

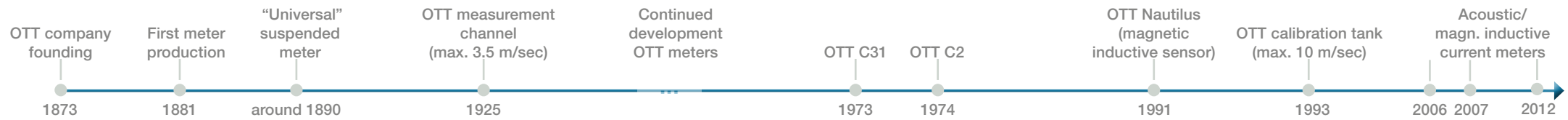
OTT measurement systems

- Reliable measurement technology
- Well-thought-out solutions
- Proven procedures
- Precise data

OTT flow measurement Mobile measurement systems



Mobile flow measurement



Mobile flow measurement

The mobile flow measurement counts as one of the oldest routine work relating to waterways.

Since the invention of the mechanical meter in 1790, flows have been determined according to the traditional verticals procedure. This procedure is an indirect measurement procedure, where both the average flow velocity at specified verticals is recorded as well as the flow cross-section. Using the measurement values, at the end of a measurement the flow can be calculated using a mathematical model.

Characteristics / Advantages

- _ Compact, functional design
- _ Safety clutch
- _ Optimized cable guide
- _ Secure holding of the load with the automatic mechanical brake or spring-applied brake
- _ Flexible drive type
- _ For mobile suspended meter measurements

OTT single-drum winches

Mobile measurement with suspended meters

With flow measurements with suspended meters, the measurement equipment hangs on a steel cable and is brought into the relevant measuring position using an electrical or mechanical winch.

If the measurement cross-section is in the area of a bridge, or if a survey vessel is available, mobile measurement is possible. For this, the suspended meter is brought into position at the required measurement point using a single-drum winch with a fixed mounting on a boom.

Compact, reliable and easy to operate

OTT offers both mechanical and electrical single-drum winches that are designed for loads between 25 and 100 kg. The winches are light and safe to operate. They ensure secure holding of the suspended meter and are protected against overload, so that even if the meter is caught by flotsam, for example, it does not represent a problem. The lowering depth can be comfortably read from the built-in depth counter.



Verticals procedure

The verticals procedure, an internationally recognized standard, is comprehensively documented in various rules and standards such as in the ISO standard 748.

In practice, with this method current meters are used that enable the measurement of the flow velocity at individual points or the recording of a complete velocity profile at the verticals.

All OTT current meters are conceived for flow measurement using the classic verticals procedure. From the smallest meter to a sophisticated measurement system – reliable data and the appropriate application in practice are in the foreground at OTT.

Flexible drive possibilities

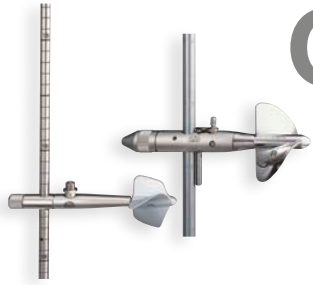
Mechanical winches can be easily upgraded to electrical drive. Electrical winches can be used even if there is a power failure, as they can easily be changed to manual operation.

Cable way on request

For stations without a bridge or survey vessel, on request we also offer a stationary cable way that is TÜV tested and fulfills all safety requirements. To move the suspended meter horizontally and vertically, our cable ways are equipped in each case with a double-drum winch, which can be driven mechanically or electrically and has a distance or depth counter.



Bridge boom with OTT single-drum winch



OTT C2 and C31

Classic flow measurement with proven meters

Characteristics/Advantages

OTT C2

- _ Exact measurement of the flow velocity from as low as 0.025 m/s
- _ For the most shallow water from 4 cm
- _ Robust and indestructible
- _ Compact and easy to transport



Tradition for over a hundred years

The classic among the current meters is the OTT meter. Proven thousands of times, it is in operation worldwide as the standard measurement device.

With OTT meters, the point flow velocity is determined using the number of propeller rotations at a measure point. Careful and individual calibration of the devices in our calibration tank in Kempten guarantees long-term, reliable measurement results.

Even under extreme conditions, OTT meters deliver exactly what they promise – high-quality materials and the extremely robust construction make sure of it.

