



# CALYPSO

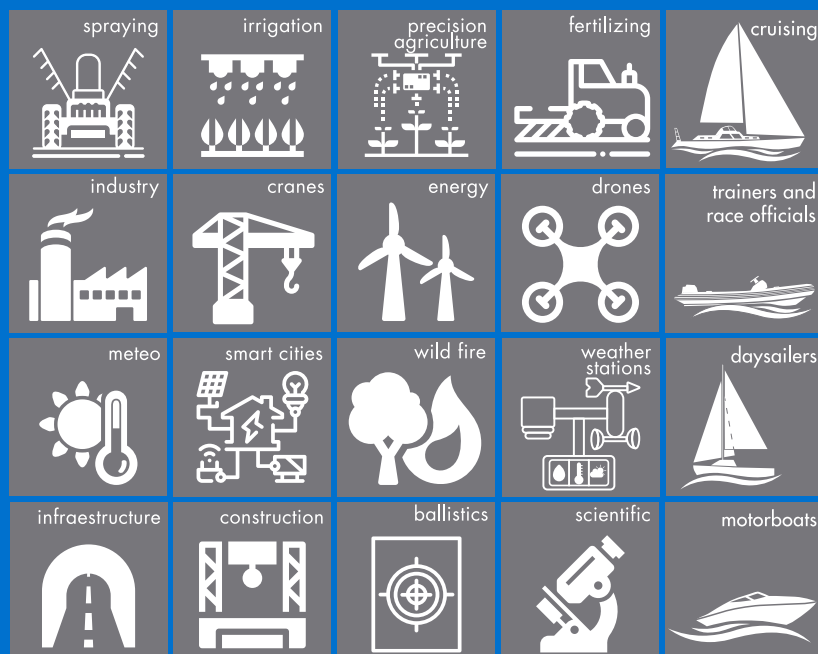
## ULTRA-LOW-POWER ULTRASONIC PRO

### WIND METER

## User manual



English version 1.0  
09.11.2022



If you want to know more about our new ULP Pro wind meter, please keep reading or visit our website [www.calypsoinstruments.com](http://www.calypsoinstruments.com)

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## 1. Product overview

Thank you for choosing the ULP Pro Ultrasonic Anemometer from Calypso Instruments. This ULP Pro is the second model of our generation II, representing an important technology breakthrough condensing an extensive R+D investment.

- Both shape and firmware have been enhanced for an improved rain performance. This is key for static applications such as weather stations.
- Mechanical design has been revamped making the unit more robust and dependable.
- We feel very proud to release a unit that requires under 0.4 mA of power at 5V, sampling at 1Hz.
- Different output options available: RS485, UART/TTL and MODBUS.

Applications for the ULP485 are the following:  
Weather Stations | Drones  
Temporary Scaffolding and construction | Infrastructures and building | Cranes  
Spraying | Irrigation | Fertilizing | Precision Agriculture  
Smart Cities | Wild fires | Shooting | Scientific



## 2. Package content

The package contains the following:

- One ULP Pro Wind Instrument plus 2 meters (6.5 ft) of cable for connection
- 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.
- M3 headless screw (x7)

### 3. Technical specifications

The ULP has the following technical specifications:

3.1. Dimensions

· Diameter: 68 mm (2.68 in.)

· Height: 65 mm (2.56 in.)



