



CALYPSO ULTRASONIC Portable

WIND INSTRUMENT AND DATA LOGGER

User manual



Our new Ultrasonic Portable Wind Instrument and data logger pretends to be an innovative product, bringing top-notch ultrasonic wind measurement technology to the mobile world. Affordable, portable, with no moving parts, IPX8, easy to install, accurate, and open to third-party apps.

The Calypso Ultrasonic Anemometer brings astonishing technology to a wider range of users, from the sailor to the farmer.

If you want to know more about our new ULTRASONIC PORTABLE wind meter, please keep reading or visit our website www.calypsoinstruments.com

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1. Product overview

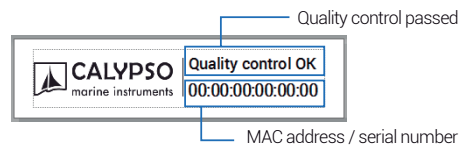
Congratulations, you are the owner of a brand new ULTRASONIC Wind Instrument and Data Logger. A wireless (BLE) and self-powered (solar) IPX8 pocket-sized ultrasonic anemometer, easy to install, simple to use and compatible with iOS and Android.



2. Package content

The package contains the following:

- Ultrasonic Portable Wind Instrument
- Serial number reference in the back of the packaging
- Quality control reference in the same place as the previous one (Both shown in the bottom image)
- User Quick guide at the back of the packaging and some more information useful for the customer.



3. Technical specifications

Ultrasonic Portable incorporates the following technical specifications:

- 3.1. Dimensions**
- Diameter: 70 mm
 - Height: 57 mm



- 3.2. Weight**
- 135 grams

Either, dimensions and weight, make the Ultrasonic Portable a compact and easy to use product.

- 3.3. Bluetooth**
- Version: 4.0 or beyond
 - Range: 50 m (open space)

The Ultrasonic Portable incorporates BLE technology (Bluetooth Low Energy).

BLE is the first open wireless communication technology, offering communication between mobile devices or computers and other smaller devices such as our new wind meter.

Compared to Classic Bluetooth, BLE is intended to provide considerably reduced power consumption and cost while maintaining a similar communication range.

Version

The BLE version is 4.0. It incorporates important developments for the user by facilitating the reconnection between their devices once they come out and re-enter the range of action.

Compatible devices

You can use our product with the following devices:

- Compatible Bluetooth 4.0 Android devices, Android 4.3 or 4.4
- iPhone 4S or beyond
- iPad 3rd generation or beyond
- Run the *Sailing Anemotracker App* to check compatibility and make sure your device is compatible.

Range

The coverage range is around 50 meters when it is an open space.

3. Technical specifications (continuation)

3.4. Power

- Solar panel
- Internal battery
- Advanced power management
- Battery consumption
- Battery charge

This new product incorporates an innovative energy system. The assembly integrates a solar panel that feeds an internal battery.

Solar panel/Internal battery

The design has a solar panel in the upper part. This solar panel feeds a battery located in the interior of the product. - Thanks to the hermetic locking it is isolated from any type of external agent.



The useful life of the battery is 2100 charge/discharge cycles.

Battery life it should not be a concern. It has an autonomy with no sunlight of 1 year in sleep mode and ~30 days while measuring.

Besides, ULTRASONIC PORTABLE mounts a solar battery that should maintain the internal battery loaded, minimizing charge/discharge cycles.

Advanced Power management

The Ultrasonic device automatically manages power use, power storage and solar production. The built-in energy management system sets operation made to one of the followings modes, depending on battery status:

OFF MODE

- Battery level: 0% - 2,5%
- Safety level to prevent battery damage.
- It does not provide any information.
- Needs to be recharged.

SLEEP MODE

- Battery voltage: 2,5% - 10%
- It just provide advertising information (BLE signal).
- Needs to be recharged.

