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 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 output code resolution is ±2.8°.

Heated Bearings Withstand Cold Weather

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

Complete Package Available

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

WHP151 power supply provides the operating and heating power needed for WA15. The power supply, as well as the signal and power cables are available as options.

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 [1]	< 0.5 m/s (1.1 mph)
Distance constant	2.0 m (6 ft 7 in)
Transducer Output	
Output	0 ... 750 Hz square wave
Characteristic transfer function	Uf (wind speed) = 0.328 + 0.101 × R (output pulse rate)
Accuracy Within 0.4 ... 60 m/s (0.9 ... 134 mph)	
With characteristic transfer function (standard deviation)	±0.17 m/s (0.38 mph)
With simple transfer function $U_f = 0.1 \times R$	±0.5 m/s (1.12 mph) [2]
Transducer Output Level	
(I_{out} < +5 mA)	High state > U_{in} –1.5 V
(I_{out} > -5 mA)	Low state < 2.0 V

1) 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.
2) Typical error vs. speed with the "simple transfer function" used.

WAA151 Inputs and Outputs

Electrical connections	MIL-C-26482 type, Plug 6-PIN
Cabling	6-wire cable through cross arm
Recommended connector at cable end	SOURIAU MS3116F10-6P
Operating power supply	U_{in} = 9.5 ... 15.5 VDC, 20 mA typical
Heating power supply	AC or DC 20 V, 500 mA nominal
Settling time after power-up	< 30 µs

WAA151 Operating Environment

Operating temperature [1]	-50 ... +55 °C (-58 ... +131 °F)
Storage temperature	-60 ... +70 °C (-76 ... +158 °F)
Operating humidity	0 ... 100 %RH
IP rating	IP65
Wind tunnel tests	ASTM standard method D5366-90
Exploratory vibration test	MIL-STD-167-1
Humidity test	MIL-STD-810E, Method 507.3
Salt fog test	MIL-STD-810E, Method 509.3
EMC compliance	EN/IEC 61326-1:1997 + Am1:1998, Am2:2001, Generic Environment

1) With shaft heating.

WAA151 Mechanical Specifications

Dimensions (H × Ø)	240 × 90 mm (9.45 × 3.54 in)
Swept radius of cup wheel	91 mm (3.58 in)
Weight	570 g (1.26 lb)
Materials	
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	±2.8°
Damping ratio	0.19
Overshoot ratio	0.55
Delay distance	0.4 m (1 ft 4 in)
Accuracy	Better than ±3°
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, Plug 10-PIN
Cabling	10-wire cable through cross arm
Recommended connector at cable end	SOURIAU MS3116F12-10P
Operating power supply	U_{in} = 9.5 ... 15.5 VDC, 20 mA typical
Heating power supply	AC or DC 20 V, 500 mA nominal
Settling time after power turn-on	< 100 µs

WAV151 Operating Environment

Operating temperature [1]	-50 ... +55 °C (-58 ... +131 °F)
Storage temperature	-60 ... +70 °C (-76 ... +158 °F)
Operating humidity	0 ... 100 %RH
IP rating	IP65
Wind tunnel tests	ASTM standard method D5366-93 (for starting threshold, distance constant, transfer function)
Exploratory vibration test	MIL-STD-167-1
Humidity test	MIL-STD-810E, Method 507.3
Salt fog test	MIL-STD-810E, Method 509.3
EMC compliance	EN/IEC 61326-1:1997 + Am1:1998, Am2:2001, Generic environment

1) With shaft heating.

WAV151 Mechanical Specifications

Dimensions (H × Ø)	300 × 90 mm (11.81 × 3.54 in)
Swept radius of vane	172 mm (6.77 in)
Weight	660 g (1.46 lb)
Materials	
Housing	AlMgSi, gray anodized
Vane	AISI 12, anodized

WA15 Mechanical Specifications

Dimensions	
Junction box	125 × 80 × 57 mm (4.92 × 3.15 × 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 Spare Parts and Accessories

Power supply	WHP151
Set of bearings and gasket	16644WA
Cup assembly	7150WA
Tail assembly	6389WA
Crossarm and Serial RS-485 Transmitter	WAC155
Serial RS-485 transmitter card	WAC155CB
Crossarm and Termination Box	WAC151
16-lead signal cable	ZZ45048
6-lead power cable	ZZ45049
Crossarm and Analog Transmitter	WAT12
6-lead cable for signal and power	ZZ45049

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