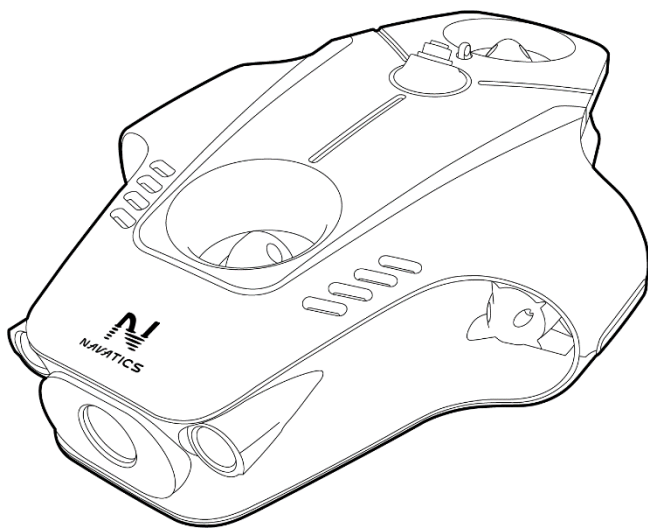# NAVATICS
MITO

Underwater Drone

Owner's Guide

Important Safety Instructions

Please read this owner's guide carefully and save it for future reference.
Important safety instructions

1. Read these instructions
2. Keep these instructions
3. Heed all warnings
4. Follow all instructions
5. Do not use this system in dangerous area
6. Install in accordance with the manufacturer's instructions
7. Do not install near any heat sources, such as radiators, heat registers, stove or other apparatus that produce heat
8. Only use attachments/accessories specified by the manufacturer
9. Unplug and take out the battery when it is unused for long periods of time
10. Refer all servicing to qualified service personnel. Servicing is required when the system has been damaged in any ways

---

WARNING:

1. Do not place naked flame sources, such as lighted candles, on or near the product
2. Do not subject batteries to mechanical shock
3. In the event of a battery leaking, do not allow the liquid to come in contact with the skin or eyes. If contact has been made, wash the affected area with copious amounts of water and seek medical advice
4. Do not use any chargers other than the ones specifically provided for the equipment by the manufacturer
5. Do not leave a battery on prolonged charge when not in use
6. After extended periods of storage, it may be necessary to charge and discharge the batteries several times to obtain maximum performance
7. Batteries works in temperatures between 23°F(-5°C) to 113°F (45°C)

CAUTION: Do not make unauthorized alterations to the product; doing so may compromise safety, regulatory compliance, system performance, and may void the warranty.

WARNING: Contains small parts which may be a choking hazard. Not suitable for children under age 3.

WARNING: This product contains magnetic material. Contact your physician if you have questions on whether this might affect the operation of your implantable medical device.

NOTE:

Product markings are located on the bottom and inside battery chamber of the product. This product contains no user serviceable parts. Contact Navatics Customer Service for all servicing concerns.

Declaration of Conformity

Object of the Declaration:
Product: Underwater drone
Model: Navatics MITO, Navatics Wireless Communication Buoy
Company Name: Navatics Technology (Shenzhen) Limited

Address: Room 209, Bldg.17, 1201 Liuxian Ave., Shenzhen, Guang Dong Province, China

The object of the declaration is in conformity with the following directives:

EC Council Directive of 2014/30/EU
EC Council Directive of 2014/53/EU

Test Standards:

EN 55032:2015/AC:2016;	EN 55035:2017;
EN 61000-3-2:2014;	EN 61000-3-3:2013
Draft EN 301 489-1 V2.2.0:2017-03;	Draft EN 301 489-3 V2.1.1;
EN 300 440 V2.1.1 (2017-03);	EN 62479:2010;
EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013	
FCC Rules and Regulations Part 15 Subpart B Class B;	
ANSI C63.4:2014	

The original certificate was issued by
Dongguan Dongdian Testing Service Co., Ltd. in Guang Dong, China.

Navatics MITO

CE Test Report NO.: DDT-R18111907-1E2
Issued Date: Mar 19, 2019

FCC Test Report NO.: DDT-R18111907-1E1
Issued Date: Mar 19, 2019

Navatics Wireless Communication Buoy

CE Test Report NO.: DDT-R18111907-1E3, DDT-R18111907-1E5, DDT-R18111907-1E6, DDT-R18111907-2S1,
Issued Date: Mar 28, 2019

Signature

Andreas Widy, Chief Executive Officer & Co-founder of
Navatics Technology (Shenzhen) Limited

Regulatory Information

NOTE:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by Navatics Technology Ltd could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

(1) Reorient or relocate the receiving antenna.

(2) Increase the separation between the equipment and receiver.

(3) Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Please complete and retain for your records:
Serial and model numbers can be found on the bottom of the system

MITO:
Serial number:_____
Model number: NMR0001

Battery
Serial number:_____
Model number: NMB001

Wireless Communication Buoy
Serial number:_____
Model number: WCR0001

Remote controller
Serial number:_____
Model number: SRC0001

Contents

Introduction

About Navatics MITO

Navatics MITO is an underwater vehicle that can be used to explore depths. It uses four highly efficient thrusters to stabilize and maneuver itself underwater. It captures 4K videos and 12 megapixel photos, and is capable of carrying extra payload without deterioration in performance.

