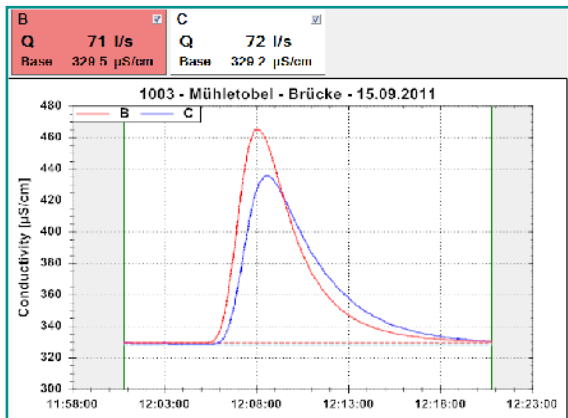


TQ-Tracer

Mobile discharge measurement with salt or fluorescent tracer



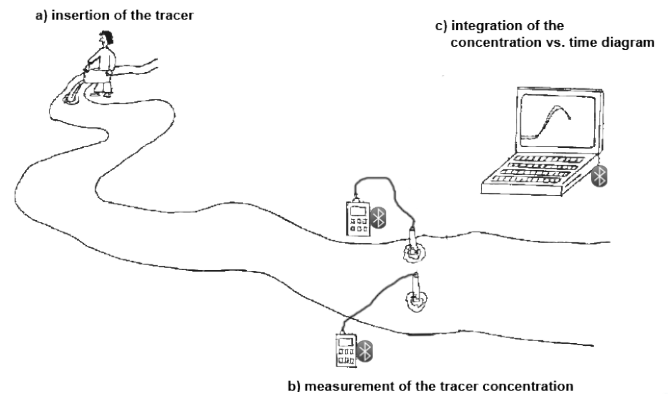
Properties and benefits

- » Simple and mobile discharge measurement
- » Discharge amount directly available
- » Bluetooth-transmission of the measurement values from sensor to receiving device
- » Receiving with notebook, PDA or smartphone
- » Online-visualization of the measurement
- » Simultaneous measurement with up to 4 sensors
- » Application with conductivity or fluorescence sensors (Fluorescein / Rhodamine)
- » Complete equipment in 2 cases
- » Independent of the cross section profile
- » Optimal application with high velocities and turbulent streams

Introduction

Measurement principle

The measuring principle is based on the tracer dilution method with instantaneous feed. Here, a known amount of tracer is introduced with a rapid pulse into the water. The tracer is transported downstream by mixed with the water and forms an elongated cloud. At a certain point downstream that cloud is recorded and out of it is calculated the discharge.



Application

The tracer dilution method is applicable for discharge measurements in all waters where complete mixing of the tracer takes place. It is especially suitable for fast-flowing, turbulent waters with complex cross-sections. High turbulence, changing cross sections and stones in the mixing route, such as in mountain streams, promote the mixing and therefore have a positive effect on the measurement. There are no informations regarding the cross-section of the water needed.

Implementation

A measurement can be carried out in a short time by a single person. The data transmission via Bluetooth from the receiving device to a notebook or smartphone can be operated in a safe and comfortable place during the measurement. The measurement curves are displayed online and the discharge is calculated continuously. Calibration of the sensors can be easily carried out on site.

Salt and fluorescent sensors

Conductivity sensors

As tracer is common salt or road salt (NaCl) used which can be simply and uncomplicatedly entered into the waters.

The used conductivity sensors have an internal temperature compensation and are linearized according to EN27888 for natural water.



| | |
|---------------------------------|--|
| Tracer type | Conductivity sensor |
| Application | Discharges up to 10 m³/s |
| Typical tracer insertion | approx. 5 kg per m³/s |
| Positive | <ul style="list-style-type: none"> • Easy to use • Cost-saving • Ease procurement of tracer |

Fluorescence sensors

The advantage of using fluorescence sensors is the low minimum concentration for detection. Therefore, only very few tracer is added to the water and measurements of large discharge amounts are possible.

By default, the measurement units for fluorescence measurements are equipped with Uranine sensors. Optionally are used other optical sensors like Rhodamine sensors.



| | |
|---------------------------------|--|
| Tracer type | optical Fluorescence sensor |
| Application | All discharges |
| Typical tracer insertion | approx. 0.5 g per m³/s |
| Positive | <ul style="list-style-type: none"> • Low tracer amount • Low due to stress • High detection limit |

TQ-Tracer hardware

Measuring unit

A measure unit consists of the following components:

- Conductivity or fluorescence sensor
- TQ-Amp (acquisition device with Bluetooth)
- Handy cable winder



TQ-Amp ground conductivity probe

Bluetooth transfer

The measured values are transmitted via Bluetooth and received with the program TQ Commander on a laptop, PDA or smartphone. On loss of the connection it will be automatically restored and the missing values are transmitted.

