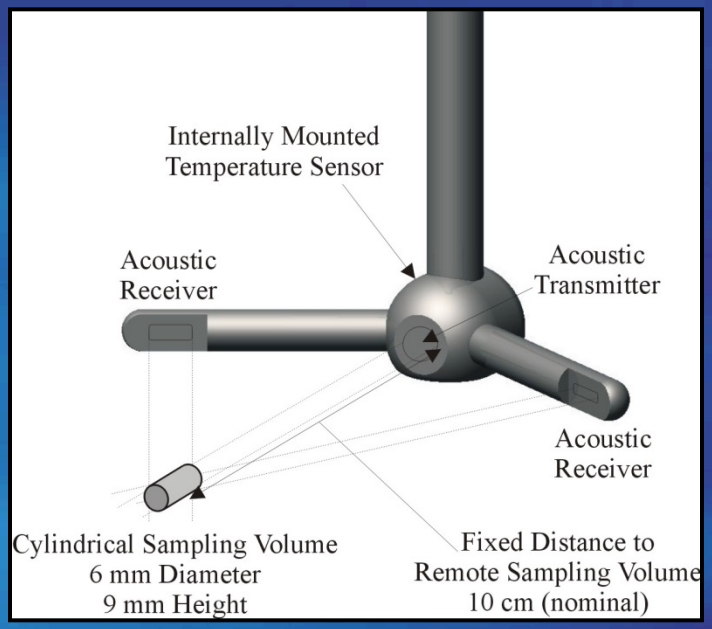
IV) Systems for Hydrology – Wading Measurements

FlowTracker Handheld ADV®

ADV Sampling Volume



Sampling Volume is a Cylinder - Roughly 6mmx9mm (10 MHz) and located 10 cm from transmitter

IV) Systems for Hydrology – Wading Measurements (cont.)

FlowTracker Handheld-ADV

Use on or off a wading rod

Why Use the FlowTracker?

- It uses the most accurate water velocity measurement technology (ADV) on the market
- It measures unobstructed velocity (1mm/s to 4.5m/s)
- It measures in water as shallow as 2 - 3 cm
  - No need for the 2 x Impellor depth &

    1 x width clearance requirement
- It never needs calibration (unless damaged)

IV) Systems for Hydrology – Wading Measurements (cont.)

Why Use the FlowTracker? contd.

HR Wallingford

Current Meter Calibration

Calibration No. 7992 — Date. 19 December 2000

Meter Make. OTT — Meter No. 15908

Type. C31 — Impeller No. 1-15908

Submitted by Environment Agency - Midlands Region

Suspension. 20mm diameter rod — Calibration limits 0.061 - 3.052 m/s

Calibration equations

Range of rate of revolution of impeller n *revolutions per second* minimum	maximum	Equation for speed of flow V *metres per second*
0.16	0.64	V = 0.022 + 0.2419 n
0.64	3.59	V = 0.011 + 0.2588 n
3.59	11.68	V = 0.003 + 0.2610 n
-----	-----	V = ----- + ------ n

Minimum response speed 0.061 m/s

The uncertainty of repeatability (at the 95 per cent confidence level) of calibration varies with the speed of flow, within the limits stated below (British Standard 3680).

Speed of flow m/s	0.03	0.10	0.15	0.25		
Uncertainty per cent	20	5	2.5	2	1	1

The above values represent a possible variation of +/- 0.005m/s up to speed of flow 0.5m/s.

Signed

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- Unlike Rotating Element Meters there is no 'start-up speed' calibration limits

Date. 19 December 2000

Meter No. 15908

Impeller No. 1-15908

ncy - Midlands Region

Calibration limits 0.061 - 3.052 m/s

tion equations

n	Equation for speed of flow V *metres per second*

ne uncertainty of repeatability (at the 95 per cent confidence lev
ith the speed of flow, within the limits stated below (British Stan

Speed of flow m/s	0.03	0.10	0.15	0.25
Uncertainty per cent	20	5	2.5	2

ne above values represent a possible variation of +/- 0.005m/s

or inaccuracies at lower velocities

Actual UK Environment Agency Current Meter Calibration Document

SonTek

Why Use the FlowTracker? contd.

- It measures 2D (3D optional) flow
    - Automatically handles the ‘skew flow’ cosine correction
- It has built in temperature measurement (reported in file output – useful Water Quality information)
- It reports echo intensity (indicator of relative sediment load)
- It is completely waterproof

Why Use the FlowTracker? contd.

