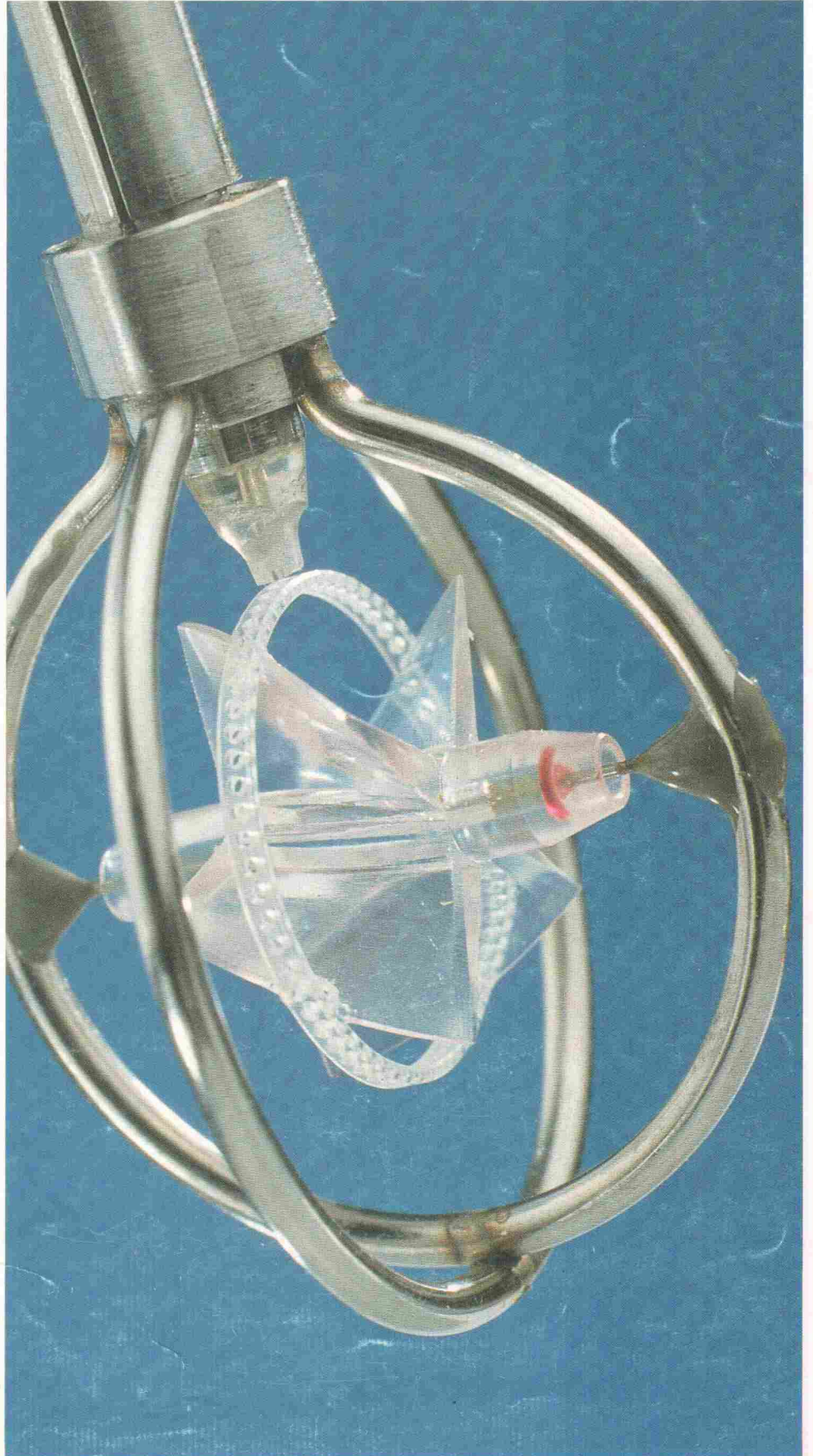




waterloopkundig laboratorium  
delft hydraulics laboratory

## W V M

bi-directional impeller liquid-velocity meter



general information

## Applications

The applications mentioned on this page are ONLY EXAMPLES of realised measurements and principal possibilities. Further information is available on request.