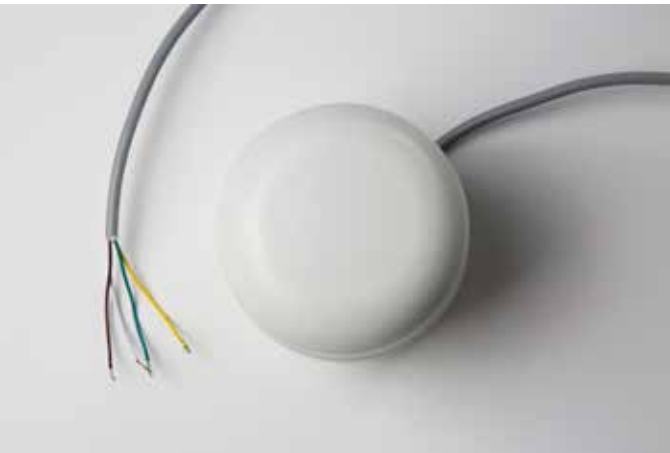
3.2. Weight

200 grams (7 ounces)

3.3 Power

· 3.3-18 DCV

The ULP has to be connected as shown in this section.



RS485/MODBUS RTU Output:

|                        |                      |
|------------------------|----------------------|
| White<br>GND (Power -) | Yellow<br>DATA (B -) |
| Brown<br>VCC (Power +) | Green<br>DATA (A +)  |

UART/TTL Output:

|                        |                   |
|------------------------|-------------------|
| White<br>GND (Power -) | Yellow<br>DATA Rx |
| Brown<br>VCC (Power +) | Green<br>DATA Tx  |

|                |                               |
|----------------|-------------------------------|
| Data interface | 1Stream<br>2-POLL<br>3-MODBUS |
| Data format    | NMEA0183                      |
| Baudrate       | 2400 to 115200 bauds          |
| Voltage range  | 3.3-18V                       |

Power consumption:

- (RS485) 0.25 mA at 38400 bauds, 1 Hz. (5V)
- (UART) 0.15 mA at 38400 bauds, 1 Hz. (5V)
- (MODBUS) 0.25 mA at 38400 bauds, 1 Hz. (5V)

3.4. Sensors

Ultrasonic transducers (4x)

Sample rate: 0.5 Hz to 10 Hz

The ULP 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 transducers calculates the signal delay and get information about both wind direction and wind speed.

### 3.5 Wind Information

- Wind speed
- Wind direction

Sample rate: 1 Hz

Wind Speed

Range : Range: 0 to 45 m/s (1.12 to 100 mph)

Accuracy:  $\pm 0.1$  m/s at 10m/s (0.22 at 22.4 mph)

Threshold: 1 m/s (2.24 mph)

Wind direction

Range: 0 - 359°

Accuracy:  $\pm 1^\circ$

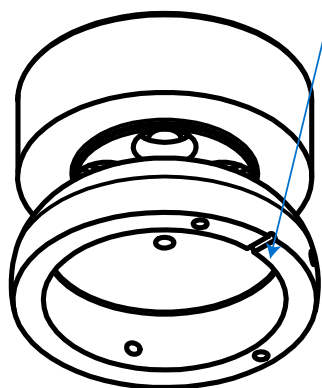
### 3.6. Easy mount

- 2 x M3 lateral female tripod thread
- 3 x M3 base female tripod thread
- UNC 1/4" - 20



#### Noth mark position

Make sure the north mark is perfectly aligned to the north.



### 3.7. Mounting accessories

A wide range of accessories can be used with the device. The ULP Pro can be mounted on a flat surface and screwed on to different sizes of poles. It can also be used with an adaptor for poles of 39 mm.

\* Please, visit our website and check all the accessories available and their possible combinations.





**3.8. Firmware** Upgradable RS485, MODBUS or UART/TTL configurator tool available on our website for downloading in the section **Technical Information**.

### 3.9 Product Material

The ULP Pro is engineered to be a robust device with minimal downtime. This new shape has been designed for optimum water spillage which implies lower probability of ice formation. Frost might affect measurements if it blocks the wave path. The input wires are protected by Transient voltage Suppression (TVS) diodes. The instrument body is inject molded.

