

OTT measurement systems

- Reliable measurement technology
- Expert planning
- Professional installation
- Comprehensive service

OTT flow measurement Stationary measurement systems





OTT Sonicflow

Flow measurement using the travel time principle

Characteristics/Advantages

- _ Technology tested worldwide
- _ Modular system construction
- _ Reliable measurements from only 16 cm water depth
- _ Integrated protection against lightning
- _ Can also be used with transverse flows
- _ For medium and large flowing waterways (stream width up to 200 m)



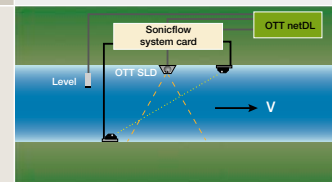
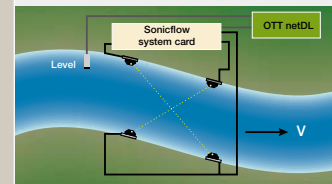
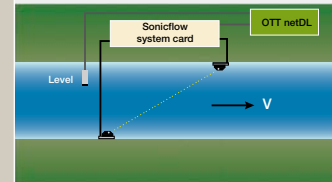
OTT Sonicflow is a system for continuous measurement of flow speeds using the travel time principle. In use for several years, it has proven itself in numerous countries throughout the world.

Two acoustic transducers diagonally opposite each other transmit ultrasound signals at the same time into the water, which are then received on the respective opposite side. Impulses transmitted against the flow need more time as those that travel in the same direction as the flow. This delay time is measured. It is proportional to the average flow speed in the measuring path.

A station manager connected, e.g. OTT netDL, calculates the flow based on the values determined and the current water level.

Thanks to modern ultrasound technology and robust construction, the OTT Sonicflow provides reliable data even with low water depths or contaminated transducers.

The right solution for every situation



With the OTT Sonicflow, a maximum of 8 measuring paths can be realized. Depending on the number and arrangement of the measuring paths, different configuration possibilities arise.

Single path system

If the main flow is parallel to the edge, a simple configuration is possible (e.g. canals; complete, straight waterway sections).

Cross path system

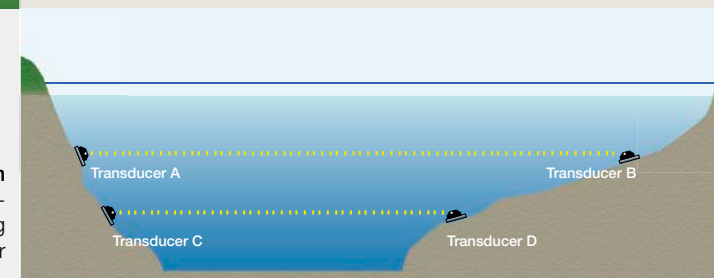
Even at difficult locations, where the main direction of flow is not parallel to the edge, the OTT Sonicflow provides reliable measurements (e.g. natural meandering waterways; measurement beams below bends in a river).

Hybrid system

In addition to OTT Sonicflow, the OTT SLD unit is used. Redundant flow measurements based on different physical methods (travel time and Doppler) provide reliable measured data even during events that result in higher levels of suspended matter such as flooding.

Multi-level system

Ideal for measurement cross-sections with heavily varying water level or flooding (e.g. for divided stations with flood plains).



Technical Data

Measuring range	-10 m/s ... +10 m/s
Accuracy	1 % of measured value ±2 mm/sec
Frequency	250 kHz
Bandwidth	50 %
Waterway width	5 to 200 m
Path length	14 to 300 m*
Supply voltage	9 ... 15 V DC, typically 12 V DC
Current consumption	300 mA (active); 0.1 mA (stand-by)
Ambient temperature	-10 °C ... +60 °C

*Depending on the conditions at the measuring site



Control cabinet with station manager for automatic flow calculation



OTT SLD

Flow measurement using the acoustic Doppler principle

Characteristics/Advantages

- _ Inexpensive installation
- _ Optimized electrical consumption
- _ Flexible discharge calculation, within the unit or in the datalogger
- _ Easy integration in process control systems through Modbus interface
- _ Suitable for waterways with a high level of floating matter
- _ For small and medium flowing waterways



The OTT SLD is used for continuous measurement of flow velocity and water level (optional). It uses the acoustic Doppler principle to measure the flow velocity.

