

RIVERS AND STREAMS MONITORING

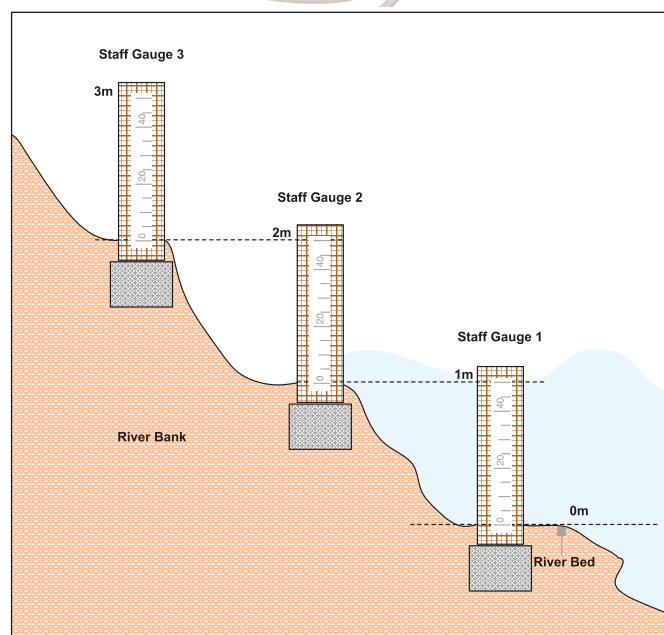


APPLICATION BACKGROUND

Careful measurement and monitoring of streams and rivers is vital to manage water resources throughout the world. Rivers also flood so the careful measurement of river levels can help mitigate damage caused by floods.

River flow measurements are calculated by hydrographers and are analysed by hydrologists and other scientists. To calculate flow, the river level is measured accurately at a certain point in the river, typically at a flume or weir which has known dimensions / has been constructed to a known standard. There are different types for different conditions, for example a flume type generally passes sediment more easily, while a V notch type is not suitable for use in waters with lots of sediment.

The water level above the low point of the flume / weir is measured and the flow is calculated based on measurement results and the shape and size of the flume / weir. For measuring flow of large / wide rivers, manual river gauging process is undertaken. Hydrographers record level and velocity at different depths along the slope of the river bank. From these measurements a set of relationships is determined such that the flow at the certain point in the river can be determined based on the water level at a certain point in the river, so called stage to flow relationship.