MITO boasts 4 knots (2 m/s) maximum speed. The battery, designed to be replaceable, runs for 2 hours when fully charged. The wireless communication buoy comes with 4 hours runtime, equipped with solar panel to extend usage duration.

System features

Best built in active stabilization system
Powerful thrusters tilt, hover and stabilize Navatics MITO even in heavy currents to capture the exact footage you want.

45° Adjustable tilt lock
Adjustable tilt lock from -45 ° to 45 ° enables it to capture a stunning shot while moving forward or backward.

Control wirelessly up to 500M
The custom-designed remote controls Navatics MITO uses radio frequency. It connects your smartphone to a wireless transmission system in a waterproof buoy with a range up to 500 m /1640 ft.

Vivid color, 4K recording and 1080p HD streaming
Navatics MITO shoots at 4K 30 frames per second and captures 12MP stills. It also offers 1080p streaming to the Navatics app, which features built-in tools for color correction and let you share your underwater moments directly on social media.

Brave the dark & Explore deeper
Two bright 1000 lumen LED lights illuminate a clear path for Navatics MITO as it navigates, ensuring you to see where you're going and what footage you're capturing.
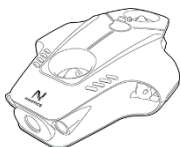
Recharge & Swap for longer dives
Wonders never cease in the deep, so why should Navatics MITO? Stay underwater longer with a 2-hour battery that you can swap out easily.

Introduction

Unpacking the System

Carefully unpack and confirm that the following parts are included.
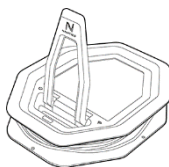
Inside the box

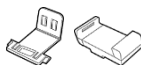Navatics MITO ROV   4x Spare propellers   Wireless communication buoy w/50m tether
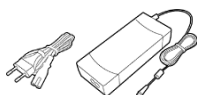

Remote controller   Smart device mount A & B   OTG (Micro USB, Type C) & Lightning cables

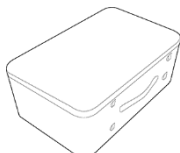Smart battery   Smart battery charger   Buoy and remote charger

2x Type C charging cable   USB Data Cable   Transport foam box
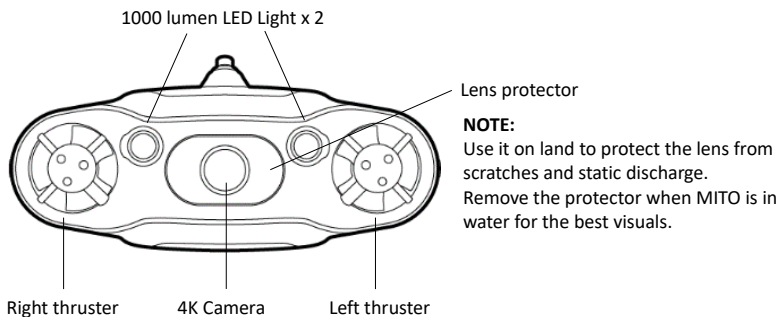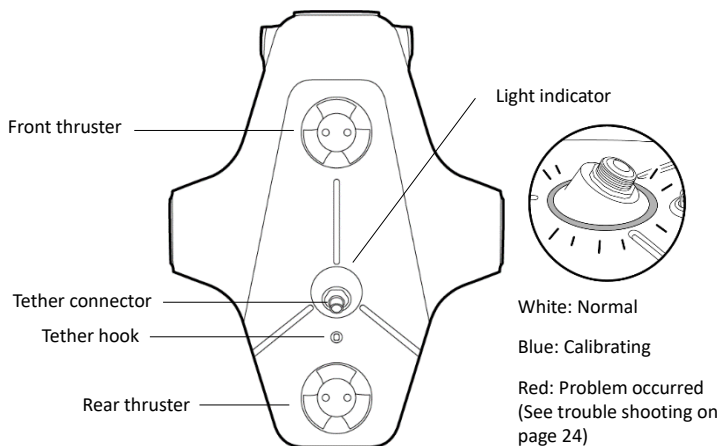
⚠️   May ship with multiple AC power adapters. Use the AC power adapter for your region.

NOTE: If part of the system is damaged, do not use it. Contact your authorized Navatics dealer or Navatics customer service.

Introduction

Drone

Front thruster

Light indicator

Tether connector

Tether hook

Rear thruster

White: Normal

Blue: Calibrating

Red: Problem occurred
(See trouble shooting on
page 24)

1000 lumen LED Light x 2

Lens protector

NOTE:
Use it on land to protect the lens from
scratches and static discharge.
Remove the protector when MITO is in
water for the best visuals.
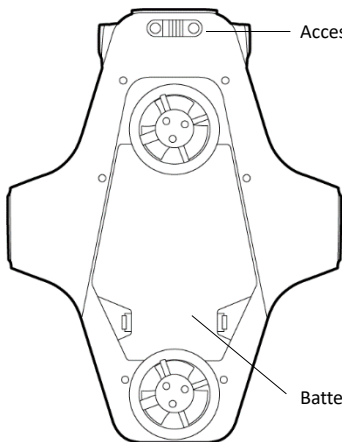
Right thruster   4K Camera   Left thruster

Introduction

Drone

Accessory mount

The mount can hold up to 17.6 ounces (500g) accessory without extra flotation.

