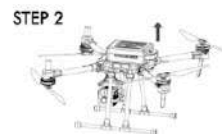
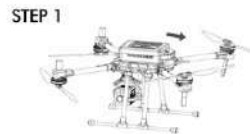
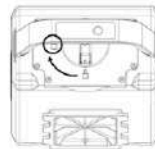
**NOTE:** the battery will not fall all the way down until the knob is turned.

**⚠ IMPORTANT:** Check the battery locking knob is in "locked" position and battery fully forward before flying the drone.

**How to remove battery to the drone**

**⚠ IMPORTANT:** Always turn off the battery before remove.

Turn the locking knob button to "unlocked" position and pull out the batterie.



**Charging**

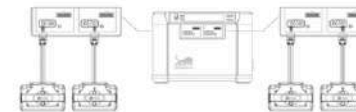
Please note that this battery can only be charged using the series APCH intelligent charger

**⚠** Before every flight, make sure the battery is fully charged  
If the drone enters the low battery warning mode, it should land and stop flying as soon as possible, and replace the battery.



Please before use, refer to the charger manual (APCH3000X4-01 as an example)  
Connect the charger to the mains electricity and turn on the power.  
Connect the charger and the battery with the charging cable, make sure that the connectors at

both ends are plugged into the position.



**Charging status**

When the battery is charging, the LED lights will gradually flash to indicate the charging status, and all the lights will go out when fully charged. Please disconnect the charging device after charging. Please be sure to use the official recommended charging equipment to charge the battery.

LED1	LED2	LED3	LED4	SOC
○	○	⊙	⊙	0-50%
○	⊙	⊙	⊙	51%-75%
⊙	⊙	⊙	⊙	76%-94%
●	●	●	●	95%-100%


**⚠** The battery will automatically stop charging when it is fully charged. It is recommended to disconnect the charging device after the battery is fully charged

Before charging, please keep the battery power off, otherwise the power interface may be damaged.

**Abnormality indicator table**

The battery LED light can display relevant information about battery protection triggered by abnormal conditions.

Projects	Indicator light
Charge	Display battery level
Discharge	Display battery level
Push button	Display battery level
Upgrade	LED display of progress
Charging high temperature alarm	LED 5 blinks + LED 1 blinks 3 times continuously
Charging low temperature alarm	LED 5 blinks + LED 1 blinks 2 times continuously
Charging overcurrent alarm	LED 5 blinks + LED 3 blinks 2 times continuously
Discharge overcurrent protection/short circuit on	LED 5 blinks + LED 3 blinks 3 times continuously
Short circuit protection	LED 5 blinks + LED 3 blinks 1/2 time continuously
Discharge low voltage alarm	LED 5 blinks + LED 3 blinks 3 times continuously
Charging high voltage alarm	LED 5 blinks + LED 2 blinks 3 times continuously
Battery damage	LED 5 is always on when battery power on


 There will be no warranty for batteries that produce abnormal records due to abnormal use.

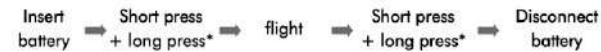
**Start button option**

**Option 1 : « Normal use »**

Insert the battery into the drone. After the battery is properly connected to the drone, short press and then long press the power button to turn on the battery.

Once the flight is over and the propellers are stopped, please short press and then long press to turn off the battery power (10sec), then disconnect the battery from the drone after all green LEDs (LED1 to LED4) are OFF .

 One short press = led flashing slowly, that mean batterie waiting for more instructions



**\*LED Signal operation:**

	LED 1	LED 2	LED 3	LED 4	LED 5	
Switch on <small>Short + long press<sup>1</sup></small>	ON**	ON**	ON**	ON	OFF	LED are on and show you the battery level cf: page 16

<sup>1</sup>During start on, Leds switch on by sweep to led 4 to led 1

Switch off <small>Short + long press<sup>2</sup></small>	**Fast flashing	**Fast flashing	**Fast flashing	Fast flashing	OFF	Enter into switch off process
After 10 sec	OFF	OFF	OFF	OFF	OFF	You can exchange batteries

<sup>2</sup>During shut off, LEDs switch on by sweep to LED 1 to LED 4

\*\*Depending of battery capacity status

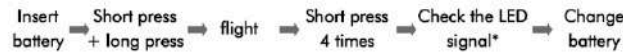
**Intelligent communication**

**Option 2 : « Hotswap »**

Hotswap is useful for changing the battery faster.

