

Educational Field Equipment. UK Ltd

The Columbia 2 Digital Stream Meter

Assembly Instructions

Congratulations, you have chosen a robust and reliable stream metre that will work in a wide range of flow regimes. The specification of the Columbia2 Digital Stream Meter ensures that it will be of equal value to Geography and Science students in High School, College and University as well as industrial applications.

Unpacking your meter.

When you have carefully unpacked all the meter parts you should have the following:

1. A 2 x 1/2 metre wading rod with at one end a rubber sleeve, and at the other end a 'T' handle.
(4 wading 1/2 metre rods and screw on round foot are included in professional models, or 6 x 1/3 meter rods).
2. The digital stream meter control box..
3. A Columbia2 impeller and lead terminating in a green or yellow K plug.
4. These instruction sheets.
5. Professional models - You may also have ordered a waterproof pouch with strap and a kit carry bag.

All the meters count units look exactly the same. See the next set of instructions over setting it up for your chosen impellers.. It requires a battery fitted in the lower compartment at the rear of the case. Do not attempt to open the upper sealed compartment. Use an alkaline PP3 battery only.

Impeller Assembly

To assemble the impeller on the wading rod undo the large knurled end screw on the impeller until the sleeve can slide back far enough to permit a wading rod to be inserted through the hole without resistance. Tighten the screw gently to lock the wading rod. Screw lengths of rod together to make the correct length for your site. Unless operating in deep water it is always easier to use short, rather than long rods. The handle fits onto the rod with an external thread at one end. If a screw on foot is provided then this will fit any wading rod end, if not, use the rubber foot to protect threads and your hands.



Reversing the Impeller

Do not undertake the following unless you are confident and beware of losing the small parts. The impeller normally faces into the flow. For **non pupil** use, if you are in very high or turbulent flows, or are suspending the impeller from a bridge then it will naturally turn round with the direction of flow. To obtain very accurate results the impeller blade should be removed and reversed in such circumstances. This requires a 5.5mm socket spanner and should be carried out away from the waters edge and is not covered by the guarantee - carry this out with caution, you can bend the shaft or loose the nut if you are not sure. The white nose cone can be unscrewed by hand if the impeller is gripped with the other hand to prevent damage. Remove the exposed self locking 3mm nut with the socket spanner and slide off the assembly. Unscrew the white collar from the impeller and screw it back on the other end of the impeller. Reassemble. You have effectively turned the impeller round on the shaft. Don't forget to turn it back when under normal operation. .



Columbia2 - Using the Meter

Whatever the site the method of use for this meter is the same.

Where to place the meter varies according to the reason for sampling. When working with pupils their age, size and purpose of the exercise has to be taken into account.

1. The meter should be connected to the impeller via the K plug and the impeller unit attached to the wading rod before the impeller is placed in the water. - See the assembly instructions. Make sure the plug is in the correct way round. One pin is significantly larger than the other, do not force the plug into the socket.
2. Choose the depth at which the measurement is to take place and lock the impeller in place on the wading rod. Depth measurement should be from the middle of the impeller.
3. 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 impeller to the wading rod i.e.. the impeller head is upstream of the wading rod. See assembly notes for circumstances when this is reversed
4. Set the meter to the appropriate impeller and measurement scale.
The sample interval can be varied while the meter is running. Every second count is instantaneous and will show all the pulsations in the flow but the frequent variations can be confusing to younger students. Change the sample interval until a constant reading is obtained. Traditional stream meters took flow over a minute and the graph was based on these results. This meter gives you the option to choose the length of integration period according to your own sampling criteria.



Care of your meter in the field

Your meter will float - this means it will also drift away at great speed if dropped into the water - Always have the meter and the case held firmly in your hands. Using two people is the safest method for the students and the meter.

If you purchased the extra waterproof bag then do use the neck strap to prevent loss. An accidental drop of the meter into water not in a waterproof bag but with the K plug in place requires the K plug removing and the meter gently wiped dry with a soft tissue. Dry away from any direct source of heat. Reconnect and the meter should work.

- v If the K plug was detached, or following the above operation the meter fails to get a count, then the K plug pin should be dried with a tissue and the meter left disconnected for several days to dry the socket
- v If the meter was submerged for a long period of time, or fails to count after the above operations were tried please return to the manufacturer stating when the meter was soaked and that you have tried the above procedures. Do not force dry over a source of heat such as a radiator or attempt to open the meter.
- v Try to keep the K plug out of the water. Do not stand on the plug as it contains some micro circuitry.

