

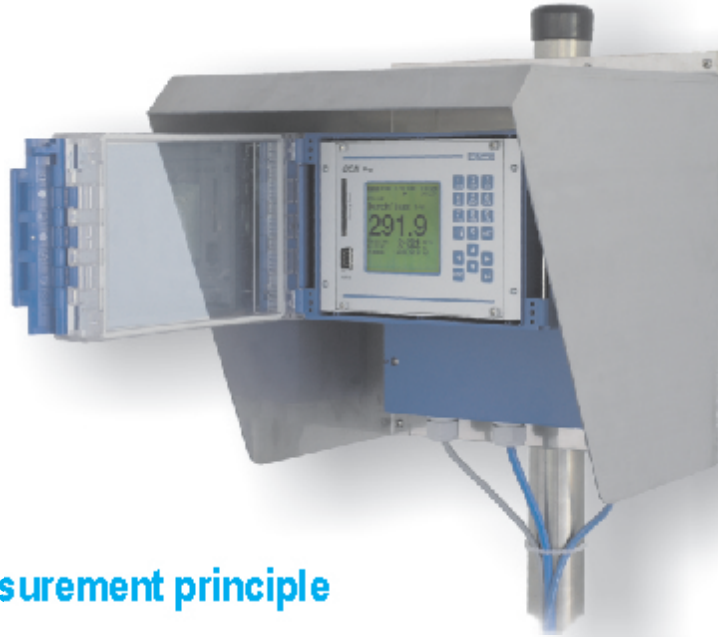
**NEW** with active sensor  
for even faster measurement

## OCM Pro -active-

High accurate flow  
measurement in  
part filled and full pipes  
and channels

## New in the field of flow measurement

- ★ Suitable for MCERTS applications
- ★ Measurement of the real flow velocity profile
- ★ Spatial allocation of single velocities
- ★ Cross correlation with digital pattern recognition
- ★ Very high accuracy
- ★ No calibration required
- ★ No electrodes, no conductivity required
- ★ Absolutely zero point stable and drift-free
- ★ Measurement in part filled and full pipes and channels
- ★ Suitable for all channel profiles
- ★ Easy to install, no additional constructions
- ★ Measurement in highly contaminated and abrasive liquids
- ★ For use in difficult applications too
- ★ Simple, menu-driven operation
- ★ Large graphical backlit display
- ★ Ex Approval for Zone 1 according to ATEX
- ★ All data stored on flash card
- ★ Internet access (available soon)
- ★ Distances of up to 250 m between sensor and transmitter



### Measurement principle

The magnitude >>Flow "Q"<< cannot be measured directly. The principle for flow calculation is based on the following general equation:

$$Q = A \cdot \bar{v}$$

A = wetted cross-sectional Area

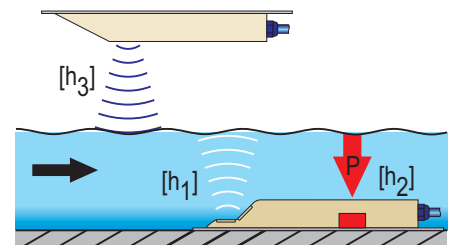
$\bar{v}$  = average Flow Velocity

The wetted cross-sectional area A depends on the section profile and the flow level. In fully pipes, e.g. pressure pipes, the cross-sectional area is always the same and thus can be entered as a constant. In case of a part filled pipe the flow level is determined by an external or integrated level measurement device.

Then the wetted cross-sectional area is calculated by taking the section profile into account.

The flow height, which is determined as a result from that, is proportional to the measured time.

This method stands out for its accuracy and long-term stability. Measuring from the bottom up is particularly advantageous since no dead zones above the water surface are to be taken into account. Thus, the measurement can be carried out in part filled pipes without dome tops up to full fill. Foam or any other substances on the water surface do not affect the measurement result.

