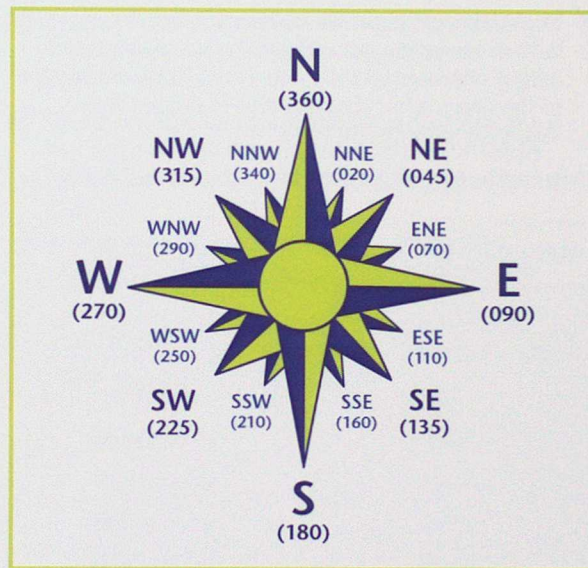


Surface wind

Wind is the horizontal movement of air and is specified by its speed and direction.

- Wind direction is measured in tens of degrees relative to true north (not magnetic north).
- This is always the direction the wind blows *from*.
- Wind speed is measured in knots (kn) and 10 kn is about 11.5 m.p.h.

If possible, measure wind speed and direction using instruments. Estimate wind speed using the Beaufort scale when instruments are not available or not working (see page 7).



The 16 compass points, with values in degrees (shown in brackets)

- ✓ The standard height for surface wind measurement is 10 m above the ground. If your measurement height differs from this, you must apply a correction to the mean wind speed to give the value at the 'equivalent height' of 10 m.

Correction to give 'equivalent' wind speed readings

Height of anemometer (m)	Correction for wind at 'equivalent height'
1-2	add 30%
3-4	add 20%
5-7	add 10%
8-13	no correction
14-22	subtract 10%
23-42	subtract 20%
43-93	subtract 30%

Mean speed and direction

There are various ways of obtaining wind readings:

- estimation;
- hand anemometer;
- indicating dials;
- automated displays; and
- anemograph.

These methods are discussed on the following pages.

Estimation

If you don't have instruments, or they are not working, you will need to estimate the wind speed and direction yourself.

- ✓ Estimation is best done as a daily check to reveal possible instrument errors, but it is also worthwhile practising for times when the instruments cannot give reliable readings, such as at low wind speeds, or when they fail.
- ✓ For wind direction, choose a well-exposed place (away from obstructions) and face into the wind for at least 20 seconds. Use whatever means you can to estimate wind direction, such as smoke from chimneys or flags flying from masts.
- ✓ Estimate the mean direction from which the wind is coming by reference to the true direction of known landmarks (e.g. Stevenson Screen door faces north). A compass is useful, but remember it gives magnetic degrees not true degrees.
- ✓ Do not use cloud movement for estimating wind direction because it is often very different to the surface wind direction.
- ✓ Estimate the wind speed using the Beaufort force descriptions and then convert this to the mean equivalent value in knots (using the guidance on page 7).
- ✓ Do not try to report gusts or variations in direction when using the method of estimation.
- ✓ Be careful not to mistake *local* wind conditions generated by buildings, trees etc. (known as eddies), for the *general* drift of the wind.

Hand anemometer

This gives a direct reading of wind speed, which is shown by either a fluorescent pointer on a graduated scale or a digital display housed between the cups and the handle. To get the mean equivalent speed at 10 m you have to correct this reading by adding 30%.

- ✓ Stand in a well-exposed place (away from obstructions) and hold the anemometer with your arm aloft to measure a representative wind speed.

Take a reading (averaged over 15 seconds) at the start and end of your observation.

- If these differ by <10 kn, report the average.
- If they differ by >10 kn, take a third reading. Compare all three to see if you can find an average between any two of them (so long as they differ by <10 kn) and report this.
- If that fails (due to very variable winds), report your third reading.
- ✓ Remember to correct the speed for an equivalent height of 10 m if necessary.
- ✓ Do not try to report gust values from hand anemometers.



Hand anemometer

An anemometer will provide readings displayed on indicating dials, automated displays or an anemograph.

Indicating dials

Take a reading (averaged over 15 seconds) at the start and end of your observation.

- If these differ by <10 kn and/or <30 degrees, report the average.
- If they differ by more, make a third reading. Compare all three to see if you can find an average between any two of them (so long as they differ by <10 kn and/or <30 degrees) and report this.
- If that fails (due to very variable winds), report your third reading.
- ✓ Remember to correct the speed for an equivalent height of 10 m if necessary.
- ✓ Do not try to report the highest hourly gust speed from wind dials.

