

# TQ-Tracer

Mobile system to measure the discharge with salt tracer (TQ-S) or fluorescence tracer (TQ-F)



## Features and Benefits

- ✓ Easy and mobile measuring of discharge
- ✓ Reliable results independent of information about the cross section profile
- ✓ Ideal application at high velocities and turbulent streams and rivers difficult to access
- ✓ Ecologically compatible and harmless to the water
- ✓ Realtime visualisation of measurement results and amount of discharge
- ✓ Comfortable transmission of measurement values from sensor to receiving unit via bluetooth
- ✓ Simultaneous measurements with up to four probes for an instant plausibility check
- ✓ Device usable with conductivity or fluorescence probes (e.g. for fluorescein, rhodamine and others)
- ✓ Comfortable and compact: whole equipment securely packed into tool cases

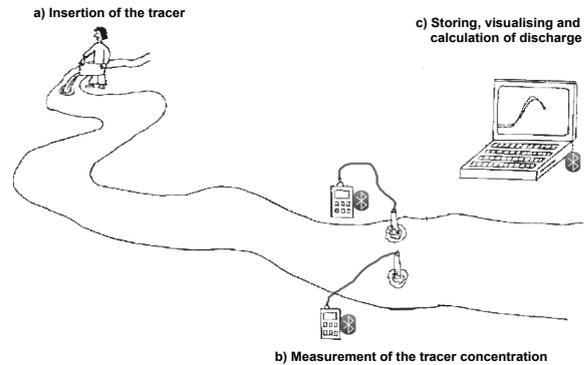
# Introduction

## Measurement Principle

The measurement principle is based on the **tracer dilution method with instantaneous feed**. A known amount of tracer material is added to the water in a rapid pulse. The tracer is taken downstream, mixes with the water and forms an elongated cloud. At a certain point downstream the measuring devices record the tracer concentration with which the discharge can be calculated. No further information about the cross section profile of the body of water is needed for this calculation.

## Application

The tracer dilution method is applicable for discharge measurements in all waters where a complete mixing of the tracer takes place. It is especially suitable for fast-flowing, turbulent waters with complex cross-sections. High turbulences, changing cross sections and rocks on the mixing path, as for example in mountain streams, foster the mixing and therefore have a positive effect on the measurement.



## How the Measurement Works

A single person can do a measurement in a short time. The **data transmission via Bluetooth** from the receiving device to the notebook allows to remain at a safe and comfortable place. The measurement curves are displayed in realtime and the device calculates continuously the given discharge. First, the probes have to be calibrated at the site. Simultaneously measurements with up to four probes are possible what provides an immediate plausibility check.

## Software:TQ-Commander

The software TQ-Commander guides the user comfortably through the entire measuring sequence including the calibration of the probes.

**Connection:** After pressing the start button the device connects itself via the Bluetooth interface. No further settings are necessary.

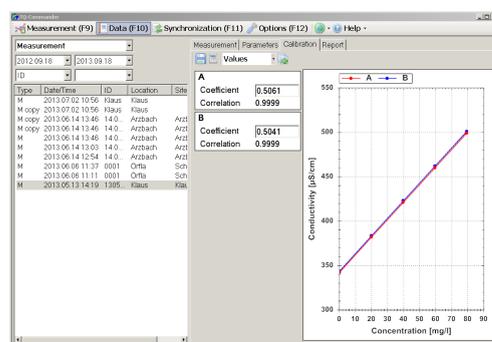
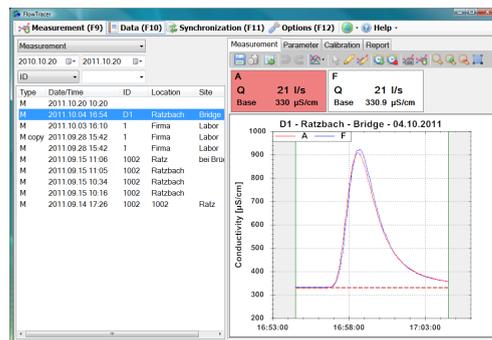
**Realtime visualisation:** The measurement curves are displayed on the screen in realtime. Therefore the quality of the results can be evaluated already during the measurement itself.

**Calibration:** The software supports the calibration of the probes to the actual water. All the calibration tools are included safely in the TQ-system as accessories.

