LIGH-T ₄

User Manual

V4.1

ELISTAIR
THE TETHERED DRONE COMPANY

Contents

Warning

Read this entire user manual before you use the Ligh-T system to ensure safe operation. Failure to adhere to the instructions and precautions below could result in damage or serious injury.
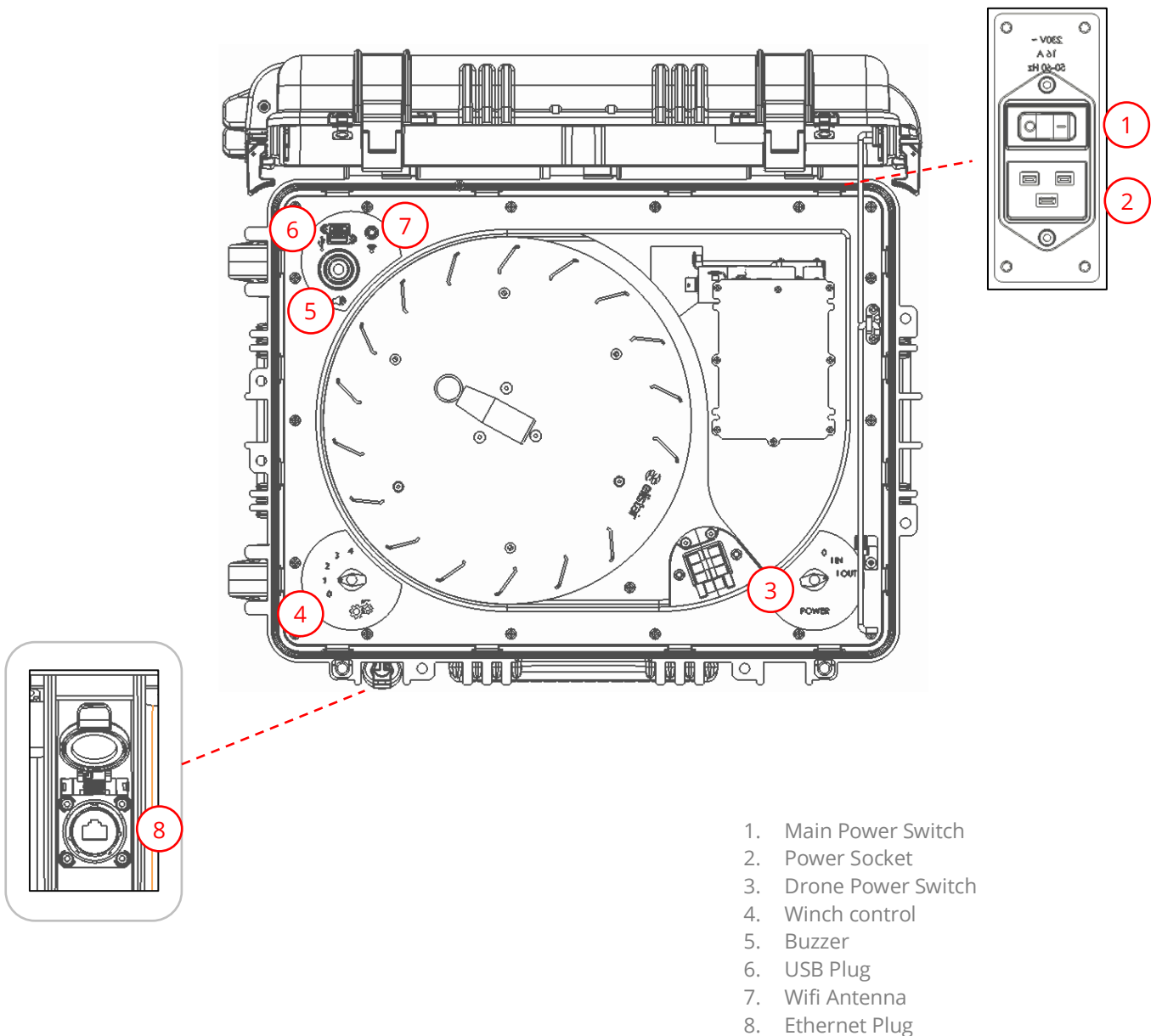

Ligh-T

The Elistair Ligh-T is a compact and rugged tether station for drones, offering extended flight time to drone operators. The micro-tether provides a continuous power supply, secure and high-speed data transfer and physical security against fly away. Easily transportable and deployable on various types of terrain, the Ligh-T is compact, and can be operational in minutes. Designed to meet the requirements of the NF EN 60950-1 standard and French Civil Aviation laws, the Ligh-T brings a greater legal flexibility to drone operations.