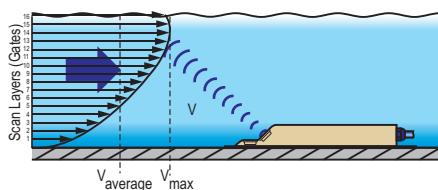


### Flow level measurement

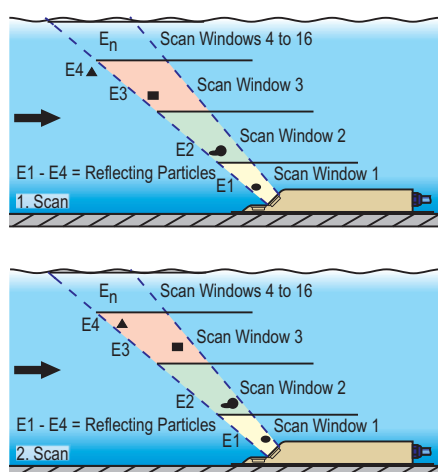
Based on ultrasonic-echo-sounding principle the flow height (flow level) is measured [h<sub>1</sub>] either in the medium from the bottom up or from top down [h<sub>3</sub>] through air-ultrasonic. In both cases the water/air sonic boundary (water surface) is recognised and the sonic time of travel between sensor and water surface is measured.

In conditions where liquids are strongly absorbant or the combi-sensor is off-set the internal pressure transducer over-rides the integrated ultrasonic level sensor.

## Flow velocity measurement



An ultrasonic converter (sensor) sends a short ultrasonic impulse into the medium. This impulse is reflected by particles or gas bubbles in the medium. The sensor operates in impulse-echo-mode. This means that the ultrasonic converter switches to receive mode immediately after emitting an impulse and then receives the reflected echo as a characteristic pattern. The echo patterns from the first scan are stored digitally.



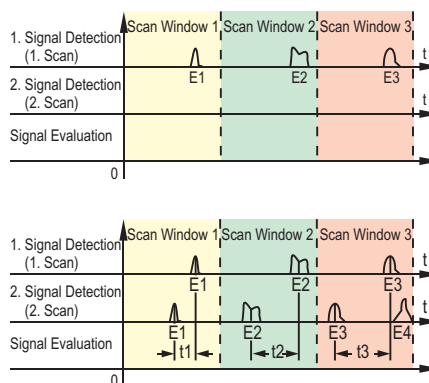
In the second scan another ultrasonic impulse is emitted and the received echo patterns are stored as well.

The runtime between the moment of reception and transmission determines the particles' position within the flow section taking the beam angle into account. Due to resolution purposes the flow section will be subdivided in up to 16 time slots (segments) depending on the flow level.

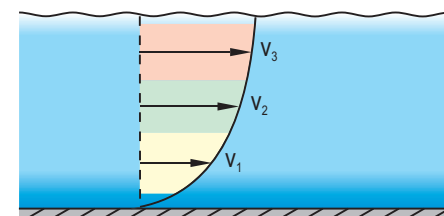
By using the **cross correlation method** the echo patterns of the time slots are checked for agreement. The cross correlation also provides the pattern's temporal movement in the second scan in comparison with the first scan. This temporal movement can be converted directly to the flow velocity in the scan windows respective to the beam angle.

