measure analyse optimise

NIVUS®

Our Hydropower Solutions

Suspended Solids Measurement and Flow Metering

Measurement Systems for optimised Hydropower

Hydropower is the most important and proven renewable energy to date. The ever-increasing demand for electricity and the global warming threatening us all through the use of fossil fuels make it necessary to tap into as yet untapped potential for hydropower and also to optimise existing hydropower plants. This is what measurement technology is necessary for.

We are a partner who identifies hydraulic requirements and challenges through many years of experience. With our expertise and systems, we provide you with innovative solutions for measuring suspended solids concentration, flow and water level.

Reducing turbine wear due to suspended solids

In July 2017, a very localised heavy rain event in the catchment area of a Swiss power plant led to a drastic increase in the concentration of suspended solids in the inflow of the hydropower plant.

While the maximum discharge of 38 m³/s was about twice the development discharge of the water intake, very high suspended sediment concentrations of 110 g/l were reached.

If the water had not been discharged, 14,600 t of fine sediment would have entered the power plant system and caused massive damage to turbine components due to hydroabrasive wear. A decrease in the efficiency of the turbines and even an immediate replacement of the impellers at full load operation would have been the consequences.

Optimal suspended sediment monitoring would have detected the increase in suspended sediment concentration at an early stage and the power plant could have avoided damages amounting to 76,200 € by discharging and shutting down the turbines in time.

Since a drop in the suspended solids concentration to a value < 5 g/l would also have been detected immediately, the downtime could have been minimised to 7 hours and thus the production loss to 18,000 €.

Production loss during approx. 7 h standstill at full load (450 MWh, assumption approx. 40 €/MWh)	- 18,000 €
Avoided repair costs (6 €/t, 12,700 t avoided sediment input)	+ 76,200 €
Total	**58,000 €**

Source:
Felix D., Abgottspon A., Staubli T., von Burg M., Kasunger M., Albayrak I., Boes R. (2022): Untersuchung der Schwebstoffbelastung, der hydroabrasiven Erosion und der Wirkungsgradänderungen an beschichteten Peltonturbinen in der Hochdruckwasserkraftanlage Fieschertal, Schlussbericht
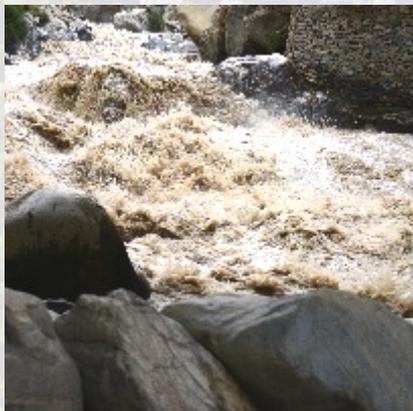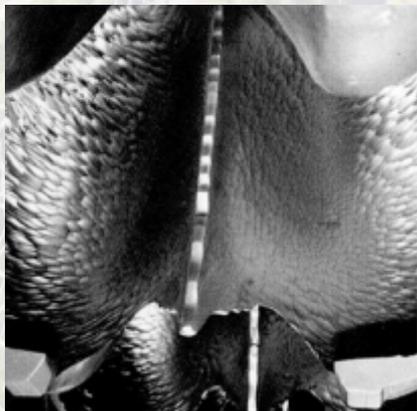
Suspended Solids Measurement

NivuParQ 850

Mineral suspended solids, which are present in the drive water of hydropower plants, cause massive hydroabrasive wear on exposed turbine components. This causes a decrease in the efficiency of the turbines and increasing operating costs due to more frequent and more extensive maintenance work. In order to minimise this damage, suspended solids monitoring is necessary, which not only records the concentration of suspended solids, but also makes statements about the size distribution of the suspended solids.

Our NivuParQ 850 detects the suspended solids concentration in five size classes. This is done by evaluating the backscatter and attenuation of ultrasonic signals. The sensor can be easily installed in open channels or pipe systems.

Reducing Turbine Wear

Areas of Application

- Minimisation of wear on the turbines through controlled discharge at very high sediment concentrations
- Sustainable sediment management and suspended solids monitoring
- Efficient turbine maintenance through continuous recording of the actual turbined sediment load resolved into 5 grain size classes
- Continuous monitoring of reservoir flushing

Benefits

- Very low operating costs, as no time-consuming sampling with laboratory analysis is required
- Very simple installation directly in the channel or in the desander
- Continuous monitoring
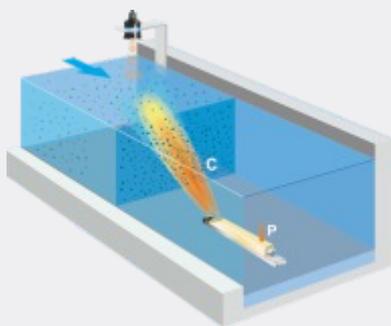
NivuParQ 850
(Particle Concentration)