Characteristics/Advantages

OTT C31

- _ Exact measurement of the flow velocity
- _ Wide range of applications from 0.25 m/s to 10 m/s
- _ Robust and indestructible
- _ Can also be used for checking current and flow meters
- _ Can be used universally as rod-mounted or suspended meter



OTT C2

With its small dimensions, the OTT C2 has its niche in very shallow waters from 4 cm, for example in:

- _ streams and small runoff ditches
- _ small channels
- _ pipes
- _ laboratories
- _ river models

Compact, handy and easy to transport, it is also often used at stations that are difficult to reach.

OTT C31

The OTT C31 can be used both in small flowing waterways with low depths and in deeper waterways with higher velocities. Depending on the application, the meter can be used on a measuring rod or, mounted on a weight, as a suspended meter.

Technical Data



	OTT C2	OTT C31
Ø propeller (mm)	30; 50;	80; 100; 125
Propeller pitch (m)	0.05; 0.10; 0.25; 0.50	0.125; 0.25; 0.50; 1.00
Propeller material	aluminum	aluminum; plastic
v min. (m/s)*	0.025; 0.030; 0.035; 0.050; 0.055; 0.060	0.025; 0.030; 0.035; 0.040; 0.055; 0.060;
v max. (m/s)*	1.0; 2.0; 4.0; 5.0	2.5; 3.0; 5.0; 6.0; 10.0

*The velocity measurement ranges are dependent on the diameter and pitch of the propeller used

Exact calibration
in our in-house calibration tank

Signal counter set OTT Z400

A modern, digital, signal counter for registering the propeller rotations (impulses) is available with the OTT Z400.

Using a connection wire, the meter is simply attached to the signal counter. The simple membrane keyboard allows the largest hands to use it reliably.

The device can save meter equations internally and display both the number of impulses counted and the flow velocity itself.



Digital signal counter set
OTT Z400



OTT ADC

Ultrasound technology for the traditional rod measurement

Characteristics/Advantages

- _ Can be used with conventional measuring rods
- _ Familiar measurement process
- _ Step-by-step user guidance
- _ Correct immersion depth can be read on display
- _ Automatic flow calculation in accordance with international standards
- _ High measurement accuracy
- _ Can be used in a variety of situations such as rivers, streams, canals, dams



Contemporary rod measurement in the proven way

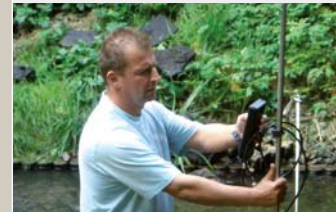
The OTT ADC (Acoustic Digital Current meter) measures point velocities in open channels using acoustic signals. Highly developed procedure for signal evaluation guarantees precise and reliable measurement results.

Similar to a meter, the OTT ADC can be used on conventional measuring rods. It does not only measure the flow velocity at the measuring point, but is also equipped to measure the depth: A pressure cell integrated in the sensor automatically determines the water depth at the vertical and the immersion depth of the device.

Step-by-step user guidance

The display on the handy handheld unit helps the user to position the sensor exactly. The other data are also easy to read on the display. The software for the handheld unit leads the user from edge to edge, step by step, and at the end of each measurement calculates the flow.

Precise measurement values and data always available



Sophisticated measurement process

The ultrasound transducers of the OTT ADC transmit signals at short intervals. These are reflected by, for example, floating material in the water and return as an echo. Using mathematical methods, the OTT ADC checks two sequential echos for similarity and determines their time shift. This is then used to calculate the flow velocity. The most modern technology, intelligent evaluation algorithms and integral quality checks guarantee a high accuracy of the measured values that remains stable in the long term.

Automatic reporting

Laborious reporting of measurement data is unnecessary with the OTT ADC. All measurement values and the calculated partial and total flows are saved in the handheld unit and can be simply called from there. For further use, the user can transfer the data to a PC using the OTT Qreview processing software and process it there.