### Formula

$$x(t) \cdot y(t-t) \int_{-T/2}^{T/2} f(t) g(t) dt$$

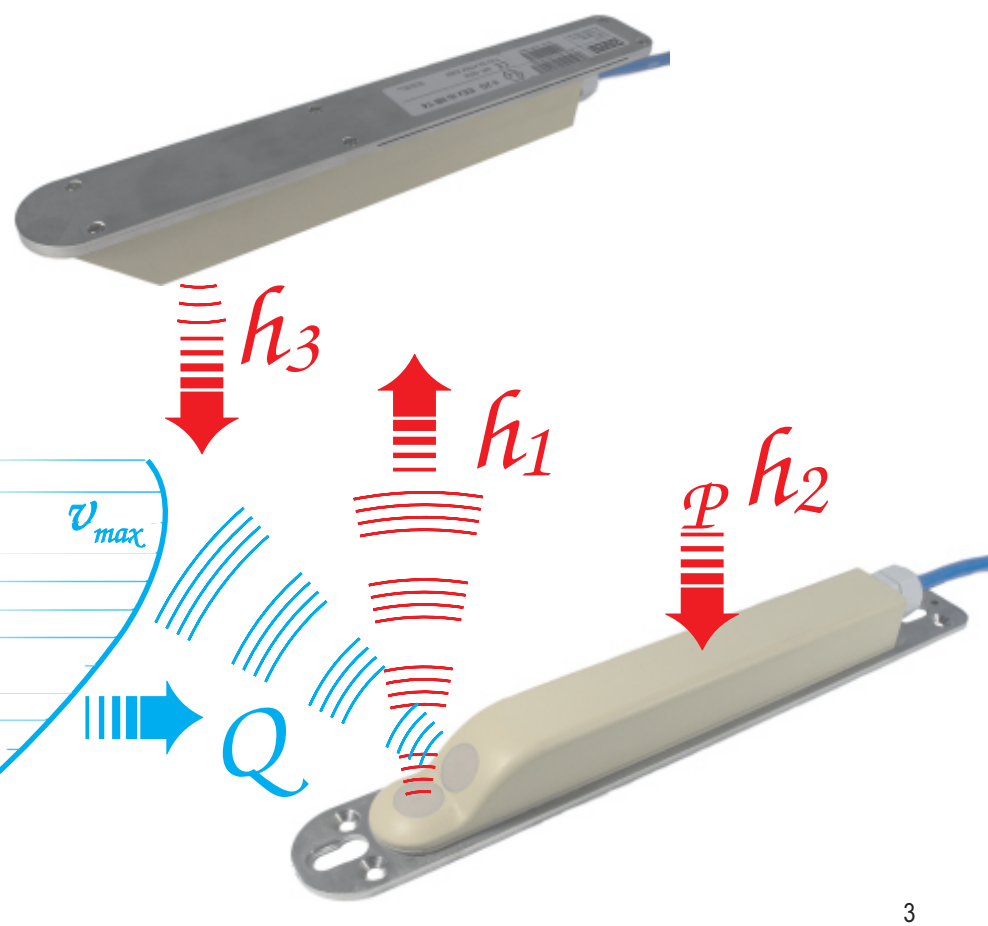
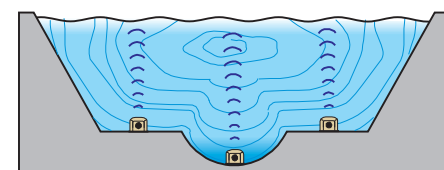


This event is repeated up to 2000 times per second. Using the sensor/integrated signal processor (DSP) the flow profile will be investigated directly in real time by using the individual velocities within the precisely spatially allocated measurement windows.




Hence, it is possible to obtain high accurate measurement values without additional calibration.

