WAA252
Heated Anemometer

- **Non-freezing all-weather sensor**
- **Lightweight cups with integral heaters**
- **Non-contact heating power transmission**
- **Low starting threshold**
- **Excellent linearity even at low wind speeds**
- **Fast response; distance constant only 2.7 m**

The WAA252 Heated Anemometer is an optimum choice for non-freezing applications. It offers the linearity and sensitivity of a well-designed cup anemometer plus the advantage of heating carried out right where it is needed - in the cups. Foil heaters are included in each cup and in the cupwheel hub. For easy maintenance the cupwheel is removable, with a 2-pin connector for heating electricity.

The transmission of heating power to the WAA252's rotor is contactless, with no slip rings or brushes. This feature completely eliminates sparks, as well as excessive friction and wear. Power to the heaters is supplied via a rotary transformer, with 26kHz low-EMI sinewave.

An intelligent heating control circuitry is included, with integral sensors for both ambient and internal temperature. Therefore, there is no need for a separate temperature sensor in the system.

Power consumption, typically 72 watts, is very low considering the heating efficiency and the protection against freezing provided. Approximately 50 watts of the power is on the cupwheel, 12 watts on the shaft and bearings, and 10 watts on the body. Hence also the sensor body is kept free of ice, which is important for maintaining the gauge's aerodynamic performance.

A single 24VDC (3.5A) power supply is able to feed the whole device, including the transducer. The WAA252 can even deliver an isolated 12V excitation to a separate wind transmitter, if needed. Thus one power supply is enough for the whole sensor system.

Optionally it is possible to take the transducer power from an external device such as the WT521 or WAT12 wind transmitter. This guarantees an uninterrupted transducer supply, independent of the heating power. The opto-chopper type transducer consumes only some 10mA from a 5... 15V excitation.

The WAA252 can be mounted on Vaisala's regular WAC151 crossarm and its output interface is compatible with that of the regular WAA151 anemometer. Therefore, upgrada-tion to a heated-cup system is easy - just a minimal wiring alteration is needed in the crossarm's junction box.

Wind tunnel tests per ASTM method D5096-90 have been conducted on the WAA252 in order to define its aerodynamical behaviour.

The WAA252's power inputs and signal outputs are well protected against line transients and interference. The device itself emits no inacceptable electro-magnetic noise to the signal cables or the atmosphere.

TECHNICAL DATA

Sensor/Transducer type		Cupwheel anemometer / Opto-chopper
Measuring range		0.4 ... 75 m/s
Starting threshold		< 0.5 m/s [1]
Distance constant		3.4 m
Transducer output	(for wind speeds 0 ... 75 m/s)	0 ... 750 Hz square wave
Characteristic transfer function	(R = o/p pulse rate; U_f = wind speed)	$U_f = 0.39 + 0.10 \times R$
Accuracy (within 0.4 ... 60 m/s)	with characteristic transfer function	± 0.17 m/s [2]
	with transfer function $U_f = 0.1 \times R$	–0.3/+1.0 m/s [3]
Input power		24 VDC ± 10 %, max. 3.2 A
Typical power consumption	(U_{in} = 24 VDC)	72 W below +2 °C (heating on)
		1 W above +6 °C (heating off)
Optional xducer i/p power	(U_{xdr})	4.8 - 15.3VDC, 11mA typ.
Transducer output high level	(with I_{out} < +5 mA)	> 11 V (or > U_{xdr} - 1.5V)
Transducer output low level	(with I_{out} > –5 mA)	< 1.5 V
Output power for wind xmitters		13 ± 1 VDC, 75 mA max.
Electrical connections		MIL-C-26482 type 6-pin plug
Operating temperature		–55 ... +55 °C
Storage temperature		–60 ... +70 °C
Housing material		AlMgSi, grey & black anodized
Cup material		PC reinforced with glassfibre; black
Dimensions		264 (h) × 90 (Ø) mm; swept radius of cup wheel: 91 mm
Weight		800 g

[1] Measured with cup wheel in position least favored by flow direction. Optimum position yields < 0.35 m/s starting threshold.

[2] Standard Deviation

[3] Typical error versus speed, when "simple transfer function" $U_f = 0.1 \times R$ is used:

Range (m/s)	0-5	5-10	10-15	15-20	20-24	24-29	29-34	34-39	39-44	44-48	48-58
Error (m/s)	-0.2	-0.1	±0.0	+0.1	+0.2	+0.3	+0.4	+0.5	+0.6	+0.7	+0.85

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