SONIC-ANEMO-MODBUS-12VDC
Ultrasonic wind vane-anemometer and barometer

User Manual
12/01/2018 rev2.0
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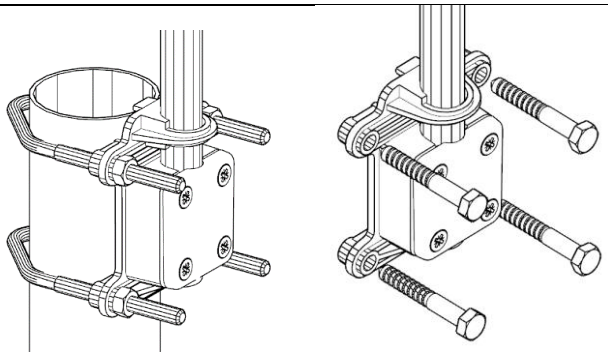
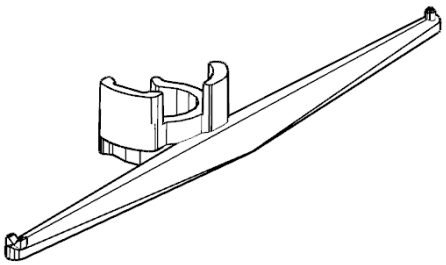
GIROUETTE ANÉMOMÈTRE À ULTRASONS
LCJ CAPTEURS

SONIC-ANEMO-MODBUS

ULTRASONIC WIND VANE / ANEMOMETER and BAROMETER

Thank you for purchasing our SONIC-ANEMO-MODBUS sensor. Your ultrasonic sensor is also equipped with a barometer. A measurement frequency of 2 Hz will allow you to visualize the wind gusts.

Quick Installation :

<table>
<tr><td>1- Mount the sensor on a pole or a vertical surface :</td><td>2- Align your sensor with the tool supplied :</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>3- Connect the cable to your application.
<table>
<tr><td>Red/black pair</td><td>White/green pair</td></tr>
<tr><td>Red wire : 6 to 16VDC
Black wire : 0 V</td><td>White wire: line A
Green wire : line B</td></tr>
</table>
Connect the cable shield to the chassis of your application.</td><td>4- Your sensor is ready to use.</td></tr>
</table>

Content

1. General information

A. About this manual

This manual brings all the required information to install and use the SONIC-ANEMO-MODBUS. Read all the information contained in this manual carefully before using the sensor, as misuse can cause mistakes and damage to the product.

B. Warnings

Important points are highlighted in this document as follow:

Warning! Serious hazard. Read carefully and follow the instructions. High risk of injury or even death.

Warning: Potential hazardous situation. Read carefully and follow the instructions to avoid damages on the product or loss of important data.

Note: Important information regarding use of the product.

C. Your experience

LCJ CAPTEURS values your feedback and suggestions to improve the manual. Should you find any mistake, please contact us indicating the chapter, section and page to correct. You can find our details on the manual's cover page and on our website: www.lcjcapteurs.com.

D. Safety

When using the product, safety measures described below must be followed to avoid damage and legal responsibility. Follow all safety and use instructions regarding the product. Follow all warning notices indicated in the product's use instructions. The following instructions are meant to reduce all risk of personal injuries, electric shock, fire and damage of the equipment.
Read carefully and follow all instructions contained in this manual to avoid measures errors caused by misuse.

Warning! Follow all safety measures applicable for the product's installation.

This product has been designed to be powered by an AC voltage of 24 V - 50 Hz. Any other use may be dangerous and will void any approval for this product.

A. Recycling

LCJ Capteurs encourage recycling of all material when possible, following local regulations. You can find more details about recycling by contacting the local authorities in charge of Environment Protection in your country.

A. Warranty

Your LCJ CAPTEURS product is warranted against manufacturing defects in materials and workmanship for a period of 24 months from the date of purchase. LCJ CAPTEURS will at its discretion, repair or replace faulty products free of charge at their premises. The warranty does not cover the installation labour and shipping costs of the faulty parts. A proof of purchase can be asked when processing the warranty claim by written. Once LCJ CAPTEURS approve the warranty claim, the sensor must be sent to their workshop address. LCJ Capteurs guaranties that each wind sensor is tested and calibrated before despatch.
The warranty does not apply in the following cases:
1. Damage resulting from misuse.
2. Improper installation or inappropriate conditions of operation.
3. If the product has been damaged, open or repaired by an unapproved agent.
4. Damage resulting from lightning, fire or any similar circumstances.