The Ligh-T V4 includes:

- Dual-Mode Winch: Automatic Tether Management system, with motorized auto-tensioning, adjustable to your mission needs. This Enables the user to switch from motorized to manual mode easily, depending on the mission.
- Data Transfer: Up to 200 Mb/s Ethernet datalink, secured and unjammable.

Non-conducting and crushproof, the Ligh-T case is tailored for demanding field operations. Its padded handle makes it easily transportable whilst the foam integrated lid protects and secures the micro-tether's integrity during transportation.

1. Main Power Switch
2. Power Socket
3. Drone Power Switch
4. Winch control
5. Buzzer
6. USB Plug
7. Wifi Antenna
8. Ethernet Plug

Ligh-T User Interfaces

Main Power Switch (1) and Power Socket (2): The power socket is located on the back of the station. It allows the station to be connected to 110-230V 50Hz. In case of an emergency, unplugging the cable will cut the power supply to the station.

Drone Power Switch (3): Power through the micro-tether needs to be activated with this switch. I IN feeds power to the system. I OUT gives power to the micro-tether. Serious injury could occur if the micro-tether is manipulated once it is switched I OUT. Only turn the power switch I OUT when the drone is connected, and you are ready to take-off.

Torque Button (4): Position 0 will stop the motor and allow the winch to turn freely. Position 1 to 3 provides increasing levels of torque which can be used to manage the micro-tether during flight. Position 4 will automatically start to reel in the tether.

Buzzer (5): The buzzer alerts the user to possible problem (power consumption, temperature, power ON, power standby).

USB Plug (6): The USB plug is used to upgrade the software of the LIGH-T station.

WIFI Antenna (7): The antenna sends data to a smartphone or android tablet for the T-Monitor Application.

Ethernet Plug (8): The ethernet plug can be used to send and receive data to and from the drone.

Air Module

The Ligh-T is compatible with Elistair's range of Air Modules[1], providing flexibility and compatibility with a range of commercially available drones. This manual uses the Elistair Standard Air Module Data (6S or 12S versions) as an example. For other Elistair Air Modules used with the Ligh-T, please refer to and carefully read the Air Module User Manual for complementary information.

The Air Module is a key component of the Ligh-T. Miniaturized and ruggedized to fit in standard battery compartments, this compact module delivers a continuous DC power supply to the drone, whilst also providing a failsafe feature with a safety battery system.
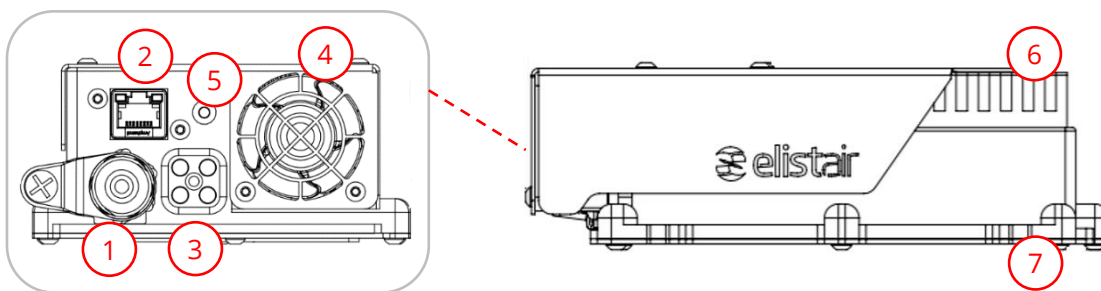
1. Micro-tether Connector
2. Ethernet Port
3. Drone connector (AS150 female red and XT150 female black)
   Safety Battery connector (XT90 male)
4. Air Vent
5. Air Module LED
6. Metallic Cooling Plate
7. Fixing Inserts

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[1] Air Modules can be purchased separately from Elistair or official partners.

