

Instrument

Programmable electromagnetic liquid velocity meter

The electromagnetic velocity meter measures bi-directional water velocity in two perpendicular directions. The measurement principle is based on conductive liquid moving through a magnetic field. The magnetic field is induced by electrical current in a small coil inside the body of the probe. Two pairs of diametrically opposed platinum electrodes sense the induced voltages produced by the flow past the probe. The probe has been designed in such a way that these voltages are proportional to the liquid velocity parallel to the plane of the electrodes.

Applications

Specific applications where the electromagnetic liquid velocity meter can be used include:

- laboratory research
- engineering studies
- open channel stream gauging
- slurries and sludge transport
- environmental and hydrological measurements
- sedimentation and filtration processes
- flow monitoring under surge conditions

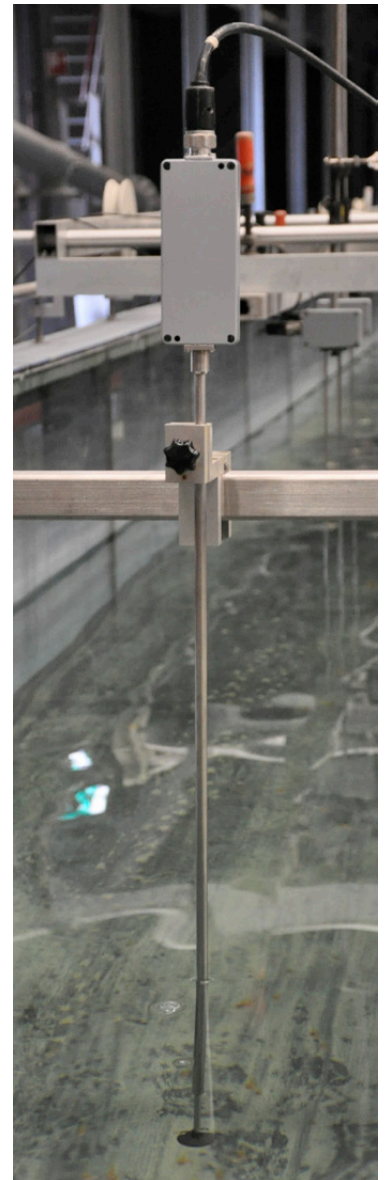
Standard probes

There are two standard probes available. The E30 type probe is especially suitable for physical model studies and laboratory research due to its smaller probe size. The E40 type probe has a larger probe size and is therefore more robust. Furthermore, the E40 type probe can be fully submerged in liquid, as opposed to the E30 type probe. Next to these two standard probes, special probes (e.g. cranked) can be made to suit specific applications.

As described above, the probes measure the liquid velocity using a magnetic field beneath the probe. This magnetic field should not be disturbed. The probes have to be connected to a control unit.

Features

- 0 - 2.5 m/s bi-axial four quadrant range
- towing tank calibration
- < 10 mm/s per 24 hours zero stability
- ellipsoid type probes for high spatial resolution and minimum flow disturbance
- galvanic isolation between probe and output



Technical specifications

Materials exposed to liquid	<ul style="list-style-type: none"> stainless steel 316 platinum PU finish 03-69554 Ral 9021 F9
Medium	<ul style="list-style-type: none"> liquids and suspensions, including slurries minimum required conductivity 0.2 mS/cm maximum temperature 40°C (water)
Probe	<ul style="list-style-type: none"> electromagnetic, bi-axial, 4-quadrant E30 type: ellipsoid 11x33 mm, total length 1090 mm, immersion depth 850 mm E40 type: ellipsoid 14x40 mm, total length 500 mm, fully immersible (max. 30 m) special probes available on request (e.g. cranked probe)
Range	up to 2.5 m/s (E40 type optional up to 5.0 m/s)
Accuracy	+/- 0.01 m/s +/- 1 % of measured value
Tilt response error	negligible for tilt angles < 10° if compensated for cosine response
Temperature influence	<ul style="list-style-type: none"> medium: < 1.0 mm/s per °C ambient: < 0.3 mm/s per °C
Conductivity influence	< 0.02 % of reading per mS/cm
Cables	<ol style="list-style-type: none"> E30 type: 10 m (optional up to 100 m) E40 type: 25 m (optional up to 100 m)

Control unit

The control unit for the electromagnetic liquid velocity meter can be used with different types of probes. Its various functions can be controlled by three keys on the front panel. The control unit is able to communicate in ASCII coded messages (text) via the RS-232c port with a PC, terminal, etcetera. Measurements can be programmed and data collected at distance from the control unit (data handling software is not included).

Features

The following features can be selected from the control unit:

- Vx and Vy or magnitude and direction
- display in volts or m/s
- actual or average data, standard deviation of values measured
- continuous or single measurement
- averaging time 0.1 - 9999.9 s
- probe type
- baud rates from 1200 to 9600
- zero calibration
- synchronization to mains

Technical specifications

Range	0 to +/- 1.0 or +/- 2.5 m/s optional 0 to +/- 2.0 or +/- 5.0 m/s
Output	analog voltage 0 to +/- 10 V, range selected, short circuit proof RS-232c port for data transfer to PC
Measuring period	by menu, continuous or single period
Averaging time	By menu, 0.1 - 9999.9 s
Dynamic response (70%)	7 Hz
Dimensions cassette	standard eurostyle cassette



E40 probe

E30 probe



Control unit front view



Control unit rear view

More information: instrumentation@deltares.nl