VAISALA / TECHNOLOGY DESCRIPTION

Vaisala Wind and Weather Sensor Technologies for Measurements in Industrial Applications

Vaisala's long history in wind and weather measurements started already in the 1930s from the development of a radiosonde to measure the conditions in the upper atmosphere. Today, Vaisala wind and weather instruments are used in dozens of applications and industries all over the world.

Industrial Applications for Wind and Weather Measurements

Wind and weather data are required in many activities across industries. For example, in power industry, the efficiency of power lines is a function of wind speed and direction.

Nuclear power plants require wind data for safety reasons to be able to model the dispersion of potentially radioactive leakages. In addition to nuclear power plants, also chemical factories need to gather wind data for dispersion monitoring.

Accurate outdoor measurements are essential in operating modern buildings. Processes such as free cooling, natural ventilation, and automated shading are dependent on real-time weather data. Ventilation control in greenhouses also relies on localized weather data to ensure an optimized environment for plant growth.

Vaisala Wind and Weather Instruments

Vaisala manufactures wind and weather instruments for different applications, requirements and budgets. The wind sensor portfolio for industrial applications includes both mechanical and ultrasonic sensors. View the complete range of wind products at **www.vaisala.com/wind**. Have a look at the multiparameter Vaisala Weather Transmitter WXT520 at **www.vaisala.com/wxt520**.

Vaisala Ultrasonic Wind Sensors in Brief

- Wind sensor with no moving parts
- Unique triangular design for accurate measurements from all directions
- Optional sensor heating available
- Maintance free, no field calibration required
- Measurement range up to 75 m/s

Vaisala Mechanical Wind Sensors in Brief

- Accurate wind speed and direction sensors
- Fast and linear response
- Low measurement starting treshold
- Sensors with heating elements available for cold climates

Vaisala Weather Sensor in Brief

- Measurement of the six essential weather parameters: wind speed and direction, liquid precipitation, barometric pressure, temperature, and relative humidity
- Feature proprietary Vaisala sensor technologies: WINDCAP®, RAINCAP®, HUMICAP®, and BAROCAP®

Vaisala Sensor Technologies for Wind and Rain Measurements

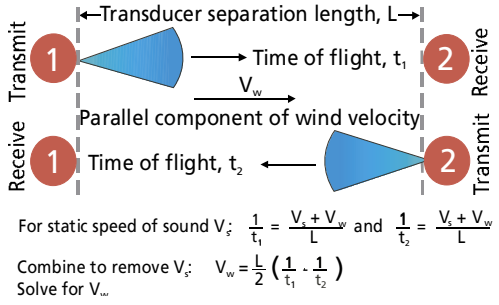
Vaisala WINDCAP® Sensor

Vaisala WINDCAP® Ultrasonic Wind Sensor uses ultrasound to determine wind speed and direction. The sensor has no moving parts, which makes it independent of the limitations of mechanical wind sensors such as friction, inertia, time constant, over-speeding, and starting treshold.

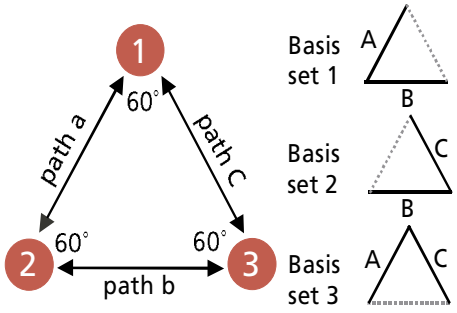
How It Works

WINDCAP® sensor features an array of three ultrasonic transducers oriented to form an equilateral triangle. Wind measurement is based on time of flight (TOF) of the sonic impulse - the time it takes for the signal to travel from one transducer to another. TOF is measured in both directions for each pair of transducer heads. Simple algebra allows solving for the parallel component of wind velocity independently of the static speed of sound.

The equilateral triangle configuration of the three



transducers provides three possible sets of basis vectors. The combinations yield bi-directional measurements on the paths labeled A, B and C. These measurements are used to determine the wind velocity components parallel to each of the three paths.



Vaisala RAINCAP® Sensor

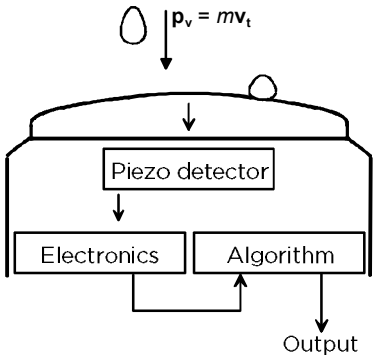
Vaisala RAINCAP® Sensor is an acoustic sensor that measures the impact of individual raindrops on a smooth stainless steel surface using a piezoelectric detector. The sensor provides real time information on rain intensity, duration, and accumulated rainfall.

