

Mainstream Measurements Ltd

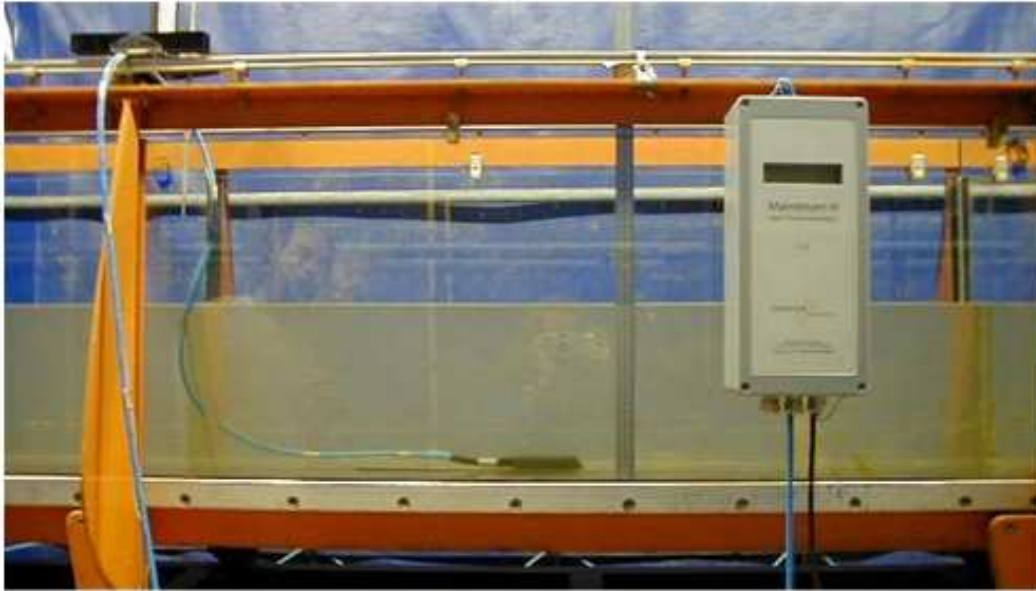
Mainstream 2000 Series

Velocity Probe Evaluation

Application Note 2001/02

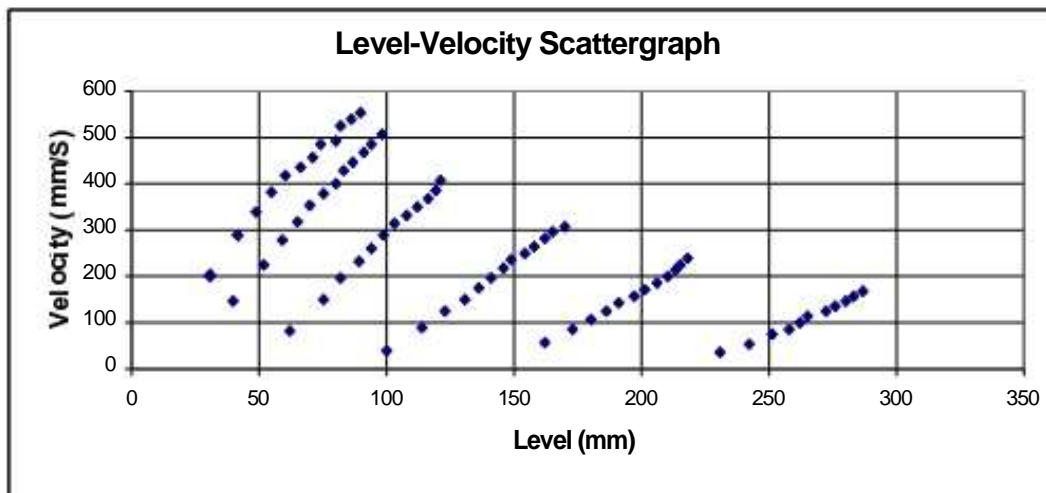
Mainstream 2000 Series Velocity Probe

A new Mainstream velocity probe, the 2000 series, has been developed to give improved immunity to surface waves and increased sensitivity for operation in clean liquids. A sample velocity probe was tested in the 300 mm wide rectangular open channel facility at WRC, Swindon. The channel slope was approximately 2 mm per metre. Test conditions covered water levels from 30 mm to 300 mm and flow velocities from 35 mm/S to 500 mm/S.

