CALYPSO instruments

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LoRa

CALYPSO

Ultra Low Power LoRa

WIND METER

User manual

English version 1.0
22.11.2024

CE FC 0809

ACCURATE WIND SPEED & DIRECTION

If you want to know more about our new Ultra Low Power LoRa wind meter, please keep reading or visit our website **www.calypsoinstruments.com**

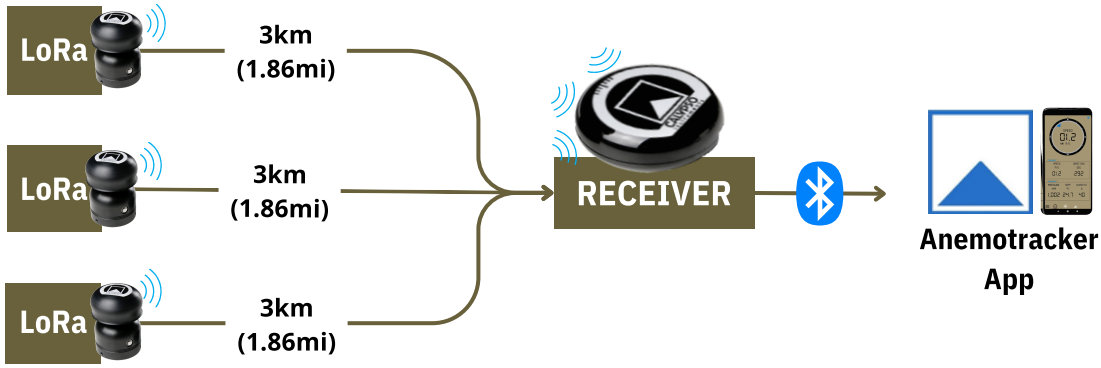
Index

1. Product overview

Thank you for choosing the Ultra Low Power LoRa wind meter from Calypso Instru- ments. The Ultra Low Power LoRa Instrument is a wireless, Bluetooth Low Energy (BLE) and battery-powered, compact ultrasonic anemometer, easy to install, simple to use and compatible with IOS, Android and Garmin watches.

It transmits wind data every second via LoRa with a range of up to 3 km (1.86 ml) in direct line of sight.

The receiver relays data via Bluetooth, enabling real-time monitoring through the Anemotracker app. it can be connected to up to 3 ULP LoRa.



2. Package content

The package contains the following:

- Ultra Low Power LoRa Wind Instrument
- Wireless charging QI + USB-C charger
- Serial number reference on the side of the packaging
- A quick user guide on the back of the packaging and some more useful information for the customer.

*This photo is not the actual box, but rather for reference.

3. Technical specifications

The Ultra Low Power LoRa has the following technical specifications:

3.1 Dimensions	·Diameter 70 mm (2.76 in.) · Height: 95 mm (3.74 in.)
3.2 Weight	·213 grams (7.1 oz.)
3.3 Power	3.3- 5 DCV 50 Hours Active use Battery Powered Wireless Charging QI
3.4 Sensors	Ultrasonic transducers (4x)

3.5 Bluetooth & LoRa

· Bluetooth: Version: 5.1 or beyond

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 provides considerably reduced power consumption and cost while maintaining a similar communication range. t incorporates important developments for the user by facilitating the reconnection between their devices once they leave and re-enter the Bluetooth range.

· Output Protocol: LoRa P2P (up to 3 km direct line of sight). Our device is available for LoRa frequencies 868 and 915 MHz, with 433 MHz being added in the future

3.6 Wind Information	· Wind speed · Wind direction

Sample rate:	1 Hz
Wind Speed:	Range: 0.5 to 45m/s (1.12 to 100 mph) Accuracy: ±0.3m/s at 10m/s (0.67mph at 22.37 mph) Threshold: 0.5 m/s (1.12 mph)
Wind direction:	Range: 0 - 360º Accuracy: ±1º

3. Technical specifications II

3.7. Protection Grade

· IPX8 (10 meters)*

3.8 Easy mount

3xM4 lateral female thread,
3xM4 base female thread
Tripod mount UNC1/4"-20

3.9 Firmware

Upgradable via Bluetooth

3.10 Product Material

The Ultra Low Power LoRa is engineered to be a robust device with a minimal downtime. Nylon polymer with excellent resistance to UV radiation, mechanical fatigue while being lightweight. It's ideal for electrical isolation, protects internal hardware to ensure reliable measurements.

