Open Channel Flow Measurement
Using Ultraflux
“Time of Flight” Ultrasonic Flowmeters
From Flowline
OPERATING PRINCIPLE
Diagram above depicts the basic operating principle – The use of one or more ultrasonic “paths” located at approx 45 deg to the river axis, measuring velocity at different depths allowing an accurate average velocity to be calculated.

Measurement principle used is “Time of Flight”, ultrasonic sound pulses are alternately sent between probes mounted on opposite sides of the channel/river, the pulses that travel “with” the flow are speeded up, pulses that travel “against” the flow are slowed down, the time that each pulse is transmitted and received is very accurately measured, the greater the time difference between transmission and reception the higher the flow velocity.
Ultraflux UF 322 Open Channel Flowmeter Range

Accurate Flow Measurement
Ultraflux have been at the forefront of ultrasonic flow measurement for over 25 years. The UF322 CO Flowmeter range combines this experience with the very latest technology including Digital Signal Processing to give the user with a well proven solution providing highly accurate flow measurements under a wide range of flows and site conditions.

The system can be specified with 1 to 6 velocity measurement chords thereby providing cost effective flow measurement for each application.

Key Advantages Of The UF-322 Flowmeter
- Useable in any shape channel or river profile.
- Measures extremely low velocity flows i.e. 1mm/sec
- Ease of use – Site set-up via keypad or software supplied.
- Minimal civil work required.
- Simplicity of design – no head amplifiers or multiplex systems required – leading to a robust system design.
- The same system is used in channels from 0.5 to 200 metres wide.
- System is used and operates in accordance with ISO 6416
Ultraflux Model UF 322 CO

Model UF 322 Fixed System
The UF 322 is a fixed control unit designed for outside/inside installation. The enclosure is rated IP 67. The UF 322 can be powered 220 or 110 VAC/50 Hz or 12/50 VDC. Site set-up is made via RS232C connected to a laptop or PC and a menu driven Windows based set-up software, the unit can also be set up using the built-in keypad.

The UF 322 has the following standard outputs: 4-20 mA output for flowrate, 3 programmable relay outputs: alarms, faults, totalisation, RS 232/485, Modbus/JBus

Basic System Specification
Accuracy of velocity measurement < +/- 0.5%
Typical accuracy of flow calculation 1 to 5% dependent no. chords and site configuration
Number of Chords 1 to 6 dependent on site conditions

Standard Features:
- Display: Flow, Velocity, Level, Volume.
- Full diagnostics display including echo display for each sensor path.
- Data logger stores a range of selectable parameters.

Options include GSM and PSTN modems, Solar Power packages, battery back systems.
UF 322 Data Reporting

The UF 322 is equipped with a built-in data logger as standard. Data can be downloaded via a lap-top or a remote link, it can also be viewed on the control units meters own LCD display.

Up to 9 parameters can be logged with up to 32400 lines of logged data, parameters include:

Flow
Total flow
Velocity
Level
Speed off sound
Faults
Alarms

A typical system logging 4 parameters every 15 minutes will store 1 years data.

Diagnostics Display

The built-in display allows the performance of each sensor path to be interrogated, the echo and amplification figures are displayed, giving real time diagnostic information.

Example of echo display showing diagnostic information and amplification (36 dB)
Examples of UF 322 Installations - Rivers

Installation in a river using existing arch bridge to locate probe supports

Installation in 150 metre wide river

Close up of flush mounted probe installed in existing brick channel – shown at low water level. Probe shown is 50mm in dia.
Examples of UF 322 Installations – Waste Water

Installation in 6 metre wide raw sewage inlet channel – note channel shape. Channel is one of five flow to works inlets, probes are recessed into channel walls.

Control units for 5 open channels located in weatherproof enclosure.

Installation in 2 metre wide final effluent channel – Probes are mounted on channel wall under level sensor.
UF 322 CO and CO-S General Specifications

Flow Measurement
Volumetric flow partially filled round, rectangular and odd shaped conduits using form 2 to 6 velocity chords

Velocity Measurement
Method: Time of Flight ultrasonic
Accuracy: +/- 0.5% of reading
Range: 0.002 m/s to + 5 m/s
Probe Frequency: From 0.5 MHz dependent on application

Level Measurement
4-20 mA input signal from any suitable transmitter: i.e. Ultrasonic, Radar, Pressure

Flow Calculation
Method: Conversion of water level and pipe size to fluid area. Multiplication of fluid area by mean velocity to equal flowrate.
Flow measurement accuracy: +/- 5% reading typical
* Proper site selection, sensor placement are recommended to achieve accuracy

Sensor/Probe units
Field interchangeable with Control units
Sensor housing: IP 68. Stainless Steel casing
Sensor cables: Twinax type cable, usually armoured, special cables to order.
Max Sensor cable length: 500 m, Sensor mounting hardware: To suit site.

Controller/Display Unit
Field interchangeable with Sensor units
IP 67. Enclosure, Built-in data logger up to 32400 flow readings, control unit programmable with software supplied or via key pad, report generating software supplied FOC.
Display: Flowrate/Total, diagnostics, 3 off Programmable relays, 4-20 mA output for Flowrate.

Certification
CE marked
CENELEC available for hazardous areas