How It Works

The RAINCAP® sensor consists of a round stainless steel cover, approximately 90 mm in diameter mounted to a rigid frame. A piezoelectric detector is located beneath the cover.

Raindrops hit the RAINCAP® sensor surface at terminal velocity, which is a function of the raindrop diameter. Rain measurement is based on acoustic detection of each individual rain drop as it impacts the sensor cover. Larger drops create a larger acoustic signal than smaller drops.

The piezoelectric detector converts the acoustic signals into voltages. Total rain is calculated from the sum of the individual voltage signals per unit time and the known surface area of the RAINCAP® sensor. In addition, the intensity and duration of rain can be calculated.



Pv = vertical momentum
m = mass of drop
v_t = terminal velocity of drop

Vaisala Weather Transmitter WXT530 Series

Benefits

- Right parameter combination
- Easy to use and integrate
- Weather parameter hub
- Analog sensors can be added
- Compact, light-weight
- Low power consumption
- mA output suitable for industrial applications
- Cost effective

The Vaisala Weather Transmitter WXT530 is a unique series of sensors with parameter combinations that allows you to choose what is right for your application. The WXT530 Series is the flexible, integrated building block for weather applications. The WXT530 Series improves your grip on weather.

Flexibility

The WXT530 is a series of weather instruments that provides six of the most important weather parameters, which are air pressure, temperature, humidity, rainfall, wind speed and direction through various combinations. You can select the transmitter with the needed parameter(s) into your weather application, with a large variety of digital communication modes and wide range of voltages. There is a heated option available. Low power consumption enables solar panel applications. The Vaisala WXT530 Series focuses on maintenance-free operations in a cost effective manner.

Integration

The series offers analog input options for additional third party analog sensors. With the help of the built in analog to digital converters, you can turn the Weather Transmitter WXT530 into a small, cost effective weather parameter hub. Additional parameters include the solar radiation and external temperature sensor. Further, the analog mA output for wind speed and direction enables wide variety of industrial applications. The WXT530 exceeds IEC60945 maritime standard.

Solid Performance

The WXT530 Series has a unique Vaisala solid state sensor technology. To measure wind the ultrasonic Vaisala WINDCAP Sensors are applied to determine horizontal wind speed and direction. Barometric pressure, temperature, and humidity measurements are combined in the PTU module using capacitive measurement for each parameter. This module is easy to change without any contact with the sensors. The precipitation measurement is based on the unique acoustic Vaisala RAINCAP Sensor without flooding, clogging, wetting, and evaporation losses.

WXT530 Weather Transmitter Series


WXT534
MEASURES:
Air Pressure
Temperature
Humidity
115 (4.52)
158 (6.22)
198 (7.78)
WXT535
MEASURES:
Air Pressure
Temperature
Humidity
Rainfall
115 (4.52)
158 (6.22)
198 (7.78)
WXT536
MEASURES:
Air Pressure
Temperature
Humidity
Rainfall
Wind Speed
Wind Direction
115 (4.52)
238 (9.35)
198 (7.78)
Analog Inputs

Technical Data

Barometric Pressure

Range	600 ... 1100 hPa
Accuracy (for sensor element)	±0.5 hPa at 0 ... +30 °C (+32 ... +86 °F) ±1 hPa at -52 ... +60 °C (-60 ... +140 °F)
Output resolution	0.1 hPa, 10 Pa, 0.001 bar, 0.1 mmHg, 0.01 inHg

Air Temperature

Range	-52 ... +60 °C (-60 ... +140 °F)
Accuracy (for sensor element) at +20 °C (+68 °F)	±0.3 °C (0.17 °F)
Output resolution	0.1 °C (0.1 °F)

Relative Humidity

Range	0 ... 100 %RH
Accuracy (for sensor element)	±3 %RH at 0 ... 90 %RH ±5 %RH at 90 ... 100 %RH
Output resolution	0.1 %RH
PTU Measuring interval	1 ... 3600 s (= 60 min), at one second steps

Precipitation

RAINFALL	Cumulative accumulation after the latest auto or manual reset
Collecting area	60 cm^2
Output resolution	0.01 mm (0.001 in)
Field accuracy for long-term accumulation	Better than 5 %, weather dependent
RAIN DURATION	Counting each 10-second increment whenever droplet detected
Output resolution	10 s
RAIN INTENSITY	Running one minute average in 10 second steps.
Range	0 … 200 mm/h (broader range with reduced accuracy)