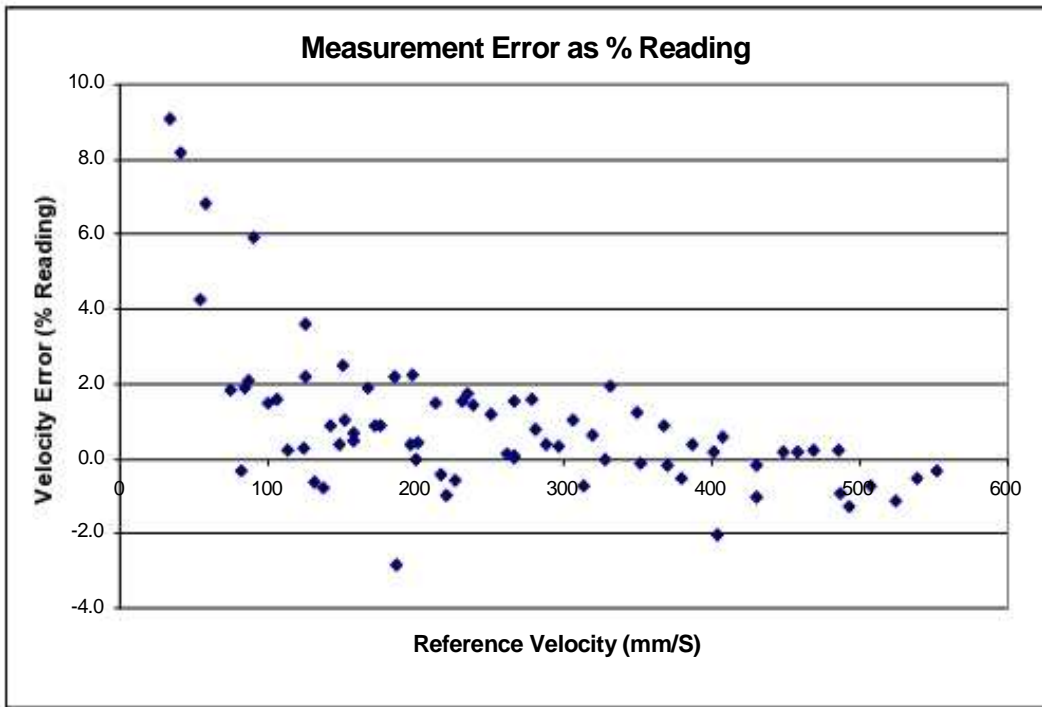


The reference velocity was calculated using the flow rate from a full bore electro-magnetic flowmeter located in the supply line and manual measurements of the water level in the channel. This gives an uncertainty in the reference velocity of the order of 2% for a level of 50 mm decreasing to approximately 0.5% at a level of 300 mm.

The velocity measurement configuration of the Mainstream system unit was set to default and the indicated flow velocity and reference velocity data were recorded using a sequence of 12 flow rates at each of six downstream control settings. The scattergraph below shows the velocity measurement from the Mainstream plotted against the level and indicates high quality flow data with distinct characteristics for each of the six hydraulic conditions.



The velocity measurement error, expressed as a percentage of reading, is plotted below against the reference velocity.



For velocities above 100mm/S the error is generally within 2% of reading. This translates to better than 0.2% when expressed in the more usual form as a percentage of the 5000 mm/S full scale velocity.

The most significant errors occur at the lowest velocities which are below the 50 mm/S minimum velocity of the default Mainstream configuration. To put these errors in context, the worst case is an absolute error of only +3 mm/S at a reference velocity of 34 mm/S.