Using Ligh-T

1- *Check Your Drone Compatibility*

1. Before any flight with a new drone, please check that your drone is fully compatible with your Ligh-T specifications (see "General Precautions" page 6). Please also use the "Pre-Flight Checklist" provided page 5 of this manual.

2- *Download the Elistair T-Monitor App for Android*

T-Monitor is an Android application (Health Monitoring System) connecting directly to the Ligh-T Wi-Fi network. This enables accurate monitoring of your flights, recording and analysis of several values, and provides live alerts on incidents via alert messages. The messages are activated in case of power outage, cable limit reached and other incidents.

To install the T-Monitor Android application, go to www.elistair.com/app.apk and download the app. The password is: Elistair.

3- *Prepare the Ligh-T*

1- Position the Ligh-T horizontally on a flat surface.
2- Position your drone next to the Ligh-T, with a minimum distance of 3 meters.
3- Position your power source within easy reach of your Ligh-T. The power supply cord is used as the main disconnect device, ensure that the socket/outlet is located/installed near the equipment and is easily accessible.
4- Be careful to not entangle the micro-tether while unwind the Ligh-T
5- Securely fasten the Air Module to your drone, ensure that there is a robust physical attachment point to connect the mechanical ring on the end of the micro-tether to.
6- Connect the micro-tether power connector to the Air Module and turn until you feel a secure click.
7- Connect your fully charged and suitable safety battery to the Air Module: The Air Module LED (5) will turn RED.
8- Turn on your drone.
9- Turn on the micro-tether Main Power Switch (1) and Power Switch (3). Power is now activated in the micro-tether.
10- Launch your T-Monitor app and connect to your Ligh-T Wi-Fi hotspot. Check that your drone is effectively powered by the Ligh-T station via the power gauge on T-Monitor front panel. You should see an average of 30W consumption.

11- Your drone is ready for take-off. The power consumption should be greater than 200W when you are flying.
12- When using rewinding or cable tension be careful of the rotation of the reel. Avoid ample clothes jewels and attach your hair if needed.

4- *During and After Flight*

1- Carefully monitor the flight with the T-Monitor Android App and your drone App.
2- After flight, switch OFF the Main Power Switch and the Power Switch before disconnecting the micro-tether from the Air Module.
3- Save flight logs on T-Monitor before switching of the App.

Specifications

- **Ligh-T**

Dimensions	627x475x292 mm (25x19x12 in)
Weight	20 kg (44 lbs.)
Built-in protection	Fuse
Power Supply Cable	Type E
Micro-Tether Management	Dual-mode Winch: Manual with handle or Motorized
Wi-Fi Connectivity	Protocol 802.11 b/g/n, Frequency 2.4G-2.5G (2400M-2483.5M)
	Encryption WEP/TKIP/AES, Security WPA/WPA2.
	T-Monitor Android application (WIFI)
Carriage	3 + telescopic handle and wheels
Torques	Position 1 = 1 N
	Position 2 = 2 N
	Position 3 = 4 N
	Position 4 = 6 N

- **Micro-tether configurations**

Power Supply	120 VAC	230 VAC
Length	70 m (230 feet)	-
Linear Weight	16 g/m	-
Total Weight	1120 g	-
Tensile Strength	150 daN	-
Diameter	3,5 mm	-
Power Source Requirements	120 VAC	-
	50-60 Hz	-
	3 kW min	-
	pure sinewave inverter	-
Max continuous Power	900 W	1200 W
Peak Power 10 s	1200 W	1500 W
Peak Power 3 s	1500 W	2000 W
Recommended Safety Battery	6S 5Ah 35C	6S 8Ah 35C
Tether operating range	30 to 70 m	-
	60 to 200 ft	-
Operational temperature	-10° to 40° C	-
	(14° to 95° F)	-
Data - data speed	80Mb/s minimum (up to 200Mb/s, depends on the packet size)	
Data - data connectors	Ethernet RJ45 (Air Module and Ligh-T)	