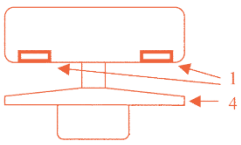
Warranty is void if operation, use, installation and technical service instructions have not been followed and if a repair has been carried out without prior agreement.

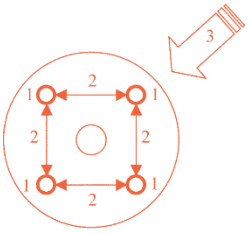
B. Product return

Contact your dealer prior to returning a product to LCJ CAPTEURS. A Return Merchandise Authorisation (RMA) must be issued and received before sending a product back.

2. Introduction

A conventional Wind-vane Anemometer includes mechanical rotating parts. These parts are subject to wear and they represent sources of failure of the sensor. Our ultrasonic sensor has been designed to avoid this and to ensure reliable and stable operation. This Wind-vane-anemometer shows very stable results over a long term and with no maintenance.





The sound (and ultrasound) is conveyed by the movement of the fluid in which it crosses. The electro acoustic transducers (1) communicate between themselves two by two using ultrasonic signals (2) to determine, following the orthogonal axes, the wave transit time differences induced by the air flow (3). The measurements are combined in an integrated calculation to establish the wind speed and its direction in relation to a reference axis. The temperature measurements are used for calibration corrections. The sensor's design minimises the effect of heel angle (4). The CV7 range of products features lateral transducers delivering four independent measurements. The validity checks are used to measure head wind vectors for calculations. This method gives a sensitivity of 0.15 m/s, a 40 m/s (144 km/h) reliability and excellent linearity.*

LCJ Capteurs has designed and manufactured wind sensors since 1999. Our range of wind vanes/anemometers covers the needs over many applications. They have proved their robustness and accuracy on the marine sector, and they are now widely used in other fields such as weather stations, industry, security and agriculture to name a few.

At LCJ Capteurs, each sensor is fully tested before despatch and the test results are saved against the serial number. The sensor is placed in our wind tunnel on a bracket that rotates through 9 degree steps. This is Computer Controlled. The sensor is aligned at 0 degrees of the air flow and then, 40 measure points are completed with data saved for speed and angle. The full document is available on our website.

3. Installation

A. Checking the delivery

Before opening the box, check it carefully to spot any damage that can have occurred in transport. If the packaging is damaged, fill in a Freight Claim with full description of the problem.

B. Opening the box

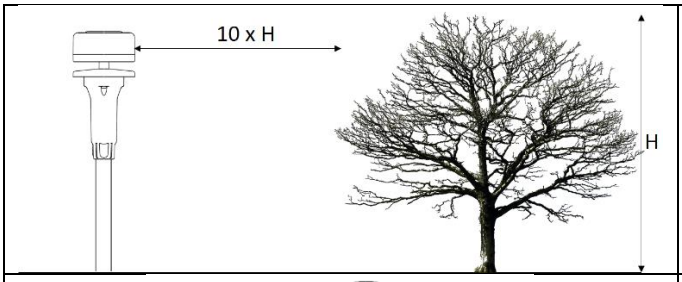
Unpack the parcel in a dry and clean place and check the delivery:

1. SONIC-ANEMO-MODBUS.
2. Mounting bracket with 4 nuts.
3. Alignment tool
4. User manual

Warning: Unpack the product with care to avoid any damage

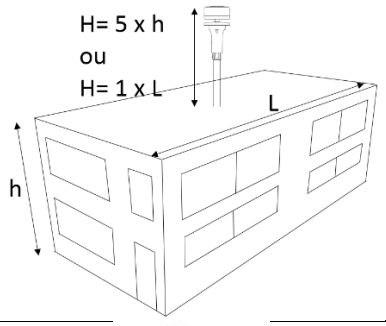
C. Choose the best location

The choice of the appropriate installation location is crucial to get the best measurements. The location must be free of turbulence and magnetic field resulting from electricity, engines, radio transmitters, radars, etc. For mobile installations, consider that the sensor measures the apparent wind speed and angle. This has to be integrated in the data process to calculate the true wind vector.