NOTE:
With extra weight MITO might not be able to keep positive buoyancy. It means MITO might sink instead of float when the motor is off.

WARNING:
DO NOT mount any dangerous object on to MITO including but not limited to fishing net and spear gun

Battery cover

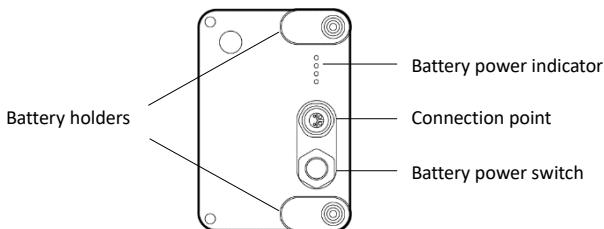Open the battery cover to access the battery chamber
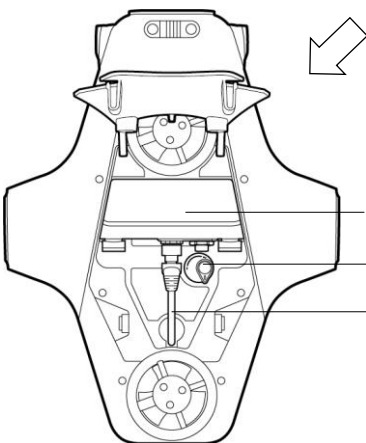
Battery chamber

Battery switch

Battery connection cable

Introduction

Battery

Battery holders

Battery power indicator

Connection point

Battery power switch

Press and hold the red switch button, then check the status of the battery indicator

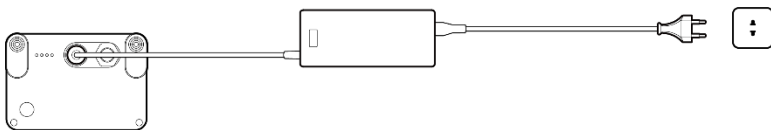Each light indicates 25% of the battery.

O O O O

On: Turned on

Off: Need to charge
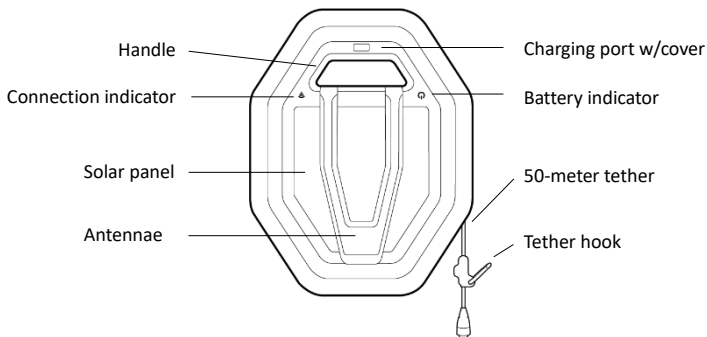
Blinking: Charging

Charger for battery

1. Plug the power cord into the connector on the smart battery

2. Connect the charger with the charging cord

3. Plug in to power socket

4. Check the power indicator for charging status

Introduction

Wireless communication buoy

Handle

Connection indicator

Solar panel

Antennae

Charging port w/cover

Battery indicator

50-meter tether

Tether hook

On: Turned on / Charged

Blinking: Charging

Flashing: Low battery

On: Establishing connection

Blinking: MITO Connected

Off: MITO not connected

Charger for wireless communication buoy and remote controller
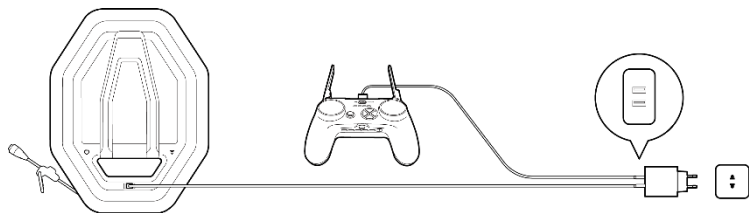
1. Plug the Type C charging cable into the charging port on the buoy and controller

2. Connect the buoy to the fast charging port on USB charger (Green port)
    Connect the remote to the regular charging port on USB charger (White port)

3. Plug the USB charger into power socket

4. Check power indicator for charging status

NOTE:
Charge the wireless communication buoy with fast charging

Introduction
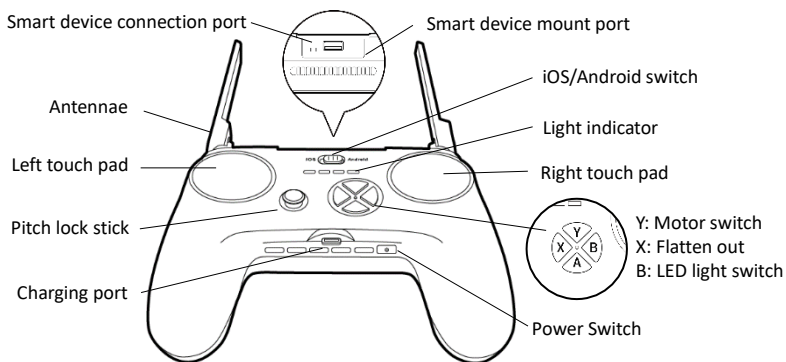
Remote controller (Senseplay Race)