### 3.10 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.

## 4. Configuration Options

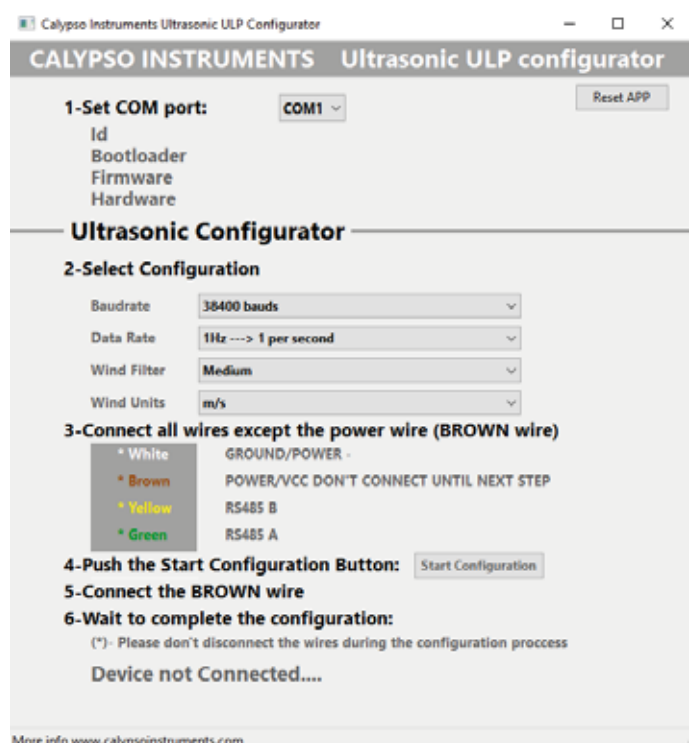
The ULP Pro can be set up by using a special configurator App made by Calypso Instruments. In order to use the app you should download the configurator from our website at [www.calypsoinstruments.com](http://www.calypsoinstruments.com).

To configure your device, connect the ULP Pro via either a USB to RS485 converter cable (in case of the ULP Pro RS485 or the ULP Pro Modbus) or via a USB to UART converter cable (in case of the ULP Pro UART). Connect all the ULP Pro cables except for the brown cable to the converter. Insert the USB into the computer, open the configurator app, select the configuration wanted and follow the instructions on the screen to finish the configuration.

For more information, please watch the following video. <https://bit.ly/3DuA7IM>

\*USB converter cables available on [calypsoinstruments.com](http://calypsoinstruments.com)

|                      |                            |
|----------------------|----------------------------|
| <b>baudrate:</b>     | 2400 to 115200 (8n1) bauds |
| <b>output rate:</b>  | 0.5 to 10 Hertz            |
| <b>output units:</b> | m/sec., knots or km/h      |



## 5. Communication Protocols

### 5.1 Modbus Registers

DIR\_BASE\_LA1 30001  
SYSTEM\_STATUS DIR\_BASE\_LA1 + 200  
WIND\_SPEED DIR\_BASE\_LA1 + 201  
WIND\_DIRECTION DIR\_BASE\_LA1 + 202  
TWO\_MIN\_AVG\_WS DIR\_BASE\_LA1 + 203  
TWO\_MIN\_AVG\_WD DIR\_BASE\_LA1 + 204  
TEN\_MIN\_AVG\_WS DIR\_BASE\_LA1 + 205  
TEN\_MIN\_AVG\_WD DIR\_BASE\_LA1 + 206  
WIND\_GUST\_SPEED DIR\_BASE\_LA1 + 207  
WIND\_GUST\_DIR DIR\_BASE\_LA1 + 208  
FIVE\_MIN\_AVG\_WS DIR\_BASE\_LA1 + 210  
FIVE\_MIN\_AVG\_WD DIR\_BASE\_LA1 + 211  
FIVE\_WIND\_GUST\_SPEED DIR\_BASE\_LA1 + 212  
FIVE\_WIND\_GUST\_DIR DIR\_BASE\_LA1 + 213

### 5.2 RS485 and UART Sentences

MWV Wind Speed and Angle

1 2 3 4 5

|||||

\$--MWV,x.x,a,x.x,a\*hh

- 1) Wind Angle, 0 to 360 degrees
- 2) Reference, R = Relative, T = True
- 3) Wind Speed
- 4) Wind Speed Units, K/M/N
- 5) Status, A = Data Valid
- 6) Checksum

MWV Sentence 4800bps 8N1

The connection is straightforward with no configuration required.

