



# Wind Set WA15

## High Performance Wind Measurement



### Features

- High-performance wind measurement set
- Long and successful track record in meteorological applications
- Accurate wind speed and direction measurement
- Low measurement starting threshold
- Conical anemometer cups provide excellent linearity
- Heated shaft prevents bearings from freezing

WA15 is based on accurate sensors installed on a crossarm. It is designed for demanding wind measurement applications.

With a proven track record of successful installations, Vaisala Wind Set WA15 has earned its reputation as the industry standard in the wind sensor market. WA15 consists of Vaisala Anemometer WAA151, Vaisala Wind Vane WAV151, an optional crossarm, a power supply, and cabling.

### Anemometer with excellent linearity

WAA151 is a fast-response, low-threshold anemometer. Three lightweight, conical cups mounted on the cup wheel provide excellent linearity over the entire operating range, up to 75 m/s (168 mph). A wind-rotated chopper disc attached to the shaft of the cup wheel cuts an infrared light beam 14 times per revolution. This generates a pulse output from the phototransistor.

The output pulse rate is directly proportional to wind speed, for example, 246 Hz = 24.6 m/s (55 mph). However, for the highest accuracy, the characteristic transfer function must be used to compensate for starting inertia.

### Sensitive wind vane

WAV151 is a counter-balanced, low-threshold, optoelectronic wind vane. Infrared LEDs and phototransistors are mounted on 6 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 output code resolution is  $\pm 2.8^\circ$ .

### Heated bearings withstand cold weather

Heating elements in the shaft tunnels of both the anemometer and vane keep the bearings above freezing temperatures in cold climates.

### Complete package available

The anemometer and vane are designed to be mounted on Vaisala crossarms.

# Technical Data

## WAA151 measurement performance

Sensor/Transducer type	Cup anemometer/opto-chopper
Observation range	0.4 ... 75 m/s (0.9 ... 168 mph)
Starting threshold <sup>1)</sup>	< 0.5 m/s (1.1 mph)
Distance constant	2.0 m (6 ft 7 in)

### Transducer output

0 ... 75 m/s (0 ... 168 mph)	0 ... 750 Hz square wave
Characteristic transfer function	$U_f$ (wind speed) = $0.328 + 0.101 \times R$ (output pulse rate)

### Transducer output level

( $I_{out} < +5$ mA)	High state > $U_{in} - 1.5$ V
( $I_{out} > -5$ mA)	Low state < 2.0 V

### Accuracy within 0.4 ... 60 m/s (0.9 ... 134 mph)

With characteristic transfer function (standard deviation)	$\pm 0.17$ m/s (0.38 mph)
With simple transfer function $U_f = 0.1 \times R$	$\pm 0.5$ m/s (1.12 mph) <sup>2)</sup>

<sup>1)</sup> Measured with the cup wheel in position least favored by flow direction. The optimum position yields  $a < 0.35$  m/s (0.8 mph) starting threshold.

<sup>2)</sup> Typical error vs. speed with the simple transfer function used.

RANGE (m/s)	0-3	3-10	10-17	17-24	24-31	31-37	37-44	44-51	51-58	58-65
ERROR (m/s)	-0.4	-0.3	-0.2	-0.1	0.0	+0.1	+0.2	+0.3	+0.4	+0.5

## WAA151 inputs and outputs

Electrical connections	MIL-C-26482 type, 6-wire cable
Cabling	6-wire cable through cross arm
Recommended connector at cable end	Souriau UTS6JC10E6P
Operating power supply	$U_{in} = 9.5 \dots 15.5$ V DC, 20 mA, typical
Heating power supply	AC or DC 20 V, 500 mA, nominal
Settling time after power-up	< 30 $\mu$ s

## WAA151 operating environment

Operating temperature <sup>1)</sup>	-50 ... +55 °C (-58 ... +131 °F)
Storage temperature	-60 ... +70 °C (-76 ... +158 °F)
Operating humidity	0 ... 100 %RH
IP rating	IP65

<sup>1)</sup> With shaft heating.