LOW POWER MODE

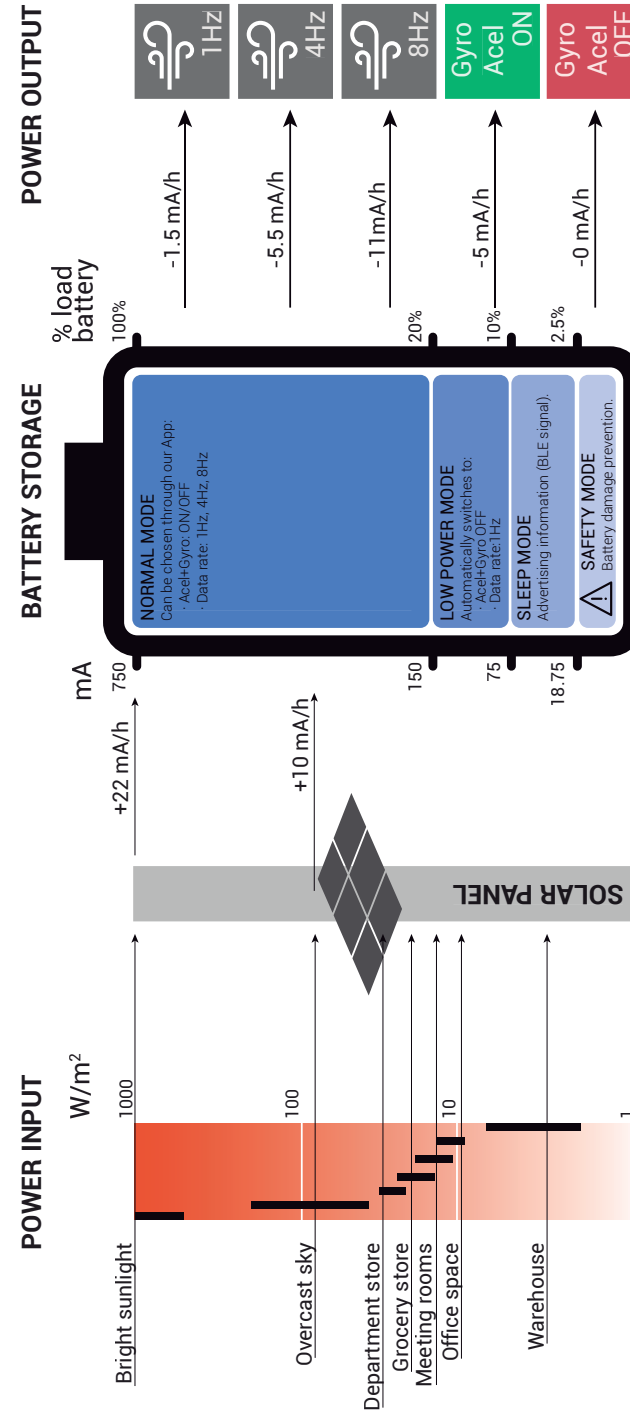
- Battery voltage: 10% - 20%
- It just allows you to get information at 1Hz. · Gyroscope and accelerometer sensors do not work.

NORMAL MODE

- Battery voltage: 20% - 100%

Every mode changes automatically depending on the voltage of the battery.

NORMAL MODE	LOW POWER MODE	SLEEP MODE	OFF MODE
100%	20%	10%	2,5% 0%
Autonomy Acel+Gyro OFF 1Hz - 29 days 4Hz - 8 days 10Hz - 3 days	Autonomy 1Hz - 3 days	Autonomy 1Hz - 67 days	
	Acel+Gyro ON 1Hz - 7 days 4Hz - 4 days 10Hz - 2 days		



power input < power output
10 mA/h - 10.5 mA/h = -0.5 mA/h
600 mA / 0.5 mA/h = 1200h autonomy

power input > power output
15 mA/h - 5.5 mA/h = 9.5 mA/h
450 mA / 9.5 mA/h = 47h for a full charge = ∞ autonomy

power output
-5.5 mA/h
-5 mA/h

power output
-5.5 mA/h

80% battery charge = 600 mA
20% to load = 150 mA

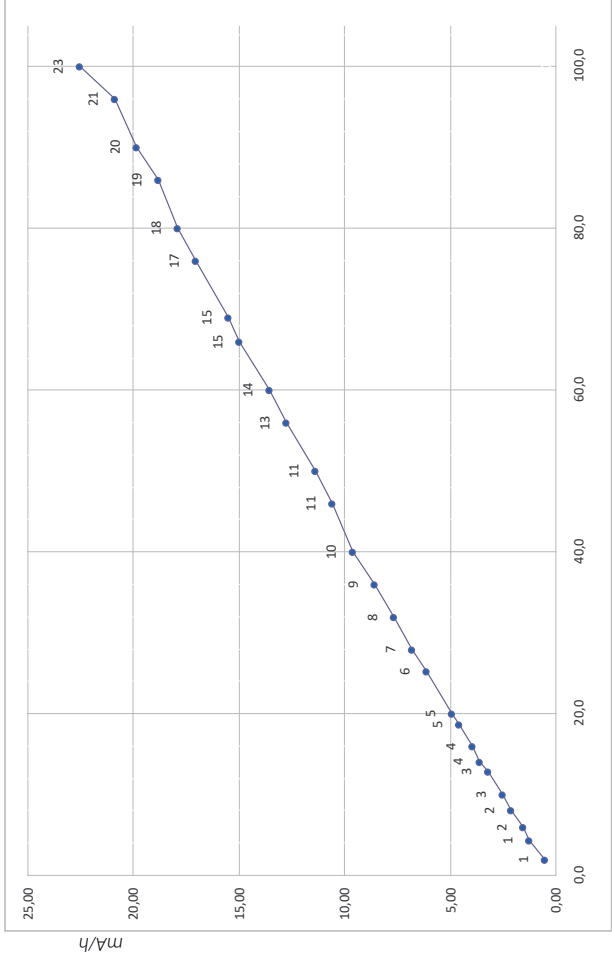
40% battery charge = 300 mA
60% to load = 450 mA

Examples:

- Gyro ON, Acel ON, 4Hz
- Gyro OFF, Acel OFF, 4Hz

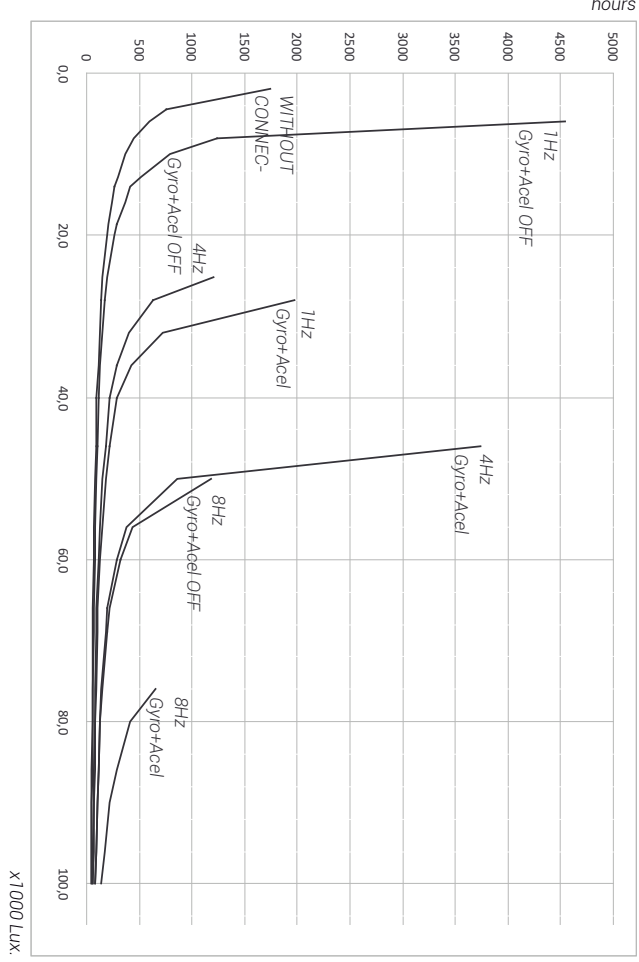
Graphic 3. Charging (mA/h) vs illuminance

Legend: OVERCAST SKY (grey), BRIGHT SUNLIGHT (orange)



3.4. Power (battery charge)

3.4. Power (battery consumption)



Graphic 2. Load hours/illuminance - DEPENDING ON THE USE OF ULTRASONIC DEVICE

3. Technical specifications (continuation)

3.5. Sensors

- Ultrasonic transducers (4x)
- Sample rate: 1, 4, 8 Hz

3.6. Secondary sensors

- Thermometer
- Compass
- Gyroscope
- Accelerometer

This product is a wind sensor instrument and it has been engineered for the sole use of accurately measure wind speed and direction using ultrasonic transducers. The product includes some secondary sensors in addition, such as thermometer, compass, gyroscope and accelerometer. These secondary sensors are not meant to be scientific instruments but to give some approximate information to enhance the product experience for the end user. Sensor are also useful for developers and professional users that will properly treat and filter the output signal. For instance, having a temperature reading does not turn the wind instrument into a sun-shielded scientific thermometer, compass will not substitute a dedicated precision compass, etc...These secondary sensors are not calibrated and should not be used.

Ultrasonic transducers (4x)

The Ultrasonic Portable has been designed to avoid any mechanical parts to maximize reliability and minimize maintenance.

The transducers communicate between themselves two by two using ultrasonic range waves. Each couple of transducers calculate the signal delay and get information about both, wind direction and wind speed.



Sample rate: 1, 4, 8 Hz

Sample rate can be chosen through the application the range of data you want to extract. If the battery level is not up to 20%, you can only get information at 1Hz.

3.6. Wind information

- Wind speed
- Wind direction

Wind speed

Range: 0 - 25 m/s
Resolution: ± 0.1 m/s at 10m/s

Wind direction

Range: 0 - 360°
Resolution: $\pm 1^\circ$

*For more information about how to get each value, please visit our website and download latest full manual of Anemotracker App.

3.7. Protection grade · IPX8 (10 meters)

The Ultrasonic Portable has been certified by an approved independent laboratory as IPX8. In order to get that IPX8 code certification, ULTRASONIC PORTABLE has successfully passed a 30 minutes water immersion test at a depth of 10 meters (1bar) with no water ingress. We have also run more severe tests in house with successful results (even though they are not certified).

However, reaching IPx8 30 min-10 m does not yield warranty of waterproofness at 10 m. The same rationale applies to swimming watches; a watch needs to be tested at 30-50 meters depth to be considered water-resistant at a swimming depth of around 1 meter. For going deeper than (snorkeling, diving) watches are individually tested up to 200-500 m!

Several factors might affect Ultrasonic watertightness: rubber seals and plastics wear and tear, drastic temperature changes (hot air then cold water), previous impacts, pressure increase rate (immersion velocity), water density and temperature, under-water speed and acceleration, ... This is why we do not certify that our Ultrasonic is IPX8 30 min-10 m but we cannot warranty that is waterproof at 10 m.

3. Technical specifications (continuation)

3.8. Easy mount · 16 mm (M16x2 female thread)

You can mount your Ultrasonic in a simple way since it comes with a threaded lower part (16 mm M16x2 female thread).



A wide range of accessories can be used with the device

CARBON FIBER POLE

· 33 cm.
· 100 cm.



ALUMINUM POLE

· 33 cm.
· 100 cm.



MAST MOUNT (for Portable and Wired versions)

NEW!



(Check availability of other measures through our website).

*Please, visit our website and check accessories availables and their possible combinations.

3.9. Firmware · Upgradable

You can update the Ultrasonic Portable firmware via Bluetooth.

How can I do that?

