

## As a Function of Cable Length

### INTRODUCTION

This application note discusses the maximum wind speed readings that the station can measure as a function of anemometer cable length.

Some Davis Instruments weather stations—such as the Monitor II, Wizard II and III, GroWeather, Health EnviroMonitor and Energy EnviroMonitor—use wires to connect the weather measuring sensor (the transducer) to the weather station console. In general, the wires serve both to power the sensor and to transmit the signal back to the console. The console then interprets the signal into meaningful units, such as wind speed in miles per hour. Others like the Vantage Pro and Vantage Pro2 use wires to connect the weather measuring sensor to a transmitter, which then relays the measurements digitally over the air (wireless Vantage Pro) or down a cable (cabled Vantage Pro).

Using wire to deliver power to sensors and then to return the signals works well and imposes few constraints. However, one important constraint is the maximum length of the connecting wire. As the wire grows too long, the sensor begins to receive insufficient power, and the returning signal begins to lose integrity as it travels back to the console or transmitter.

### VANTAGE PRO, MONITOR and WIZARD STATIONS

Loss of signal quality versus increasing cable length is most noticeable in our Monitor II and Wizard II and III and Vantage Pro and Vantage Pro2 anemometers. As the cable length increases, the accuracy of all but the highest wind speeds is unaffected, but the maximum measurable wind speed drops. That is to say, the maximum measurable wind speed decreases as cable length increases (see graph below).

The graph should be interpreted as showing “worst case” scenarios. Thus, if your station uses 140 feet (42 m) of cable, the station will measure *at least* 135 mph winds with large size cups. It may well measure higher wind speeds. If winds begin to exceed the measurable max, the console will indicate zero wind or will dash out (i.e., show dashes in place of numbers). Large cups and small cups are shown because they have different response characteristics relative to the actual wind. The numbers represent the maximum number that would appear on the Vantage Pro display. The numbers on a Monitor or Wizard display will be significantly higher at the maximum wind speeds (15% higher at 175 mph for small cups, 33% higher at 150 mph for large cups).

You can use the following website to determine the maximum wind speed you would expect in your area and thus the maximum cable length that would be suitable for your area. Use the city nearest you and the Annual value on the far right. Keep in mind that conditions may vary in-between the locations listed:

<http://lwf.ncdc.noaa.gov/oa/climate/online/ccd/maxwind.html>

### GROWEATHER, HEALTH and ENERGY STATIONS

The maximum measurable wind speed does *not* degrade in our advanced weather stations (GroWeather, Health EnviroMonitor and Energy EnviroMonitor). Our advanced stations use additional signal conditioning circuitry located in the Sensor Interface Module (SIM) to maintain signal quality right up to the maximum cable length—250 feet (75 m) from sensor to SIM and 250 feet (75 m) from SIM to console.

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