

Current Meters

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General References

Warren (1983) contains a review of current meter practice relevant to hydrographers.

US Bureau of Reclamation [Water Measurement Manual](#) is a useful reference, particularly [Chapter 10](#).

Types of Current Meter

Most current meters operate on one of the following principles: propeller or rotor with flow vane, acoustic Doppler, electromagnetic, or tilt. Manufacturer's websites are often the best source of up-to-date information. The following list is a guide only and is not intended to promote any individual manufacturer.

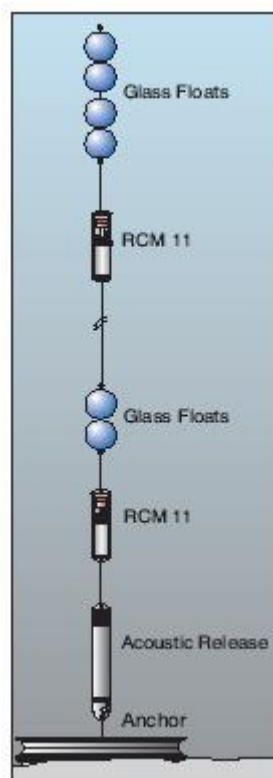
The propeller-type [current meter](#) shown below is normally mounted inline in a moored array. The large cylinder contains the A/D conversion and recording electronics. A small red propeller sits above the cylinder. A large vane keeps the instrument facing into the current. The instrument as a whole is mounted on the gimbed vertical rod that is attached to the mooring riser.



The Aanderaa doppler current meter

The Aanderaa [doppler current meter](#) is superficially similar to the propeller-type metre above, aside from the latter's vane, which

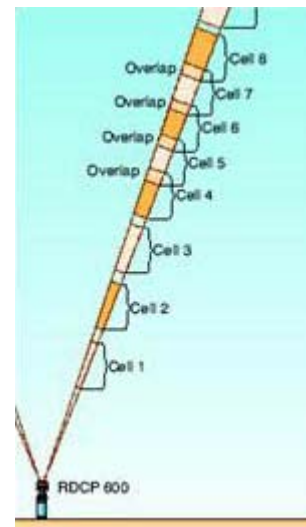
is not required as the Doppler meter uses an acoustic Doppler method to measure water velocity at the instrument's depth. The Aanderaa document describes the Doppler principle, which is based on the change in frequency of reflected sound waves - the change in frequency is proportional to the relative speed of the reflecting particle or air bubble. A simple diagram of a moored array of two meters and a release is shown below. More information about this type of meter can be found in the [Manual](#). UCM also manufactures doppler current meters for currents in three dimensions. The manual describing the [UCM-60](#) gives further information.



Acoustic Doppler current profiler (ADCP)

Acoustic Doppler current profilers (ADCPs) are designed to simultaneously measure currents at a range of distances or levels. A [data sheet](#) describes the range of modes in which such profilers can be operated. The diagram below shows a bottom-mounted instrument for vertical profile.

Bottom-mounted instrument for vertical profile

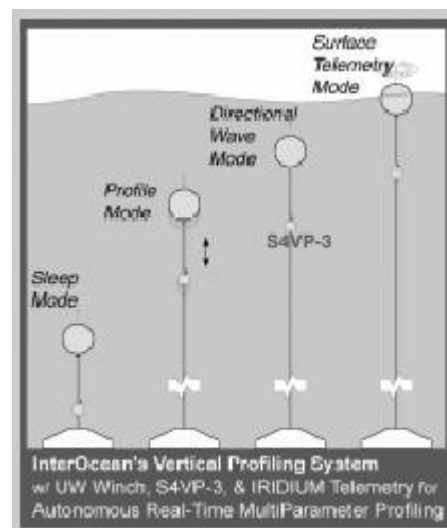


A horizontal profiler of current is often required for straits and channels. In such cases, a [side-viewing ADCP](#) may be used. The range may be up to several hundred meters.



Side-viewing ADCP

Most modern current meters and ADCPs come with a software interface for processing and visualisation, for example [WinADCP](#). Electromagnetic current meters are able to detect the velocity of the surrounding water by setting up a magnetic field and measuring the voltage induced in a pair of electrodes by the water flowing past it. Additional [description](#) and [theory](#) can be found in the linked documents. The diagram below shows several different modes in which electromagnetic current meters may be deployed.



*InterOcean's Vertical
Profiling System*

The "tilting" type meters are based simply on the fact that increased velocity results in increased angle of tilt. Wings on the side of the meter ensure that the tilt is in the correct direction (the flow direction). See [tilting current meter](#) and [manual](#) for further information (from General Oceanics).

There are a number of current meter manufacturers, and again their inclusion here is not intended as an endorsement. Manufacturers' brochures, such as the [Monitoring Brochure](#) and [Systems Brochure](#) are an invaluable source of information which can be applied to any system, not just that of the manufacturer.