- **Standard Air Module**

Dimensions	168x109x54 mm
Weight	700 g
Output Voltage	6S / 24 V (±2 V) or 12S / 48 V (±3 V)
Safety Battery Cable dimension	15 cm
Safety Battery Cable Connector	XT90 Male (to be connected to XT90 female with anti-spark)
Drone Cable dimension	15 cm
Drone Cable Connectors	AS150 RED Female, XT150 Black Female
Recommended Cabling min section	6 mm² (1200W to 1500W drone power consumption)
	10 mm² (1800W drone power consumption)

Disclaimer

NOTICE

Thank you for purchasing Ligh-T. Information in this manual is subject to change without prior notice. When using this product, please follow all instructions carefully.

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Pre-Flight Checklist

1. Make sure that the Ligh-T station is not damaged in any way.
2. When using a generator as the external power source, choose a pure sinewave inverter. Ensure the fuel level is sufficient for your planned flight time.
3. Make sure that the micro-tether is securely connected to the Air Module.
4. Check that the mechanical connection is attached to a robust part of the UAV airframe.
5. Check that the input and output power connections from the Air Module are secure.
6. Ensure that your safety battery matches Elistair recommendations and is in good conditions.
7. Check the status of the safety battery and make sure it is fully charged (above 95%) before take-off.
8. To check that the Air Module can switch to the Safety Battery during a power loss, carry out the following test: With the drone on the ground switch ON the main Power g Switch and Drone Power Switch. Check the T-Monitor app: you should see a consumption of around 30W. Then switch off the Power Arm Switch: the safety battery should continue to power the drone.
9. When preparing the drone for take-off, verify that the micro-tether is clear of the drone's landing gear.
10. Check that the micro-tether's tension is properly set and will not affect the aircraft's stability.
11. Check that the micro-tether is clear of the propellers.

Disclaimer and Warning

The information in this document affects your safety and your legal rights and responsibilities. Read this entire document carefully to ensure proper configuration before use. Failure to read and follow the instructions and warnings in this document may result in serious injuries to people, or damage to your product and aircraft.

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

General Precautions

1. Ensure the ESC's of the drone do not use a "regenerative breaking" function or similar.
2. Verify that the average and maximum power consumption values of the drone are adequate to your Ligh-T.
3. Ensure that your Power Supply Unit has a pure sinewave inverter and is adapted to your drone power consumption and to your forecast time of flight. Use only units with recommended minimum capacity (2 kW or 3 kW capacity depending on configuration, see specification table).
4. Fly smoothly and cautiously to avoid peaks of power demand.
5. Use the T-Monitor app to check power consumption during flight.
6. Do not touch the Micro-tether or Air Module when the Drone Power Switch is live.
7. Do not make any alteration to the Ligh-T or parts of the Ligh-T (micro-tether, Air Module, ground station). An alteration of the product may cause serious damage and/or injury.
8. Do not try to access the internal parts of the Ligh-T (ground station and Air Module) as it may damage its structural integrity and cause electrical hazards.
9. Respect the temperature range.
10. Do not use the Ligh-T system under water.
11. Before take-off, always use the checklist provided in this manual to verify your setup.
12. Ensure that all parts of the Ligh-T are in good condition before each flight (no broken or damaged parts).
13. Never use Ligh-T in severe weather conditions, storms, or when there is a risk of lightning. A tethered drone may become a lightning conductor.

Individual Parts

Ligh-T

1. When the Ligh-T is in use, the micro-tether is transmitting elevated voltage. Do not touch the Air Module or the micro-tether when the Power Arming and Drone Power Switches are live. An alteration of the micro-tether may cause serious damage and/or injury. Do not use the system if the micro-tether is damaged.
2. Avoid exposing the Ligh-T to excessive dust, humidity, extremes of heat or open flames.
3. Use the Ligh-T with a power device integrating a fuse rated at 16 A capacity.
4. To avoid the over-heating of the ground station during long tethered flights (over 5 minutes), please follow the micro-tether operating range indicated in the Power Specifications table above.
5. Make sure that all Ligh-T output signals are in proper working order before use.