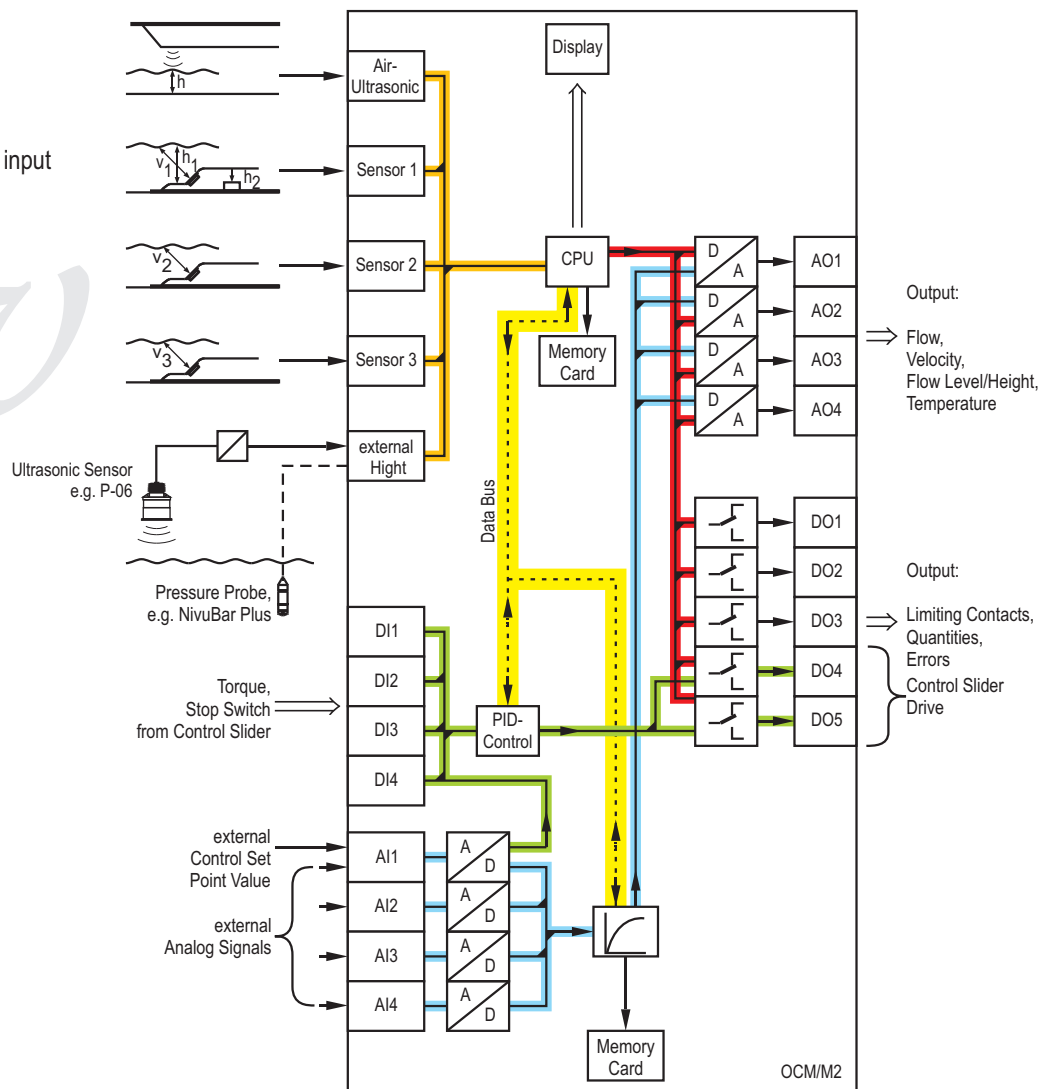
In complex or very large channel profiles full-coverage flow profiles can be investigated and evaluated by placing 2 or 3 sensors respectively.