Technical Data (1)

Velocity measurement:

Measuring range - 0.2 m/s ... 2.4 m/s
Accuracy $\pm 1\%$ of the measured value ± 0.25 cm/s

Acoustic frequency
Ultrasonic transducers 6 MHz

Minimum water depth 4 cm

Methods for discharge calculation
EN ISO 748 Mid section method
Mean section method



Handy handheld unit from OTT ADC

Technical data (2)

Operating temperature -20 °C ... +60 °C
Supply voltage 9.6 V DC (permanently installed battery)
Life typically 14 hours

Depth measurement (piezoresistive absolute pressure cell)

Measuring range 0 ... 5 m
Resolution 0.01 % FS
Accuracy 0.1 % FS



Easily read display with important data on the measurement



OTT MF pro

Versatile magnetic-inductive sensor

Characteristics/Advantages

- _ Compact, requires low maintenance
- _ Usual measurement process
- _ Intuitive user guidance
- _ Reduced time
- _ Optional: Automatic water level measurement
- _ Flow calculation according to international standards
- _ Also for weed-infested sections
- _ With turbulent flow conditions
- _ In dirty waters



Rod measurement using magnetic-inductive sensor

The OTT MF pro unit is an easy-to-use magnetic-inductive current meter that requires nearly no maintenance and is designed to cost-efficiently measure point velocities in open channels and canals.

The compact and rugged sensor is attached to the measuring rod. The measuring procedure is similar to that of the OTT ADC unit, however, a magnetic-inductive sensor is used with the OTT MF pro unit. Its compact design allows measurements to be performed even in very shallow water.

Faraday measuring method

A magnetic coil incorporated in the sensor head creates a magnetic field. When water is passing the sensor head the water ions create a voltage that relates to the flow velocity. It is obtained by means of two electrodes and then amplified. A smart microprocessor processes the signals and sends the results to the handheld unit.

Reliable data within shortest period of time



Field operations made more easy

Operating the OTT MF pro can easily be learned based on the definite instructions provided on the display of the handheld unit. No manual logging required, since all data is automatically stored. This saves time and prevents copying errors. The stored data may easily be transferred to a PC via the USB interface.

The point velocities measured and the flow that is automatically calculated are visualized in real time which allows trends to be recognized immediately. And thanks to the transreflective color display, information and instructions can be read even in sunlight.

Extended application

Because of the measuring method, the OTT MF pro unit provides reliable results, also with low flow velocities. Even in turbulent flow conditions or high suspended matter content, the unit provides dependable data and may be used both in weed-infested and dirty waters.

Technical data (1)

Velocity measurement:

Measuring range 0 m/s ... 6 m/s
 Accuracy 0 ... 3 m/s ±2% of the measured value ± 0.015 m/s
 Accuracy 3 ... 5 m/s ±4% of the measured value ± 0.015 m/s

Minimum water depth 3.18 cm

Methods for discharge calculation Mid section method
 EN ISO 748 Mean section method



Field-proven handheld unit of the OTT MF pro

Technical data (2)

Operating temperature -20 °C ... +60 °C
 Supply voltage Lithium-ion battery
 Life typically 18 hours

Depth measurement (optional):

Sensor Absolute pressure sensor with single point calibration
 Measuring range 0 ... 3.05 m
 Accuracy* the larger of ±2% of the measured value or ±0.015 m

*Steady state temperature and static non-flowing water



Compact and rugged sensor

OTT Qliner 2

Mobile flow measurement system with Doppler technology



Characteristics/Advantages

- _ Exact measurement data
- _ Robust design
- _ Automatic flow calculation
- _ Safety when measuring – no need to enter the water
- _ For waterway depths up to 20 m and flow velocities up to 10 m/s
- _ No problems with drift and moving bed

Made for hydrologists

The OTT Qliner 2 is a mobile flow measurement system that meets all the demands of the real world. It consists of an ultra-sound Doppler current sensor, a robust glass-fiber boat as device carrier, a Bluetooth data transfer unit and a waterproof PDA (Personal Digital Assistant).

Corresponding to the verticals procedure, at defined verticals of the flow cross-section the OTT Qliner 2 measures the water depth and the vertical velocity distribution precisely and reliably.

Using the measurement data, it then calculates the average flow velocity at the verticals, the partial flow of individual flow segments and then the total flow. In this it uses the mid-section method, an international standard.

Simple process according to known measuring method

Measurement process

Important parameters on the measurement cross-section and process are entered into the operating software of the PDA by the user.

For the actual flow measurement, the boat is positioned at the vertical to be measured using cable guides. The boat remains stable and secure in the flow even at high speeds – and even with moving bed the Qliner 2 provides reliable measurement values.

