NON-CONTACT SENSOR FOR MEASURING OPEN CHANNEL FLOW

OTT Surface Velocity Radar (SVR) 100

INTRODUCTION TO OTT SVR 100

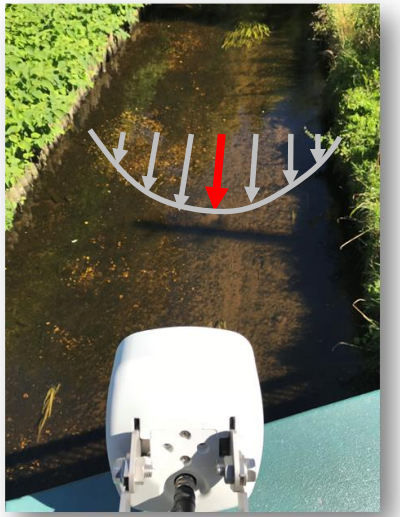
HYDROLOGY APPLICATIONS

For OTT SVR 100:

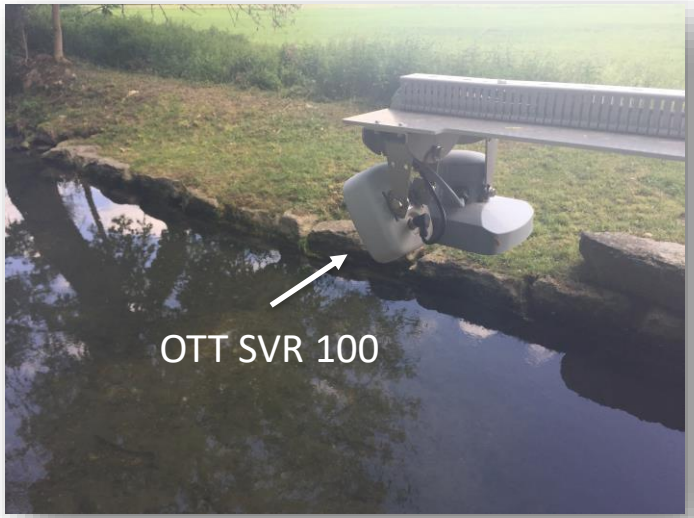
- Discharge and flow measurement in rivers and open channels
- Management of water resources and control of water management systems
- Maintenance of rating curves
- Solving hydrological tasks (flood forecast, hydrological statistics, …)
- Irrigation - monitoring inflow and outflow
- Hydropower
- Monitoring of process water

WHY MEASURE SURFACE WATER VELOCITIES?

- Velocity information essential for discharge computations and subsequent processing of hydrological tasks.
- Surface velocity measurement is a centuries-old, tried and tested measurement method in hydrometry.
- Suitable method for continuous flow monitoring in most flow situations, especially flooding with floating debris and high sediment loads.
- Will index the mean channel velocity (if site reconnaissance has been done and hydraulics on site are well defined).



BENEFITS OF OUR SOLUTION



- Simple non-contact and continuous measurement principle
- Safely mounts above the water to avoid sediments and floating debris
- Easy system integration: Connects to almost any data logger or data collection platform via SDI-12 or ModBus
- Informs when instream velocity measurements may be required
- Reduces number of field visits and total cost of ownership
- Applicable as leading indicator for shifts in existing discharge rating curves
- Meta data from integrated tilt and velocity sensor applicable for qualified data post-processing

THE TECHNOLOGY

PROVEN TECHNOLOGY

Compared to traditional measuring methods, the SVR 100 offers:

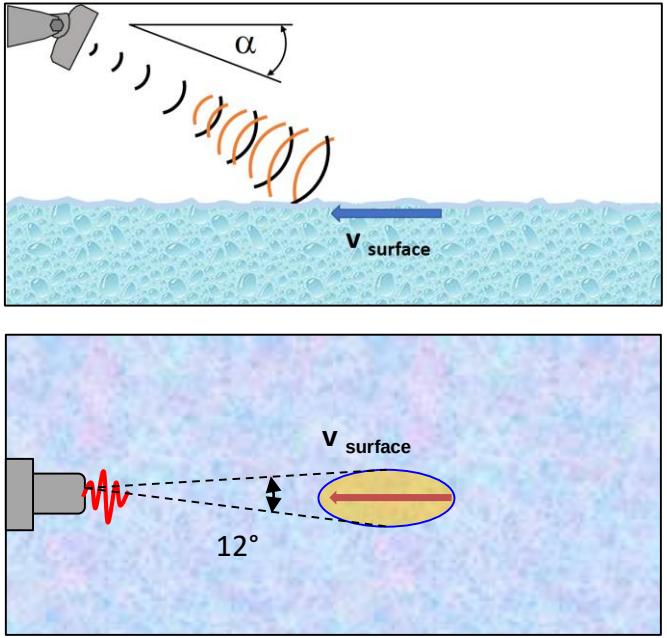
- A non-contact, cost-efficient, low-power consuming solution to get reliable surface velocity readings from flowing water 24/7
- Meta data for QA / QC (vibration, tilt, SNR)
- Customizable filter algorithms

Measurement accuracy validated by the Federal Institute of Metrology METAS in Switzerland and the Brodarski Institute in Zagreb (Croatia).

MEASURING PRINCIPLE

How does the OTT SVR 100 work?

- Oriented parallel to the main flow direction and tilted against the water surface (α = 30)
- OTT SVR 100 is transmitting and receiving electromagnetic waves
- Returning echo provides a shift in frequency respectively wavelength (Doppler – Effect)
- Water surface velocity can be derived from frequency shift



MEASUREMENT DATA

Velocity

- Instantaneous velocity
- Average velocity

Meta Data

- Tilt angle (pitch)
- QoS Signal strength (Index of signal quality)
- QoS Sensor vibration (Vibration index)
- SNR

Time	28.04.2020 15:51:28
Command sent	0M!
average flow velocity	+0.0005
current flow velocity	+0.0005
sensor tilt angle	+028
signal quality index	+000
vibration index	+000
signal to noise ratio (SNR)	+009

QA / QC

Vibration Sensor

The integrated vibration sensor detects sensor vibrations and reports a Vibration Index with each velocity measurement:

- 0 = no vibration
- 1 = little vibration
- 2 = strong vibration
- 3 = very strong vibration

This data is available via SDI-12 command.

Tilt Sensor

The integrated tilt sensor registers if the sensor orientation has changed.

- Sensor orientation has a direct influence on the measurement
- Important parameter for QA/ QC

Data is available via SDI-12 command with each measurement as inclination value in degree.

QA / QC

Measurement Data Filter

- Wind, waves or precipitation can introduce spikes or noise in the measurement data
- A moving average filter can be applied to smooth out the hydrograph of measured velocities

Direction Filter

- Prevents the radar from measuring waves heading in the wrong direction

Signal Quality / SNR

- Index indicates signal quality in a range of 0 … 3 (0 = good, 1 … 3 = bad signals ➡ readings should be discarded)
- SNR values can be used for qualified data plausibility check.