Insert the battery into the drone. After the battery is properly connected to the drone, short press and then long press the power button to turn on the battery.

After the flight is over and the propellers are stopped, please short press 4 times the power button, the LED flash, so you can change then disconnect the battery from the drone. You have 30 secondes to change the battery.



\*LED Signal operation:

		LED 1	LED 2	LED 3	LED 4	LED 5	
	Triggered /	Slow Flashing	Slow Flashing	Slow Flashing	Slow Flashing	OFF	Wait for system to be in hotswap mode
	Hotswap state	Fast Flashing	Fast Flashing	Fast Flashing	Fast Flashing	OFF	Hotswap state
1	OK to unplug battery	OFF	OFF	OFF	OFF	OFF	You can exchange batteries
Or 2	NOT OK to unplug battery	Showing normal battery status				OFF	Return to initial level status
Or 3	Cancel hotwap, into switch off state	During leds flashing					Short press + long press start button

Through the power interface on the battery, the battery information can be obtained in real time, such as voltage, power and other information.

*Cf. Please check for complement the next page « Abnormality indicator table »*

**1.1-Fault self-diagnosis function:** Diagnose the abnormality of voltage, current, temperature and other parameters, and give an alarm, and store the abnormal information in the battery at the same time.

**1.2-Short circuit detection function:** After the battery is inserted into the drone, short press and hold the power button to turn on the battery, the battery will first detect whether there is a short circuit fault in the drone, if there is a short circuit, the battery will automatically stop supplying power to the drone to avoid burning accidents.

**1.3-Charging abnormality reminder:** If there is an abnormality during the charging process, you can put the battery aside according to the indicator light, and wait for the battery to balance itself. See the abnormality indicator table for details.

**1.4-Automatic balance function:** When the battery reaches a certain condition, the battery will automatically turn on the balance function to ensure the dynamic balance of the cells in the battery.

**1.5-Automatic discharge function:** The battery has a self-discharge function. When the battery is left for more than 7 days, it will be automatically discharged to about 60% for storage.

**1.6-Automatic current adjustment and section protection function:** When charging, the charging current can be intelligently adjusted according to the current battery temperature. In addition, the battery will also protect itself according to the temperature.

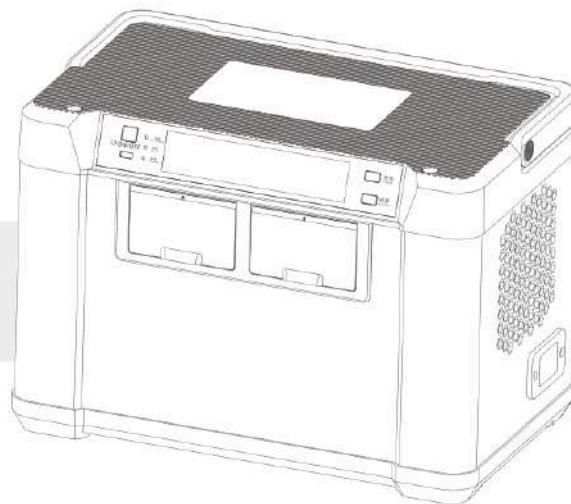
**1.7-Thermal balance management function:** The battery has a thermal balance management function, which controls the temperature difference between the cells to be within the error range and equal.

## 3.4 EV-PEAK UD-1 Charger

# UD1

## Instruction Manual

Support LiPo/LiHv/Smart battery



Shenzhen EV-PEAK New Energy Technology Co.,Ltd.  
Phone:+86(755)88848076 Email:www.ev-peak.com

## Preface

Thank you for choosing EV-PEAK's smart fast charger; this operating instruction is designed to help you better install and use this product, so please read this instruction carefully before using it, and keep it in a safe place. The safety items mentioned in this manual are only a supplement to local safety regulations.

## Safety Guidelines

These warning safety tips are very important, improper operation may damage the charging damage to the device or other equipment, or even cause electric shock or fire.