Wireless communication

Generally, the PDA and the electronics of the OTT Qliner 2 communicate wirelessly via Bluetooth. In this way, all measured data are transmitted in real time to the PDA to be processed there. Onerous reporting is no longer necessary.

After completing the measurement, the user can transfer the data to a PC and process it further there using the OTT Qreview software.



Technical data (1)

Velocity measurement

Measuring range ± 10 m/s
Accuracy $\pm 1\%$ of the measured value ± 0.5 cm/s

Transducer frequency	1 MHz	2 MHz
Max. range (water depth)	20 m	10 m

Minimum water depth	1.20 m	0.35 m
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Technical data (2)

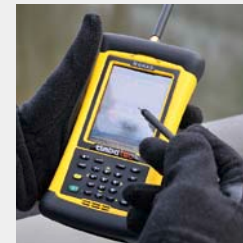
Operating temperature	-10 ... +60 °C
Supply voltage	12 V DC (rechargeable battery pack)
Life	typically 1 day use in the field

Pocket PC (PDA)	
Type	Nomad (Timber Tec)

Radio connection	
Frequency	2.4 GHz
Type	Bluetooth class 1
Range	up to 150 m (depending on environmental conditions)



Convenient remote control from the bridge



Waterproof and robust handheld unit (PDA) of the OTT Qliner 2



OTT Qreview

Powerful software for data processing and visualization

Characteristics/Advantages

- _ Validation of flow measurement data
- _ Clear representation of the measurement cross-section and the different values measured
- _ Convenient processing
- _ Simple data export to XML or TXT format
- _ Specially conceived for data from OTT ADC and OTT Qliner 2



Evaluation software included

Flow measurements that have been carried out with the OTT ADC or the OTT Qliner 2 are saved on the handheld unit/PDA as a file. The user can transfer these files to a PC and import them into the OTT Qreview software.

The comprehensive functions of OTT Qreview make it possible to validate the data and offer convenient routines for further processing. An export to external databases can also be done with a few steps with OTT Qreview.

The processing software OTT Qreview is included with the OTT ADC or OTT Qliner 2.

Powerful and at the same time completely uncomplicated



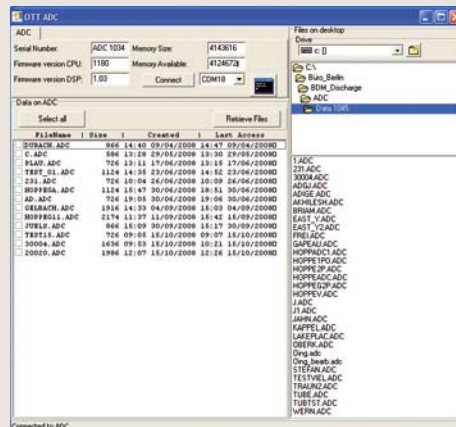
Useful functions

You can confidently save yourself laborious evaluation of flow data with OTT – it is dealt with by the software. With clear menu functions you only need a few clicks to get to where you are going. The numerous functions include:

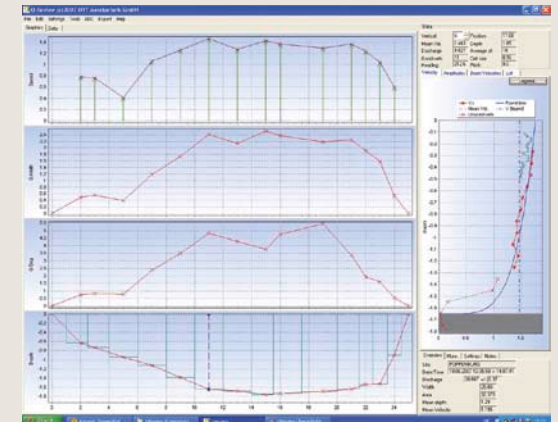
- Visualization of the measurement cross-section with the measured velocities in each case
- Visualization of individual verticals
- Production of a measurement report with overview of results and details of verticals
- Post processing and correction of OTT ADC and OTT Qliner 2 measurements
- Editing of measurement settings and recalculation of flow
- Changing the flow calculation method
- Export of the measurement to TXT or XML format, e.g. for transferring to BIBER software and Software Q
- Export of the cross-section coordinates (waterway profile) in text format



Handheld unit of the ADC mounted on the measuring rod



PDA for the OTT Qliner 2





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