Follow the next steps:

1. To check the availability of the new firmware version, please visit our webpage and download the file.
2. Download and install Rigado Toolbox App on your device from Google Play or Apple Store.
3. Enter to the App pressing on its icon.
4. Select the correct Ultrasonic (taking into reference the serial number/MAC address). Then the App will try to connect with the unit.
5. The connection is successful when the word "CONNECTED" appears at the top.
6. Select "FIRMWARE UPDATE" - Select first option "Firmware Image File".
7. Select the correct file ending in ".bin" (there will be a reference on the web).
8. Then, data has been updated on the main screen.
9. Select "Activation Characteristic" - A pop-up window will appear on the main screen - select it.
10. Another pop-up window will appear on the main screen - you have to search the correct one (in which the combination "0000A00A" appears) - Select it.
11. Then, data has been updated on the main screen.
12. Select "Activation Command" - The keyboard will be uncovered to indicate command "01".
13. Press "BEGIN FIRMWARE UPDATE".
14. A new window will appear with the progress.
15. When the process is completed, a pop-up window will appear indicating the completed update and requesting the Bluetooth reset.
16. Select "RESET BLUETOOTH".
17. The App directs you to the Bluetooth options. It connects again and you already have your unit updated!

If any error appears during the update process, please repeat all steps from the beginning.

*Tutorial video available at our website.

4. Functions

The Ultrasonic Portable will allow you to perform a great diversity of operations adapting to your needs.

It will provide you information about everything what is shown below through our application *Sailing Anemotracker App*, but the most important aspects that facilitate the unit are the followings:

- The **Apparent Wind** is a value that comes thanks to the Ultrasonic Portable.

- The **Real Wind** is a value that facilitates the application thanks to the data collected by the anemometer and the crossing with the GPS of the connected device.

- All collected data can be stored in the memory of the application.

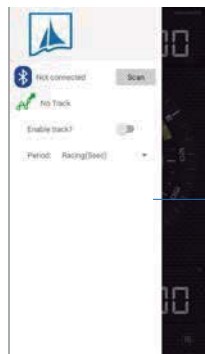


Below are some captures that refer to the data provided by the application.

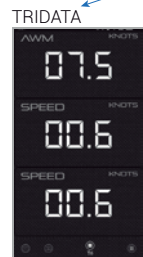


Screen that appears when you run the application.

The menu appears at the bottom, with the four main buttons.



SETTINGS - Screen that appears sliding to the right.



*For more information to How to use Sailing Anemotracker App, please visit our website and download its latest version of user manual.

5. Application areas

Thanks to the great diversity of functions the product can perform, it can be adapted to different areas.

Nautic

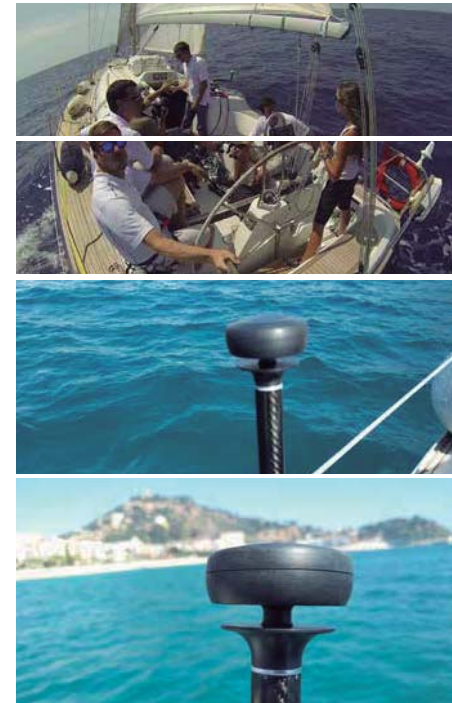


- Cruising
- Daysailers
- Trainers and race officials
- Motorboats
- Others

Extreme sports



- Kitesurf
- Kayak
- Windsurf
- Paragliding



Meteo



Industry



5. Application areas (continuation)

Energy



The Ultrasonic Portable can be used in such disparate sectors, such as agricultural or nautical, through energy or new technologies.

·Attached to any work equipment (tractor, pivot, combine harvester, ...) can facilitate information of atmospheric conditions to optimize processes and log information and position.

Agriculture



·Generate history for study and application on farms (reparcelling, redistribution of sprinklers, claim for damages. derived from the climatic conditions, etc).

·It can be an ideal complement for eolic sector. In particular for the production of wind power. It acts as a weather station, but with the peculiarity of being mobile and of being able to obtain data in real time from a state-of-the-art device, without cables and lo them.

Cranes



·To know the conditions of wind, relative humidity, temperature,... are parameters that condition certain productive processes. They can help to optimize air conditioning and humidity control in drying hams, cheeses, etc. Knowing this information in a simple way and being able to store and treat it, can contribute to the added value of these processes and, consequently, the products resulting from the same.

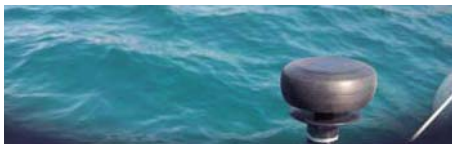
Security



·The practice of windsurfing or kitesurfing is booming. With the Ultrasonic Portable, the companies dedicated to providing services to the users of these infrastructures for the practice of these sports, could count on a Information on the weather, soxx important for the practice of these sports.

