WAA151
Anemometer

- Optoelectronic sensor
- Low inertia and starting threshold
- Excellent linearity up to 75 m/s
- Shaft heating

Vaisala's WAA151 Anemometer has established itself as the industry standard in the wind sensor market over its history of several successful years. The WAA151 is a fast-response, low-threshold anemometer. It has three lightweight conical cups in the cup wheel, providing excellent linearity over the entire operating range, up to 75 m/s. A wind-rotated chopper disc, attached to the cup wheel's shaft, cuts an infrared light beam 14 times per revolution, generating a pulse output from a phototransistor.

The output pulse rate can be regarded directly proportional to wind speed (e.g., 246 Hz = 24.6 m/s). For the best available accuracy, however, the characteristic transfer function should be used (see technical data), for compensating starting inertia and slight overspeeding.

A heating element in the shaft tunnel keeps the bearings above freezing level in cold climates. Nominally it provides 10 W of heating power.
A thermostat switch in the sensor cross arm WAC151 keeps heating on below +4 °C.

The WAA151 complies with the standards of the following performance and exploratory tests:

- Wind tunnel tests per ASTM standard method D 5096-90 (for starting threshold, distance constant, transfer function; see technical data)
- Exploratory vibration test per MIL-STD-167-1
- Humidity test per MIL-STD-810E, Method 507.3
- Salt fog test per MIL-STD-810E, Method 509.3

TECHNICAL DATA

Sensor/Transducer type		Cup anemometer/Opto-chopper
Measuring range		0.4 ... 75 m/s
Starting threshold		< 0.5 m/s[1)]
Distance constant		2.0 m
Transducer output	For wind speeds 0 ... 75 m/s	0 ... 750 Hz square wave
Characteristic transfer function	(U_f = wind speed; R = o/p pulse rate)	$U_f = 0.328 + 0.101 \times R$
Accuracy (within 0.4 ... 60 m/s)	With characteristic transfer function With transfer function $U_f = 0.1 \times R$	± 0.17 m/s[2)] ± 0.5 m/s[3)]
Transducer output level	With I_{out} < +5 mA With I_{out} > –5 mA	High state > U_{in} –1.5 V Low state < 2.0 V
Settling time after power turn-on		< 30 µs
Operating power supply		U_{in} = 9.5 ... 15.5 VDC, 20 mA typical
Heating power supply	AC or DC	20 V, 500 mA nom.
Electrical connections	MIL-C-26482 type plug	6-wire cable through cross arm
Operating temperature Storage temperature	With shaft heating below +0 °C	–50 ... +55 °C –60 ... +70 °C
Material	Housing Cups	AlMgSi PA, reinforced with carbon fibre; black
Dimensions and weight	(Swept radius of cup wheel: 91 mm)	240 (h) × 90 (Ø) mm; 570 g

1) Measured with cup wheel in position least favoured by flow direction.
Optimum position gives approx. 0.35 m/s threshold.
2) Standard Deviation
3) Typical error distribution:

Range	Error	Range	Error
0–3 m/s	–0.4 m/s	31–37 m/s	+0.1 m/s
3–10 m/s	–0.3 m/s	37–44 m/s	+0.2 m/s
10–17 m/s	–0.2 m/s	44–51 m/s	+0.3 m/s
17–24 m/s	–0.1 m/s	51–58 m/s	+0.4 m/s
24–31 m/s	±0.0 m/s	58–65 m/s	+0.5 m/s

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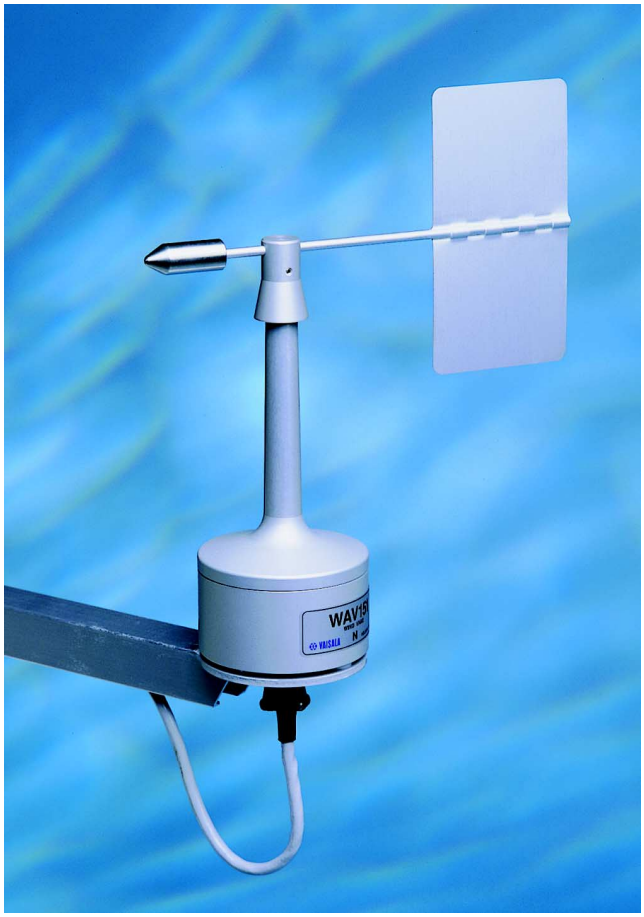
WAV151
Wind Vane

- Counter-balanced optoelectronic sensor
- Low inertia and starting threshold
- Shaft heating



The WAV151 Wind Vane has established itself as the industry standard in the wind sensor market over its history of several successful years. The WAV151 is a counter-balanced, low-threshold optoelectronic wind vane. Infrared LEDs and photo-transistors are mounted on six orbits on each side of a 6-bit GRAY-coded disc. Turned by the vane, the disc creates changes in the code received by the phototransistors. The code is changed in steps of 5.6°, one bit at a time to eliminate any ambiguities in the coding.

A heating element in the shaft tunnel keeps the bearings above freezing level in cold climates. Nominally it provides 10 W of heating power. A thermostat switch is included in the sensor crossarm WAC151, for switching power on below +4 °C.

The WAV151 is designed to be mounted to the northern end of Vaisala's standard crossarm with a regular 10-pin connector.

The WAV151 Wind Vane complies with the standards of the following performance and exploratory tests :

- Wind tunnel tests per ASTM standard method D5366-93 (for starting threshold, distance constant, transfer function; see technical data)
- Exploratory vibration test per MIL-STD-167-1
- Humidity test per MIL-STD-810E, Method 507.3
- Salt fog test per MIL-STD-810E, Method 509.3

TECHNICAL DATA

Transducer type		Optical code disc
Measuring range	At wind speed 0.4 ... 75 m/s	0 ... 360°
Threshold		0.4 m/s
Resolution		5.6°
Damping ratio		0.14
Overshoot ratio		0.65
Delay distance		0.4 m
Accuracy		better than ± 3°
Operating power supply	U_{in} = 9.5 ... 15.5 VDC	20 mA typical
Heating power supply	AC or DC	20 V, 500 mA nom.
Output code		6-bit parallel GRAY
Output levels	With I_{out} < +5 mA With I_{out} > –5 mA	High state > U_{in} –1.5 V Low state < 1.5 V
Settling time after power turn-on		< 100 µs
Plug		MIL-C-26482 type
Cabling		10-wire cable through cross arm
Operating temperature	With shaft heating below +0 °C	–50 ... +55 °C
Storage temperature		–60 ... +70 °C
Housing material		AlMgSi
Dimensions	Swept radius of vane 172 mm	300 (h) × 90 (Ø) mm
Weight		660 g

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