

05103 Wind Monitor



A high-quality combined wind speed and direction sensor

Description

The Wind Monitor measures horizontal wind speed and direction. Originally developed for ocean data buoy use, it is rugged and corrosion-resistant yet accurate and lightweight.

Construction

The main housing, nose cone, propeller, and other internal parts are injection moulded UV-stabilised plastic and offer improved resistance to corrosion from sea air environments and atmospheric pollutants.

Both the propeller and vertical shafts use stainless steel precision grade ball bearings. The bearings have light contacting Teflon seals and are filled with a low-torque wide temperature range grease to help exclude contamination and moisture.

Operation

Rotation of the 4-blade helicoid-shaped propeller produces an AC sine wave signal with a frequency proportional to the wind speed. This AC signal is induced in a stationary coil by a six-pole magnet mounted on the propeller shaft. The coil is located on the non-rotating central portion of the main mounting assembly, eliminating the need for slip rings and brushes. Three complete sine wave cycles are produced for each propeller revolution.

The position of the wind vane is transmitted by a 10k Ω precision conductive plastic potentiometer which requires a regulated excitation voltage. With a constant voltage applied to the potentiometer, the output signal is an analogue voltage directly proportional to azimuth angle.

Key Features

Wind speed accurate to $\pm 0.3\text{ms}^{-1}$, wind direction to $\pm 3^\circ$

Maximum wind speed measurement 60ms^{-1} (130mph), gust survival 100ms^{-1} (220mph)

Combined sensor simplifies installation

Direct connection to Campbell Scientific dataloggers

Other models, including the 05103LM (with 4-20mA line driver) and the 05106 ('marine' version), are also available

Typical Applications

Wind energy research

Micrometeorology

Weather data for pollution monitoring systems

Roadside weather stations

Mounting

The instrument mounts on standard 1" nominal bore pipe, outside diameter 34mm (1.34"). Campbell Scientific crossarms include a suitable mounting post. An orientation ring is provided so the instrument can be removed for maintenance and reinstalled without loss of wind direction reference. Both the mounting post assembly and the orientation ring are secured to the mounting pipe by stainless steel band clamps. Connections to a datalogger are made in a junction box at the base of the sensor mount.

Specifications

Wind Speed

Accuracy: $\pm 0.3\text{ms}^{-1}$, 1 to 60ms^{-1} ; $\pm 1.0\text{ms}^{-1}$ 60 to 100ms^{-1}

Range: 1 to 60ms^{-1} (130mph) for maximum accuracy; gust survival 100ms^{-1} (220mph)

Sensor: 180mm diameter 4-blade helicoid propeller moulded of polypropylene

Pitch: 294mm air passage per revolution

Distance Constant: 2.7m for 63% recovery

Threshold Sensitivity: 1.0ms^{-1} (max.), 0.5ms^{-1} typical

Transducer: Centrally mounted stationary coil, $2\text{k}\Omega$ nominal DC resistance

Transducer Output: AC sine wave signal induced by rotating magnet on propeller shaft; 125mV p-p at 100rpm, 12.5V p-p at 10,000rpm

Output Frequency: 3 cycles per propeller revolution (0.098ms^{-1} per Hz)

Wind Direction (Azimuth)

Accuracy: $\pm 3^\circ$

Range: 360° mechanical, 355° electrical (5° open; parallel resistor prevents floating signal in deadband)

Sensor: Balanced vane, 380mm turning radius

Damping Ratio: 0.25

Delay Distance: 1.3m for 50% recovery

Threshold Sensitivity: 1.0ms^{-1} at 10° displacement, 1.5ms^{-1} at 5° displacement

Damped Natural Wavelength: 7.4m

Undamped Natural Wavelength: 7.2m

Transducer: Precision conductive plastic potentiometer, $10\text{k}\Omega$ resistance ($\pm 20\%$), 0.25% linearity, life expectancy 50 million revolutions, rated 1W at 40°C , 0W at 125°C

Transducer Excitation: Regulated DC voltage provided by datalogger (potentiometer rating 15V DC max.)

Transducer Output: Analogue DC voltage proportional to azimuth angle with regulated excitation voltage applied across potentiometer

General

Overall Dimensions: 550mm long, 370mm high

Main housing diameter: 50mm

Propeller diameter: 180mm

Weight: 1.5kg

Cable: *The price of the Wind Monitor does not include cable.* Suitable length of six-core cable with three individually screened pairs must be purchased separately (part no. PS6905).

Wind Display Unit

R M Young Wind Tracker

The Wind Tracker is a compact wind speed and direction display unit, specially modified for use with Campbell Scientific equipment.

It incorporates advanced features, including serial input/outputs and alarm functions.

The Wind Tracker can be connected directly to the 05103 Wind Monitor to provide an immediate, direct display of wind speed and direction, and can also be used in conjunction with a datalogger. It is designed for indoor use, but can be used outdoors if it is mounted in a suitable weatherproof enclosure.

A waterproof **Marine Version** of the wind tracker is available for use in marine and other severe environments – further details are available on request.



R M Young Wind Tracker

**Please call for our separate
Wind Tracker leaflet or for
further information on
sensors and weather
stations**

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*Campbell Scientific products are
available from:*