Up to 4 sensors

Measurements can be performed simultaneously with up to four sensors. This allows a quick plausibility check of the measurement on site.

Accessories

The complete accessories such as measuring unit, charger and calibration equipment is stored in one case and can be transported easily.



Included equipment case

TQ-Commander software

The included program TQ-Commander guides the user in a comfortable way through the entire measurement including the calibration process.

Connection

The sensors are connected simply by pressing a button. No settings regarding the Bluetooth connection are necessary.

Online-visualization

The measurement curves can be followed on screen. Therefore are statements regarding to the quality of the measurement during the measurement possible.

Calibration

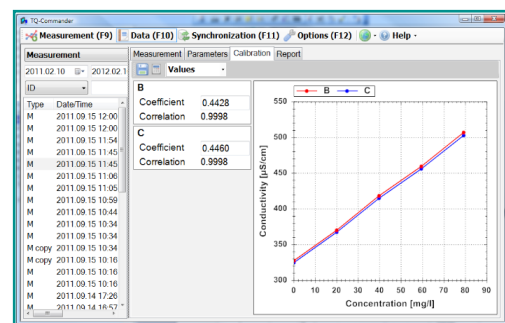
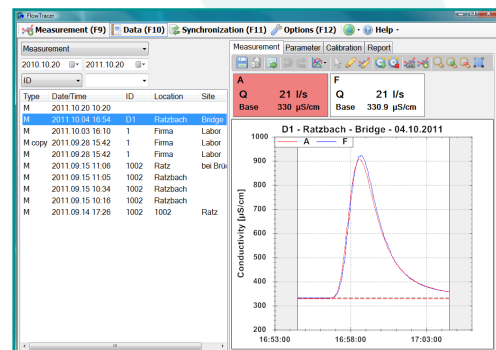
The software supports the calibration of the sensors on each water. All calibration accessories are included in the TQ system.

Finishing, protocols and data output

The measurement results can be edited later. Also reports can be created. The data output is as a CSV file or in an XML format for import with Biber.

Software-Versions

- PC-Version for Windows
- Mobile Version for smartphones or PDA with Windows Mobile 5 - 6.5



Technical Data

| | Conductivity | Fluorescence |
|--|---|---|
| General | | |
| Measurement principle | Tracer dilution method with slug injection | |
| Application | Discharges up to 10 m³/s | All Discharges |
| Sensors | | |
| Measurement range | 0 ... 5000 µS/cm | Fluorescein / Rhodamine: 0 µg/l ... 50 µg/l (ppb) |
| Resolution | 0.1 µS/cm | 0.05 µg/l (ppb) |
| Working temperature | -20°C ... +60 °C | 0°C ... +50 °C |
| Other properties | <ul style="list-style-type: none"> • Integrated temperature compensation • Measurement linearization according to: EN 27888:1993 for natural water | |
| TQ-Amp (Measurement device with Bluetooth-transmission) | | |
| Memory capacity | None (data storage in the receiving device) | |
| Transmission interval | 1 s | |
| Data transfer | Bluetooth class 1 (transmission range up to 100 m) | |
| Working temperature | -20 °C ... +60 °C | |
| Energy supply | 3 x 1.5 V batteries size AA or 3 x 1.5 V 2500 mAh NiHM accumulators size AA | |
| Operation time with 3 x 2500 mAh Akkus | 50 h | 25 h |
| Charging time | about 10 h | |
| Included accessories | | |
| Pipette | 500 µl pipette | |
| Jars | <ul style="list-style-type: none"> • Flask for calibration solution • Measuring cup 600 ml • Volumetric flask 250 ml • Measuring cup 500 ml | <ul style="list-style-type: none"> • Flask for calibration solution • Stainless steel measuring cup 750 ml • Volumetric flask 500 ml • Measuring cup 500 ml |
| Other | <ul style="list-style-type: none"> • USB memory stick (documentation + software) • USB Bluetooth adapter • Recharger | |
| | | <ul style="list-style-type: none"> • Protection- and weighting pipes |
| TQ-Commander (Software) | | |
| PC-Version | Windows XP, Windows Vista or Windows 7 | |
| Mobile-Version | Smartphone and PDA with Windows Mobile 5 - 6.5 | |