The unit may easily be installed, since the sensor is placed on one water's edge only. From there it transmits an acoustic pulse into the waterway. The echo signals caused by the floating material and other water particles return to the transducers with a frequency shift. This is proportional to the flow speed in the measured volumes being considered.

Ingeniously designed, the OTT SLD not only supplies reliable measured values, but also works in a particularly energy-efficient way. It is thus also easily used at self-sufficient measuring stations.

Persuasive complete concept



Integrated water level measurement (optional)

In addition to the flow speed, the OTT SLD can also measure the water level. For this it uses a vertical ultrasonic transducer. Using the travel time of a sound impulse from transducer to water surface and back, a patented algorithm determines the distance between sensor and water surface.

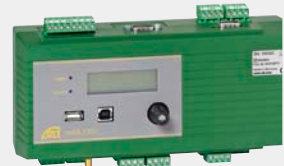
Complete discharge measurement system

The discharge may be calculated either internally on the unit itself or externally using a datalogger that is connected to the unit (e.g. OTT netDL). Flexible interfaces such as SDI-12 or Modbus help to incorporate the system into an existing measurement system or into a supervisory process control system.

The measurement system is perfectly suited for waterways with a high level of floating material and also works reliably in critical flooding cases.

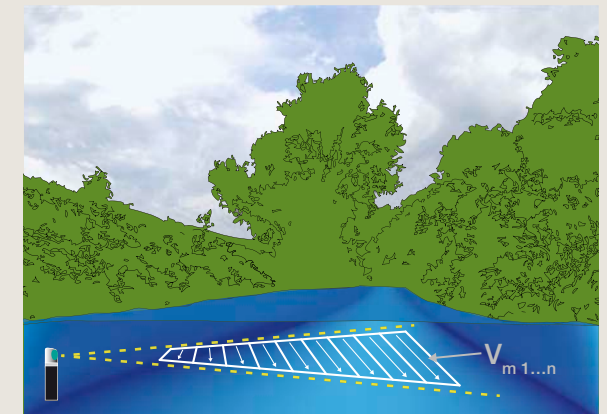
Technical Data

Flow velocity	
Measuring range	- 10 m/s ... + 10 m/s
Accuracy	1% of measured value ±0.5 cm/sec
Frequency/range	0.6 MHz / 80 m
	1.0 MHz / 25 m
	2.0 MHz / 10 m
Number of measuring cells	9
Water level	
Measuring range	0.15 m ... 10 m
Accuracy	± 3 mm, dependent on the stratification
Supply voltage	12 ... 16 V DC, typically 12 V DC
Power consumption	50 ... 500 mW
Operating temperature	-5°C ... +35°C



OTT netDL for efficient station management

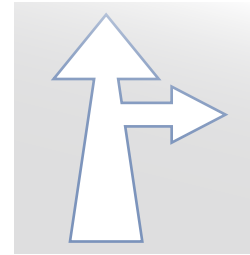
Division of the measurement area into individual measuring cells





Precision work

Secure installation



Project planning

Evaluation and planning

Characteristics/Advantages

- _ Adapted to the respective system in an optimum way
- _ Rugged stainless steel design
- _ Perfect protection against flotsam
- _ Simplified and secure installation
- _ Easily accessible sensors, no divers required
- _ Less maintenance effort
- _ Also suited for multi-level or hybrid systems



Securely installed, perfectly protected, and easy to maintain

Upon request, both measurement systems – OTT Sonicflow and OTT SLD – are available with convenient stainless steel wall brackets that are particularly designed for the respective system.

The compact and robust brackets allow for quick and secure installation on natural or fortified bank slopes. They feature low flow resistance and protect the sensors against damage caused by flotsam.

For stations in locations with higher water levels, a C rail with slide provides convenient maintenance, since the sensor that is mounted to a base plate or bracket may be pulled out of the water along the C rail like a slide. Regular maintenance operations such as cleaning the sensors can be performed requiring significantly less effort and no divers.

Concentrated expert knowledge



Evaluation of the location

Is the location under consideration for a flow measurement device at all suitable? This can be evaluated best with a joint visit to the station. Here the professional knowledge of the hydrologist on location join together with our years of experience in hydrological measurement technology.

The basis for a qualified consultation is the OTT questionnaire. It collects all the information relevant for the station. Complete and appropriate – a useful tool for finding the suitable length of waterway and location with the best hydraulic properties.

