

WS01

BOUNDARY LAYER CONDUCTANCE AND LOW WIND SPEED MEASUREMENT SENSOR

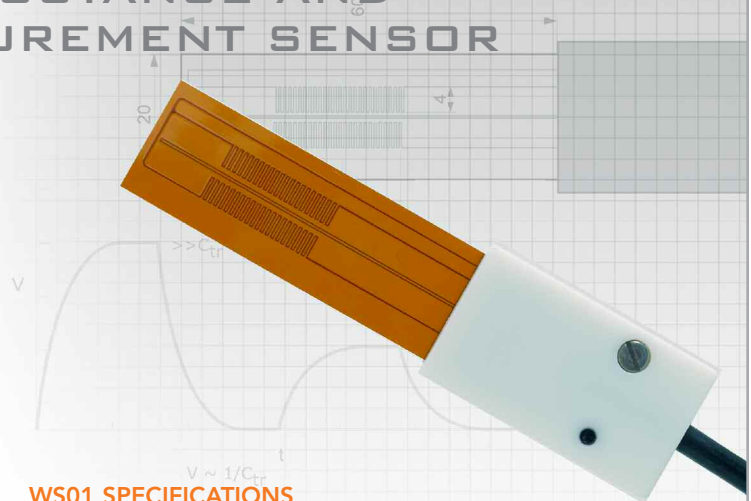
Suitable for continuous outdoors boundary layer conductance and low level wind speed research when properly configured with a data acquisition system, the WS01 is intended for heat transfer coefficient analysis (C_{tr}) occurring between the sensor's highly sensitive heated thin film surface and surrounding air. WS01 signal data can also be used to determine additional transfer coefficients (e.g. water vapor transport), or local wind speed (i.e. specifically low level wind speeds); both measurements are qualitative rather than absolute.

The WS01 sensor incorporates a heating element with two high sensitivity thermopile detectors sandwiched between two thin film Kapton layers. Differential temperature measurement around the WS01's heating element are possible due to the record breaking sensitivity of the thermopile detector circuits. When mounted in air and the heating element cycled on, the WS01 will output a millivolt signal that is inversely proportional to the heat transfer between surrounding air and sensor surface. The principal use of WS01 is as an 'artificial leaf' for mass transport leaf boundary layer studies; the sensor's leaf like geometry (i.e. flat and thin) make it ideally suited. The WS01 can also be used for low level wind speed measurement studies, from 0.1 to 2 m/s approximate in greenhouses and buildings, if the wind is predominant from a single direction. The potential for solar heating induced measurement error on the WS01's active sensing surface area is vastly diminished due to the symmetrical design of the thermopile detection circuits around the heating element, in combination with the alternating heating pulse cycle technique. The low thermal mass of the WS01 also results in a fast sensor response time (30 second response in static air). Programs are available upon request for interfacing the WS01 with either a Campbell Scientific CR10X or CR1000 data logger.

APPLICATIONS

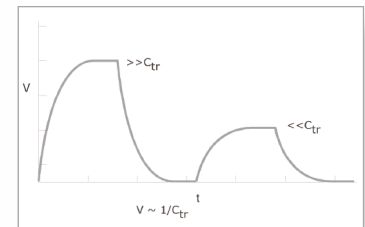
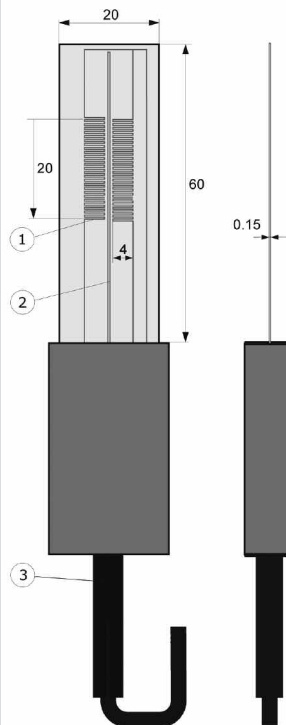
- ▶ Agrometeorology / Horticulture
- ▶ Building Physics (draft studies)

Note: Above applications are inclusive of, but not limited to the entire WS01 application range



WS01 SPECIFICATIONS

Thermocouples:	40 Cu-CuNi
Temperature range:	-30 to +80 °C
Sensor thickness (nominal):	0.15 mm
Required readout:	2 diff voltage channels 3 V and 5 mV range
Voltage input:	1 - 2 VDC (nominal)
Signal interfacing:	with most common data loggers



▲ Figure 1: WS01 sensor: graphs at different wind speeds: signal amplitude varies with $1/\text{wind speed}$ or $1/C_{tr}$. All dimensions are in mm.

◀ Figure 2: WS01 sensor: thermopiles (1), heating wire (2), cable (3).