Columbia2 Digital Stream Meter

Guarantee

The meter and impeller are guaranteed for one year provided there has been no attempt to enter either unit. This guarantee covers normal usage but does not cover batteries, forcing the K plug, or other physical damage caused by impact or pressure. Apart from Health and Safety concerns, the meter must not be used in water where there is suspected to be high chemical pollution.

Calibration and Range of Operation

- v Your meter has been calibrated in a University Research Dept. controlled series of Flume tests and in the field.
- v The minimum depth of operation is 75 mm being the amount of water required to cover the impeller.
- v Maximum depth is determined by the site and operator.

{ School groups are not advised to have pupils in the water at speeds above 1.2 m/ second unless extra precautions such as buoyancy aids or safety lines are taken. Even this speed is not suitable for Key Stage 3 pupils.

Servicing

Your meter is guaranteed for 1 year. Meters can be serviced and repaired by the manufacturer. Please return direct to us rather than the distributor. Customers will be notified of service and repair costs prior to any work being undertaken but customers must recognize there are circumstances when it is cheaper to replace rather than repair.

For overseas sales please contact EFE and GB Nets by email to service@efe-uk.com or FAX +44 120877400 For UK phone / FAX 0120877400 or e-mail on (service@efe-uk.com)

Operating different impellers at the same time, multiple use of the same impeller, and impeller storage

Many texts show a series of flow meters used at the same time to measure the varying flow patterns in a stream either vertically or horizontally. They also recommend setting at 0.8 of the overall depth to obtain an average reading. The latter is a good approximation that can be tested with these impellers but beware of the effect of one impeller on another.

1. Two impellers of any type set next to each other will affect the readings. The impellers should contra rotate to have any degree of accuracy. In Columbia2 impellers the blades can be reversed to overcome this problem. In Tamar and Ohio impellers one of the pair will have to be pointing in the wrong direction, i.e. upstream instead of downstream. This will affect the accuracy.
2. All impellers contain magnets or generate a magnetic field. They should never be stored close to each other.
3. Ohio impellers should never be used closer than 5 cms to each other as the turbine type very small blades will be slowed, even halted, by the magnetic field generated. The least noticed, but significant effect, is a reduced start up speed.

Testing one impeller against another, or substituting one impeller for another at the same site will produce surprisingly different readings. The flow patterns measured by an Ohio are different to those measured by a Tamar. The cross sectional area of all the impellers is different, hence what they are measuring is different. Fixing one impeller to face exactly the same way as a previous impeller in the flow is difficult. This can be tested by having an impeller at a fixed depth and slowly rotating either way, or tilting a few degrees up or down from the vertical. The difference will be greater the smaller the impeller blade. The Columbia2 is therefore the least affected by such variations.

Operating Instructions

Power / Pause button

1. Press once to turn on
2. Press and hold two seconds to turn off
3. When meter is reading press once to freeze display, press again to release.

Sample Interval

- Press once to reveal current sample interval.
Press and hold over two seconds – sample rate flashes.
Press once to scroll through the sample options available in seconds.
Press and hold at required option.

Function Button

1. Press once to show impeller type set and unit of measurement
2. Press and hold over two seconds – impeller type selection flashes.
3. Press once to scroll through options available.
4. Press and hold at required option – units of measurement now flash.
5. Press once to scroll through the units of measurement.
6. Press and hold at required option.

Impeller Types

- A = Tamar**
B = Ohio and Ohio Professional
C = Anemometer
D = Reserved for calibration
E = Columbia 2 (High Speed Impeller)
F = Columbia 2 (Sensitive Impeller)

NB. Your Meter is enabled for A / B / C / E / F

Connecting Impeller

The two pins on the cable are a different size. Please do not force the pins in the wrong way round.
The Ohio cable also contains micro circuitry near the plug, do not force it and try not to drop it into the water!

Direction of Flow

The *Tamar* impeller must be downstream of the wading rod --- The *Ohio* impeller must be downstream of the wading rod. --
The *Columbia 2* impeller can be reversed on its shaft with care (see instructions), but it should normally be upstream of the wading rod facing the flow.

There are No user serviceable parts. The Warranty is invalid if the case is opened or attempts made to open.
The battery is in the lower part of the case. Do not leave a battery connected for long periods when not in use (winter?)