### Local static and dynamic measurements

Solving problems related to liquid flow often requires detailed data about local velocities. Methods to obtain this information by instruments strongly depend on the environment and the details required.

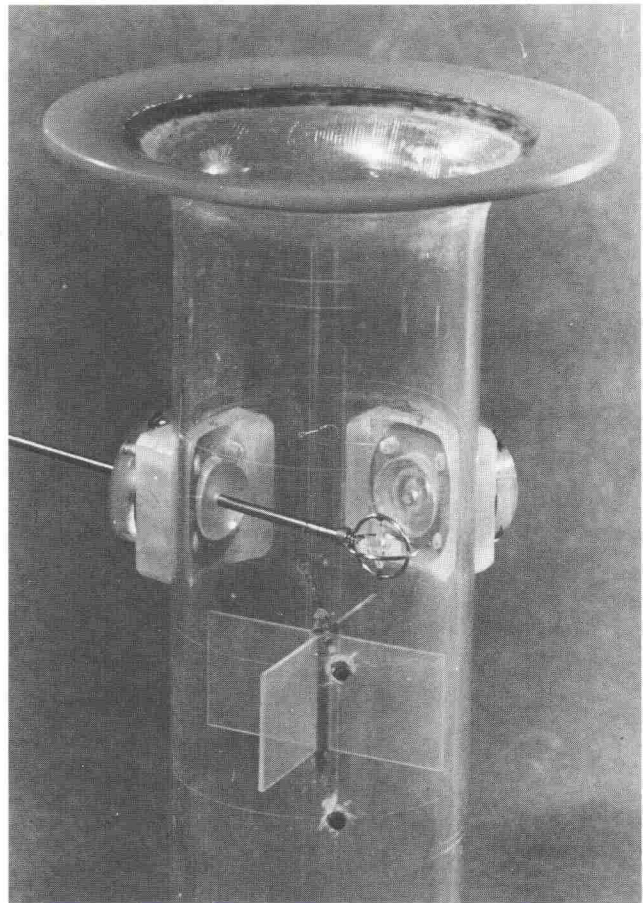
The WVM design is based on actual needs originating from the specific field of applied hydraulic research such as:

- high dimensional resolution
- low-velocity capability
- fluctuating flow application
- low operational costs

As proved over a period of many years at our laboratories and at a large number of research centres worldwide, the WVM offers a good solution for the demands described above.

### Fluctuating flow

The WVM can be successfully used for detection and measurement of dynamic flow fluctuations. Its low-mass sensor allows measurements up to 15 Hz.



### Industrial hydraulics

Although designed for open-channel applications, the WVM can be applied also for pipe-flow measurements. Good results have been obtained at velocities ranging up to 3 m/s.

### General flow monitoring applications.

The light-weight probe-type sensor offers possibilities in various situations where a portable instrument is required for local flow or flowrate monitoring. The two separate pulse-outputs also provide a solution for high-accuracy bi-directional net-flow totalising applications.

# W V M liquid-velocity meter

A proven instrument for wide range static and dynamic applications

## Featuring:

- 1% linearity
- 1:100 rangeability
- 15 mm diam. replaceable sensor
- 0 - 15 Hz dynamic response
- bi-directional operation
- analog and pulse-type outputs
- high repeatability