However, any gust you observe while taking your mean speed can be reported, rather than no gust at all. The same applies to variations in wind direction. Make

sure you use the gust or variations that occur during the period you use for your mean (this may vary if there is a marked change in speed or direction).

Automated displays (e.g. Mk 6 system)

The Mk 6 system provides measurement of mean speed and direction over specific intervals, which are regularly updated. These data are then displayed in appropriate formats on a PC screen.



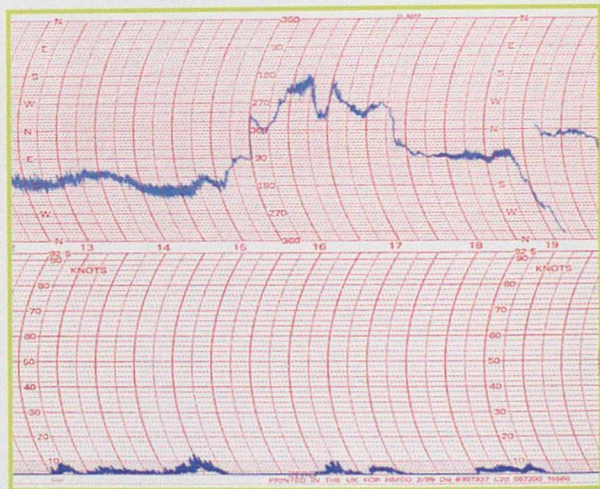
Cup generator anemometer and wind vane

Anemograph

Report the mean speed and direction for the 10 minutes just before your observation by reviewing the pen traces on the chart.

- ✓ If there has been a change during the 10 minutes of at least 10 kn in mean speed and/or at least 30° in mean direction, which has lasted for at least 3 minutes, report the new speed and/or direction.
- ✓ Remember to correct the mean speed for equivalent height if your anemometer is not at 10 m.
- ✓ Also note the highest gust recorded during the past hour but do not correct gust speeds for equivalent height.
- ✓ Always record a speed (at least 2 kn) whenever there is a definite wind direction, even if the speed trace shows zero. This is due to the minimum 'start-up' speed for the anemometer (about 5 kn).
- ✓ Time-mark the chart daily; it can record up to 31 days. The recorder has to be kept clear of dust or spilt ink when topping up the ink wells.

- ✓ Also time-mark the chart when the range-change switch is changed. Change the switch from the default 0–90 kn range to the 0–180 kn range as soon as the gusts exceed 70 kn. Switch back as soon as they fall below 70 kn.



Example of anemograph trace

The Beaufort scale for use over land

Force	Description	Specification for use on land	Mean equivalent speed at 10 m above the surface (kn)
0	Calm	Smoke rises vertically	00
1	Light air	Direction of wind shown by smoke drift but not by wind vanes	02
2	Light breeze	Wind felt on face; leaves rustle; wind vanes move	05
3	Gentle breeze	Leaves and small twigs in constant motion; wind extends light flag	09
4	Moderate breeze	Raises dust and loose paper; small branches are moved	13
5	Fresh breeze	Small trees in leaf begin to sway; crested wavelets form on inland waters	19
6	Strong breeze	Large branches in motion; umbrellas used with difficulty	24
7	Near gale	Whole trees in motion; inconvenience felt when walking against wind	30
8	Gale	Breaks twigs off trees; generally impedes progress	37
9	Severe gale	Slight structural damage occurs (<i>chimney pots and slates removed</i>)	44
10	Storm	Seldom experienced inland; trees uprooted, considerable structural damage	52
11	Violent storm	Very rarely experienced; accompanied by widespread damage	60
12	Hurricane force	Extremely rare; devastation and loss of life	≥64

Surface wind terms

Terms	Description
Gale	A mean wind speed of 34 kn or more (<i>Force 8</i>), averaged over 10 minutes and/or gusts reaching 43-51 kn in a well-exposed place 10 m above the ground
Squall (using knots)	A sudden increase of wind speed by at least 16 kn, the speed rising to at least 22 kn and lasting for at least 1 minute
Squall (using Beaufort scale)	A sudden increase of wind speed by at least 3 stages of the Beaufort scale, the speed rising to at least Force 6 and lasting for at least 1 minute
Gust	A rapid increase in the strength of the wind relative to the mean strength at the time, lasting for a few seconds.
Calm	No appreciable motion of the air; speed less than 2 kn
Veering	Clockwise change in wind direction, e.g. from SW to NW through west
Backing	Anti-clockwise change in wind direction, e.g. from NW to SW through west