3.11 Quality Control

Every single unit is calibrated with accuracy, following the same calibration standards for each one in a wind tunnel.

A Q/C report for both wind speed and direction is generated and kept in our files. Standard deviation is checked to guarantee that each unit has been calibrated to the highest standards

The Ultra Low Power LoRa 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 pair of transductors calculates the signal delay and get information about both wind direction and wind speed.

*with a specific temperature range of -15 to 60°C and relative humidity of 0-100%.

4. Installation

4.1. How to link your LoRa device with the receiver:

Follow the next steps:

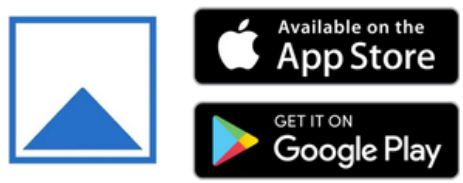
1.Download the Anemotracker Configurator app from the App Store or Anemotracker Configure & Update from the Play Store.

2.Turn on your LoRa and receiver device.
3. Open the app and swipe up. All nearby devices will appear. You can filter by direction or name.
4.Your device will be listed as "LORA-RECVR". Click on its name.
5. At the bottom of the page, you can link a new LoRa device to your receiver by pressing the "+" button and selecting the LoRa device you want to link. You can link up to **three** ULP LoRa, just repeat this step for the second and third LoRa devices.
6.To remove a linked LoRa device, press the "-" icon.
7.After making your changes, click "Configure" to save the settings.

4.2. Installing the App and testing the unit

Follow the next steps:

1. Make sure your device is BLE compatible*. · Ultra Low Power LoRa works with Android 4.3 and beyond or iOS devices (4s, iPad2 or beyond).
2. Download and install Anemotracker App on your device from Google Play or Apple Store.



3. Power on your LoRa Device and your receiver

4. Open the Anemotracker app.Go to the “Connection” menu.Tap on “Pair SENSOR.”The LoRa receiver will appear as “Lora-recvr” in the list of available devices. Select “Lora-recvr” to complete the pairing process.

- Frequencies the ULP LoRa connects to:
  - **Europe:** 868MHz
  - **USA & Australia:** 915MHz

If your device connects with the Ultra Low Power LoRa 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) is enabled on your smartphone, Tablet or PC.
2. Make sure Ultra Low Power LoRa is not in Off mode. It is in Off mode when the unit does not have sufficient battery level. There will be no battery level shown when trying to connect to the device in Anemotracker App.
3. Make sure no other device is linked to your Ultra Low Power LoRa.

Each unit can only be connected to **one** device at a time.

As soon as it gets disconnected, Ultra Low Power LoRa is ready to link to any other device with the Anemotracker app installed.

For further information please contact Calypso Technical Support.

5. General information

5.1. General recommendations

Regarding mounting the unit, align the mark of the Ultra Low Power LoRa to the place where you are aiming.

Make sure to install the sensor in a location **free from anything that obstructs the flow of wind to the sensors within a 2 meter radius**.
Other important aspects:

- Do not attempt to access the transducers area with your fingers;
- Do not attempt any modification to the unit;
- Never paint any part of the unit or alter its surface in any way.
- NOT allow to be submerged fully or partially in water.

If you have any questions or doubts, please contact us directly.

5.2. Maintenance and repair

The Ultra Low Power LoRa does not require great maintenance thanks to the lack of the moving parts in this new design. 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. The Ultra Low Power LoRa can be wiped clean with a damp cloth being careful to not touch the transducers.

5.3 Warranty

This warranty covers the defects resulting from defective parts, materials and manufacturing, if made known to the manufacturer within 24 months after the purchase date.

Warranty is void in case of non-following the instructions of use, repair or maintenance without written authorisation. Any wrongful use by the user will not incur any responsibility on part of Calypso Instruments; therefore, any harm caused to the Ultra Low Power LoRa by a mistake will not be covered by the waranty. Using assembly elements different from those delivered with the product will void the waranty. Changes on transducers position/alignment will void any warranty.