Smart device connection port — Smart device mount port

iOS/Android switch

Antennae — Light indicator

Left touch pad — Right touch pad

Pitch lock stick

Y: Motor switch
X: Flatten out
B: LED light switch

Charging port

Power Switch

Default control scheme

Left touch pad

Forward

Backward

Right touch pad

Up

Down

Turn left/right

Each light indicates 25% of the battery

On: Charged

Off: Low battery

Blinking: Charging
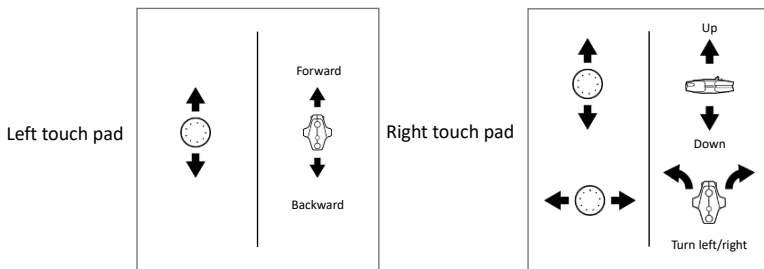
Introduction

Smart device mount

1.   Assemble Smart device mount A&B together

2.   Insert the mount to the back of the remote controller to hold your smart device

---

OTG and lightning cables

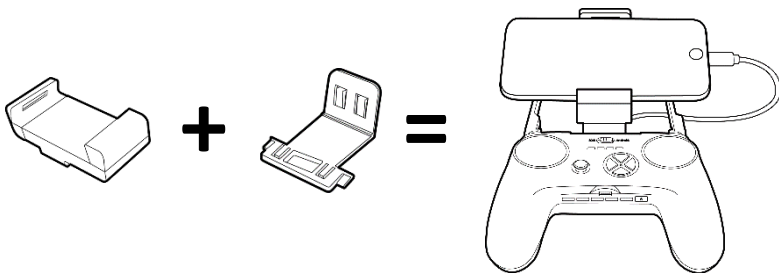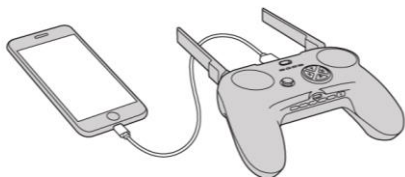You need to use an OTG cable to connect your smart device to the remote controller

Micro USB and Type C OTG Cables and a lightning cable are provided.
Please choose according to your smart device port type.

NOTE
Please make sure your Android device support OTG connection.
For some devices OTG function need to be enabled in the phone settings.
For iOS device a regular lightning cable would also work but we suggest you use the short lightning cable provided for convenience.
If you use the smart device mount, insert the mount before you connect OTG cable

Introduction

Navatics App

The Navatics App turns your smartphone or tablet into a monitor and set-up tool for the MITO underwater drone. It enhances MITO's performance and eases the way of conducting command.

The Navatics app features visual live streaming, photo and video capture and color correction functions. It also provides a wide variety of telemetry and navigation feedback (compass, depth, temperature, battery usage). The app also includes dive log, photo and video preview, vehicle software/firmware update tools and plans for improvements and new features.

Download

The Navatics App can be downloaded at Navatics official website www.navatics.com

NOTE
Keep your App up-to-date. Make sure you get the latest version of Navatics App

Create account

In order to use Navatics MITO, users would be required to sign up a Navatics account.

1. Use your email to create an account.

2. Use the code sent to your registered email address to activate your account. If you don't see the email, please try to check your spam folder or use another email address to create your account

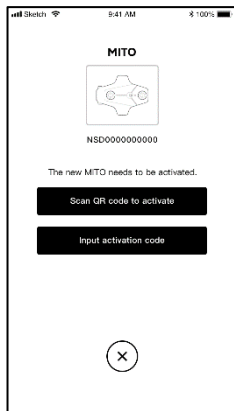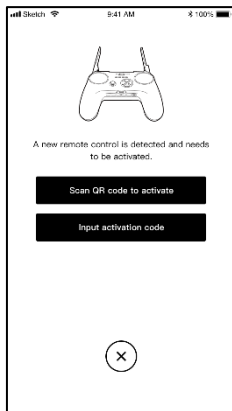3. Login to your account in Navatics App

NOTE
Internet connection is needed when creating account and login

Introduction

Binding devices

Bind the remote control and the wireless communication buoy to your account according to the page prompt that popped up on the Navatics App.

Use the given 6 digits code on the label to bind.

After bind, the APP will automatically connect to the remote controller, once connected, users can start streaming and controlling Navatics MITO.

NOTE:

Internet connection is needed when binding.
Please make sure you turned on the remote and buoy while binding.
The remote will automatically search for its latest device once the app starts working.
If a user need to change the device after a successful first time connection, using the same account is a must.