Inputs and Outputs

Operating voltage	6...24 VDC (-10% ... +30%)
Average current consumption	
Minimum	0.1 mA @ 12 VDC (SDI-12 standby)
Typical	3 mA @ 12 VDC (w/default measuring intervals)
Maximum	15 mA @ 6 VDC (with constant measurement of all parameters)
Heating	Options: DC, AC, full-wave rectified AC
Typical voltage	12... 24 VDC / 12...17 VACrms (-10% ... +30%)
Typical current	0.8 A @ 12 VDC : 0.4 A @ 24 VDC
Digital outputs	SDI-12, RS-232, RS-485, RS-422
Communication protocols	SDI-12 v1.3, ASCII automatic & polled, NMEA 0183 v3.0 with query option

Wind

WIND SPEED	
Range	0 ... 60 m/s
Response time	0.25 s
Available variables	average, maximum, and minimum
Accuracy	±3 % at 10 m/s
Output resolution	0.1 m/s (km/h, mph, knots)
WIND DIRECTION	
Azimuth	0 ... 360°
Response time	0.25 s
Available variables	average, maximum, and minimum
Accuracy	±3.0° at 10 m/s
Output resolution	1°
MEASUREMENT FRAME	
Averaging time	1 ... 3600 s (= 60 min), at 1 s steps, on the basis of samples taken at 4, 2 or 1 Hz rate (configurable)
Update interval	1 ... 3600 s (= 60 min), at 1 s steps

Analog Input Options

Parameter	Element	Range	Input	Excitation	Resolution
Temperature PT1000	Resistor	800 ... 1330 Ω	2 wire 4 wire	2,5 V	16 bits
Solar Radiation K&Z CMP3	Thermopile	0 ... 25 mV	4 MΩ	-	12 bits
Level measurement IRU-9429S	Voltage	0 ... 2,5 V 0 ... 5 V 0 ... 10 V	>10 kΩ	-	12 bits
Tipping Bucket RG13	Frequency	0 ... 100 Hz	18 kΩ	3.5 V	-

Analog mA Output Options

Wind speed	0 … 20 mA or 4 … 20 mA
Wind direction	0 … 20 mA or 4 … 20 mA
Load impedance	200 Ω max

General Conditions

Housing protection class	IP65 (without mounting kit) IP66 (with mounting kit attached)
Temperature storage	-60 ... +70 °C (-76 ... 158°F)
Temperature	-52 ... +60 °C (-60 ... +140 °F)
Relative humidity	0 ... 100 %RH
Pressure	600 ... 1100 hPa
Wind	0 ... 60 m/s

Additional technical information can be found in the user guide and on www.vaisala.com

VAISALA

Vaisala takes pride in professional and comprehensive specifications that are based on scientific test methods and known standards. The accuracy specification takes into account repeatability, non-linearity, and hysteresis, and is given for the full measurement range, unless otherwise stated. This means our customers get truly reliable information with no gaps, helping them make the right decisions.

www.vaisala.com/requestinfo

CE

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Vaisala Weather Transmitter WXT520
Access to Real Time Weather Data

The WXT520 has an automatic control circuit that switches the heating on at low temperatures.

Features/Benefits

- Measures 6 most essential weather parameters
- Applications: weather stations, dense networks, harbors, marinas
- Low power consumption – works also with solar panels
- Compact, light-weight
- Easy to install with one-bolt mounting method
- No moving parts
- Heating available
- Vaisala Configuration Tool for pc
- USB connection
- IP66 housing with mounting kit

WXT520

The Vaisala Weather Transmitter WXT520 measures barometric pressure, humidity, precipitation, temperature, and wind speed and direction.

To measure wind speed and direction, the WXT520 has the Vaisala WINDCAP® Sensor that uses ultrasound to determine horizontal wind speed and direction.
The array of three equally spaced transducers on a horizontal plane is a Vaisala specific design. Barometric pressure, temperature, and humidity measurements are combined in the PTU module using capacitive measurement for each parameter.
It is easy to change the module without any contact with the sensors.

The WXT520 is immune to flooding clogging, wetting, and evaporation losses in the rain measurement.

