



## CLAMP-ON FLOW MEASUREMENT TO KEEP HYDROELECTRIC PLANTS WITHIN ABSTRACTION LIMITS

### MEASUREMENT TASK

Hydroelectric power plants, when they are taking water from watercourses, are of course subject to maximum abstraction limits, and as they age and become less efficient, more water is required to generate a given amount of electricity. Katronic's Italian distributor Selemark were asked to look at a group of hydroplants that have been in place since the 1950's. The higher water flow that they now require to meet generation targets meant that they are running the risk of breaching their permissions. In advance of a planned refurbishment, they needed a flow measurement solution, one that could be installed without interrupting power generation.

The pipework is outdoors for its full length and runs uphill at a typical angle of 27°, and the mountainous terrain leads to an estimated ambient temperature variation of between -20 °C and +35 °C. The pipes feeding the plant are iron, 650 mm in diameter and rusted enough to give an estimated roughness on the internal surface of as much as 4 mm. The flow through the pipes is typically 1.0 m<sup>3</sup>/s, and the customer wanted as accurate a measurement of flow as possible along with a reliable alarm if flow reached the breach of abstraction limit of 1.5 m<sup>3</sup>/s.

### SOLUTION

Proof of concept tests were undertaken using a Katronic KATflow 200 portable ultrasonic flowmeter and compact K1 transducers. For the test the standard coupling gel and mounting chain supplied with the KATflow 200 were used. Katronic flowmeters feature an *Audible Sensor Positioning Assistant*, making it straightforward to accurately place the transducers on the pipe to achieve the maximum signal strength, and clear and logical, prompt-led programming makes it easy to set up each unit.

The amount of rust on the inside of the pipe, along with the predicted flow velocity of between 3.1 and 4.9 m/s was expected to create a lot of turbulence and therefore a noisy signal, but the advanced signal processing in the KATflow 200 meant that the measurement of the flow rate settled almost immediately and gave a good result. An engineer from the end user was on site too, and they were able to verify the performance of the meter by varying the flow rate by known percentages and confirming the reading.

Following the tests, the power company is expected to purchase up to 30 KATflow fixed installation flowmeters for the project, due to complete within a year.

### ADVANTAGES

- Precise measurement of approved water withdrawal quantities
- Installation and measurement without interrupting the power generation
- Verification of meter readings and pump capacities in aged power plants
- For permanent monitoring on pipelines with large nominal diameters
- *Audible Sensor Positioning Assistant* helps to find correct position of sensors
- No opening of pipelines necessary

### SPECIFICATIONS

Installation type	Portable and fixed
Medium	Water
Pipe material	Iron (Fe 42B UNI 5335-64)
Pipe diameter	650 mm (internal)
Temperature	-20 °C ... +35 °C
Flow velocity	3.1 to 4.9 m/s
Flow rate	Up to 1.5 m <sup>3</sup> /s

### APPLICATION



Reliable flow measurements in a hydropower plant ensured that the water flow remained within their abstraction limits.

### INSTRUMENT SOLUTION



A KATflow 200 proved that Katronic clamp-on flowmeters give reliable, accurate flow measurements in a potentially difficult and turbulent application.