The hardware interface is RS485, 4800bps, 8N1. The logical interface NMEA0183 has MWV ASCII simple phrases with direction and wind speed being the following:

\$IIMWV,316,R,06.9,N,A\*18  
\$IIMWV,316,R,06.9,N,A\*18  
\$IIMWV,316,R,06.8,N,A\*19  
\$IIMWV,316,R,06.8,N,A\*19  
\$IIMWV,316,R,06.8,N,A\*19

## 6. General information

### 6.1. General recommendations

Regarding mounting the unit, align the north mark of the ULP Pro towards the north.

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, for example, the mast head on a boat.

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 allowed to be submerged fully or partially in water.

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

### 6.2. Maintenance and repair

The ULP Pro 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 ULP Pro can be wiped clean with a damp cloth being careful to not touch the transducers.

### 6.3. Warranty

This Warranty covers the defects resulting from defective parts, materials and manufacturing, if such defects are revealed during the 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 given by the user will not incur in any responsibility of Calypso Instruments. Therefore, any harm caused to the ULP Pro by a mistake will not be covered by the warranty. Using assembly elements different from those delivered with the product will void the guarantee.

Changes on transducers position/alignment will void any warranty.

For further information please contact Calypso Technical Support through [aftersales@calypsoinstruments.com](mailto:aftersales@calypsoinstruments.com) or visit [www.calypsoinstruments.com](http://www.calypsoinstruments.com).



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## MODBUS Sensor Data Requests

Measurements all have a resolution of 0.1 but are reported as 10\*.

8.2 m/s is returned as a value 82. The user must /10 in order to reinsert the decimal precision.

| Address | Register | Access Type | Response Range       | Data Type         | Description                                  |
|---------|----------|-------------|----------------------|-------------------|----------------------------------------------|
| 200     | 201      | Read        | 0 to 15 <sup>†</sup> | 16-bit Signed Int | System Status <sup>†</sup>                   |
| 201     | 202      | Read        | 0 to 500*            | 16-bit Signed Int | Wind speed (m/s) (3 second moving average)   |
| 202     | 203      | Read        | 0 to 3599*           | 16-bit Signed Int | Wind direction (°) (3 second moving average) |
| 203     | 204      | Read        | 0 to 500*            | 16-bit Signed Int | 2 min avg wind speed                         |
| 204     | 205      | Read        | 0 to 3599*           | 16-bit Signed Int | 2 min avg wind direction                     |
| 205     | 206      | Read        | 0 to 500*            | 16-bit Signed Int | 10 min avg wind speed                        |
| 206     | 207      | Read        | 0 to 3599*           | 16-bit Signed Int | 10 min avg wind direction                    |
| 207     | 208      | Read        | 0 to 500*            | 16-bit Signed Int | Wind gust speed                              |
| 208     | 209      | Read        | 0 to 3599*           | 16-bit Signed Int | Wind gust direction                          |
| 210     | 211      | Read        | 0 to 500*            | 16-bit Signed Int | 5 min avg wind speed                         |
| 211     | 212      | Read        | 0 to 3599*           | 16-bit Signed Int | 5 min avg wind direction                     |
| 212     | 213      | Read        | 0 to 500*            | 16-bit Signed Int | 5 min Wind gust speed                        |
| 213     | 214      | Read        | 0 to 3599*           | 16-bit Signed Int | 5 min Wind gust direction                    |

<sup>†</sup> If not applicable to ULP-M, the register should report a value of zero (0).

\* See Data Format section for numeric conversions.