With all this, the Ultrasonic Portable becomes a multidisciplinary product, able to adapt to the needs of a wide range of users.

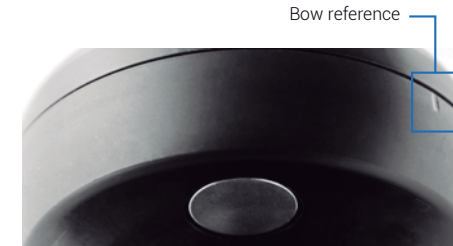
Forestry



6. Installation

6.1. Installing the unit

The Ultrasonic Portable has to be oriented to the bow taking as reference the mark that appears at the top (as shows at the image below).



As we describe you before, comes with a threaded lower part (16 mm M16x2 female thread) that you can adapt to your available accessories.

It is a standard measure, great variety of accessories in the market adapt to it.

*Please check our available accessories on our website.

6.2. Installing the App and testing the unit

Follow the next steps:

1. Make sure your device is BLE compatible*.

· Ultrasonic Portable works with Android 4.3 or 4.4 or iOS devices (4s, iPad2 or beyond).

2. Download and install *Sailing Anemotracker App* on your device from Google Play or Apple Store.



3. Once the App is installed start it and open the settings menu by sliding the screen to the right.

4. Press button "Scan" and all Ultrasonic Portable devices within the range should show up at screen.

5. Select your device and connect.
If your device connects with the Ultrasonic Portable correctly, continue with the normal installation.

If not, please read the following lines.

Your device is compatible but you can not connect?

1. Make sure BT (Bluetooth) mode is running on your smartphone, Tablet or PC.

2. Make sure Ultrasonic Portable is not on Off mode. If the device has not been exposed to any source of light for an extended period of time it might be necessary to keep it under direct sunlight for a few hours. A cloudy day will work too.

4. Make sure no other device is linked to your Ultrasonic Portable.
Each unit can only be connected to a single device at a time. As soon as it gets disconnected, Ultrasonic Portable is ready to link to any other device with the Anemotracker app installed.

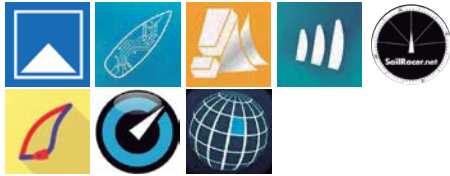
For further information please contact Calypso Technical Support.

7. Compatible Apps

We constantly work on making the product compatible with a great diversity of Applications.

The list below shows some apps that got to be compatible with our products. We are not responsible of third party bugs, updates, new releases, etc...Therefore, please check with each app developer current compatibility.

- Sailing Anemotracker App (our Own App)
- Sentinel Marine Solutions
- iRegatta
- eStela
- SailRacer
- SailGrib
- EDO sailing instruments
- Weather4D
- Among others...



*These Apps got to be compatible. Please check current compatibility and features on their websites.

Our hardware is open source.

We are a hardware firm but we developed and maintain Sailing Anemotracker App to be used with our products. We realize that our users' diverse needs require tailored solutions beyond our imagination and that's why we decided from minute one to open our hardware to the world.

We encourage third party software and hardware firms to integrate our hardware on their platforms at their will.

Here you learn how to connect to our hardware. You can replicate the product signal so you don't need to get one to start playing right away.

We made communication as simple as possible; however, if you need support, do not hesitate to contact us either by email (info@calypsoinstruments.com) or phone (+34 976 291 839).

8. FAQ/troubleshooting

What about hardware and software compatibility?

Sailing Anemotracker App will run on iOS and Android devices. However, since Ultrasonic Portable uses Bluetooth Low Energy (BLE), the App will connect only when run on BLE devices. In other words, Ultrasonic Portable will connect to smartphones and tablets with BLE chipset running Android (4.3 and 4.4 or beyond) or iOS (iPhone 4s, iPad 3rd generation or beyond) using Sailing Anemotracker App.

Make sure your device is Android (4.3 and 4.4 or beyond) or iOS (iPhone 4s, iPad 3rd generation or beyond)! Otherwise, it will not connect to Ultrasonic Portable.

Sailing Anemotracker App will check automatically compatibility. Since the app is free, you will be able to download and make the compatibility check.

Drop us an email - info@calypsoinstruments.com - if you are not sure about your device compatibility.

There are more Apps compatible with ULTRASONIC PORTABLE, which you can find it here, and read more about our Open philosophy.

Does it work offline?

Yes, ULTRASONIC will connect and will work fine with Anemotracker with no internet connection. However, the maps windows will not show any map since it needs internet connection to get map info.

How many devices can be linked to the same ULTRASONIC at the same time?

ULTRASONIC only allows one device linked at a time (Bluetooth standard). If one device is linked and you want to use a different device, you will need to first, disconnect the linked one and then connect the new one.

It is wise to go mobile onboard?

Your next smartphone will deliver better screen visibility, improved battery life, better and more apps on it, better data logging and sharing and overall better performance than the one you bought last year. But your hardware (ULTRASONIC PORTABLE) will remain at the top of your mast.

8. FAQ/troubleshooting (continuation)

How can I identify my ULTRASONIC PORTABLE among several units within my device BT range?