**WARNING**

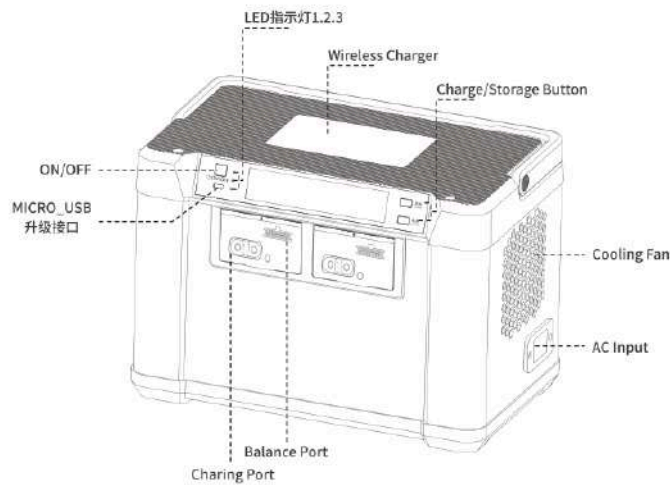
1. Do not use this product in direct sunlight, rain or humid environment.
2. This product should be kept away from heat sources, high voltage electricity, water, flammable gases, corrosives and other dangerous items; it must be used at a suitable ambient temperature (5°C~45°C is recommended).
3. The product should be placed on a horizontal platform, and it is forbidden to tilt or vibrate; there must be enough ventilation distance around (recommended >50cm) to ensure good ventilation when the product is working.
4. It is forbidden to cover the radiator or battery of the product with objects during operation; it is also forbidden to place the battery on the radiator.
5. It is forbidden to charge non-rechargeable lithium batteries that do not match the number or specifications.
6. During operation, the device and battery should be placed on a surface with strong resistance to flammability and resistance to conductors. It is forbidden to place it on car cushions, carpets or similar objects, and ensure that all flammable and explosive products are kept away from the operating area.
7. It is forbidden to try to use voltage exceeding the operating voltage specified in the manual; the number and type of batteries must comply with the settings.
8. It is forbidden to charge and discharge a battery that has been physically damaged.
9. It is forbidden to pull out the input line during the working process. After the work is completed, please pull out the battery in time.
10. If there are foreign objects attached to the metal terminals, please wipe them with a dry towel.
11. It is forbidden to modify or disassemble this product by yourself.
12. It is forbidden to use this product in thunderstorm weather.
13. Children under the age of 14 (inclusive) are prohibited from using the charger to avoid accidents.
14. Before connecting the battery, it is forbidden to beat the battery, short-circuit the positive and negative poles of the battery, and disassemble the battery by yourself to avoid danger.
15. In the process of using this product, make sure someone is guarding it.
16. In case of fire, please use a dry powder fire extinguisher correctly to extinguish the fire. Using a liquid fire extinguisher may cause electric shock.

## Warning

- This product is not suitable for people (including children) with physical, sensory or mental disabilities or lack of experience and knowledge.
- This product is not a toy, please take good care of children and make sure they cannot play with these products.
- If there is a crack on the surface, turn off the power to avoid the possibility of electric shock.
- This product is for indoor use only!



### Part Name



### Indicator light description

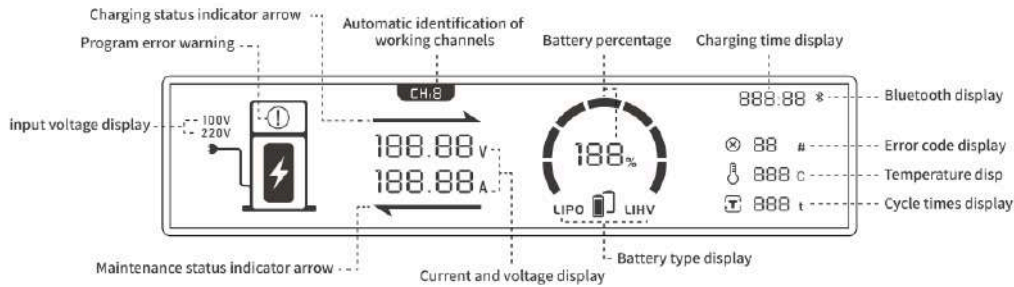
- Fast charge mode ----- ① ----- White light is always on
- Medium charge mode ----- ② ----- Red light is always on
- Slow charge mode ----- ③ ----- Yellow light is always on

### Product specification

AC input Voltage	AC 100-180V/AC180-240V
AC input Voltage	Max.60.9V=Max.50.0A/60A
Output Power	AC 100-180V maximum output power is 1500W AC 180-240V maximum output power is 3000W
Battery Type	LiPo/LiHV/Smart battery
Battery cells	6S-14S
Channels	4CH (of which 1,3 channels support balance charging)
Balance accuracy	±20mV
protection feature	Overvoltage, voltage limiting, current limiting, overheating, short circuit, reverse connection
Working temperature	5-40°C
Cooling system	Forced air cooling
External upgrade interface	USB interface
Dimension	303.2x182.2x212.8mm
Weight	≈6.2kg

Note: The product specifications mentioned in this practical manual are for reference only, and will not be notified if there is any content update.

## Screen display instructions



1. In the error state - no current display.
2. The charging/maintenance status arrow is only displayed in the corresponding status.

## Error code comment

1	Current zero drift is too large	36	battery overheating
2	Poor contact	37	The charger failed to start
3	The error between the balance port and the total voltage exceeds 2.0V	38	The charger failed to start
4	There is a battery before starting, after 2 seconds the battery is removed	39	DJI485 communication lost
5	Terminal balance port	40	battery low temperature
6	The number of batteries does not match	50	The mode cannot be changed during charging and discharging!
7	no battery	60	Unsupported power supply model
20	Total battery voltage is too high	61	Power failure, communication timeout
21	The total battery voltage exceeds the maximum set voltage by 1v	62	Power failure, short circuit failure, stop charging
22	total voltage low	63	Power failure, overheat protection, stop charging
23	Single cell voltage is too high	64	Power failure, AC input undervoltage detected
24	single cell low voltage	65	Power failure, AC input failure detected
25	Charger resistor overheated	66	Power failure, the power may have shut down unexpectedly
26	Discharge short circuit or overload	67	Power failure, fan failure detected
27	Safety timer arrives	68	Unsupported power supply model
28	The capacity exceeds the safety threshold	210	wrong hardware version
29	BMS communication error	211	wrong battery type
31	CAN communication timeout	212	wrong number of batteries
32	The BMS connection is interrupted, and the CAN contact is poor, resulting in communication interruption	213	Battery single cell voltage error
33	equalizer failure	214	not calibrated
34	Discharger failure	215	Calibrate voltage before calibrating current
35	Upgrade failed		

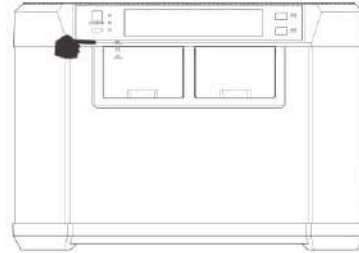
## Operation introduction

Note: DO NOT charge the battery if battery temperature higher than 45°C.  
Charger will warning when smart battery temperature higher than 45°C.

Long press the "main switch key" to turn on/off  
Short press after power on to switch between fast charge/regular/slow charge mode

The current mode can be viewed through the LED indicator

Please refer to page 2 for LED indicator notes



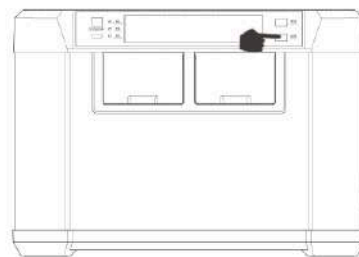
Long press the "charge button" to enter the charging mode