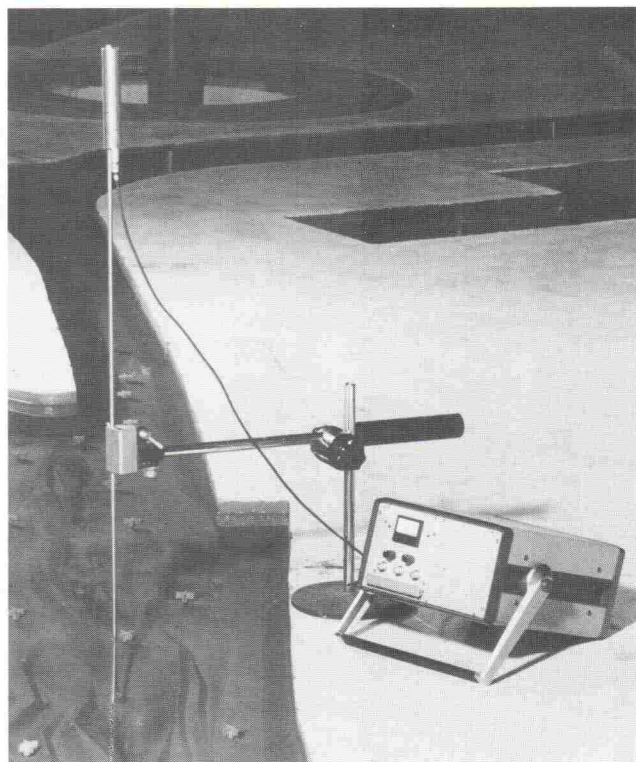
## Principle of operation

The sensing element is of the miniature high precision impeller-type. Around its circumference the plastic impeller is fitted with a small ring of the same material with 60, equally spaced, holes of 0.5 mm  $\varnothing$ . Rotational displacement of these holes causes variations in electric resistance between the probe-frame and two tiny probe-mounted electrodes. Value and direction of the liquid-velocity are derived from the frequency and mutual phase relation of the electrode signals. Bi-directional analog and pulse-type outputs are available from the separate electronic unit.



## Replaceable impeller unit

The individually calibrated units can be replaced without any adjustment or special hardware, yet providing interchangeability of calibration within  $\pm 1\%$  of the calibrated range. The calibration curves supplied are computer-calculated according to the least squares method for a low and a high velocity range.