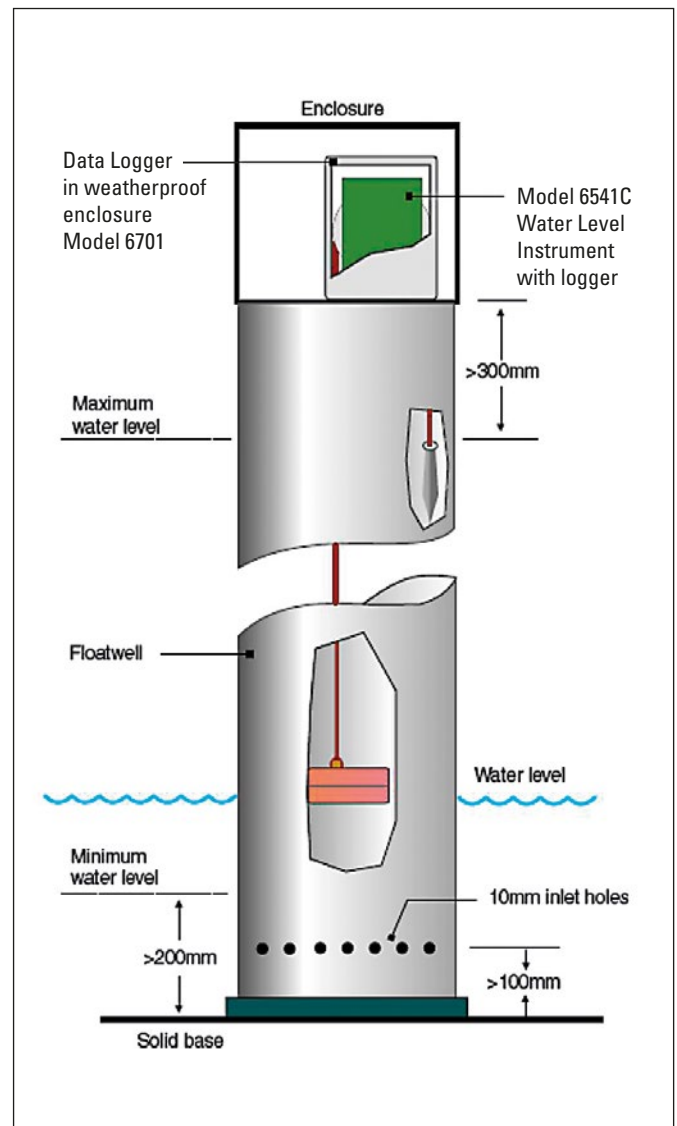
APPLICATION DETAIL

There are several different methods used to measure streams and rivers, and these methods will be summarized below. The measurement of rainfalls is often associated with river measurement stations as local rainfall is a key factor especially in hills or mountainous areas.

Regular reporting of river levels to a central server allows authorities to monitor stream and river flows across a country or region and to use that data immediately if required. For example: flood alerts / flood warnings as well as longer term analysis by hydrographers and hydrologists to manage the rivers / catchments in the long term.

The measurement methods include:

- **Method 1** - a still well or still pipe with a shaft encoder with a float and beaded float line system
- **Method 2** - a pressure sensor which is immersed into the stream or river
- **Method 3** - the more complex pressure bubbler system which allows for a small open tube to be immersed into the stream or river with a gas pump or gas cylinder to inject small bubbles into the open tube and measure water depth by measuring the back pressure required to force bubbles out of the tube in the water.
- **Method 4** - Measuring depth using Ultrasonics Doppler Instrument
- **Method 5** - Measuring depth using Radar





There are many measuring methods available, but still the most common method is shaft encoder float and wheel system.