Short press to switch charging channels



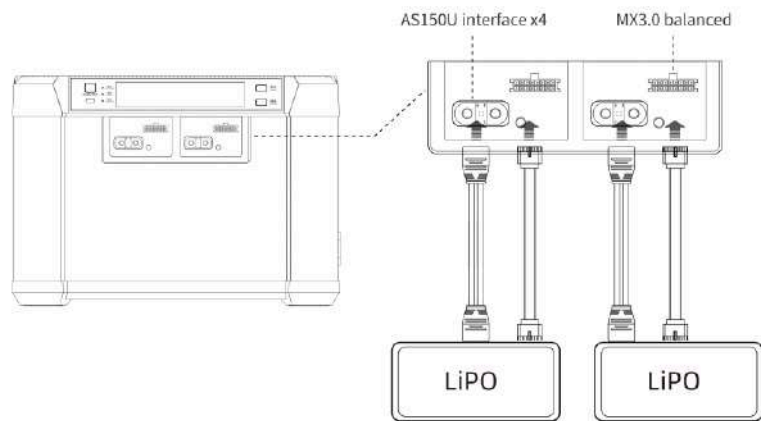
Long press the "maintenance button" to enter the maintenance mode

Short press to switch charging channels

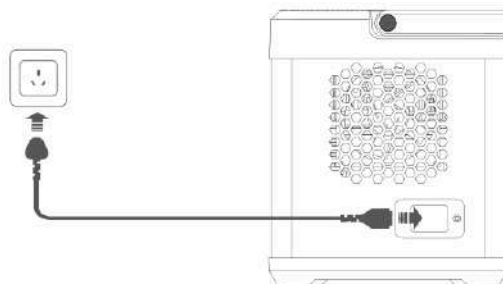


### link description

1. UD1 battery connection schematic diagram, the battery can be connected to the charger, if the battery socket does not match, the battery can be connected through the transfer line.



2. First connect the power cord to the AC input port, and the other end to the AC power supply (100-240V, 50/60Hz), turn on the power switch, and start the charger.



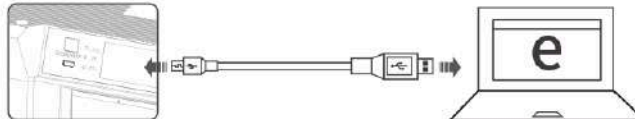
### Description of different charging gears

		Charge mode	Charge method	Charge current EACH CH
4 batteries connected	initial voltage same	fast mode	one by one	max. 60A
		standard mode	two by two	max. 30A
		slow mode	simultaneously	max. 15A
	initial voltage different	fast mode	one by one	max. 60A
		standard mode	Charge the lower battery one by one, then simultaneously charge two by two once the initial voltage became same	max. 30A
		slow mode	Charge the lower battery first, then simultaneously charge once the initial voltage became same	max. 15A
3 batteries connected	initial voltage same	fast mode	one by one	max. 60A
		standard mode	charge 2 batteries first, then charge the rest 1 battery	max. 30A
		slow mode	simultaneously	max. 15A
	initial voltage different	fast mode	one by one	max. 60A
		standard mode	Charge the lower battery first, then simultaneously charge 2 batteries once the initial voltage became same, then charge the 3rd battery	max. 30A
		slow mode	Charge the lower battery first, then simultaneously charge once the initial voltage became same	max. 15A
2 batteries connected	initial voltage same	fast mode	one by one	max. 60A
		standard mode	simultaneously	max. 30A
		slow mode	simultaneously	max. 15A
	initial voltage different	fast mode	one by one	max. 60A
		standard mode	Charge the lower battery first, then simultaneously charge once the initial voltage became same	max. 30A
		slow mode	Charge the lower battery first, then simultaneously charge once the initial voltage became same	max. 15A
1 battery connected	/	fast mode	/	max. 60A
		standard mode	/	max. 30A
		slow mode	/	max. 15A

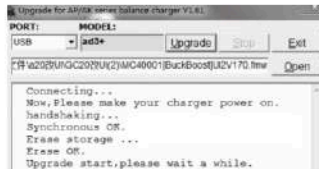
### Firmware upgrade

If the firmware of the charger needs to be updated, please pay attention to the firmware upgrade program that will be released on the EV-PEAK official website, and perform the firmware upgrade according to the following steps:

1. Visit EV-PEAK official website to download the latest firmware upgrade program (<http://www.ev-peak.com/firmware>)
2. Connect the charger, and use the USB cable to connect the firmware upgrade interface to the computer.



3. Run the firmware upgrade program, load the firmware file with the suffix fmw, click the upgrade button, and wait for the upgrade.