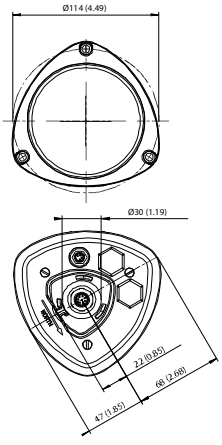
Measuring Acoustic Precipitation

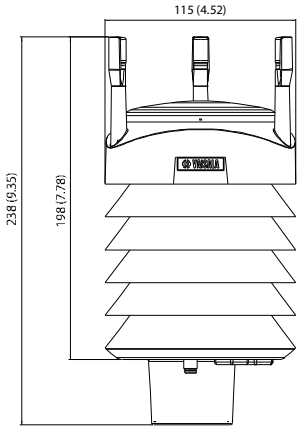
The WXT520 precipitation measurement is based on the unique Vaisala RAINCAP® Sensor, which detects the impact of individual rain drops. The signals exerting from the impacts are proportional to the volume of the drops.
Hence, the signal from each drop can be converted directly to the accumulated rainfall.

The WXT520 measures accumulated rainfall, rain intensity and duration of the rain – all in real time.

Dimensions

Dimensions in mm (inches)





Technical Data

Wind

SPEED	
range	0 ... 60 m/s
response time	250 ms
accuracy	±3% at 10m/s
output resolutions and units	0.1 m/s, 0.1km/h, 0.1 mph, 0.1 knots
DIRECTION	
azimuth	0 ... 360°
response time	250 ms
accuracy	±3°
output resolution and unit	1°

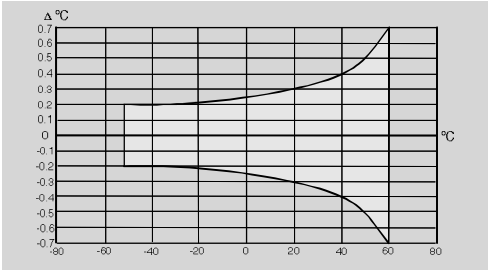
Liquid Precipitation

RAINFALL	cumulative accumulation after the latest automatic or manual reset
output resolutions and units	0.01 mm, 0.001 inches
accuracy	5%*
RAINFALL DURATION	counting each ten-second increment whenever water droplet is detected
output resolution and unit	10 s
RAIN INTENSITY	one-minute running average in ten-second steps
range	0 ... 200 mm/h (broader range with reduced accuracy)
output resolutions and units	0.1 mm/h, 0.01 inches/h
HAIL	cumulative amount of hits against the collecting surface
output resolutions and units	0.1 hits/cm^2, 0.01 hits/in^2, 1 hits
HAIL DURATION	counting each ten-second increment whenever hailstone is detected
output resolution and unit	10 s
HAIL INTENSITY	one-minute running average in ten-second steps
output resolutions and units	0.1 hits/cm^{2}h, 1 hits/in^{2}h, 1 hits/h

* Due to the nature of the phenomenon, deviations caused by spatial variations may exist in precipitation readings, especially in a short time scale. The accuracy specification does not include possible wind induced errors.

Air Temperature

Range	-52 ... +60 °C (-60 ... +140 °F)
Accuracy for sensor at +20 °C	±0.3 °C (±0.5 °F)
Accuracy over temperature range (see graph below)	



Output resolutions and units	0.1 °C, 0.1 °F

Barometric Pressure

Range	600 ... 1100 hPa
Accuracy	±0.5 hPa at 0 ... +30 °C (+32 ... +86 °F)
	±1 hPa at -52 ... +60 °C (-60 ... +140 °F)
Output resolutions and units	0.1 hPa, 10 Pa, 0.0001 bar, 0.1 mmHg, 0.01 inHg

Relative Humidity

Range	0 ... 100 %RH
Accuracy	±3 %RH within 0 ... 90 %RH
	±5 %RH within 90 ... 100 %RH
Output resolution and unit	0.1 %RH

General

Operating temperature	-52 ... +60 °C (-60 ... +140 °F)
Storage temperature	-60 ... +70 °C (-76 ... +158 °F)
Operating voltage	5 ... 32 VDC
Typical power consumption	3 mA at 12 VDC (with defaults)
Heating voltage	5 ... 32 VDC / 5 ... 30 VAC_{RMS})
Serial data interface	SDI-12, RS-232, RS-485, RS-422, USB connection,
Weight	650 g (1.43 lb)
Housing	IP65
Housing with mounting kit	IP66

Electromagnetic Compatibility

Complies with EMC standard	EN61326-1; Industrial Environment
IEC standards	IEC 60945/61000-4-2 ... 61000-4-6

VAISALA

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Scan the code for more information

WMT52 Ultrasonic Wind Sensor

The Vaisala WINDCAP® Ultrasonic Wind Sensor WMT52.

