

Wind Speed and Direction Sensors

A100R Anemometer and W200P-1 Windvane



A100R Switching Anemometer

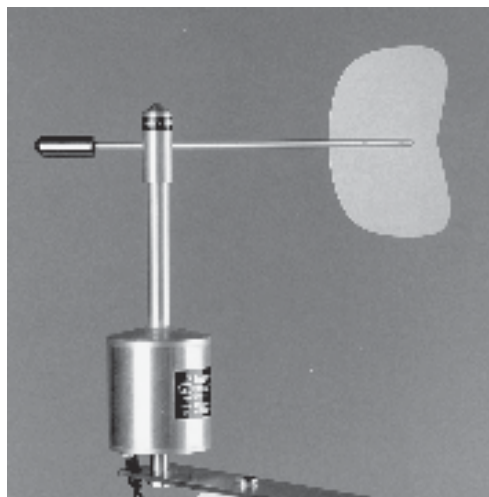
The A100R anemometer is a precision instrument which is easily interfaced with Campbell Scientific dataloggers to give accurate measurements of wind run or mean wind speed. A magnet turns with the rotor spindle producing a varying field which causes a mercury-wetted reed switch to make and break contact once per revolution of the rotor. The contacts are bounce free, and no power is required apart from that necessary to detect contact closure; the A100R is thus well suited for use on remote sites. The rotor is tested by comparison with a rotor calibrated at the UK National Physical Laboratory, and a calibration figure is provided with each instrument.

The anemometer is constructed from anodised aluminium alloy, stainless steels and weather resisting plastics. A stainless steel shaft runs in two precision,

corrosion-resistant ball-races. The bearings are protected from the entry of moisture droplets and dust, resulting in an instrument suitable for permanent exposure to the weather.

W200P-1 Potentiometer Windvane

The W200P-1 has excellent sensitivity and is suitable for remote operation. It incorporates a precision micro-torque wire wound potentiometer mounted in an all-weather, corrosion-resistant case. The potentiometer has the lowest possible torque consistent with long life and reliable operation.



The small gap at North is filled to ensure smooth operation and a long service life. The precision ball-bearing races are corrosion-resistant and protected against the entry of moisture and dust.

Key Features

Robust, precision instruments

Field-proven track record

Long cables and anti-icing heaters available to special order

Fin and rotor attached by patented gravity-sensitive fastener for rapid attachment and release in portable applications

Typical Applications

Permanent automatic weather stations

Wind farm site evaluation

Assessment of irrigation requirements

Research into wind-borne pollutants

Specifications — A100R

Performance

Stalling Speed: 0.2ms^{-1} (0.6ms^{-1} A100R/WR*)

Max. Speed: $>75\text{ms}^{-1}$

Accuracy: $\pm 0.1\text{ms}^{-1}$ ($0.3\text{--}10\text{ms}^{-1}$ [$0.7\text{--}10\text{ms}^{-1}$ for A100R/WR]); $\pm 1\%$ ($10\text{--}55\text{ms}^{-1}$); $\pm 2\%$ ($>55\text{ms}^{-1}$)

Distance Constant: 2.3m

Calibration: 0.80 revolutions per metre (1 pulse per 1.25 metres)

Switch Life: Rated 25×10^9 operations minimum (>20 years)

* In the marine version — A100R/WR, available to special order — a touching shaft-seal is fitted for extra protection in place of the standard non-contact seal; please note that this gives a small increase in the threshold or stalling speed.

Physical

Size: Height 200mm, case diameter 55mm, attached screened cable 3m

Rotor: Standard 150mm diameter 3-cup rotor

Weight: 350g including standard cable

Materials: Anodised aluminium, stainless steels and ABS plastics for all exposed parts

Temperature Range: -30°C to $+70^\circ\text{C}$ (de-icing heater available to order)

Fixing

Rotor: Patented gravity sensitive fastener for rapid attachment and release

Anemometer: Standard tripod screw ($0.25''$ BSW/UNC), taper adaptor also available. Note that mounting must be within 15° of vertical.

Electrical

Switching Voltage: 100V DC max.

Switching Current: 40mA max.