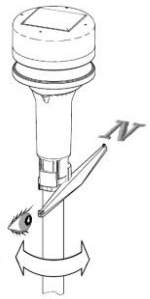
a) Clearance distance

To avoid measurement errors the sensor must be installed at a distance of at least 10 times the height of the nearest obstacle.
We recommend installing the sensor at a height of 3 metres in a clear environment and a minimum of 10 metres from nearby objects.



b) Height of mounting

When the sensor is installed on the top of a building roof, the installation height must be equal to the building's length or, if possible, 5 times the building's height.
Install the sensor in the middle of the roof when possible. It is not recommended to install a sensor on a slanted roof. These roofs generate upwards turbulences that will affect the sensor.



c) Alignment of the sensor

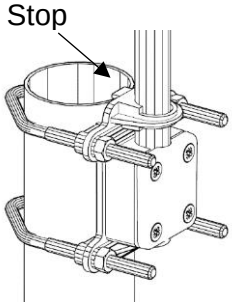
The sensor must be aligned to North. An alignment tool is supplied for this purpose. Clip the tool on the tube and slide it so that it snaps into the dedicated slots. Do not tamper with the slots. The tool must gently find its place.
Slightly loosen the 4 screws that hold the tube.
Align the tool - and the sensor - to North.
Tighten the screws.

Note: Magnetic deviation must be considered to reference the measurements to True North.

a) Mounting methods

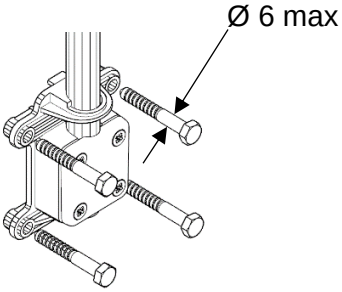
The SONIC-ANEMO-MODBUS comes with a mounting bracket allowing two mounting methods:

On a pole:
Pole diameter: Ø 35 mini ; Ø 48 maxi.



Max. tightening torque: 1.5 N.m

On a vertical surface:
(the sleeper screws are not supplied)



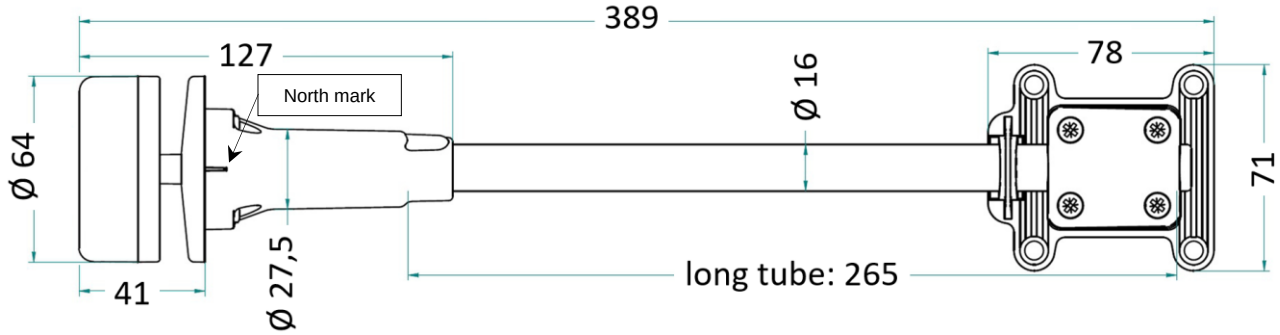
4. Technical specifications

Wind speed range	0,2-40 m/s (0,4 – 80 Knots)
Wind module resolution	0,1 m/s (0,1 Knots)
Wind module sensitvity	0,2 m/s (0,4 Knots)
Wind angle range	0-359 °
Direction resolution	1°
Direction sensitivity	+/- 1 °
Pressure: Operating range	20 kPa to 110 kPa
Pressure: Resolution	0,1 m
Operating temperature range without iceeing	-10°C to 55 °C
Sensor weight	160 gr
Environnement	Sensor : IP67

Electrical specifications:

Sensor power supply	6V to 16V DC

Dimensions :



Note : never reduce the tube length under 230 mm.

