

# 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 <sup>1)</sup>	
Distance constant	2.0 m	
Transducer output	For wind speeds 0 ... 75 m/s	0 ... 750 Hz square wave
Characteristic transfer function	(U <sub>f</sub> = wind speed; R = o/p pulse rate)	U <sub>f</sub> = 0.328 + 0.101 × R
Accuracy (within 0.4 ... 60 m/s)	With characteristic transfer function	± 0.17 m/s <sup>2)</sup>
	With transfer function U <sub>f</sub> = 0.1 × R	± 0.5 m/s <sup>3)</sup>
Transducer output level	With I <sub>out</sub> < +5 mA	High state > U <sub>in</sub> -1.5 V
	With I <sub>out</sub> > -5 mA	Low state < 2.0 V
Settling time after power turn-on	< 30 µs	
Operating power supply	U <sub>in</sub> = 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	With shaft heating below +0 °C	-50 ... +55 °C
Storage temperature		-60 ... +70 °C
Material	Housing	AlMgSi
	Cups	PA, reinforced with carbon fibre; black
Dimensions and weight	(Swept radius of cup wheel: 91 mm)	240 (h) × 90 (Ø) mm; 570 g

<sup>1)</sup> Measured with cup wheel in position least favoured by flow direction.

Optimum position gives approx. 0.35 m/s threshold.

<sup>2)</sup> Standard Deviation

<sup>3)</sup> 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