Sistemi per monitoraggi
ambientali e telecontrolli

Ultrasonic wind Speed and Direction Sensor

Mod. ANESB

Manual

Summary

1.1 Packaging and mounting

The sensor is placed in its original packaging already mounted.

1.2 Functioning and features

The ultrasonic sensor **ANESB** (ANESBR), is a two axis anemometer for measuring wind speed and wind direction, capable of detects the wind characteristics along two orthogonal axes X, Y, on the horizontal plane and their cartesian vectors resulting .

Four sonic cups, in a fixed position, transmit among them a sonic pulse, for which the transit time between two cups change with the wind speed and the temperature. **Compensating the temperature**, the only changes can be related to the wind. Using four cups in orthogonal direction, it is possible to measure the speed and the direction of wind with high accuracy.

Very robust body in **resin and anodized aluminum alloy IP66** protection. Linear, precise and extremely reliable in all conditions with high dynamic response.

The easy use and installation, makes it an effective instrument in environmental monitoring applications, where for various reasons, the regular maintenance of equipment cannot be easy done, such as for mechanical anemometers. The sensor is made according to WMO standards (World Meteorological Organization).

Sensor type	***Wind speed***
Type	ANESB
Compliance	WMO
Measuring range:	0 ÷ 60 m/s wind speed, 0 ÷ 359° wind direction
Security range:	0 ÷ 75 m/s
Transducer type	4 Ultrasonic cells
Supply	10 ÷ 30Vdc
Electrical output	4-20mA; RS485; ModBus
Output impedance	50 Ohm
Protections	Electrical Discharger
Accuracy	<0.01 m/s wind speed; <± 1° wind direction
Sensibility	0.003 m/s
Resolution	0.008 m/s
Systematic error (distance constant)	2.5m
variables which influence the measure in normal operative conditions and their effect	Insects and nest
Operation intervals	-10 ÷ +80°C
Made of	Resin, Aluminum alloy and stainless steel screws
Weight	1Kg
Size	ømax = 162 mm; h = 320 mm
Consumption (max)	30mA@12Vdc

Features written in the table can be modified. For updating always see the latest version of the datasheet.

1.3 Available electrical outputs and interfacing

The sensor is usually available with different outputs (pre-configured in factory), that correspond to different order codes, respectively (named XXX the sensor code):

XXX – **B** : Sensor with current output 4-20mA = 0…60m/s not self-powered [**(m/s)=[60 • (mA - 4)]/16**]
XXX – **S** : Sensor with digital output RS485 or ModBus- see below.

For connections to IP68 connector, see the sensor datasheet.
The supply includes the solder connector or a cable with ends for terminal block.

In case of sensors with digital output, there are two cases:

- ***RS845 Interface (Half duplex)***
  - Standard communication settings are:
    baudrate: **9600**
    parity: **N**
    data bit: **8**
    stop bit: **1**
  - Data request command for wind direction is: **004CR**
  - Data request command for wind speed is: **009CR** (xxx represents the sensor ID always expressed in 3 digits by putting 0 for numbers less than 100, or 10, example 009;
    CR = Carriage Return;
    if set at 000 answer all sensors on the same line 485, example 000CR). *See § 1.8*
  - The response to any sensor request is the measure value in the programmed engineering unit (eg. m/s or °N), so isn't necessary calculate the value again.

NOTE: The ID to measure speed an direction are different, ID 009 and 004 If not differently specified

- ***RS845-MODBUS Interface (Half duplex)***
  - Standard communication settings are:
    baudrate: **9600**
    parity: **N**
    data bit: **8**
    stop bit: **1**
  - The sensor answers to MODBUS RTU command only with **FUNCTION CODE 0x03** (Read Holding Register), on the same ID of the RS485; the protocol allows the reading of the measure value, which is stored in two MODBUS registers with the **IEE754 representation.** The floating point value is represented with 32 bit, occupying two MODBUS registers of 16 bit.
  - Modbus addresses to be used are:

40002 - 40003 (2 registers required with a single command)

1.4 Calibration

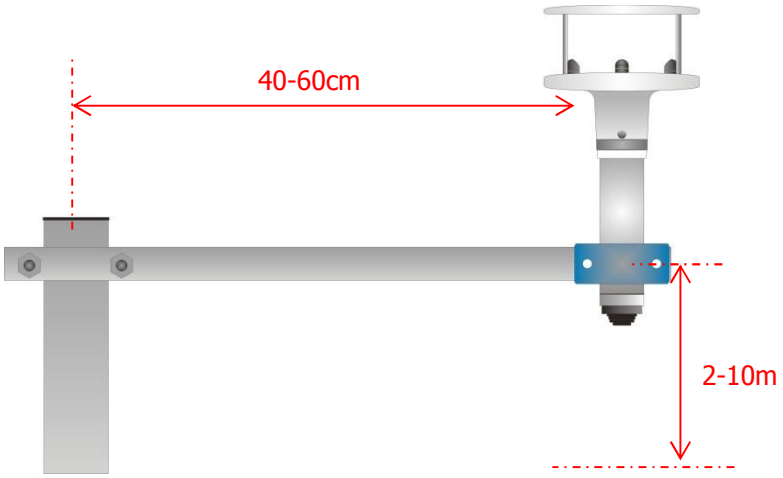
To measure dynamic characteristics of the sample sensor, it's used a **wind tunnel**. The sensor is placed inside the tunnel, where the air speed changes from 0 to a maximum value, which depends on the certification (IEC61400 ➔ 16m/s). The measure acquired by the sensor is compared to that of a **Pitot tube or a Doppler laser**, which **is calibrated and certified** to be used as reference tool, with an accuracy of at least one order higher than that required for the sensor calibration. The sample sensor is then used for functional test in normal production.
The testing is made comparing many sensor' measures acquired at various velocities to those acquired by the reference sensor in the same conditions. The deviation between these measures mustn't differ of a value higher than the tested sensor accuracy. The reference sensor is periodically sent in an Accredia/MeasNet center (there's a wind tunnel) to be calibrated with different measure point. This primary sensor is a First Class cup sensor.

1.5 Cleaning and maintenance

The sensors don't require routine maintenance, but it is recommended to periodically check that there aren't dusts, insects or nests among sonic cells or over/inside sensor, to avoid influences on the measures. In case clear the sensor with a brush.

1.6 Installation

Fix the sensor on the arm on the support pole top, to avoid that there are obstacles which can generate turbulence and falsify the detected measure. The sensor should be installed on an support arm that keeps it at least at 40-60cm from the pole. . WMO standard installation height is 2 or 10m from the ground.
An automatic compass inside permit you to not check the North position, because the sensor will orient itself automatically.



1.7 Validity of certificates

Unless otherwise indicated, the sensor warranty is 24 months from the manufacturing date, while the validity of the certification is 12 months from first use if stored in a depot suitably to the characteristics written on the datasheet.

1.8 ID's sensor for serial communication

ID for RS485*	Measure
1	Temperature
2	Humidity
3	Global Solar adiation
4	Wind Direction
5	Evaporation
6	Hydrometic Level
7	Phreatic Level
8	Battery Voltage
9	Wind Speed
10	Rain Fall
11	Net Solar Radiation
12	Snow Level
13	Pressure
14	Voltage
15	Evapotranspiration
16	Leaf wetness
17	pH
18	Conductivity
19	Counter (digital)
20	Cracks measure
21	Inclinometer
22	Load Cell
23	Redox
24	Oxygen Solution
25	Torbidity
26	Extensimeter
27	Linear Moving
28	Frequency
29	CH4
30	THC
31	NMHC
32	Current
33	Flow
34	CO
35	NO
36	NO_X
37	NO_2
38	O_3
39	SO_2
40	Energy

* Check if it is the latest table