For further information please contact Calypso Technical support through **sales@calypsoinstruments**.- com or visit **www.calypsoinstruments.com**.

6. Additional information

6.1. General features and product description

The ULP LoRa product was developed to meet the need for a device that can be placed in remote locations without requiring specific infrastructure, enabling data to be received from several kilometers away. This means the anemometer can be installed at a desired location, with data being received remotely “over the air” through a small receiver device that adapts the output format to the client’s preferred configuration. Various markets and situations would find the ULP LoRa particularly beneficial. For instance:

1. **Maritime Sector**
   - Wind recording at multiple coastal points: Each ULP LoRa could be installed on buoys several kilometers offshore, allowing more accurate wind measurements than those taken at the coast, where wind conditions vary greatly from the open sea to land. Wind
   - recording at multiple points on a large ship: The Portable Solar or Portable Mini is unsuitable due to limited Bluetooth range, while the ULP LoRa overcomes this limitation.
2. **Golf**
   - In golf courses, wind speed and direction can vary across different areas, significantly impacting ball trajectory. A ULP LoRa could be installed at each hole, with a receiver transmitting wind data to the cloud, accessible to users via an app on their mobile devices.
3. **Ballistics**
   - For long-distance shooting competitions, accurately knowing the wind conditions along the projectile's path is critical, providing competitors a clear advantage by anticipating shot deviations.
4. **Wind Energy Sector**
   - To assess the viability of a wind farm on a specific site, wind profiles need to be recorded over several months. Deploying multiple ULP LoRa units allows for extensive data collection across multiple points without costly, intrusive wired infrastructure, ideal if the location proves unsuitable for wind farming.

6.1. Continuation

As seen, any scenario requiring multiple data points several kilometers from the data collection center is a scenario where the ULP LoRa excels. However, the initial product version is designed to address one of the simpler markets, serving as a starting point for expanding into other markets. Specifically, the ballistics sector, where fewer anemometers are required compared to other scenarios. The user would initially have 1 to 3 wireless anemometers (battery-powered), not constantly exposed to the elements.

The current product consists of a wireless anemometer, charged via induction, and a receiver that can be charged by USB-C. The anemometer sends a LoRa signal every second (1 Hz) with wind data, receivable up to 3 km in direct line of sight. The receiver listens and retransmits each LoRa message via Bluetooth Low Energy, allowing real-time data access through Anemotracker.

ULP LoRa (Receiver)

- **Power**: Lithium polymer battery, 50 hours of active use, USB-C charging.
- **Output Protocol**: LoRa P2P (up to 3 km direct line of sight), Bluetooth Low Energy 5.1 (up to 30 m direct line of sight).
- **Dimensions**: Diameter - mm, Height - mm, Weight - g.
- **Operating Conditions**: IP65 certified, temperature range -15 to 60°C, relative humidity 0-100%.

6.2. Usage Example

Usage Example: A Day in Bob’s Life

Bob wakes up early, nervous about the shooting competition that awaits. As he packs his gear, he remembers to bring along his ULP LoRa, which has been charging overnight. He also charged the receiver via USB-C.

Since this is Bob's first time using the product, he configures the receiver to listen to his LoRa transmitter’s messages. He powers on the transmitter and receiver, opens Anemotracker on his phone, connects to the receiver, and configures the LoRa filter. Once set, the receiver saves the anemometers it should listen to and shuts off. When turned back on, it automatically listens to the designated anemometer’s messages (until reconfigured).

Bob then powers on both devices and confirms they blink in sync. He connects his phone to the receiver, receiving real-time wind data. Confident his LoRa system is running smoothly, Bob heads to the competition, feeling ready to compete with an advantage.

Summary:

1. Both the anemometer (transmitter) and receiver are charged for several hours— the transmitter via Qi (placed face-down on the charger) and the receiver via USB-C.
2. Both transmitter and receiver are powered on, and Anemotracker is opened on the mobile device.
3. The app connects to the receiver and configures its LoRa filter, determining which transmitters it will listen to (up to three simultaneously).
4. When the devices are reactivated, they blink in sync. By connecting to the receiver or transmitter via Bluetooth on Anemotracker, wind data can be viewed in real-time, as if using a Mini.

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