- Tying a safety rope across the river/stream below the measuring point so any person has a grab line should they slip.
- Avoid using waders with small people who may be swept away or would have great difficulty in moving should the waders fill with water.
- Avoid operating in flows over 1.2m/second with school pupils. The smaller and younger the pupils are, the lower the flow or turbulence in which they can safely operate.

❑ Care

- Rivers with large amounts of debris could case damage to the impeller. Avoid using the impeller when there is a high material load in the stream.
- Do not force the impeller into the river bed. The blades can become damaged if grit enters the mechanism as a result of prolonged action of this nature.
- Grit around the impeller may be washed out by placing the impeller under gently running tap water.
- Do attempt to dismantle the unit and do not get the plug or datalogger wet. Only the sensor and cable are waterproof - the connection to the logger and the logger itself are not.
- If there is any suspicion that the impeller has been used in polluted waters then it should be washed under a slow tap with normal hygiene precautions such as using rubber gloves.
- If used in estuarine waters the sensor should always be washed in fresh water prior to storage.
- Apart from Health and Safety concerns (see section on safety), the meter should not be used in water where there is suspected to be high chemical pollution.

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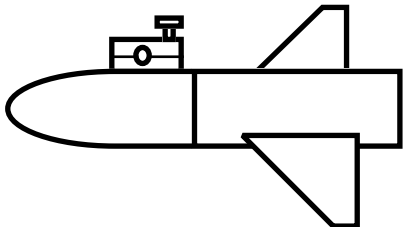
Microsense® Stream Flow for the LogIT system

DataMeter 1000✓ LIVE✘ LogIT SL✓ Explorer✘



❑ Introduction

The Microsense® Stream Flow sensor is designed to measure the flow of water in metres per second (some software will also allow you to display feet per second) for a wide range of flow regimes. Included with the impeller are two half metre wading rods with at one end a rubber sleeve and at the other end a 'T' handle.

This sensor design has been type-calibrated by Autonnic Research, an Independent Researcher and EFE UK in two different University flumes. A similar version has been judged as having less than 1% error when in the ideal situation of being towed by a boat.

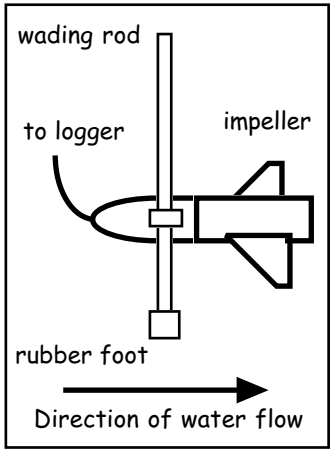
Important: DCP Microdevelopments Ltd, or any of it's distributors, cannot accept any responsibility or liability for the use of the equipment. Please read this manual fully, especially the Safety Guidelines, before using the sensor.

❑ Sensor assembly

To assemble the impeller on the wading rod, unscrew the black thumb screw and push the unit onto the wading rod, this is often helped by a clockwise turn. There may be some resistance, so make sure the black thumb screw has been sufficiently undone. Once the required depth is reached simply tighten the black thumb screw - in very turbulent water the thumb screw and the lock screw may both have to be tightened. Either one or both rods can be used, or additional rods added - it is advisable to protect the end of the wading rod by using the rubber foot supplied.

❑ Instructions for use

- It is very important that the impeller is placed downstream of the wading rod for accurate measurements.
- The minimum depth of operation is 50mm - this being the amount of water required to cover the impeller. Depth measurement is from the middle of the impeller.
- The impeller should be connected to the meter and fitted to the rod before being placed in the water.
- Having found a safe and secure point from which to operate place the wading rod vertically in the river. This is important as the impeller is so sensitive that any deviation from the direction of flow will produce low results. Water should be flowing past the wading rod to the impeller head i.e. the impeller is downstream of the wading rod. This ensures the flow is linear as it passes the impeller and there is no twisting affect of the impeller trying to turn round in fast flow conditions.



- *NB Tests in a University regulated flume suggest that for an average result the higher readings taken are more representative of the whole flow regime.*

❑ Safety guidelines for aquatic studies

The following is a list of guidelines that should be considered before any aquatic based field studies are carried out.

- Obtain permission for access to the site where appropriate
- Complete appropriate permission procedures within school/college
- Ensure that there is correct and adequate insurance cover for such activities
- inform the appropriate water authority of your plans and they will advise of any problems with safe water quality.

If you are unfamiliar with the site a reconnaissance visit is essential. A risk assessment should then be undertaken. The assessment should include:

- assessment of ease of access to the water and any hazards
- the degree of supervision which will be required (e.g. staff to student ratio)
- equipment required (e.g. footwear, safety equipment)
- the degree of isolation
- mobile telephone reception
- ensure staff have appropriate experience or qualifications for such an activity
- water conditions, in flowing water this may vary a great deal due to time of year, weather etc. if possible a reconnaissance visit should be made when the river is at high and low flow (the latter will enable you to assess the state of the river bed)
- if studying a pond or lake and if students are to go into the water obtain local knowledge on bottom conditions (e.g. deep mud, submerged objects). If this is not available some personal assessment may be necessary prior to the student visit to ensure student safety
- for rivers obtain local knowledge about the speed, river rise and local conditions in the event of rain etc.
- identify local resources e.g. telephone box, police, hospital service, nearest road
- identify all control measures required for safety and have a written evacuation plan in the vent of an accident

Before the study is commenced:

- Brief students and practice measurement procedures in a safe environment before departure.
- Ensure staff and students are aware of what is required of them prior to departure with regards to procedure and safety.
- Have a written emergency procedures plan with copies to all staff and students.
- Leave written guidelines of your activities with the school/college.
- If students are to enter the water there should be staff members trained or with appropriate experience in water rescue procedures.
- Staff should possess throwing lines and be trained in their use.
- Wading poles, or in the absence of these trekking poles, can be very useful in ensuring safety and rescues.
- Hygiene and washing facilities should be available prior to consuming food and at the end of the activity.
- Should weather conditions deteriorate this increases the degree of risk especially in rivers.
- If in doubt adjust the activity accordingly. Never push ahead with the activity for the sake of completing your plans if safety is compromised.

Other possible considerations:

- Using buoyancy aids or life jackets when pupils cannot swim, when the river is deep, or you have any concerns about safety.