



## **APPLICATION NOTE # 322CO/04**

### **Ultraviolet (UV) Channel Flow Measurement Using Ultraflux “Time of Flight” Ultrasonic Flowmeter**

Location: Waste Water Treatment Works: South Wales  
Description: 2 Metre wide channel, Depth range 0.3 to 1 metres

#### Notes:

Sewage Works and other treatment processes commonly use UV systems to provide additional disinfection prior to final effluent discharge, these systems require accurate and reliable flowrate signal input in order to correctly regulate the power supplied to the lamp assemblies.

As part of an installation at a works in South Wales, Flowline Mfg Ltd provided a metering system to measure the flows and output a flow signal to the UV plant.

Flows had been measured previously using a conventional flume, this was made unusable by changes made to accommodate the UV plant.

Flowline supplied a 2 path Ultrasonic System from Ultraflux, the complete supply package included, initial site survey, selection of suitable metering point, installation of the system including mounting probes in the channel, cable runs and commissioning.

Although the works was operating during the installation, it was possible to stop the flow for approx 20 minutes to allow the probes to be installed.

The control unit was located approx 20 metres away, in this installation mains power was available however other more remote sites use battery/solar operation.

Photo 1: Site prior to installation of system, looking downstream



Picture 1: “Time of Flight” Operating principal

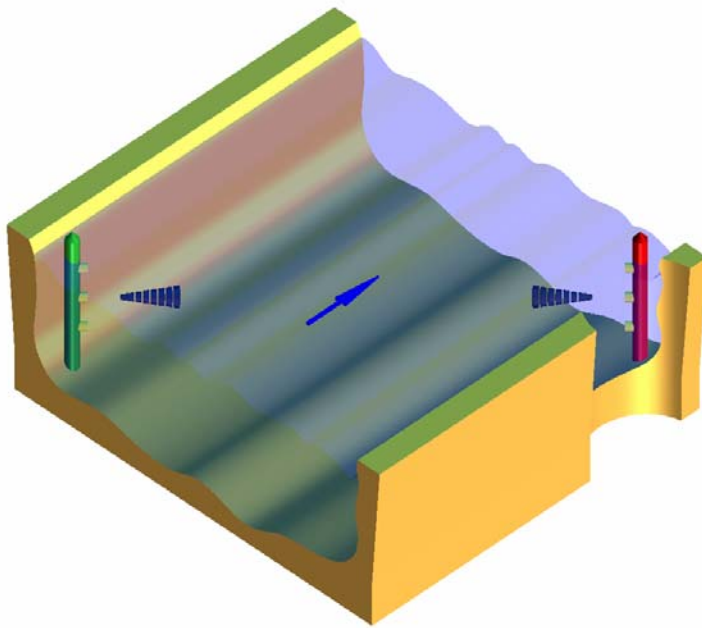


Diagram above depicts the basic operating principle – The use of one or more ultrasonic “paths” located at approx 35 deg to the flow axis, measuring velocity at different depths allowing an accurate average velocity to be calculated.

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.

Photo 2: One probe support plate showing high and low level probes. Note St.St protection covers for cables



Photo 3: Close-up of installed sensor mounting at normal operating level, Ultrasonic Level sensor is shown above channel



Photo 4: Close up of control unit.



# UF 322 CO and CO-S General Specifications

## Flow Measurement

Volumetric flow partially filled round, rectangular and odd shaped conduits using from 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: +/- 2 - 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

ATEX available for hazardous areas