- No need to change impellor for different velocity ranges

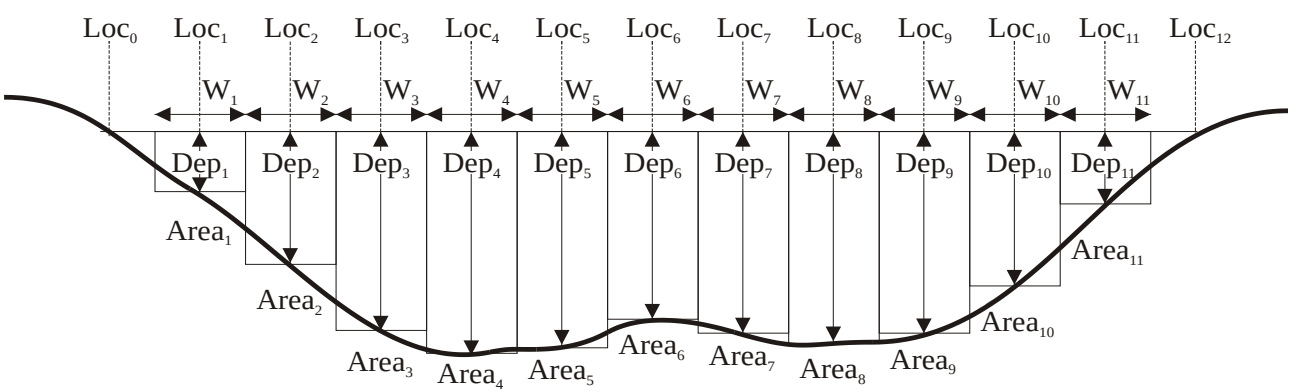
Meter type	Impeller type	Impeller diameter / head depth (m)	Impeller pitch (m)	Minimum depth of water for deployment to comply with ISO 748 (m)	Typical minimum response speed (m/s)	Typical maximum operating speed* (m/s)
REM meters						
OTT C31	1	0.125	0.25	0.5	0.06	3.00
	2	0.125	0.5	0.5	0.06	3.00
	3	0.125	1.0	0.5	0.055	
	4	0.08	0.125	0.32	0.04	1.50
OTT C2	1	0.05	0.05	0.2	0.03	0.60
	2	0.05	0.1	0.2	0.04	1.20
	3	0.05	0.25	0.2	0.04	2.50
	4	0.05	0.5	0.2	0.08	5.0
	5	0.03	0.05	0.12	0.06	0.60
	6	0.03	0.1	0.12	0.06	1.20

Excerpt from UK Environment Agency Hydrometric Manual showing number of impellors required *and each requires calibration*

IV)

Why Use the FlowTracker? contd.

- It has a built-in ISO discharge calculation



Station Location = Loc_i
Station Water Depth = Dep_i
Station Width = $W_i = (Loc_{i+1} - Loc_i)/2 + (Loc_i - Loc_{i-1})/2$
Station Area = $Area_i = W_i * Dep_i$
Mean Station Velocity = V_i
Station Discharge = $Q_i = Area_i * V_i$
Total Discharge = $Sum(Q_i)$

IV) Systems for Hydrology – Wading Measurements (cont.)

Typical Discharge Summary File

ST.	Loc. (m)	Depth (m)	IceD (m)	MDep (*D)	Clock	Npts	Spike	Vel (cm/s)	SNR (dB)	Angle (deg)	Verr (cm/s)	Bnd	Temp (degC)	Corr Fact	MeanV (cm/s)	Area (m^2)	Flow (cms)
0	0.91	0	0	0	0:00	0	0	0	0	0	0	0	0	1	24.23	0	0
1	2.74	0.061	0	0.6	11:11	10	0	24.23	30.9	8	8.8	0	31.09	1	24.23	0.111	0.027
2	4.57	0.085	0	0.6	11:11	10	0	35.4	19.3	-2	5.8	2	29.97	1	35.4	0.143	0.0506
3	6.1	0.104	0	0.6	11:12	10	0	53	17.6	8	6.5	0	29.31	1	53	0.158	0.0837
4	7.62	0.122	0	0.6	11:13	10	0	42.34	18	23	5.2	0	29.08	1	42.34	0.186	0.0787
5	9.14	0.146	0	0.6	11:14	10	0	73.9	21	-3	4.8	0	28.79	1	73.9	0.223	0.1648
6	10.67	0.165	0	0.6	11:15	10	0	73.72	21.9	-4	5.4	0	28.7	1	73.72	0.201	0.1479
7	11.58	0.213	0	0.6	11:15	10	0	44.71	21	-1	5.3	0	28.74	1	44.71	0.195	0.0872
8	12.5	0.213	0	0.6	11:16	10	0	43.72	20.6	-3	7	0	28.78	1	43.72	0.13	0.0568
9	12.8	0.165	0	0.6	11:17	10	0	57.72	21	1	3.3	0	28.93	1	57.72	0.1	0.0579
10	13.72	0.152	0	0.6	11:18	10	0	46.25	21.5	2	6.2	0	29.08	1	46.25	0.186	0.0859
11	15.24	0.128	0	0.6	11:19	10	0	74.33	22.7	11	5.6	0	29.43	1	74.33	0.195	0.145
12	16.76	0.098	0	0.6	11:20	10	0	50.44	20.6	12	3.6	0	30.25	1	50.44	0.149	0.0749
13	18.29	0.067	0	0.6	11:21	10	0	47.31	21.5	20	3.5	0	31.48	1	47.31	0.153	0.0725
14	21.34	0	0	0	0:00	0	0	0	0	0	0	0	0	1	47.31	0	0

This is 1 of 4 ASCII output files available from the system

File ---------- Z:\chris\Data\FlowTracker\11073495.2.wad
Start Date and Time ------- 2001/05/25 11:11:16
Sensor Type ---------- FlowTracker Handheld ADV
SerialNumber ---------- P59
Averaging Time ---------- 10 sec
Units system ---------- METRIC
Staff height ---------- 0.000 m
Gauge height ---------- 0.000 m
Rated discharge ---------- 0.0000 cms
Starting edge of water ---- LEW
Number of stations -------- 13
Total width ---------- 20.42 m
Total area ---------- 2.130 m^2
Total discharge ---------- 1.1328 cms
Mean velocity ---------- 51.31 cm/s
Mean SNR ---------- 21.4 dB
Mean std. error of vel. --- 5.5 cm/s
Mean boundary conditions -- 0 (BEST)
Boundary condition (Bnd) -- 0: BEST

Just like your handwritten ‘gaugers’ notepad