Introduction

Monitor

Battery status

Parameters setting

Camera parameters setting

Photo/video button

Photo/video switch

The media file

Motor state

Heading indicator

Pitch   Depth and target depth   Light intensity   Temperature

DEPTH
20.00m 20.30m

15°C
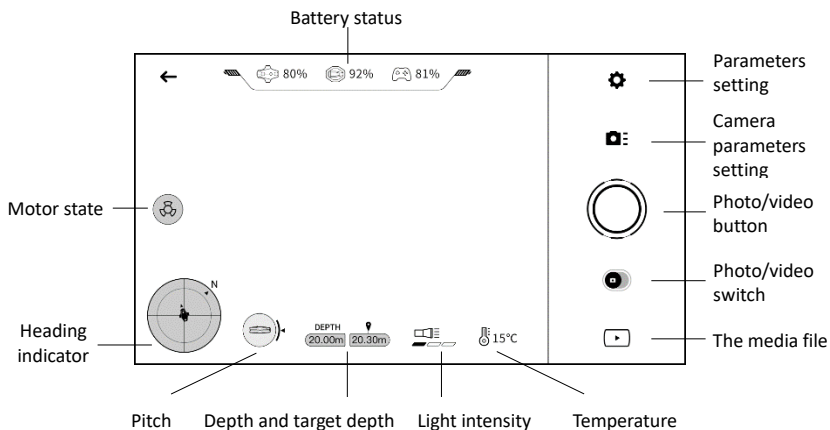
NOTE:

Once bound to an account, the remote and wireless communication buoy can only be used by that account. The app will try to automatically connect to the latest connected device.

Quick Start
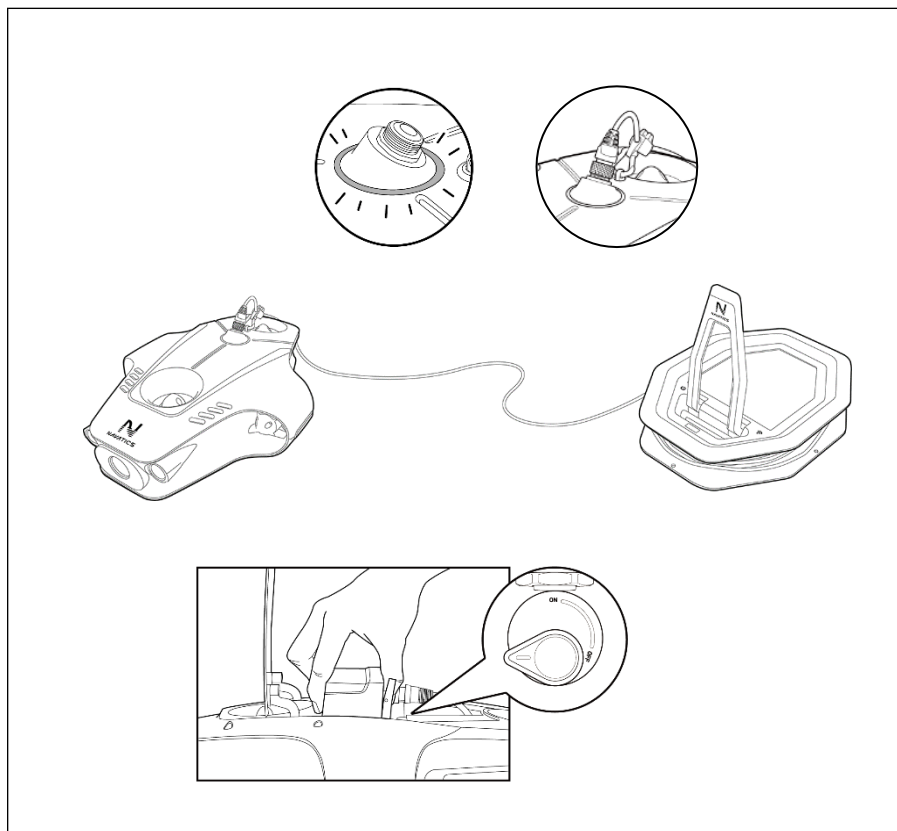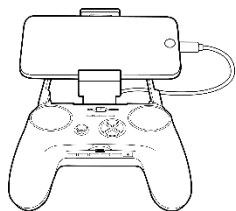
Set up steps:

1. Install the Battery, turn on MITO, and check the light indicator for MITO's status

2. Turn on the wireless communication buoy, connect it to MITO, and check both of their light indicators

3. Turn on the remote controller and select the right mode

4. Connect the smart device and open Navatics App

NOTE:
Refer to this quick start manual when both remote and wireless communication buoy are bound to your account

Preparing for Dive

Evaluating Conditions and Safety

Do your first few dives in line of sight in calm waters to get accustomed to the controls and the behavior of the vehicle.

✓ Recommended conditions
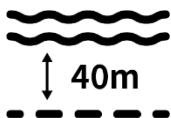
Dive down to 40 m   The drone can handle   Dive in open water
                        rain and snowy weather

⚠ Avoid

Reefs, rocks, seaweeds or other objects may cause crash or entanglement
Water traffic or crowded areas, including but not limited to beaches, diving sites, operating fields etc.

⚠ Attention

In areas with lots of electromagnetic interference you may experience lag or artefacts in the video stream. Electromagnetic interference may be caused by large steel or concrete structures or areas with lots of other WiFi activity. To resolve this you can try to move closer to the surface unit or move to another location.