Switch Rating: 4W max. (DC resistive)

Duty Cycle: $50\% \pm 5\%$ up to 50ms^{-1} ($\pm 10\%$ up to 75ms^{-1})

Impedance: 120Ω series resistor plus 10nF capacitor across line for interference suppression

Actuating Time: 1.5ms

Switch Bounce: NIL

Min. Current: NIL (life not reduced by use in dry circuits)

HE-1 Anti-icing Heater

An anti-icing heater, Model HE-1, which is fitted around the shaft to help prevent icing up of the bearings, is available as an option for these sensors.

The effectiveness of this heater is dependent on the prevailing windspeed. Typically it will provide protection down to -10°C at windspeeds up to 10m/s in dry air.

The heater does *not* prevent snow or ice build-up on the rotor/vane.

The heater is normally specified when ordering the sensor, when it will be fitted during manufacture; however, the heater can be supplied, if required, for fitting to existing field units.

The heater requires a separate 12V (AC or DC) power supply.

Specification:

Operating Voltage: 12V AC/DC

Current (nominal): 0.5A

Power Rating (nominal): 6W

Element Resistance: ± 24 ohms

Max. Air Temp. when operating: 39°C

Cable: Supplied with 3m cable as standard (or as specified sensor cable length when fitted during manufacture).

Specifications — W200P-1

Performance

Threshold: 0.6ms^{-1} (fin moves when aligned 45° to flow)

Max. Speed: $>75\text{ms}^{-1}$

Response: Distance constant 2.3m, Damping ratio 0.2

Range: 360° mechanical angle; full circle continuous rotation allowed

Accuracy: $\pm 2^\circ$ obtainable in steady winds over 5ms^{-1}

Backlash: $\pm \frac{1}{2}^\circ$ when fin removed and replaced (no backlash movement during use)

Resolution: $\pm 0.2^\circ$

Repeatability: $\pm 0.5^\circ$

Linearity (potentiometer error): 0.5% of full scale output

Life: 5×10^7 revolutions (equivalent to 10 years' typical exposure)

Physical

Overall height: 270mm, case diameter 56mm, attached cable 3m

Fin clearance: 180mm

Weight: 350g including standard cable

Materials: Anodised aluminium, stainless steels, and ABS plastics for all exposed parts

Temperature Range: -50°C to $+70^\circ\text{C}$ (de-icing heater available to order)

Potentiometer Components

General MOD DEF STAN 05-21

End Resistance MOD DEF STAN 5123

Fixing

Fin: Patented gravity sensitive fastener for rapid attachment and release

Windvane: $0.25''$ BSW/UNC (6° taper fitting type 128-1 also available for portable applications) tapped hole and screw into base

Electrical

Potentiometer Resistance: $1\text{k}\Omega \pm 10\%$

Electrical Continuity Angle: $357.7^\circ \pm 1.5^\circ$ (2.3° gap at North)

W200P-1 windvanes supplied by Campbell Scientific are fitted with a $100\text{k}\Omega$ parallel resistor to prevent floating readings in the deadband. The effect on accuracy is minimal.

Electrical Variation Angle: $356.5^\circ \pm 1.5^\circ$ (3.5° deadband)

Temp. Coefficient: $\pm 50\text{ppm}/^\circ\text{C}$

Maximum Power Dissipation: 0.5W -50°C to $+20^\circ\text{C}$; derate linearly to 0.25W at $+70^\circ\text{C}$

Insulation Resistance: $50\text{M}\Omega$ minimum

Wiper Current: 20mA maximum

Voltage, case to potentiometer: 125V maximum

Supply Voltage: 20V maximum

Marine Version

Available to special order; call for further details.

Applicable Standards for A100R and W200P-1

WMO Requirements:

Surface wind measurement in WMO No.8 with suitable processing of data to provide 2-minute or 10-minute averages.

Electromagnetic Compatibility:

Generic emission standard to BS EN 50081-1 1992
Generic Immunity standard to BS EN 50082-1 1997

Enclosure (case):

Class IP53 (IP54 with /WR option)
Anodised finish to BS1615 AA15

Cables:

Miniature Instrumentation MOD DEF STAN 61-12 parts 4 & 5

Miscellaneous Electronic Components:

Supplied from ISO 9000 sources wherever possible.

**Campbell Scientific supply
a range of sensors and
complete automatic
weather stations — call for
details.**

Campbell Scientific products are available from: