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Vaisala WAS425 Ultrasonic Wind Sensor

Features/Benefits

- Solid State Wind Speed and Direction
- Patented Technology
- MTBF of 26 Years
- No Regular Maintenance Required

Accurate and maintenance-free

With the new wind sensor WAS425 from Vaisala, meteorologists now have an alternative to the cup and vane mechanical sensors. The WAS425 has no moving parts, and is resistant to contamination and corrosion. The WAS425 eliminates on-demand and periodic maintenance requirements while improving accuracy and reliability of data in all wind conditions, in all climates.

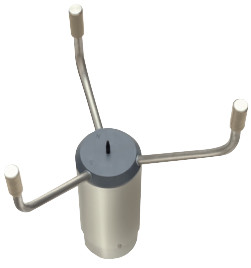
Technical Summary

The WAS425 Wind Sensor uses ultrasound to determine horizontal wind speed and direction. The measurement principle is based on transit time, the time it takes for the ultrasound to travel from one transducer to another, depending on the wind speed along the ultrasonic path. The transit time is measured in both directions. For zero wind speeds, both the forward and reverse transit times are equal. With wind along the sound path, the upwind transit time increases and the downwind transit time decreases. Using these two transit time measurements, the WAS425A micro-controller computes the wind speed along the path. The computed wind speed is independent of altitude, temperature, and humidity.

The method described for one path is repeated to determine the wind speed along each of the three paths which are offset by 120° with respect to each other. The micro-controller computes the wind speed and direction, as well as the rectangular components and reports them to the data logging system.

Two Models

The WAS425 is available in two models: Standard and Heated. The heated model has thermostatically controlled heaters in the transducer heads to prevent freezing rain or snow to build up. The heaters require 36-volt power, which is available as a power supply kit that can be mounted into any rain-tight enclosure. Analog and RS-232 outputs are available in the WAS425A and WAS425AH models.



Technical Data

Type	Ultrasonic 100 kHz. Fully compensated over temperature, humidity and altitude
Range	Operating: 0-65 m/s (0-144 m.p.h.; 0-125 knots) Survival (tested) 0-129 m/s (0-288 m.p.h.; 0-250 knots)

Response Characteristics

Maximum Reading Rate:	1 per second
Sonic Measurement Time:	0.2 second
Signal Processing Time:	0.15 second
Response Time:	0.35 second

Accuracy

Wind Speed	± 0.135 m/s (0.3 m.p.h.; 0.26 knots) or ± 3% of reading, whichever is greater, up to 144 m.p.h.
Wind Direction	± 2 degrees (at wind speeds over 1 m/s) Additional error of -2° for analog output only when reference voltage is more than 4V and angle is more than 291°

Resolution	
Wind Speed	0.1 m/s (0.1 m.p.h.; 0.1 knots, 0.1 km/h)
Wind Direction	1 °
Power	10 to 15 VDC Operating: 12 mA (analog) Heater (WAS425AH): 36 VDC, ±10%, 0.7 A
Starting Threshold	Virtually zero
Delay Distance	Virtually zero
Dead Band Wind Direction	None

Output

RS-232, RS-422; RS-485	Four different message formats, either polled or regular transmission. Bitrate adjustable from 1200 to 19200 bits/s.

Analog Wind Speed

Frequency:	5 Hz/m.p.h.; 0 to 625 Hz represents 0 to 125 m.p.h.
Voltage:	8.0 mV/m.p.h.; 0 to 1.0 V represents 0 to 125 m.p.h.
Output Impedance:	10 kΩ

Analog Wind Direction

Simulated Potentiometer:	0 to Vref represents 0 to 359°
Reference Voltage:	1.0 to 5.0 V,
Output Impedance:	24 kΩ
Available Averages	RS-232: 1 to 9 seconds
Operating Temperature	425A: -40° to +50° C , 425AH: -55° to +55° C
Dimensions and weight	11 W X 9.5 D X 21 H (inches), 27.94 X 24.3 X 53.34 (cm) Sensor only: 2.92 lbs (1.32 kg), with shipping carton: 7 lbs (3.17 kg)
Material	Sensor Arms: 316 Stainless Steel Sensor Body: 6061-T6 Anodized Aluminum Transducer Heads: Silicone Rubber and PVC
Traceability	The fundamental calibration constant used in the WAS425 Series was determined in a wind tunnel with an NIST traceable pressure sensor with pitot tube
Calibration	The WAS425 Series sensors require no calibration adjustments
Verification	The sensor geometry can be verified by physical measurement between transducers

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