5. MODBUS information

The SONIC-ANEMO-MODBUS operates in RTU mode and complies with the provisions described in "MODBUS APPLICATION PROTOCOL SPECIFICATION V1.1b3" available on http://www.modbus.org/docs/Modbus_Application_Protocol_V1_1b3.pdf

A. Initial configuration

Your sensor is shipped with the following default values :
UART : 9600 bds – 8 bits – no parity – 1 stop bit
Offset pression : 0
Address : 2

It is of great importance to ensure at the time of the procedure of devices addressing, that there is not two devices with the same address. In such a case, an abnormal behavior of the whole serial bus can occur, the Master being then in the impossibility to communicate with all present slaves on the bus.
The CoefNode and the RetFix are set at the factory. For correct operation of your sensor, it is not advisable to modify these values.

a) UART configuration

To change the baud rate, send the corresponding value according to Table 1 :

Baud Rate	4800	9600	14400	19200	38400	57600	115200
Value	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Table 1 : BaudRates

b) Supported functions

0x03 storage register reading	0x06 single holding register writing
0x04 input register reading	0x2b/0e sensor identification

c) Alarm management

Decoding alarms :

N° of alarm	1	2	3	4	5
Meaning	Wind data not available (CHK)	Van turn back > 165°	Not used	Not used	Wind data not available (V)

Table 2: Alarms

d) Sensor identification

Frame to be sent to know the sensor identifiers:

022b0e01003477

Upon reception of the frame, the sensor returns the information:

« Vendor name » ; « Product code » ; « Major/Minor revision » in ASCII.

B. Mapping

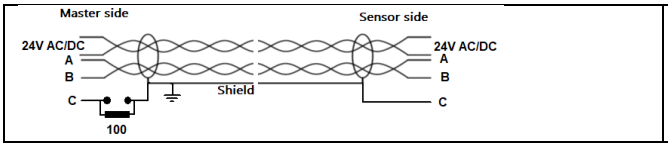
INPUT REGISTERS (code function 4)		
Address	**Identification** (unit)	**Value** (2 bytes)
30001	Wind angle (degree)	0/359
30002	Wind speed (1/10eme kt)	0/800
30003	Wind speed (1/10eme mph)	0/920
30004	Wind speed (1/10eme m/s)	0/412
30005	Wind speed (1/10eme km/h)	0/1482
30006	Wind Temperature (1/10eme °C)	-200/800
30007	Wind Temperature (1/10eme °K)	2530/3530
30008	Wind Temperature (1/10eme °F)	-40/1760
30009	Internal Temperature of the sensor (1/10eme °C)	-200/800
30010	Alarm	0/65535
30011	Atmospheric pressure (1/100eme Bar)	85/115
30012	Atmospheric pressure (hPa)	850/1150
30013	Atmospheric pressure (1/10eme mBar)	8500/11500
30014 to 30032	Proprietary datas	20 bytes
HOLDING REGISTERS (code function 3)		
Address	**Identification** (unit)	**Value** (2 bytes)
40001	UART speed (bauds)	1-7 (cf Tableau 1)
40002	Calibration barometer (offset pressure)	0/65535
40003	Device address	0/65535
40004	Proprietary datas (CoefNoeud)	0/65535
40005	Proprietary datas (RetFix)	0/65535
READ DEVICE IDENTIFICATION (code function 43/14)		
Object Id	**Identification** (unit)	**Type**
0	Vendor name	ASCII
1	Product code	ASCII
2	Major/Minor revision	ASCII

C. Wiring

The SONIC-ANEMO-MODBUS includes a data cable to be connected to your application.