**Postprocessing, protocols and data output:** The TQ-Commander helps to postprocess measurement results and to edit reports. The data is outputted in the file formats CSV or XML to be imported in individual user programs.

### Software-Versions:

PC-version for Microsoft Windows



## Salt Tracer TQ-S

Salt (NaCl), which can be easily injected and dissolved in water, is used as tracer material. \*)

The probe to be used is a conductivity probe. It has an internal temperature compensation and is linearised according to the norm EN27888 for natural water.

For use in very turbulent rivers and at high flow velocities the probes of the TQ-S can be equipped with a protective and heavy armour.

Probe type	Conductivity probe
Application	Discharges up to 10 m <sup>3</sup> /s
Typical tracer insertion	approx. 5 kg per m <sup>3</sup> /s
Advantages	<ul style="list-style-type: none"> <li>- Easy handling</li> <li>- Little investment costs</li> <li>- Easy procurement of salt as tracer</li> </ul>

*TQ-Amp with handy cable-spool and probe*



*Conductivity probe of the TQ-S*

## Fluorescence Tracer TQ-F

A main advantage of using fluorescence tracers is the small minimum concentration required for detection. Therefore, only a very small amount of tracer material needs to be added to the water and yet measuring of considerable volumes of discharge is possible. \*) The TQ-F (contrary to salt tracers) can be applied for **measuring sewage**, too.

By default the tracer units for fluorescence measurements are equipped with Fluorescein probes. However, upon request alternative optical sensors, e.g. for Rhodamine, are also available.

For increased stability and secure application the probes of the TQ-F are equipped with a protective and heavy armour.

Probe type	Optical fluorescence probe
Application	All discharge volumes
Typical tracer insertion	approx. 0.5 g per m <sup>3</sup> /s
Advantages	<ul style="list-style-type: none"> <li>- Little amount of tracer needed</li> <li>- High detection limit</li> <li>- Measuring sewage is possible</li> </ul>

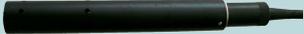
*TQ-Amp with handy cable-spool and probe*



*Fluorescence probe of the TQ-F*

\*) Inserting substances in the water might eventually require a permission by local authorities.

## Technical Data

	Tracer System TQ-S	Tracer System TQ-F
		
<b>General</b>		
Measurement principle	Tracer dilution method with instantaneous feed	
Application	Discharges up to 10 m <sup>3</sup> /s	All discharge volumes
<b>TQ-Amp (Measurement device with Bluetooth-transmission)</b>		
Memory capacity	None (data storage in the receiving device)	
Transmission interval	1 second	
Data transfer	Bluetooth class 1 (transmission range up to 100 m)	
Working temperature	-20 ... +60 °C	
Protection	IP66	
Energy supply	3x 1.5 V batteries, size AA or 3x 1.5 V, 2500 mAh NiMH battery, size AA	
Operation time (with 3x 2500 mAh battery)	50 hrs	25 hrs
Charging time	approx. 10 hrs	
<b>Probes</b>		
Probe type	Conductivity probe	Fluorescence probe
Measurement range	0 ... 5000 µS/cm	Fluorescein/Rhodamine: 0 ... 50 µg/l (ppb)
Resolution	0.1 µS/cm	0.05 µg/l (ppb)
Working temperature	-20 ... +60 °C	0 ... +50 °C
Other features	<ul style="list-style-type: none"> <li>- Integrated temperature compensation</li> <li>- Measurement linearization acc. to: EN 27888:1993 for natural water</li> </ul>	Further types of probes for different tracer substances available upon request.
<b>Accessories included</b>		
Pipette	500 µl pipette	
Jars	<ul style="list-style-type: none"> <li>- Bottle for calibration solution</li> <li>- Measuring cup 600 ml</li> <li>- Measuring cup 500 ml</li> <li>- Volumetric flask 250 ml</li> </ul>	<ul style="list-style-type: none"> <li>- Bottle for calibration solution</li> <li>- Measuring cup 750ml, stainless steel</li> <li>- Measuring cup 500 ml</li> <li>- Volumetric flask 500 ml</li> </ul>
Others	<ul style="list-style-type: none"> <li>- USB memory stick (documentation + software)</li> <li>- USB Bluetooth adapter</li> <li>- Recharger</li> </ul>	
		Protection- and weighting armour
<b>TQ-Commander (Software)</b>		
PC-Version	Windows XP, Windows Vista or Windows 8 / 8.1	