



Sensor Characteristics

SS Temperature Probe: Vernier Stainless Steel Temperature Probe, TMP-BTA

(Based on manufacturer specifications for temperatures around 25°C in open air)

Resolution: 0.03°C

Accuracy: ±0.3°C

Response time: (time for 90% change in reading): 10 seconds (in water, with stirring)
 400 seconds (in still air)
 90 seconds (in moving air)

Calibration: Steinhart-Hart equation

Calibration factors:

$$^{\circ}\text{C}: K_0 = 1.02119 \times 10^{-3}, K_1 = 2.22468 \times 10^{-4}, K_2 = 1.33342 \times 10^{-7}$$

Surface Temperature Probe: Vernier Surface Temperature Sensor, STS-BTA

(Based on manufacturer specifications for temperatures around 25°C in open air)

Resolution: 0.03°C

Accuracy: ±0.3°C

Response time: (time for 90% change in reading): 50 seconds (in still air)
 20 seconds (in moving air)

Calibration: Steinhart-Hart equation

Calibration factors:

$$^{\circ}\text{C}: K_0 = 1.02119 \times 10^{-3}, K_1 = 2.22468 \times 10^{-4}, K_2 = 1.33342 \times 10^{-7}$$

Barometer Probe: Vernier Barometer, BAR-BTA

(Based on manufacturer specifications for pressures around 1 atmosphere)

Resolution: 0.0001 atm, 0.01 kPa

Accuracy: ±0.005 atm, ±0.5 kPa

Response time: 100 μs

Calibration: Linear, $P = K_0 + K_1 V$,

Calibration factors:

Atm of pressure: $K_0 = 0.8088, K_1 = 0.07698$

kPa of pressure: $K_0 = 81.952, K_1 = 7.800$

mm Hg of pressure: $K_0 = 614.84, K_1 = 58.52$

Meters of attitude: $K_0 = 1610, K_1 = -647$ 8400 m elev. = 1 atm pressure

Feet of altitude: $K_0 = 5280, K_1 = -2122$ 27550 ft = 1 atm

Conversion factors:

$$H(\text{m}) = 8400(\text{m}) - 11.05(\text{m/mmHg}) \times P(\text{mmHg})$$

$$H(\text{ft}) = 27550(\text{ft}) - 36.24(\text{ft/mmHg}) \times P(\text{mmHg})$$

Windmeter Probe:

(Based on student experiments)

Resolution: ± 0.2 knot, ± 0.1 m/s

Accuracy: ± 1% of reading

Calibration: none

1 knot = .514m/s = 1.15 mph



Laser Rangefinder Probe: Newcon Optik model LRM 200

(Based on student experiments)

Resolution: ± 0.5 m
Accuracy: ± 2 m
Range: 20-1500 meters
Calibration: none

$H = R \sin\theta$		
R	θ	H
300 \pm 2m	90 \pm 5 $^\circ$	300 \pm 3m
300 \pm 2m	80 \pm 5 $^\circ$	295 \pm 8m
300 \pm 2m	70 \pm 5 $^\circ$	281 \pm 11m
300 \pm 2m	60 \pm 5 $^\circ$	260 \pm 15m