Preparing for Dive

⊘ **Warning**

→ 1.2m/s

Do NOT dive when current speed is greater than 1.2m/s

↕ 0.5m

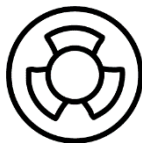Do NOT put wireless communication buoy into water when wave is higher 0.5m

👁 1m

Do NOT use MITO when visibility is under 1m

Do NOT look directly the LED light

Do NOT let the thruster rotating in air

Do NOT touch the propellers when powered

Preparing for Dive

Power On and Connect

Drone
1. Open the battery chamber at the bottom part of Navatics MITO.
2. Connect the battery cable to the battery's waterproof connector,
3. Push the battery into the chamber to lock it in place.
4. Switch on the battery to turn it on and close the chamber
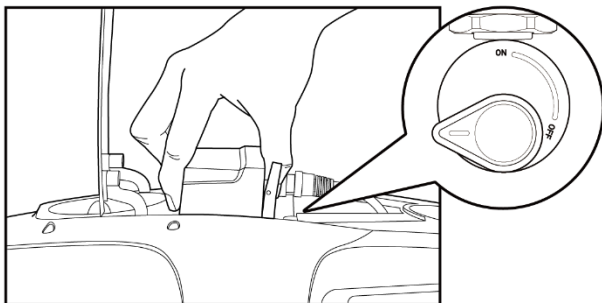
When started, MITO is going to check for the states of its sensor. In the process, it will turn on the LED lights as an indicator, as well as changing the color of LED ring to indicate the process. Once all sensors are calibrated, the LED lights will turn off and the LED ring will turn white.
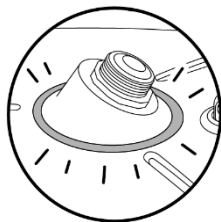
White: Normal

Blue: Calibrating

Red: Problem occurred (See trouble shooting on page 24)

NOTE:
If the light is blue, it is necessary to calibrate the sensor, please refer to Sensor Calibration instructions on page 19

Preparing for Dive

Wireless communication buoy:

1. Pull up the antennae and wait until the power indicator lights up
2. Connect the tether from the Wireless Communication Buoy to the top connector of the robot. Wait until the signal indicator blink shows that the tether roller is ready to transmit video and data to the remote controller.
3. Hook the tether on the tether hook
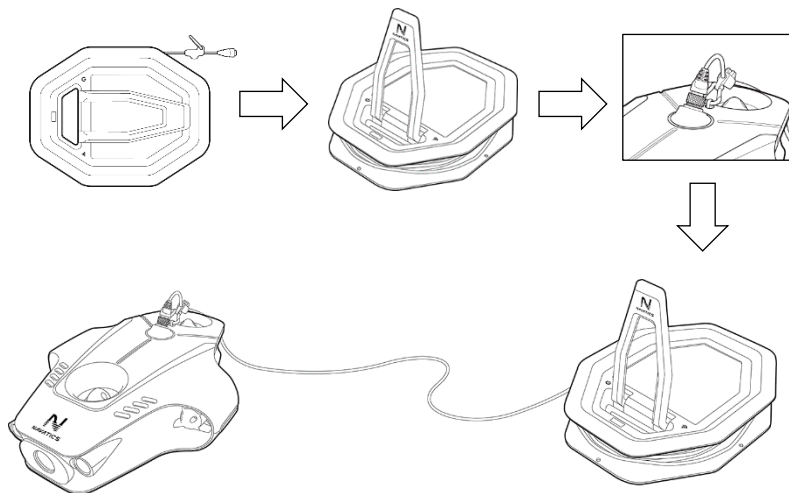
On: Turned on / Charged

Blinking: Charging

Flashing: Low battery

On: Establishing connection

Blinking: MITO Connected

Off: MITO not connected

NOTE:

It is strongly recommended to cover the Type-C charging port with the provided rubber cover attached to the charging port and it is a MUST when putting the wireless communication buoy in water.

Preparing for Dive

Remote controller

1. Use the power button at the bottom of the remote controller and wait until the battery indicator lights up
2. In the middle of the remote there is a switch that users need to select between Android app and iOS app, select the appropriate mode depending the smart device type.
3. Connect smart device via USB port on top of the remote controller. Android base devices require OTG cable (Micro USB and Type C OTG cable provided). iOS base devices can be connected with common lightning cable (provided).
4. Once the users open the app, the remote will start searching for the latest device it was connected to, or users can select another device to connect to.
5. Once connected, users can start streaming and controlling Navatics MITO
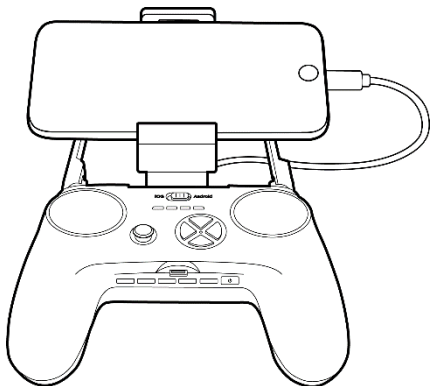
NOTE:
If users have not bound the controller with Navatics account, please check page 9-10 for account registration and device binding

Preparing for Dive

Sensor Calibration

When first receiving MITO, it is recommended for users to calibrate the gyroscope and compass. In addition, compass re-calibration is recommended when diving in new places, to adjust to the magnetic condition of the dive site. The instructions below provides guidelines to calibrate the compass.

1. Start MITO and the tether floatation, and connect the Senseplay Race to MITO..
2. Start the Navatics app in the smartphone.
3. Go to Camera View and click on the parameters settings icon to open the dialog box.
4. Go to the calibration page in the app
5. Place MITO on a flat ground, allow it to stay still, and press calibrate gyroscope. MITO will be restarted and the LED light will flash.
6. The calibration process runs for around 1 second each.
7. Finally, press calibrate compass. The calibration process is as following:
8. Hold MITO with the bottom facing the ground. Rotate horizontally for 360 degrees.
9. Once the calibration finished the LED will be turned off.
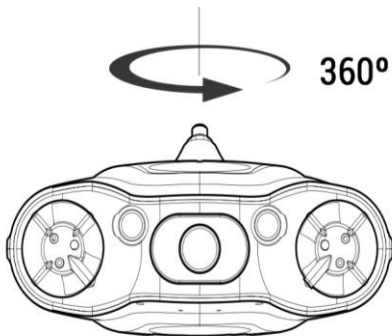
Preparing for Dive

Preparing for Launch

Battery check
Please check the battery level of each parts

Make sure the batteries on the drone, surface unit, controller and mobile device are at least 75% charged before you go diving.

When the battery in the drone reaches 25% when diving, go back to shore.

Using tether

To avoid tangle on the tether, do not unroll it all at once. Unroll it 3 feet (1 meter) at a time. Make sure that there are no knots.
Use the lock provided to limit the length of tether you want to use for each dive

Pack it 3 feet (1 meter) at a time to the wireless communication buoy

Diving

Put the drone into water

- Lower the drone slowly into water by hand

- The securely hooked tether can be used from heights.

- Do not throw the drone into water

Start MITO

- Once the drone is in water, turn on the motors of the drone by pressing the Y button on the remote controller.

- Press again to turn off the motor and the drone will automatically float to the surface of water when the motors are off

Control MITO

- Control MITO using the remote controller

Left touch pad

Right touch pad
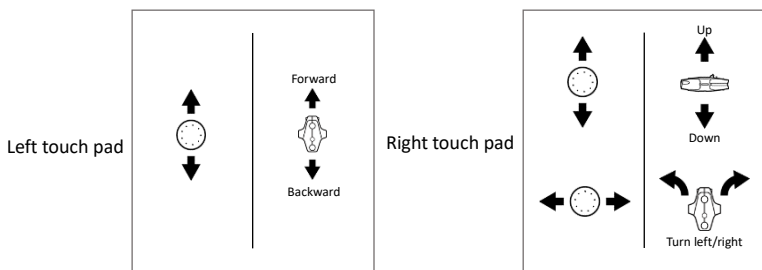
After Diving

Cleaning

Rinse MITO with fresh water. To avoid unnecessary wear on the drone and the wireless communication buoy, after each dive in salt water, the drone and buoy MUST be rinsed with fresh water. The tether is also suggested to be rinsed.
The drone, buoy and tether can either be submerged in fresh water or rinsed with a garden hose.

NOTE:
Remember to seal the charging port with cover when rinsing wireless communication buoy.

Manage Dive Log

Dive logs are taken in the App every time a user used MITO to dive.

It will start recording the data when MITO dives deep enough, and stop recording when MITO is floating on the surface and the thrusters are turned off, or when it is running out of battery.

The dive log will record various data, including duration of dive, maximum depth, depth and temperature chart, maps, and display photos taken in the dive.

View Image

Viewing pictures and videos on your smart device

Videos and pictures taken during each dive can be viewed it in Navatics App

Media Files

Users can click on "Photo and Video" buttons from the App's landing page, or from the bottom corner of the camera view screen to access captured images and video.

Color Correction Filter
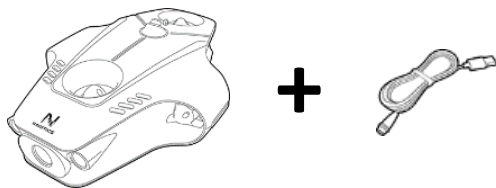When opening a picture, users can access Navatics' color correction filter function.

Sharing
You can share photos and videos directly to your social media account

After Diving

Download Image

To transfer full size videos and images to your devices, you need to use the USB data cable provided to connect MITO directly to your device.

NOTE:
Please turn off MITO before downloading files from MITO

Care and Maintenance

Trouble shooting

Setting up an account
- If the verification email is not received, please check the Spam folder.
- We have tested this to work with Gmail and Yahoo mail, but we had problems with Office (365 mail)
- Check your internet connection

Logging in and logging out
- If connection failed, check your internet connection

Connecting wireless communication buoy with Navatics MITO
If the communication buoy fails to connect with Navatics MITO, check and make sure:
- Navatics MITO is turned on
- The communication buoy is turned on
- The tether roller is connected
- Once connected, the signal LED on the communication buoy will blink

Binding the communication buoy and remote to your account
- Check your internet connection
- Check if you are logged in to your account
- The binding should be done in sequence, i.e. the remote should be bound before you can search and bind a communication buoy

Unbinding communication buoy and remote to your account
- Check your internet connection
- The unbinding process should be done in sequence, i.e. if you wish to unbind both devices the communication buoy should be unbound first, then the remote

Operating Navatics MITO
- If the LED is Red, there might be problems with the internal hardware. Check if there is any damage to motors and restart the ROV
- If the motor suddenly stop, normally that was caused by something stuck on the propeller (e.g. seaweed or sands)
- The LED will automatically dim at 0.2m deep in water

Care and Maintenance

Changing Propellers

Spare propellers are provided in case of any damage on the original propellers.