DISCHARGE COMPUTATION

From velocity to discharge

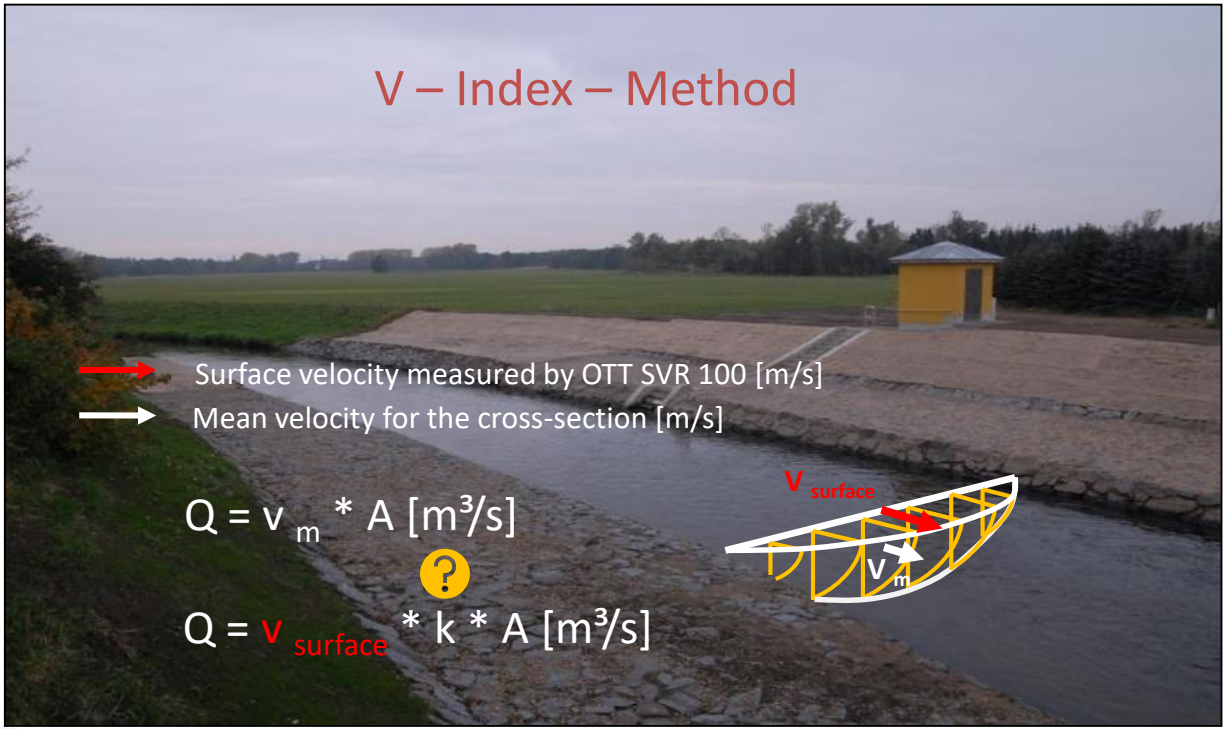
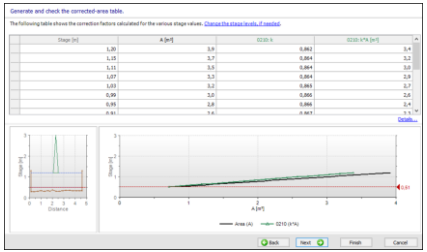


Foto: SBUL Radebeul

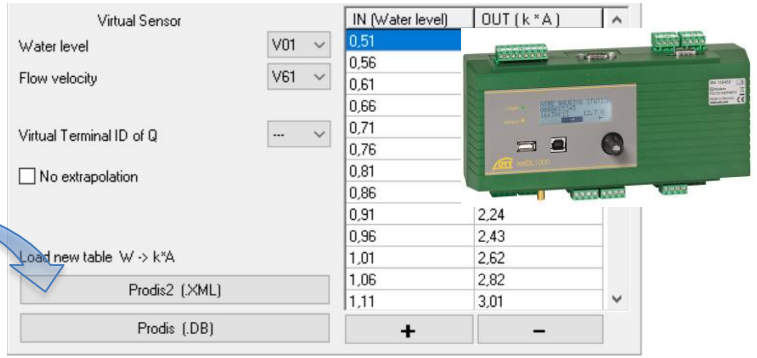
DISCHARGE COMPUTATION

Software PRODIS 2

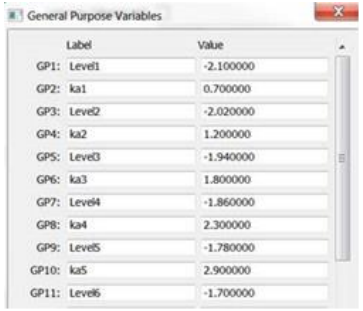
- Manages site configurations and system calibrations (k –values).
- **Computes velocity – index – ratings** based on theoretical model approach or field comparative measurements
- Provides XML output for subsequent processing in data loggers
- Generates calibration reports



Logger Implementation



Apply Python script



LEARN MORE

Contact our team today to start customizing your solution with the OTT SVR 100:

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To view the technical specs and learn more about the OTT SVR 100, other resources include:

- Data Sheet
- OTT SVR 100 Whitepaper: Surface Velocity Radar for Measuring Open Channel Flow