Flow Measurement in full Pipes
- in the Medium or contactless
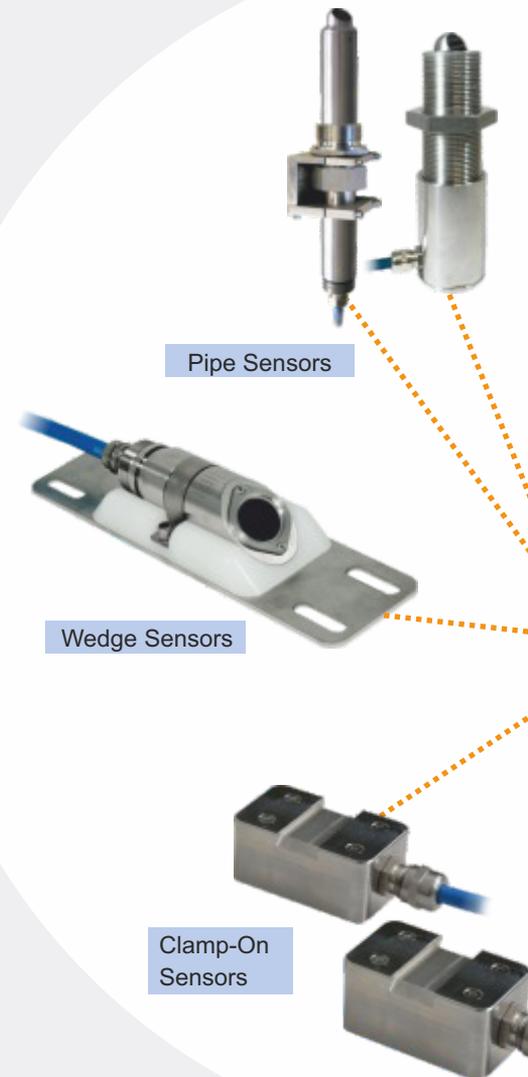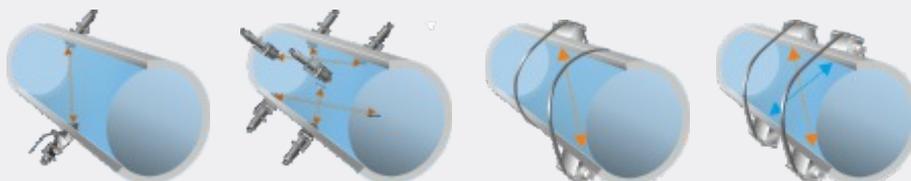
NivuFlow 600

The NivuFlow 600 measurement system was specially developed for flow measurement in full filled pipes. For the highest accuracy requirements, the system can be operated with up to 32 measurement paths and thus enables efficient water management. The sensors can be installed in the water or contactless.
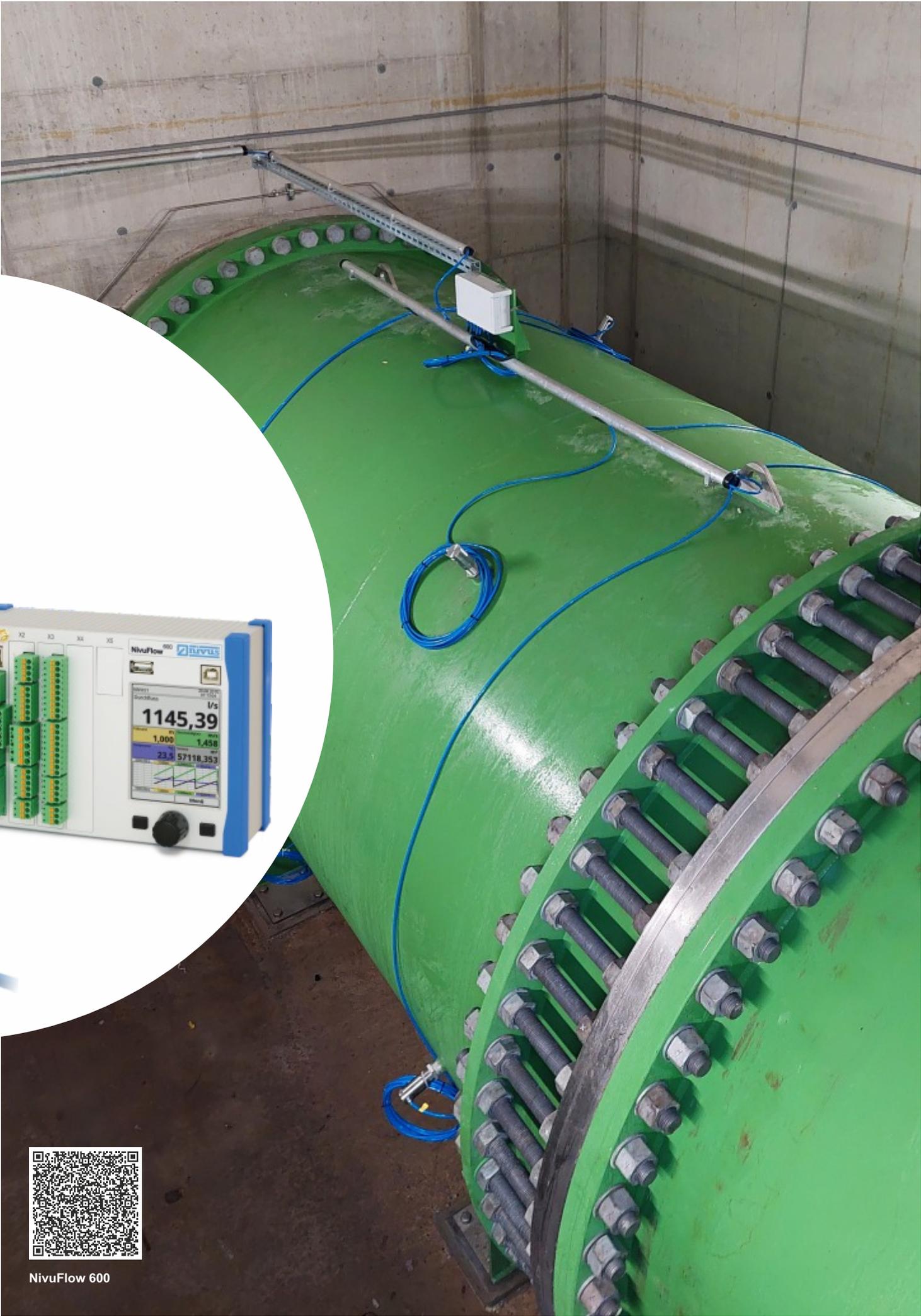
Areas of Application