Air Module

1. Make sure that the Air Module is securely attached and is positioned to allow proper connection to your drone (power connector and Ethernet connector).
2. Only use safety battery with XT90 anti-spark connector.
3. Use a safety battery in accordance with the power matching table.
4. Please note that the ventilation grid needs to be free of obstructions to ensure a proper airflow and cooling of the Air Module. A 3D model of the Air Module can be supplied by Elistair (.step file) for integration work.
5. The safety battery system is not meant to handle power peaks. It could damage the Air Module.
6. The Air Module is not compatible with regenerative breaking esc or similar function. This function will generate a voltage peak on the module and damage some electrical components or the fan.

T-Monitor App

1. Avoid areas of RF signal saturation especially in the Wi-Fi band.
2. Turn your phone's 3G or 4G off.
3. Use a fully charged device to enable monitoring of the whole flight.
4. At the end of each flight, make sure you hit the "Save Flight Logs" button.
5. Please note that the values displayed on the App are averaged and displayed every 2s. For instance, brief power peaks surging over Ligh-T limitations and causing a switch to your safety battery might not appear on the app.

Storage and Transportation

1. Disconnect the micro-tether and the safety battery from the Air Module during transportation.
2. Do not transport the station when the micro-tether is unwound.
3. .
4. Store the Ligh-T station in a dry area.

Maintenance and Upkeep

- **Routine visual checks**: to perform before and after each flight, as described in the pre-flight check list.
- **Quick Maintenance Process**: to perform every 50 hours of use, every 10 flights or after any problem, even minor, as described below.
- **Global Maintenance Process**: performed by ELISTAIR, every 200 hours of use and every 50 deployments, at ELISTAIR offices.

Quick Maintenance Procedure

Ligh-T

1. Wind out and wind in the entire micro-tether and ensure that it is free from any slowdowns or snagging. At the same time carry out a visual check for damage to the micro-tether.
2. Check that all parts on the Ligh-T are still secure and in good shape.
3. Check for rust or wear on the station, especially externally.

Air Module

1. Visually check the Air Module
2. Visually and manually check all the connectors:
   a. Micro-Tether / drone: mechanical fastener.
   b. Micro-Tether / Air Module: Power connector, data connector.
   c. Air Module / drone: Power connector, data connector.

Setup Precautions

1. Ensure that the Air Module is securely fastened to your drone. This connection should be manually checked by the operator.
2. Make sure that the micro-tether is correctly connected to your drone.
   a) The mechanical connection should be attached to a robust part of the UAV airframe.
   b) The input and output power connections from the Air Module must be tightly fastened.
3. For the safety battery, only use a 6S LiPo battery and carefully choose its capacity and discharge rate to ensure at least two minutes of extra flight time at maximum power.
4. Always check that the safety battery is fully charged, in working condition before take-off.
5. Make sure the fans on the LIGH-T and on the embedded power module is clear of obstructions.
6. Ensure the esc of the drone is without a regenerative breaking function or similar.

After-Flight Precautions

1. Switch of the drone arm switch after the flight and before touching the tether.
2. Disconnect safety battery from the Air Module during transportation.
3. Regularly check the micro-tether's integrity. Any alteration of the micro-tether's sheath can cause severe damage and injury.
4. Do not transport the station when the micro-tether is unwound.

Appendix

Buzzer Signals on Control Board

Warning	Type	Power consumption 10.5g/m	Power consumption 16 g/m
Alert 1	Beep-Beep	950 W	1250 W
Alarm	Continuous Beep	1200 W	1500 W

The alarm will also turn on to indicate that your power consumption has dropped under 200 W after the drone's take-off. That would mean that your drone is consuming power from its safety battery. If power consumption then goes back over 200 W, the alarm will turn off again.