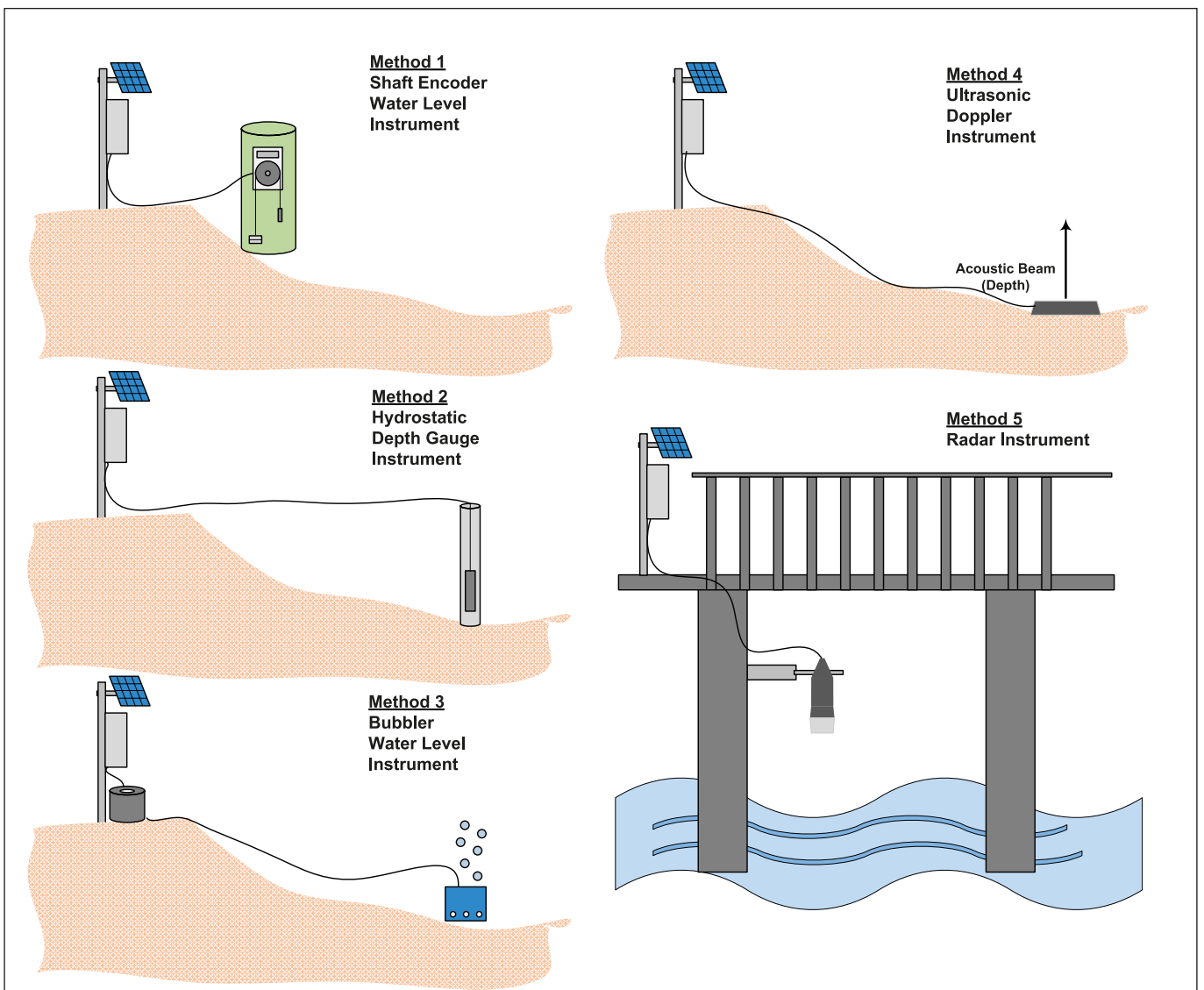
This method requires a large well or a smaller pipe to be installed on the stream, river bank or on a bridge structure, to provide a stable, not disturbed by flow or wind, measurement environment.

A small float, a float line and a counter weight system will respond to depth / level changes in stream or river. That response causes rotation of the shaft of a wheel. Shaft rotation is measured very accurately by optical encoder and the data is

simultaneously displayed and recorded in the data logger within the instrument.

The Unidata 6541 Precision Water Level Instrument is a very accurate shaft encoder instrument. 6541 integrates both an LED display for displaying water level instantaneously and a data logger for recording / storing water level readings as required.

When a Neon Remote Logger is added, the water level information can be transmitted over the internet to a central Neon server to allow authorities to view the data on the web in near real time.



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS/INPUTS

Options	Unidata Part Number	Description
Ultrasonic Doppler Instrument - velocity, depth & flow	6526J-21	Starflow Ultrasonic Doppler Instrument 0-2m
Ultrasonic Doppler Instrument - velocity, depth & flow	6526J-51	Starflow Ultrasonic Doppler Instrument 0-5m
Ultrasonic Doppler SDI-12 Instrument - velocity & depth	6527A	Starflow QSD Ultrasonic Doppler SDI-12 Instrument
Water Level Instrument	6541C-11	WLI with 500mm Pulley & Alk Batt Metric
Float	6541F-115	WLI Float Assembly - Cylinder 115mm (other options available)
Float Line	6541D-M	WLI Beaded Float line Metric

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G/4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G/4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite-Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite-Inmarsat & 3G/4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU/NRL	3004A-M000 / 3004A-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU/NRL 3G/4G	3004A-MC00 / 3004A-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU/NRL	3004A-ML00 / 3004A-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU/NRL	3004A-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU/NRL	3004A-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU/NRL	3004A-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

AVAILABLE FROM: **Unidata Pty Ltd** | 40 Ladner Street, O'Connor, 6163 Western Australia | Tel: +61 8 9331 8600 | info@unidata.com.au