Red/black pair	White/green pair
Red wire : 12 V DC Black wire : 0 V	White wire: line A Green wire : line B

a) Grounding arrangements

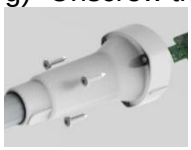


The cable shield must be grounded and connected to the "common" of your application. Depending on the case, a resistance of 100 Ohms may be required.

b) Line termination

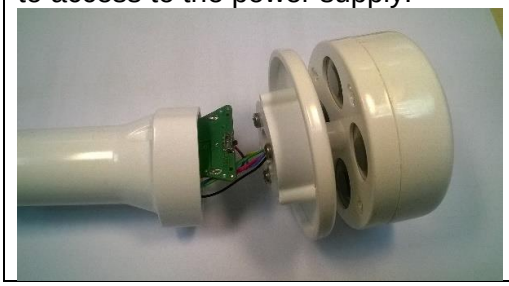
The SONIC-ANEMO-MODBUS has a 120 Ohm termination resistor. Please check if it is necessary depending on the configuration of your Modbus network. To disconnect it follow the following indications:
This should be done in a clean, dry place.

a)- Switch off the sensor.
b)- Dismount the SONIC-ANEMO- MODBUS.
c)- Remove the cap.
d)- Slide the cap along the cable.
e)- Have a Phillips screwdriver.
f)- Spot the North mark on the case.
g)- Unscrew the 3 screws of the case:

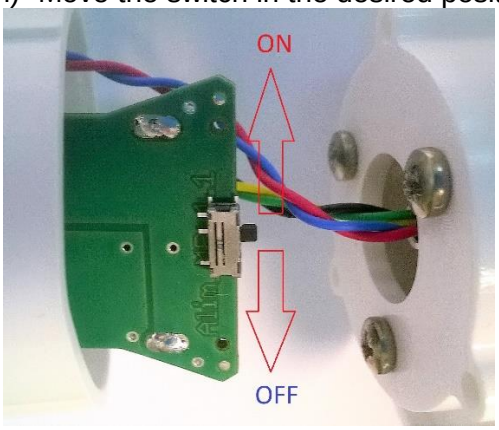


h)- Slide the tube along the cable until the mark

to access to the power supply.



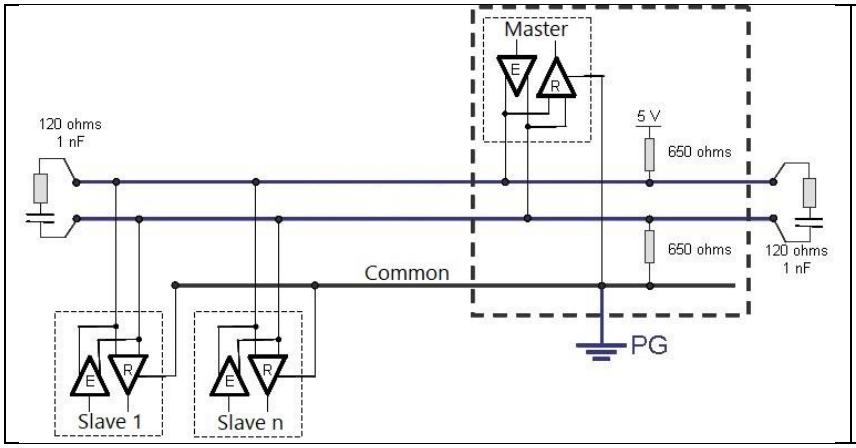
i)- Move the switch in the desired position:



ON : connected OFF : disconnected

j)- Slide the tube back to the slot while taking care of the North mark previously identified.
k)- Tighten the 3 screws.
l)- Plug the cap.
m)- Mount the SONIC-ANEMO-MODBUS back in place.
n)-Switch on.

c) Line polarization :



Check if your network requires the use of bias resistors.

Connection and commissioning of the devices can only be carried out by qualified professionals. Always make connections when the power supply is switched off.

6. Maintenance

The SONIC-ANEMO-MODBUS does not require particular maintenance. Wipe eventually the solar module from time to time.

Warning: Do not use alcohol base cleaning products. Use a clean soft cloth, clear water or a neutral cleaning product.

7. Declaration of Conformity

LCJ Capteurs certifies that the following product:
SONIC-ANEMO-MODBUS, Ultrasonic Wind-vane-anemometer
Conforms with the provisions of the following directives:
1. Electromagnetic Compatibility: 2004/108 / CE
2. Low voltage: 2006/95 / CE
This declaration of conformity is based on the product's compliance with the following harmonised standards:
1. Electromagnetic Compatibility: EN 61326-1: 2006

2. Safety: EN 61010-1: 2001

Date of issue: 12/01/2018
Signed by:

Christophe MICHEL
Title: Manager