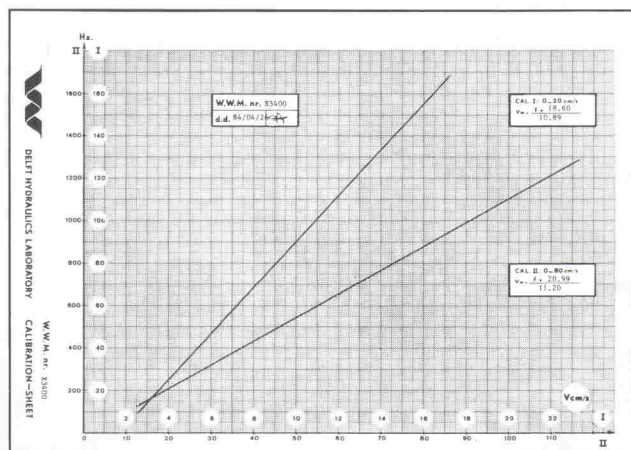
## Electric isolation

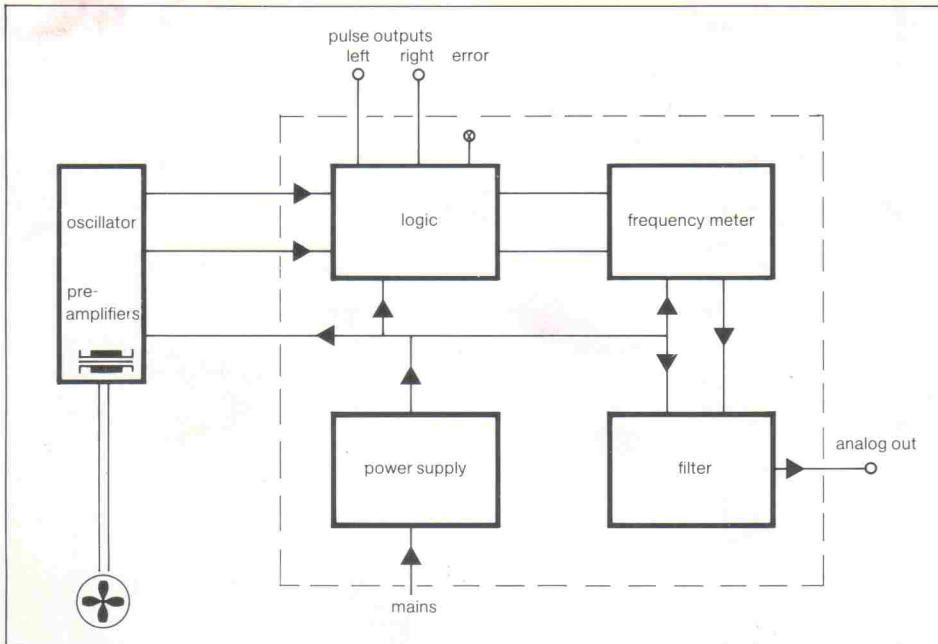
Susceptibility to electric interference by ground-loops is minimised by inductive coupling of the sensor. Special grounding precautions at the location of signal-handling are not required.

## Outputs

The outputs are presented as:

- a direction dependent analog voltage
- separate electronic counter compatible pulse type outputs for each sense of direction.





Simplified electronic diagram

## Specifications

### 1. Probe

- Sensor** : 4-bladed impeller, 50 mm pitch,  
15 mm  $\phi$  perforated ring: 15 mm  $\phi$ ,  
60 holes, 0.5 mm  $\phi$   
material: Luran, density 1080 kg/m<sup>3</sup>  
bearings: 2 jewels on 0.15 mm taut wire  
protective cage 29 mm  $\phi$
- Medium** : conductivity between 0.4 and 100 mS
- Range** : 2.5 - 120 cm/s (calibrated), bi-directional
- Max. velocity** : 3 m/s
- Calibration** : individual calibration  
non-linearity < 1% b.s.l. (cal. range)  
deviation between different sensors:  
< +/- 1% of calibrated range
- Interchangeability** : deviation between different sensors:  
< +/- 1% of calibrated range
- Dynamic response** : 0 - 15 Hz max.
- Tube** : material stainless steel 304  
- overall length : 117 cm  
- immersible length : 95 cm, 7 mm  $\phi$   
- electronic case : 15 cm, 27 mm  $\phi$   
- electrodes : 2 platinum electrodes,  
embedded in perspex  
distance to impeller-ring 0.1 mm  
- max. pressure 300 kPa
- Output Power** : 300 mVpp for each direction  
: 15 VDC, 12 mA, supplied from control unit

### 2. Control-unit

- Input** : 40-400 mVpp, 2 channels  
(15 VDC for probe-electronics is  
provided via input-connector)
- Ranges** : frequency calibrated 200, 500,  
1000 and 2000 Hz; bi-directional  
(1000 Hz approx. 90 cm/s)
- Display** : - frequency meter,  
moving coil, scale 50 mm  
- error indicator (l.e.d.)
- Outputs** : - analog voltage output, linear related  
to the measured frequency  
(+/- 0-10 VDC, 10 mA max)  
- 2 pulse outputs, one for each sense of  
direction, electronic counter  
compatible (TTL)
- Power** : 220 VAC, 50-60 Hz, 5 VA (incl. probe)
- Dimensions** : portable case, 26 x 15 x 32 cm,  
(plug-ins: Euro-frame)
- Weight** : portable case : 5 kg  
probe/tube (in box) : 0.5 kg (3.5 kg)  
spare impeller : 50 gr  
nett shipping weight  
per complete set : 10 kg

### 3. Cables

- supplied standard:
- measuring cable 4 core, shielded,  
with connectors probe/control unit.  
total length 10 m
  - power cord (length 1.5 m)

Special cable sets may be ordered on request (length up to 100 metres) against actual cost.

givm85

**waterloopkundig  
laboratorium**

P.O. Box 177  
2600 MH Delft  
The Netherlands  
tx 38176 hydel nl