Features/Benefits

- Measures horizontal wind speed and wind direction
- Triangular design ensures excellent data availability
- No moving parts
- Maintenance-free
- Optional heating available
- Compact, durable and robust
- Low power consumption
- IP66 housing with mounting kit
- Applications: marine, wind energy, environmental monitoring

Proven Vaisala Performance

The Vaisala WINDCAP® Ultrasonic Wind Sensor WMT52 incorporates decades of Vaisala experience in wind measurement using ultrasound to determine horizontal wind speed and direction.

With no moving parts, the WMT52 has high sensitivity as the measurement time constant and starting threshold are virtually zero. This makes it superior to the conventional mechanical wind sensors.

The WMT52 is designed to operate without periodic field calibration and maintenance.

Applications

The WMT52 is ideal for use in marine applications as the housing with the mounting kit is water resistant. The WMT52 is also suitable for wind energy and environmental monitoring, for example, for measuring the distribution of air pollution and road tunnel ventilation.

Easy to Install

The WMT52 is delivered fully assembled and configured from the factory. With the Vaisala Configuration Software Tool you can change the settings, such as averaging times, output mode, update intervals, measured variables and message contents.

The WMT52 can be mounted either on top of a pole mast or on a cross arm.

When using the optional mounting kit, the north alignment needs to be performed only once.

Heating

The optional heating available in the WMT52 assists measurements in the freezing weather conditions and during snowfall.

As the heating circuit is independent of the operational power, separate supplies can be used. Heating is switched on automatically at low temperatures, well before the freezing point.

Low Power Consumption

The WMT52 has very low power consumption; during the idle mode the device typically consumes about 2 ... 3 mW.

Technical Data

Wind

WIND SPEED	
Range	0 ... 60 m/s
Response time	250 ms
Available variables	average, maximum, and minimum
Accuracy	±3% at 10m/s
Output resolution	0.1 m/s (km/h, mph, knots)
WIND DIRECTION	
Azimuth	0 ... 360°
Response time	250 ms
Available variables	average, maximum, and minimum
Accuracy	±3°
Output resolution	1°
MEASUREMENT FRAME	
Averaging time	1 ... 3600 s (=60 min), at one second steps on the basis of samples taken at 4 Hz rate (configurable)
Update interval	1 ... 3600 s (=60 min), at one-second steps

General

Self-diagnostics	separate supervision message, unit/status fields to validate measurement quality
Start-up	automatic, <10 s from power on to the first valid output
Serial data interface	SDI-12, RS-232, RS-485, RS-422, USB connection
Communication protocols	SDI-12 v1.3, ASCII automatic & polled, NMEA 0183 v. 3.0 with query option
Baud rate	1200 ... 115 200
Operating temperature	-52 ... +60 °C (-60 ... +140 °F)
Storage temperature	-60 ... +70 °C (-76 ... +158 °F)
Dimensions	
height	139 mm (5.7")
diameter	114 mm (4.49")
weight	510 g (1.12 lb)
Housing	IP65
Housing with mounting kit	IP66
Vibration	IEC 60945 paragraph 8

Power Supply

Operating voltage	5 ... 32 VDC
Power consumption on average	
minimum	0.1 mA at 12 VDC
maximum	14 mA at 5 VDC
typical	3 mA at 12 VDC (default measuring intervals)
Heating voltage	5 ... 32 VDC / 5 ... 30 VAC_{RMS})

Accessories

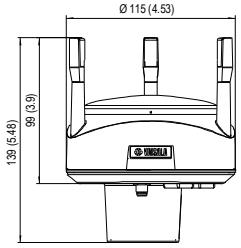
Mounting kit	212792
Bird spike kit	212793
Surge protector for sensor	WSP150

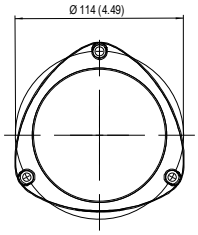
Electromagnetic Compatibility

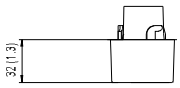
Complies with EMC standard: EN61326-1, Industrial Environment	
IEC standards	IEC 60945/61000-4-2 ... 61000-4-6

Dimensions

Dimensions in mm (inches)







mounting kit

WINDCAP® is a registered trademark of Vaisala.

