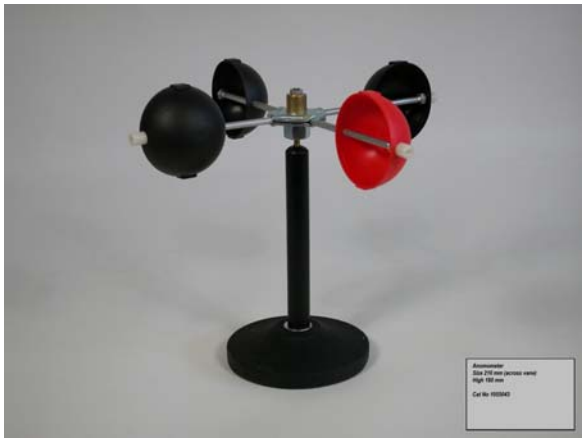
Serrata Anemometer - Cat No. 1055043



Description:

Anemometers are used to measure wind speed and can measure air velocities of 5 - 20 mph accurately.

This anemometer is called the Robinson Cup type and takes advantage of the fact that *moving air exerts more force on the open end of a hemisphere than upon the closed end.* It consists of 4 lightweight cups at the end of spokes which are at right angles to one another. Each open end faces the closed end of the following cup. The difference in air force between open and closed ends is enough to cause the anemometer to spin at a speed approximately 1/6 that of wind velocity (Full-size anemometers rotate at a speed 1/3 that of wind velocity).

The anemometer operates at wind speeds as slight as 3 km/hr.

Calculating Wind Velocity from Your Data:

Anemometers usually carry a meter calibrated in units of speed activated by voltage generated by connecting the vanes to a small electric generator. In this simple cup anemometer you calculate the wind velocity as follows.

1. Measure the distance from the centre of the cup to the centre of the shaft. It is about 16 cm.
2. Count the number of rotations in one minute as the anemometer spins. You can use a stopwatch to time the interval and count the number of times the red cup passes.
3. Note that when a cup make sone full circle (one revolution), it covers a distance equal to the perimeter of a circle of radius 8 cm. In other words, it covers a distance equal to $2\pi r$, which would mean:

2 x 3.1416 x 8 cm, or 50.3 cm.

Your anemometer cup therefore moves through 50.3 cm each time it revolves.

4. Calculate the speed of your anemometer.

Example: You counted 60 revolutions in one minute. Your anemometer speed would be 60 RPM (revolutions per minute.) It means a linear distance of 60 x 50.3 cm covered per minute.

Convert this into km/hr using the following calculation:

$$60 \times \frac{50.3\,\text{cm}}{1\,\text{min}} \times \frac{60\,\text{min}}{1\,\text{hr}} \times \frac{1\text{km}}{100000\text{cm}} =$$

= 60 x 0.003 km/hr

= 1.8 km/h

If you had counted 30 revolutions per minute instead of 60, your anemometer speed would have been 30x 0.003 km/hr; or if the number of revolutions were 15, the anemometer speed would be 15 x 0.003 km/hr. You can use a "shortcut" method in calculating the anemometer speed. Multiply the RPM by 0.03 to obtain your anemometer speed in km/hr.

5. Once you know your anemometer speed, you can figure out the wind velocity that moved it.

Remembering that the anemometer moves only 1/6 as fast as the wind, multiply your anemometer speed by 6 to get wind speed.

(6 x 1.8) **OR** 10.8 km/hr

For an anemometer speed of 60RPM, wind velocity is 10.8 km/hr.

Maintenance:

A drop of oil inside the bearing makes for easier turning. Light oil such as kerosene is recommended. Graphite will also work.

Serrata Anemometer - Cat No. 1055043

Speed (RPM)	V (km/hr)	
5	0.9047808	km/hr
10	1.8095616	km/hr
15	2.7143424	km/hr
20	3.6191232	km/hr
25	4.523904	km/hr
30	5.4286848	km/hr
35	6.3334656	km/hr
40	7.2382464	km/hr
45	8.1430272	km/hr
50	9.047808	km/hr
55	9.9525888	km/hr
60	10.8573696	km/hr
65	11.7621504	km/hr
70	12.6669312	km/hr
75	13.571712	km/hr
80	14.4764928	km/hr
85	15.3812736	km/hr
90	16.2860544	km/hr
95	17.1908352	km/hr
100	18.095616	km/hr
105	19.0003968	km/hr
110	19.9051776	km/hr
115	20.8099584	km/hr
120	21.7147392	km/hr
125	22.61952	km/hr
130	23.5243008	km/hr
135	24.4290816	km/hr
140	25.3338624	km/hr
145	26.2386432	km/hr

This table provides wind velocities calculated for different speeds of this anemometer using the described method. It may or may not include your exact data. If not, follow the instructions or use the graph to the right, which has been plotted using the data of the table but made precise up to 3 decimal places. To find the wind velocity corresponding to the anemometer speed of your experiment, locate this speed on the x-axis and find the wind velocity on the y-axis by extrapolation. Follow the example shown for an anemometer speed of 60 RPM.