## WAA151 mechanical specifications

Dimensions (H $\times$ $\emptyset$ )	240 $\times$ 90 mm (9.45 $\times$ 3.54 in)
Swept radius of cup wheel	91 mm (3.58 in)
Weight	570 g (1.26 lb)
<b>Materials</b>	
Housing	AlMgSi, gray anodized
Cup	PA, reinforced with carbon fiber

## WAV151 measurement performance

Sensor/Transducer type	Optical code disc
Observation range at wind speed 0.4 ... 75 m/s (0.9 ... 168 mph)	0 ... 360°
Starting threshold	< 0.4 m/s (0.9 mph)
Resolution	$\pm 2.8^\circ$
Damping ratio	0.19
Overshoot ratio	0.55
Delay distance	0.4 m (1 ft 4 in)
Accuracy	Better than $\pm 3^\circ$
Output	6-bit parallel GRAY code

### Resolution

$\pm 2.8^\circ$

Damping ratio: 0.19

Overshoot ratio: 0.55

Delay distance: 0.4 m (1 ft 4 in)

Accuracy: Better than  $\pm 3^\circ$

Output: 6-bit parallel GRAY code

### Transducer output level

( $I_{out} < +5$ mA)	High state > $U_{in} - 1.5$ V
( $I_{out} > -5$ mA)	Low state < 1.5 V

## WAV151 inputs and outputs

Electrical connections	MIL-C-26482 type, 10-wire cable
Cabling	10-wire cable through cross arm
Recommended connector at cable end	Souriau UTS6JC12E10P
Operating power supply	$U_{in} = 9.5 \dots 15.5$ V DC, 20 mA typical
Heating power supply	20 V AC or DC, 500 mA nominal
Settling time after power turn-on	< 100 $\mu$ s

## WAV151 operating environment

Operating temperature <sup>1)</sup>	-50 ... +55 °C (-58 ... +131 °F)
Storage temperature	-60 ... +70 °C (-76 ... +158 °F)
Operating humidity	0 ... 100 %RH
IP rating	IP65

<sup>1)</sup> With shaft heating.

## WAV151 mechanical specifications

Dimensions (H $\times$ $\emptyset$ )	300 $\times$ 90 mm (11.81 $\times$ 3.54 in)
Swept radius of vane	172 mm (6.77 in)
Weight	660 g (1.46 lb)
<b>Materials</b>	
Housing	AlMgSi, gray anodized
Vane	AlSi 12, anodized

## WA15 mechanical specifications

Junction box	125 $\times$ 80 $\times$ 57 mm (4.92 $\times$ 3.15 $\times$ 2.24 in)
Crossarm length	800 mm (31.50 in)
Mounting to a pole mast with a nominal outside diameter	60 mm (2.36 in)

## WA15 compliance

Compliance marks	CE
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## WA15 spare parts and accessories

Service kit for one WA15/25 sensor (a set of bearings and gasket) 16644WA

Cup assembly WAA151	7150WA
Tail assembly WAV151	6389WA
Sensor board WAA151	1433WA
Sensor board WAV151	1434WA
Attachment hardware for WAA151/252 and WAV151/252	16546WA
Crossarm and serial RS-485 transmitter	WAC155
Component board for WAC155	WAC155CB
Crossarm and termination box	WAC151
16-lead signal cable 10 m for WA15/25, open leads on both ends	ZZ45048
6-lead heating power cable 10 m for WA15/25, open leads on both ends	ZZ45049
Special length 16-lead signal cable for WA15/25, open leads on both ends	ZZ45048SPEC
Special length 6-lead heating power cable for WA15/25, open leads on both ends	ZZ45049SPEC
Sensor cable for WAA151/252 0.8 m (31.5 in) , open lead on one end (6 wires), connector 230118 on another end	ZZ45036
Sensor cable for WAV151/252 0.8 m (31.5 in), open lead on one end (10 wires), connector 230119 on another end	ZZ45037
Special length sensor cable for WAA151/252, open lead in one end (6 wires), connector 230118 on another end	ZZ45036SPEC
Special length sensor cable for WAV151/252, open lead in one end (10 wires), connector 230119 on another end	ZZ45037SPEC
Connector WAA151, WAA252	230118
Connector WAV151, WAV252	230119
Crossarm and analog transmitter	WAT12
Component board for WAT12	16637WA
Power supply for WA15	WHP151
Power board for WHP151 power supply	WA35120

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