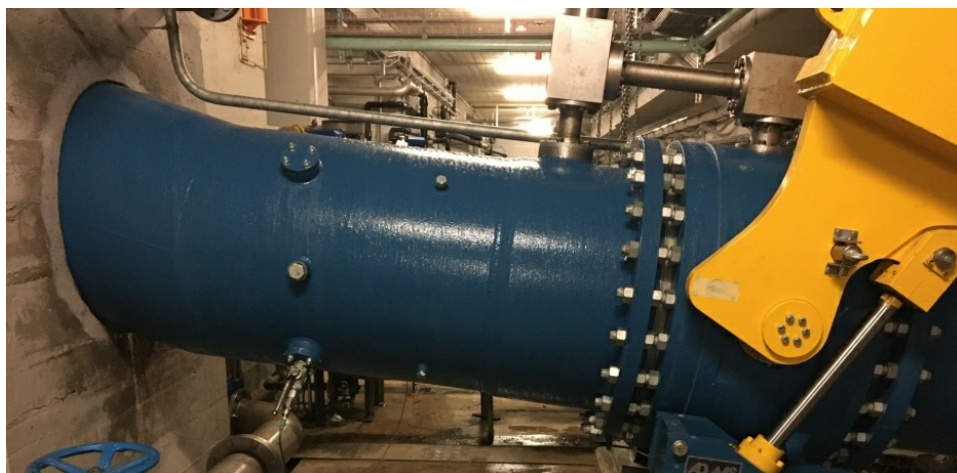


# MEASUREMENTS OF HYDRAULIC TRANSIENTS

Hydroelectric installations are subject to high levels of hydraulic stress. The water hammer and mass oscillation in the pipes must be controlled without fail in order to protect the plants. In addition to this, any extremely erratic phenomena occurring at a high frequency, such as pressure fluctuations due to the rotor-stator interaction (RSI), must be monitored in order to gauge the inherent fatigue or reduce any adverse effects (vibration, noise, etc.).

These phenomena must be recorded not only in terms of pressure (water and oil) and flow, but also through more general measurements such as the opening position of a valve, the power of the machine, the rotational speed or the acceleration of a mechanical vibration.



HYDRO Exploitation has the equipment and expertise to adapt to any kind of hydroelectric plant and carry out these measurements drawing on a wide variety of different disciplines. The methods used for taking the measurements are selected in a way that adapts to suit each respective situation. The specialists intervene not only to approve the performance of a new or refurbished installation, they also verify how a plant continues to perform over time.

## Methodology

- on-site inspection of the unit to determine which is the most appropriate method for taking the measurements
- preparation of the measurement equipment and sequencing of the schedule
- measurement on site under live operating conditions following a predefined program
- analysis of the results and recommendations for operational modifications.

## ADDITIONAL SERVICES

### Transient phenomena modelling / simulation

To ensure the safety of hydroelectric facilities, HYDRO Exploitation has developed a proactive, systematic method of identifying, assessing and managing operational risks.

### Thermodynamic efficiency measurement

The hydroelectric units must operate at maximum performance in order to ensure the plant is running at peak profitability. Measuring the thermodynamics quantifies the performance of the plant in terms of its efficiency, flow and power by recording, with the greatest accuracy possible, the heating of the flow through the turbine.

## CONTACT

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### Specific skills

The specialists at HYDRO Exploitation provide :

- highly skilled services in the areas of measurement and hydraulic machines
- high-performance measuring equipment (sampling at 100kHz, pressure sensors measuring up to 2kHz, etc.)
- sound know-how built on experience acquired over the course of numerous measurement projects on any type of installation
- significant experience in managing hydroelectric plants arming them with a comprehensive and extremely accurate view of each situation.

### Client benefits

The owner of the hydroelectric plant benefits from :

- an all-inclusive service provided by experienced specialists, of which there are not many in Switzerland
- relevant information about the ongoing performance of his plant
- informed advice for reducing pollution (vibration, noise).