- Monitoring and optimisation of turbine efficiency
- Early leakage detection to avoid pipe bursts

Benefits

- Ultrasonic transit time measurement with accuracies of bis zu 0.5 %
- Single or multi-path measurment with up to 32 paths
- Flow measurment in water with pipe sensors, wedge sensors
- Contactless with clamp-on sensors
- Easy retrofitting
- Flow measurement according to IEC 60041/SME PTC 18
- Communication via Modbus RTU/TCP
- Bidirectional flow measurement in pumped storage plants
- Parallel operation of two measure-ment points

Pipe Sensors

Wedge Sensors

Clamp-On Sensors

NivuFlow 600

Robust portable Flow Meter for long-term Monitoring of full filled Pipes

NivuFlow Mobile 600

The NivuFlow Mobile 600 was specially developed for long-term measurements where no external power supply is available on site. Flow measurements for checking and verification are possible without problems with the self-sufficient and portable measuring system, even in harsh environments. Service lives of several weeks up to several months considerably reduce the personnel expenditure for maintenance and reading out the data.
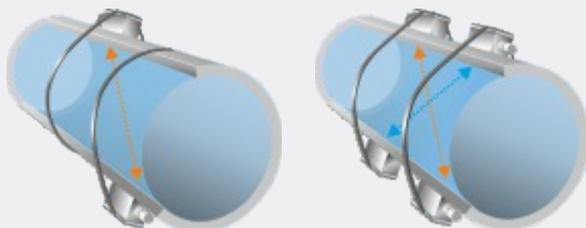
Flow Measurement without external Power Supply

Areas of Application

- Monitoring and optimisation of the efficiency of turbines
- Early leakage detection to avoid pipe bursts

Benefits

- Monitors flow rate, temperature and pressure
- Ultrasonic transit time difference measurement
- Different measurement frequencies for pipes from DN50-DN6000
- Extremely long battery life
- Easy battery change without measurement interruption
- Operation with smartphone, tablet, notebook
- For the harshest ambient conditions
- Up to 2 measurement paths

**NivuFlow
Mobile 600**

Measurement of Bed Load Height

Our 2-channel measurement system records the interface layers or bed load heights by means of ultrasonic signals. The proven measurement system does not require any readjustments and has an automatic cleaning device.

Interface Measuring Device

Radar Level Sensor

Hydrostatic
Level Sensor

Self-Sufficient
Data Logger

Ultrasonic Level Sensor

Level Measurment

In order to reliably measure the water level, we have the option of using various measurement technologies. In addition to non-contact measurement methods using ultrasound or radar technology, we also offer hydrostatic probes. Existing water level measurements can also be easily integrated.

We can provide the right measurement system for each of your measurement situations.

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