Information on the waterway hydraulics

▶ Waterway course	straight	<input type="checkbox"/>
	sharp bends	<input type="checkbox"/>
	meandering	<input type="checkbox"/>
▶ Velocity distribution	regular	<input type="checkbox"/>
	in measurement cross-section irregular	<input type="checkbox"/>
▶ Influenced by vegetation	in measurement cross-section vegetation on edge area	<input type="checkbox"/>
	in measurement cross-section vegetation on bed	<input type="checkbox"/>
...	...	

Technical Data

OTT Sonicflow:

Wall bracket material	stainless steel
Design	
Low water levels	support structure
Higher water levels	C rail mount
Installation	vertically or inclined

OTT SLD:

Wall bracket material	stainless steel
Design	C rail mount
Installation	vertically or inclined

Details on request



Support structure for OTT Sonicflow

System planning

Careful planning of the measurement system is essential and has a decisive influence on the later measurement quality.

Our qualified sales and service personnel are available for consultation for all planning steps. Whether project plan or detailed planning – with us you have the right partner. You can also have professional support for concrete work, such as:

- _ Planning the measurement system with connections for energy supply and communication
- _ Production of detailed drawings for installation location and type of installation
- _ Production of a cost estimate



Planning work – done professionally



Installation

Carry out on-site work

Starting up

Here's to a good start!

Problem-free and experienced

Professional project management

So that the individual steps for installing a measurement system run smoothly and are linked well, professional project management is of untold value.

Our HydroService team offers turnkey solutions in cooperation with qualified sub-contractors. You do not have to worry about the often time-consuming coordination of the individual tasks – you can confidently leave it to the professionals at OTT. With us you can rely on the swift implementation and high quality of all contract work!

Milestones in the installation process

- _ Secure and proper installation of the sensors on the edge
- _ Laying of all cables required in protective piping and cable trenches (data cables, energy supply, communication)
- _ Connecting the cables with sensors and electronics
- _ Connection of energy supply and data transmission paths
- _ Integrating the sensors into the local height system



Possibility for testing

Test period

As soon as the measurement system has been installed, the test period begins. It is an important part of the initial process and provides the opportunity to put the system through its paces. The following actions, for example, are now on the program:

- _ Ensure functionality of all system components
- _ Check plausibility of all measured data
- _ Carry out initial calibration of the measurement system



Something special needs specialists

Acoustic sensors must be securely fastened under the water and accurately aligned. For this, OTT works with professional, specially trained divers. Using suitable special tools for underwater work, they install the sensors solidly, professionally, and permanently.

Divers also clear the waterway bed along the acoustic paths of obstructions so that the ultrasonic signals can spread without hindrance. This guarantees you reliable operation of the sensor system.



Specialists for every area

Official initial start

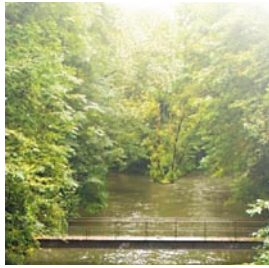
After a suitable test period of at least 14 days, the acceptance test follows and the measurement system can then finally go into operation. On this date, the employees from OTT hand over all documentation important for the system (as-built plans, cabling plans, operating instructions, calibration report, etc.).

Well-trained personnel

Naturally we will familiarize your personnel thoroughly with the operation of the systems and devices. This also includes an introduction to the functions and operation of the calibration software OTT Prodis 2. For knowledge produces security.



In-depth introduction and training



OTT Prodis 2

Calibration software for optimizing the flow calculation

Characteristics/Advantages

- _ Continuous optimization of the flow calculation
- _ Administration of all important parameters for the station
- _ Guaranteed long-term, high accuracy
- _ Step-by-step user guidance
- _ Special knowledge not necessary



Flow calculation

Continuous flow measurement systems are indirect measurement systems. Using locally measured velocities, the average cross-section velocity is calculated using a correction factor (K value). This is multiplied by the cross-sectional area being flowed through to give the flow.

Optimized K values with OTT Prodis 2

K values are a function of the measured local velocity and the water level. This function is administered in a table, either within the datalogger, e.g. OTT netDL or within the unit, e.g. in case of the OTT SLD with built-in discharge measurement.

OTT Prodis 2 provides the appropriate values for this. But that is not all – with the OTT Prodis 2 it is possible to continuously improve the K values and to adapt them to the hydraulic features of the respective station. This naturally has a positive effect on the flow calculation, which becomes more precise the more concrete the K value is.