Each ULTRASONIC PORTABLE shows a unique ID when you it's paired with your device. The number should be printed on your box and/or the ULTRASONIC sticker. You can also write it down the first time you connect, since it will not change over the time.

What is the distance range of my ULTRASONIC PORTABLE?

The Bluetooth Low Energy radio chip integrated on the device has a nominal value of 50m. During in-house testing we have reached up to 80 m range on an open space, at the same level and keeping transmitter (ULTRASONIC) and receiver (Nexus 5) at the same positions along the test.

Range will depend upon transmitter-to-receiver direct visibility, your device antenna performance, electromagnetic environment (electrosmog), etc.

However, in all tests we run, we had no problem to get the signal from the top of the mast to the cabin, even to our berths.

Will my Sailing Anemotracker App get data from a boat close to mine when racing?

No! As any other bluetooth device, the communication is password protected. Once you paired your smartphone with your ULTRASONIC PORTABLE unit, no other smartphone can communicate with it.

Is it compatible with NMEA CONNECT?

We made CUPS 4.0 compatible with NMEA CONNECT. And ULTRASONIC PORTABLE will be compatible within the few months, we are developing a new firmware that will allow you to use it with NMEA CONNECT 4.0 repeater so ULTRASONIC can be integrated on your boat network.

Is the ULTRASONIC PORTABLE firmware upgradable?

Yes, definitely. You will get new firmware updates via Bluetooth by means of an App with lots of new features and improvements.

How long will the battery last?

ULTRASONIC PORTABLE is built with an advanced automatic power management system, so battery life it should not be a concern. It has an autonomy with no sunlight of 1 year in sleep mode and ~30 days while measuring.

Besides, ULTRASONIC PORTABLE mounts a solar battery that should maintain the internal battery loaded, minimizing charge/discharge cycles.

Battery life is therefore limited by its life expectancy.

*Please, go to section 3. **Technical especifications** to know more about battery use and life.

ULTRASONIC PORTABLE is IPX8, what does it mean?

The Ultrasonic Portable is been certified by an approved independent laboratory as IPX8. In order to get that IPX8 code certification, ULTRASONIC PORTABLE has successfully passed a 30 minutes water immersion test at a depth of 10 meters (1bar) with no water ingress. We have also run more severe tests in house with successful results (even though they are not certified).

However, reaching IPX8 30 min-10 m does not yield warranty of waterproofness at 10 m. The same rationale applies to swimming watches; a watch needs to be tested at 30-50 meters depth to be considered water-resistant at a swimming depth of around 1 meter. For going deeper than (snorkeling, diving) watches are individually tested up to 200-500 m!

Several factors might affect Ultrasonic watertightness: rubber seals and plastics wear and tear, drastic temperature changes (hot air then cold water), previous impacts, pressure increase rate (immersion velocity), water density and temperature, under-water speed and acceleration, ... This is why we do certify that our Ultrasonic is IPX8 30 min-10 m but we cannot warranty that is waterproof at 10 m.

How can I update the firmware version of my unit?

Please, go to chapter 3.9. **Firmware**, follow the steps that we indicated and rely on the following images if you wish.

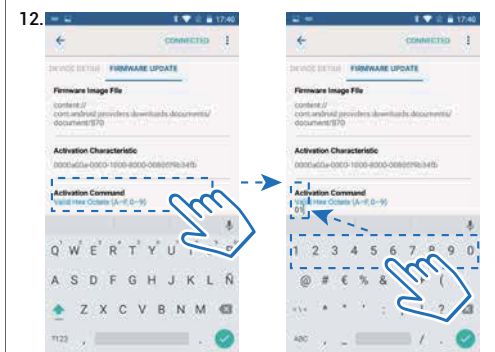
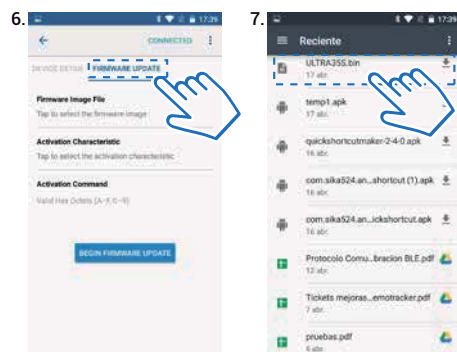
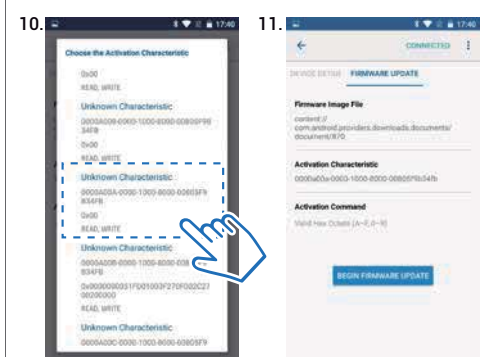
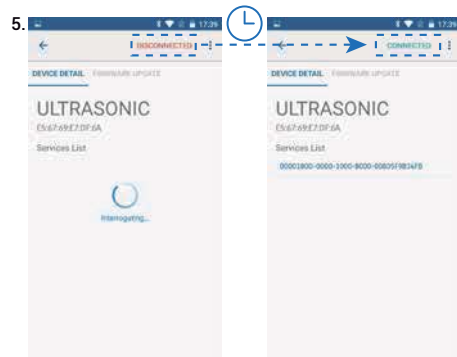
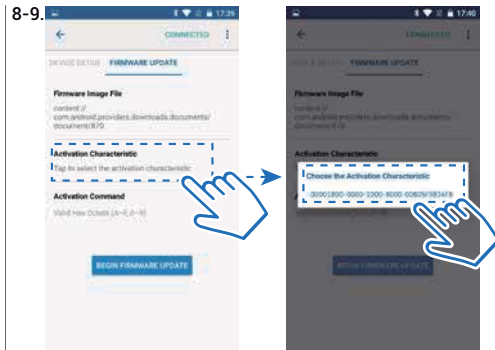
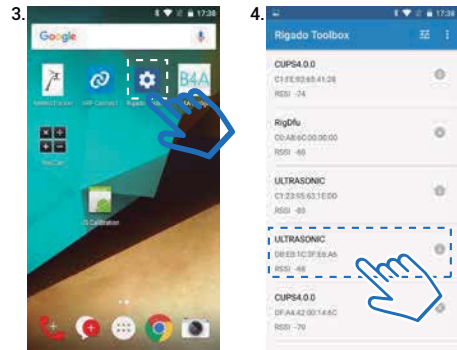
Follow the next steps:

1. To check the availability of the new firmware version, please visit our webpage www.calypsoinstruments.com

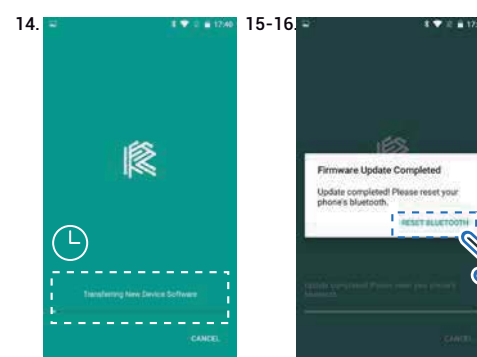
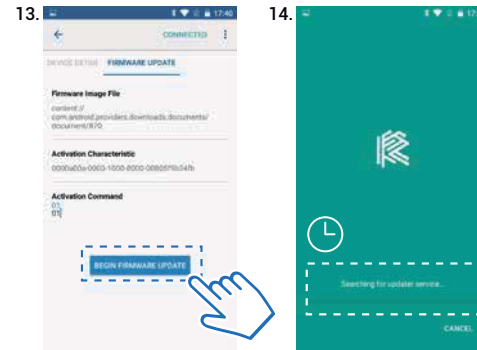
2. Download and install Rigado Toolbox App on your device from Google Play or Apple Store.



8. FAQ/troubleshooting (continuation)



8. FAQ/troubleshooting (continuation)



How can I start using the Anemotracker App?
Here is a quick start up guide so you can begin using your device and the App.

START UP STEPS

1. First thing you need to do, is to activate both your GPS and your Bluetooth.
2. Then, once you are in the main menu of the app, you need to slide to the right so the "Settings" tab will show up.
3. There, you can press "SCAN", and after about 15 to 20 seconds you will see a list of the devices surrounding you, where you can choose the one you own by pressing on it.
4. When you do that, and after another 15 to 20 seconds, the device will connect.

You only need to do this once, the next time you start the app, the last device you connected will connect automatically.

Will it work on a rotating mast?
Not right now, but in the near future, the ULTRASONIC will be able to compensate any rotation given, and recalculate to display the proper data back to you.

What happen if my unit gets blocked?
The ULTRASONIC PORTABLE restarts after 10 minutes thanks to the system called "watchdog". You simply have to reset the application again and it will work again correctly.

8. FAQ/troubleshooting (continuation)

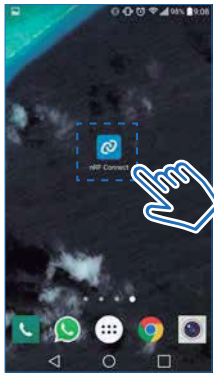
How can I recalibrate the compass of my Ultrasonic Portable?

Follow the next steps:

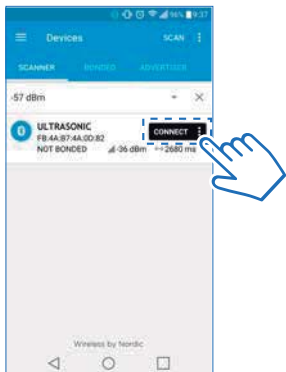
1. Download and install NRF Connect App on your device from Google Play or Apple Store.



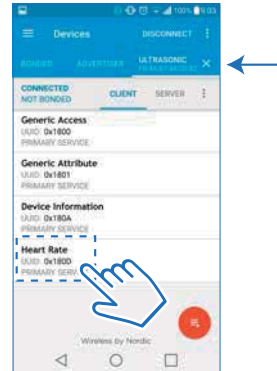
2. Enter to the App pressing on its icon.



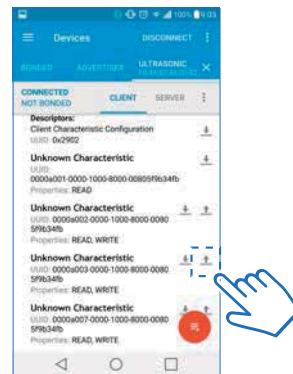
3. Search your Ultrasonic in the list which appears at main screen (at "SCANNER" tab) and press "CONNECT".