4. After the upgrade is successful, the device will automatically restart.
5. If the upgrade fails, please try to upgrade again.

For detailed steps, please follow the prompts to upgrade the software!

## Package contains

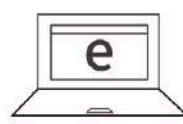
This product includes: UD1 smart balance charger x1 AC power cord x1 remote control software download link x1 after-sales service card x1



UD1- Smart Balance Charger



AC power cord



Remote control software



After-sales service card

## After sales and warranty

Thank you for purchasing the charger from our company. EV-PEAK will do its best to provide you with perfect after-sales service and fully protect your rights and interests. If your product fails, please contact the after-sales personnel of EV-PEAK.

1. The warranty deadline after the product fails is subject to the after-sales service center of Yonghang Company;
2. Due to the quality problem of the product itself within one year from the date of purchase, all warranties are free. If the customer cannot provide a valid purchase certificate, the internal date code shall prevail;
3. If the period exceeds one year from the date of purchase, the cost will be charged as appropriate, and the user must bear the round-trip transportation costs;
4. When you send for repair, please be sure to leave your contact information, so that you can be notified in time after repair.

The product is damaged and cannot be used normally due to the following reasons, which is not covered by the warranty:

1. Failure to connect to the correct voltage as required leads to damage to the product;
2. Damage caused by improper use in accordance with the instructions;
3. All man-made, accidental impact or other force majeure causes damage to the product;
4. Unauthorized modification, disassembly or modification of the internal circuit of this product without the approval of the company;
5. Damage caused by water immersion, moisture or other foreign matter entering the product;
6. Aging, bumps and scratches on the surface of the product.



Please pay attention to correct use: the user is responsible for any consequences caused by the operation, and the company is not responsible for the expenses beyond the product cost and reserves the right to modify this clause; if there is any modification, no prior notice will be given.

**EV-PEAK**

EV-PEAK New Energy Technology Co.,Ltd  
www.ev-peak.com

The product specifications and information mentioned in this instruction manual are for reference only, and are subject to update



Copyright Shenzhen EV-PEAK New Energy Technology Co., Ltd. All rights reserved

## 4 CONTACT

---

Main Contact for DV Support: [aftersales@dronevolt.com](mailto:aftersales@dronevolt.com)

Main Contact for DV Group in relation to KOBRA: [sales@dronevolt.com](mailto:sales@dronevolt.com)

For regional after sales support, see all contact information below.

### **DRONE VOLT FRANCE**

**14 rue de la Perdrix - Lot 201  
93420 Villepinte, France**  
Phone: +33 (0)1 80 89 44 44  
[contact@dronevolt.com](mailto:contact@dronevolt.com)  
[www.dronevolt.com](http://www.dronevolt.com)

### **DRONE VOLT DENMARK**

**Drone Volt Scandinavia  
ApS – Park Allé 380  
2625 Vallensbæk, Denmark**  
Phone: +45 60 17 28 90  
[kontakt@dronevolt.com](mailto:kontakt@dronevolt.com)  
[www.dronevolt.dk](http://www.dronevolt.dk)

### **DRONE VOLT ITALY**

**Via Riviera 1  
6900 Lugano  
Switzerland**  
Phone: +41 (0) 91 976 0209  
[italy@dronevolt.com](mailto:italy@dronevolt.com)  
[www.dronevolt.it](http://www.dronevolt.it)

### **DRONE VOLT SWITZERLAND**

**Via Riviera 1  
6900 Lugano, Switzerland**  
Phone: +41 (0) 91 976 0209  
[swiss@dronevolt.com](mailto:swiss@dronevolt.com)  
[www.dronevolt.ch](http://www.dronevolt.ch)

### **DRONE VOLT CANADA**

**2816 Joseph A. Bombardier  
Laval – Quebec – Canada H7P,  
6E2**  
Phone: +1 450-688-8200  
[canada@dronevolt.com](mailto:canada@dronevolt.com)  
[www.dronevolt.ca](http://www.dronevolt.ca)

### **DRONE VOLT USA**

[usa@dronevolt.com](mailto:usa@dronevolt.com)  
[www.dronevolt.us](http://www.dronevolt.us)