Extensive functions, intuitive user interface



Practice-oriented

OTT Prodis 2 takes account of the hydraulic conditions on location and as a result makes professional system calibration possible. This is because the program uses the measurement results of historic and current multiple point measurements for the K value calculation. The refined K values enter into the flow calculation after exporting to the K value table of the station manager. This guarantees long-term optimized, precise flow values.

In addition, the OTT Prodis 2 also administers the cross-sectional geometry and supports the user in organizing further system-relevant parameters, which describe the measuring system used and the station.

Previous knowledge not necessary

The software is also very easy to use. It leads the user step by step in a self-explanatory way from setting up the station to exporting the K value table. At the end of each calibration, a calibration report is produced, which lists not only data on the measurement system but also calibration data.

K value determination as required

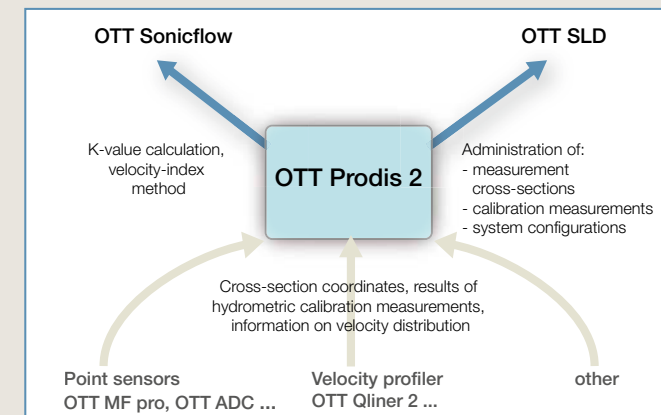
Depending on the data situation, you select the appropriate method for the K value calculation:

- _ Velocity-index method – uses sensor data and hydrometric calibration measurements carried out independently (meters, OTT ADC, OTT Qliner 2, OTT MF pro, etc.)
- _ Model calibration – uses a theoretical approach for deriving the vertical and horizontal velocity distribution in the measurement cross-section
- _ Hydrometric calibration taking account of the actual velocity distribution – uses multiple point measurements using the verticals process as its basis
- _ External calculation using hydronumeric models (2D and 3D)



Convenient administration of the station from a PC with the OTT Prodis 2

OTT Prodis 2 in the overall concept of flow measurement





Maintenance and service

Flexible maintenance contracts for tailored service

Noticeably better

A flow measurement system only works reliably in the long term if it is serviced regularly and professionally. Therefore, we offer modular service contracts that are exactly tailored to your requirements. They ensure the best possible availability in the long term of verified measurement data with a calculable maintenance cost.

Maintenance and inspection module

We check your measurement system regularly with remote diagnosis and on location. This guarantees you the highest possible security against failure and loss of data with noticeably improved accuracy and reliability of the flows determined.

The components of the Maintenance and inspection module:

- ✓ Concentrated maintenance cycles, especially in the first year after the initial start – regular checking and optimization of the measurement accuracy and of the complete system is a must for all flow measurement processes with local velocity measurement.
- ✓ Functional check of all system components incl. communication, energy supply and cable connections
- ✓ Checking the attachment and adjustment of sensors
- ✓ Regular checks of measurement cross-sections – important, as the cross-sectional area is fed proportionally into the flow calculation.
- ✓ Hydrometric calibration measurements in differing flow conditions – secures the quality of the calibration function over the whole measurement range.
- ✓ Immediate incorporation of the measurement results into the calibration of the measurement system with Prodis 2 – updates your calibration continuously. Changes are documented historically.
- ✓ Cleaning of all system components (flow velocity and water level sensors)
- ✓ Software updates and software maintenance
- ✓ Situation analysis and cost optimization



Inspection of the systems on location

Always well provided for

Repair module

If your system fails to work at any time, we are available so that your measurement operation can be resumed as soon as possible.

The components of the Repair module:

- ✓ On location diagnosis within a specified period
- ✓ Repair work, incl. coordination of the services of sub-contractors
- ✓ Providing loan devices for the time of the repair
- ✓ Calibration of devices as required
- ✓ Acceptance report
- ✓ Hot-line service



The OTT HydroService team is always there for you!

Data service module

We make exactly the data available that you really need – and you only pay for that. You determine the form it is made available in.

The components of the Data service module:

- ✓ Data recall and data validation
- ✓ Prompt availability of the data in the local network or using the OTT netView web application
- ✓ Making data available on the Internet



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