4. If the connection has been successful, the identification of your ultrasonic will appear in the upper tab. Then, press "Heart Rate" section.



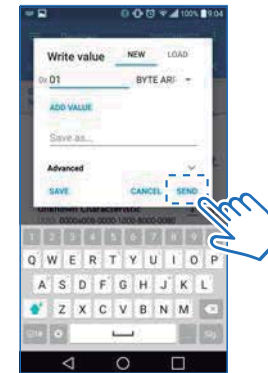
5. Search "Unknown Characteristic UUID: 000a003-0000-1000-8000-0080" and press the up arrow located at the right.



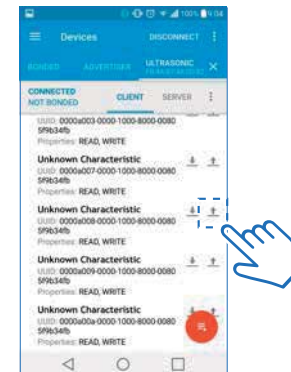
8. FAQ/troubleshooting (continuation)

How can I recalibrate the compass of my Ultrasonic Portable?

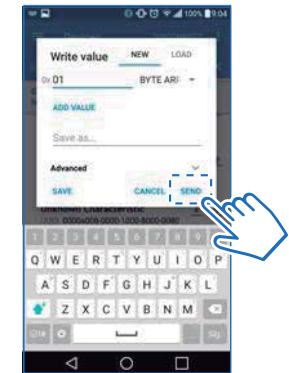
6. Write "01" and press "SEND".



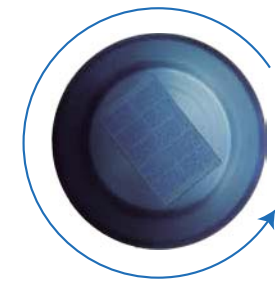
7. Search "Unknown Characteristic UUID: 000a008-0000-1000-8000-0080" and press the up arrow located at the right.



8. Write "01" and press "SEND".



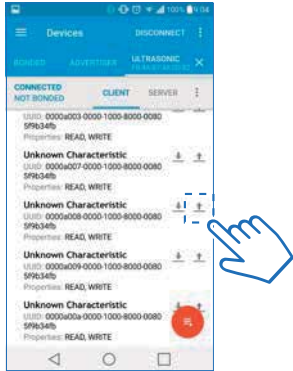
9. Rotate the device 360 degrees as slow as possible, repeat it for 3 times. If your unit is mounted on the mast, make a few rounds with the boat.



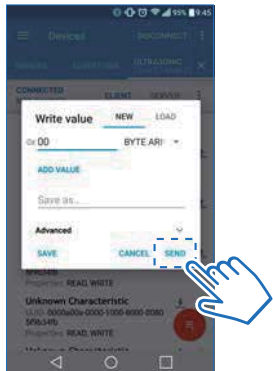
8. FAQ/troubleshooting (continuation)

How can I recalibrate the compass of my Ultrasonic Portable?

10. Search "Unknown Characteristic UUID: 000a008-0000-1000-8000-0080" and press the up arrow located at the right.



11. Write "00" and press "SEND".



Now, the compass of your device is already calibrated.

12. Exit the App by pressing "back" at your device.

9. General information (continuation)

9.2. Maintenance and repair

The ultrasonic does not require great maintenance thanks to the avoiding of the moving parts in this new design.

The only maintenance you have to do is to clean the solar panel with a wet tissue a few days before using it and place it in a light source / solar to get the battery full of charge.

Before using it, make sure that the device has enough battery to work without problems. You can get that information directly through the application.

Transducers must be kept clean and aligned. Impacts or incorrect impulsive handling may lead to transducers misalignment.

The space around the transducers must be empty and clean. Dust, frost, water, etc... will make the unit stop working.

Rinse with freshwater and let dry.

9.3. Warranty

Warranty is void in case of non-following the instructions of use, repair or maintenance without written authorisation.

This product is for leisure purposes exclusively. Any wrongful use given by the user will not incur in any responsibility of Calypso Instruments. As well, any harm caused to ULTRASONIC PORTABLE by a mistaken use will not be covered by the guarantee. Using assembly elements different from those delivered with the product will void the guarantee.

Changes on transducers position/alignment will avoid any warranty.

For further information please contact Calypso Technical Support through info@calypsoinstruments.com or visit www.calypsoinstruments.com.

9. General information

9.1. General recommendations

The Ultrasonic Portable has been calibrated with accurate, following the same calibration standards for each unit.

Regarding to mount the unit

As we describe you before, you have to prepare the mast head for the mechanical installation. Align the North mark of the Ultrasonic in order to have it heading to the bow. Then install the sensor in a location free from wind perturbation, usually on the mast head.

Other important aspects

·Do not attempt to access the transducer area with your fingers.

·Solar panel comes with with a protective film built-in. Do not remove the film, it will damage the cell.

·Do not attempt any modification to the unit.

·Never paint any part of the unit or alter its surface in any way.

If you have any questions or doubts, please contact directly with us. We will be glad to assist you in any time.

Calypso Instruments team thanks you for your confidence.



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ULTRASONIC Portable
User manual English version 1.6
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