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WA15 Wind Set for High Performance Wind Measurement

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

With a proven track record of successful installations, the Vaisala Wind Set WA15 has earned its reputation as the industry standard in the wind sensor market.

The WA15 consists of a Vaisala Anemometer WAA151, a Vaisala Wind Vane WAV151, an optional crossarm, a power supply and cabling.

Anemometer with Excellent Linearity

The 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.

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.

Features/Benefits

- 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

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

Sensitive Wind Vane

The 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.

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

Technical Data

Vaisala Wind Set WA15

Options and Accessories

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
Crossarm and serial RS485 transmitter	WAC155
Serial RS485 transmitter card	WAC155CB
Power supply	WHP151
Set of bearings and gasket	16644WA
Dimensions	
Junction box	125 x 80 x 57 mm
Crossarm length	800 mm
Mounting to a pole mast with a nominal outside diameter	60 mm
Cup assembly	7150WA
Tail assembly	6389WA

Technical Data

Vaisala Anemometer WAA151

Wind Speed

Measurement range	0.4 ... 75 m/s
Starting threshold	< 0.5 m/s *
Distance constant	2.0 m
Characteristic transfer function	U = 0.328 + 0.101 × R
(where U = wind speed [m/s], R = output pulse rate [Hz])	
Accuracy (within range 0.4 ... 60 m/s)	
with characteristic transfer function	± 0.17 m/s **
with transfer function U = 0.1 × R	± 0.5 m/s***

General

Operating power supply	U_{in} = 9.5 ... 15.5 VDC, 20 mA typical
Heating power supply	AC or DC 20 V, 500 mA nominal
Output	0 ... 750 Hz square wave
Transducer output level	
with I_{out} < +5 mA	high state > U_{in}-1.5 V
with I_{out} > –5 mA	low state < 2.0 V
Settling time after power turn-on	< 30 µs
Plug 6-PIN	MIL-C-26482 type
Cabling	6-wire cable through crossarm
Recommended connector at cable end	SOURIAU MS3116F10-6P
Operating temperature with heating	-50 ... +55 °C (-58 ... +131 °F)
Storage temperature	-60 ... +70 °C (-76 ... +158 °F)
Material	
housing	AlMgSi, grey anodized
cups	PA, reinforced with carbon fibre
Dimensions	240 (h) × 90 (Ø) mm
Swept radius of cup wheel	91 mm
Weight	570 g

Test Compliance

Wind tunnel tests	ASTM standard method D5096-90
Exploratory vibration test	MIL-STD-167-1
Humidity test	MIL-STD-810E, Method 507.3
Salt fog test	MIL-STD-810E, Method 509.3

Complies with EMC standard EN61326-1:1997 + Am1:1998 + Am2:2001; Generic Environment

* Measured with cup wheel in position least favoured by flow direction. Optimum position gives approx. 0.35 m/s threshold.

** Standard Deviation

*** 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

Vaisala Wind Vane WAV151

Wind Direction

Measurement range at wind speed 0.4 ... 75 m/s	0 ... 360°
Starting threshold	<0.4 m/s
Resolution	±2.8°
Damping ratio	0.19
Overshoot ratio	0.55
Delay distance	0.4 m
Accuracy	better than ±3°

General

Operating power supply	U_{in} = 9.5 ... 15.5 VDC, 20 mA typical
Heating power supply	AC or DC 20 V, 500 mA nominal
Output code	6-bit parallel GRAY
Output levels	
With I_{out} < +5 mA	high state > U_{in} –1.5 V
With I_{out} > –5 mA	low state < 1.5 V
Settling time after power turn-on	< 100 µs
Plug 10-PIN	MIL-C-26482 type
Cabling	10-wire cable through crossarm
Recommended connector at cable end	SOURIAU MS3116F12-10P
Operating temperature with heating	-50 ... +55 °C (-58 ... +131 °F)
Storage temperature	-60 ... +70 °C (-76 ... +158 °F)
Material	
housing	AlMgSi, grey anodized
wave	Alsi 12 anodized
Dimensions	300 (h) × 90 (Ø) mm
Swept radius of vane	172 mm
Weight	660 g

Test Compliance

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

Complies with EMC standard EN61326-1:1997 + Am1:1998; Am2:2001; Generic Environment

VAISALA

Vaisala takes pride in professional and comprehensive specifications that are based on scientific test methods and known standards. The accuracy specification takes into account repeatability, non-linearity, and hysteresis, and is given for the full measurement range, unless otherwise stated. This means our customers get truly reliable information with no gaps, helping them make the right decisions.

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