Alert name on app	Previous Condition	Alert	Alarm
Power consumption too high	Always active	950 W (10g) 1200W (16g)	1250W (10g) 1500W (16g)
Cable cut or onboard module failure, system will shut down, land your drone	Power consumption was more than 200W	Power consumption under 200W	Power consumption under 200W
Temperature of the system too high	Always active	55°C	65°C

Technical drawings

475

627

292

105

4x Ø 4.50

102

109

168

54

2
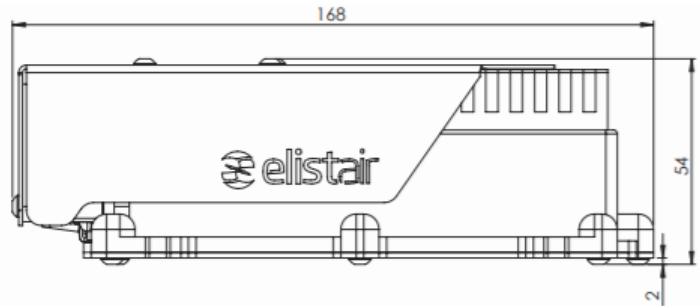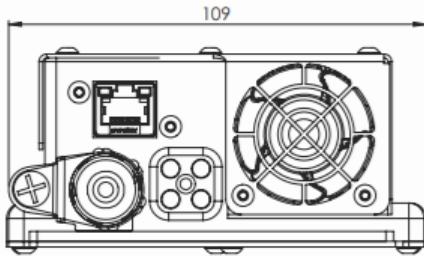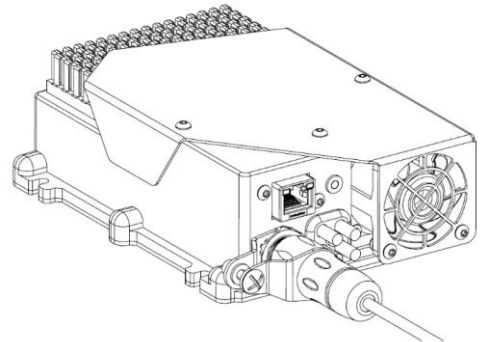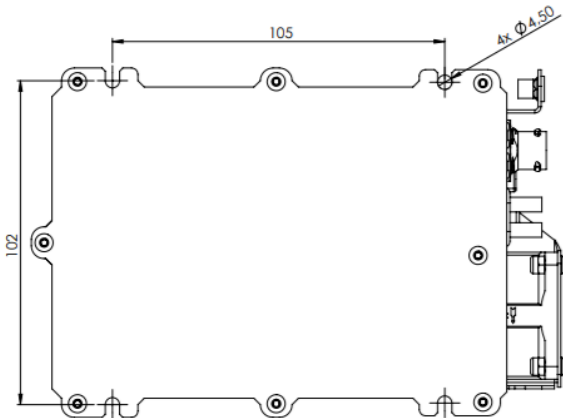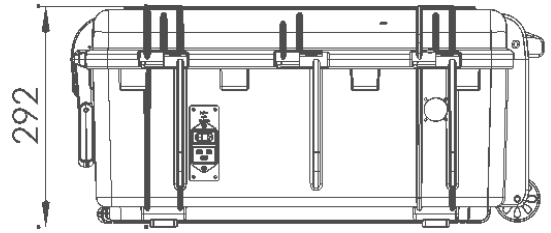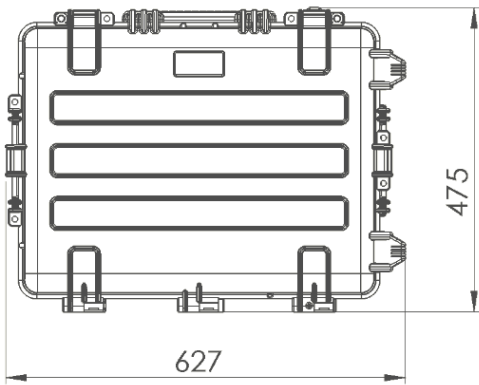
Electrical interface

Step 1: To Plug the connector

Step 2: To rotate the connector's ring until the 'click'

Step 3: To tighten the locking screw

Data transmission (*)
(from the drone)

Drone power
from SAFE-T

To the
battery

To the
drone

(*): depends on the model of module

Module 6S

SAF-320-PI000

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