1. Remove the screws from the propeller

2. Take off the propellers from the thrusters' rotor

3. Make sure that you are picking the right propeller (R or L)

4. Once installed, screw the new propellers back in place

NOTE:
Use 1/16inch (2mm) hex–key screwdriver to remove screws
The R propeller can only be used on the right and back thrusters, while the L propeller can only be used for left and front thrusters. Failure to install the right type of propeller will cause instability.
The Mark is inside the propeller:
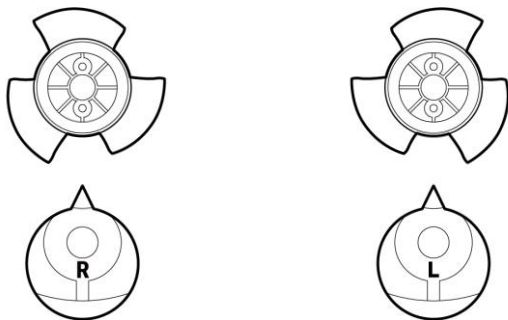
Care and Maintenance

Cleaning Thrusters

Regular cleaning for the thrusters is suggested for a longer use time

1. Take out the screws that holds the rear cover of the thruster

2. Remove the lock nut at the back of the thruster while holding the rotor

3. Once the lock nut is removed, the rotor can be taken out. Clean any debris stuck

    between the rotor and the stator before placing them back in

4. Once finished, reinstall the rotor and fix them with the lock nut

5. Reinstall the thruster's rear cover

NOTE

Use 1/16inch (2mm) hex–key screwdriver to remove screws

Updating Firmware

Firmware should be updated when available

1. Download the latest version firmware in your App at the update page

2. Make sure all batteries are sufficiently charged before updating

3. Keep your devices connected to internet

4. Keep your devices connected to MITO

5. Please do not shut down the system while you are updating

6. Reboot the devices after the update has been completed

Care and Maintenance

Technical Information

	Specification	Details
	Specification	**Details**
1.	Dimension	400mm x 300 mm x 135 mm
2.	Weight	3.45 kg /7.6 lbs. (including 0.8 kg battery) 0.1kg positively buoyant in the water
3.	Battery:	
	Capacity	5500mAh
	Voltage	14.8V
	Energy	80Wh
	Type	LiPo
	Operating time	4 hours (Normal Use) 2 hours (Intensive Use, High Speed)
	Charging time	1.5 hours
	Weight	850g
	Operating Temperature Range	-20°C to 60°C
	Charging Temperature Range	10°C to 60°C
	Input Voltage	16.8V 5A
	Safety	Waterproof, 100m water resistant, over-temperature and over-current protection
4.	Camera	
	CMOS Size	1/1.7 inch
	Video Recording Resolution	3840x2160 30/25 fps
		2048x1536 30/25fps
		1920x1080 30/25fps
	Image Capture Resolution	12 MP
	Live Stream Resolution	1920x1080 30 fps

	Codec	h.264
	Shutter Speed	1 - 1/1000
	ISO	100 - 6400
	Aperture	F2.0
	FOV	120° diagonal
5.	SD card	64GB
6.	Maximum Speed	2m/s / 3.8 knot
7.	Maximum Depth	40 m / 130 ft.
8.	Tether Length	50m / 165 ft.
9.	Tether Roller	
	Wireless Communication Range	500 m
	Operating Time	4 hours
	Charging Time	2.5 hours Fast Charging, 5 hours Normal Charging
	Battery Capacity	38.8Wh 3.7V 10500mAh
	Waterproofing	1m (IP68)
	Weight	1.7 kg / 3.75 lbs.
	Dimension	330 mm x 250 mm x 55 mm
	Tether Strength	100 kg Kevlar reinforced
	Tether diameter	4.2 mm
	Charging Interface	USB Type-C
	Input Voltage	DC 5.0V/2.0A 9.0V/2.0A 12.0V/1.5A
10.	Remote Controller	
	Dimension	170mm x 110mm x 70mm
	Operating Time	2.5 hours
	Charging Time	2 hours
	Battery Capacity	3000 mAh
	Stream Port	USB Type-A

	Charging Port	USB Type-C
	Input Voltage	DC 5.0V / 2.0A
11.	Application	Support Android and IOS
12.	LED	2x 1000 lumen 10W
	Color Temperature	5700K
	Intensity	4 Levels : 100%, 66%, 33%, 0%
13.	Operating Condition	
	Salinity	Fresh water and salt water
	Temperature	-5℃ to 40℃
	Thruster	Removable motor, can be cleaned after usage in harsh condition to prevent sand built up
14.	Mobility	Capable of moving in 4-axis forward/backward, rotate left/rotate right, up/down and tilt up/tilt down
15.	Attitude and Depth Control	Constantly maintain depth, heading and pitch angle both during hovering and moving
16.	Tilt Lock	Set desired pitch angle between -45° to 45° and have the ability to move forward/backward, rotate left/right and vertical up/down while maintaining desired depth
17.	Adaptive payload	Able to carry payload up to 500g underwater while maintaining attitude and depth control.

NAVATICS

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