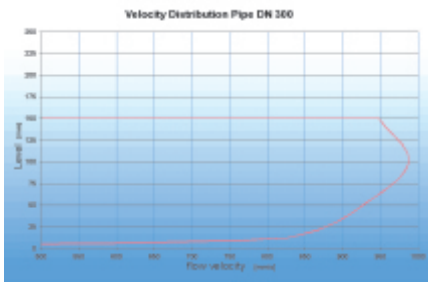
# Transmitter

## Overview of the most important features:

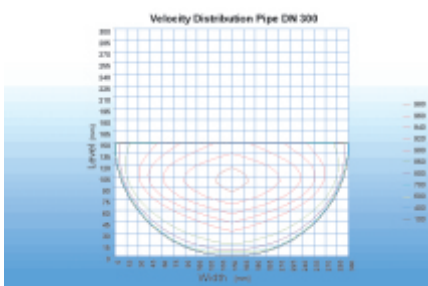
- Large graphical backlit display
- Graphical and numerical value display
- Graphical display of the hydraulic conditions at the measurement place
- Menu driven user interface; users only enter channel shape and dimensions
- Use of most modern DSPs (digital signal processors) and 32-bit controller technology
- RS232 interface
- Up to 4 analog inputs 0 - 10V or 4 - 20mA
- Up to 4 digital inputs
- Ex Approval for Zone 1 according to ATEX 
- Ex-version: additional 4 - 20mA input with power supply
- Up to 4 analog outputs 4 - 20mA
- Up to 5 relays (center-zero relays)
- 12-bit inputs and outputs
- Potential-free isolated inputs and outputs
- Integrated 3-point step controller with free programmable flush functions, quick close function and slide monitoring
- Memory card (flash card), up to 64 MB, for data storage and data transmission to PC
- Recording function of the most important measurement data up to 14 days
- Internet access via modem or radio (GSM, available soon)
- Enclosure: wall mount, panel mount and 19" plug-in unit



## Sensors



Axial Velocity Profile



Isovel Chart

For direct connection to the OCM Pro -active- flow velocity sensors are available with or without integrated flow level measurement as well as air-ultrasonic sensors .

By combining water-ultrasonic, air-ultrasonic and hydrostatic measurement it is possible to have a level measurement with triple redundancy.



Depending on the application various constructions are used.



Wedge sensors (mouse) for mounting in flumes and open channels as well as pipe (insertion) sensors for mounting in steel, concrete and plastic pipes.

The mounting expenses are extremely low. In case of upgrading steps huge investment costs can be saved since the measurement place does not need to be modified.

Cables can be extended up to 250 m without any problems by using standard signal cables.

## Controller

The OCM Pro -active- is optionally equipped with a 3-point step controller, which has been functionally optimized for the requirements in the wastewater field. Thus, quick close function and automatic obstruction control are standard, as well as selectable external/internal set points and slide valve runtime monitoring.

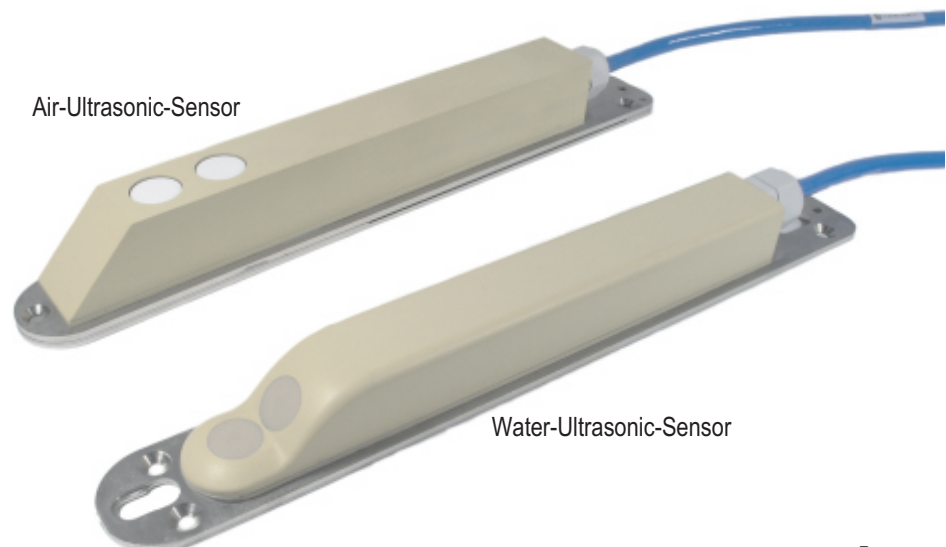
For measurement sections which tend to soiling a programmable flush algorithm can be activated, which automatically removes sludge sedimentation from the sensors.



For measurement in aggressive liquids, e.g. chemical industry wastewater, high resistant sensors are available.



Air-Ultrasonic-Sensor



Water-Ultrasonic-Sensor

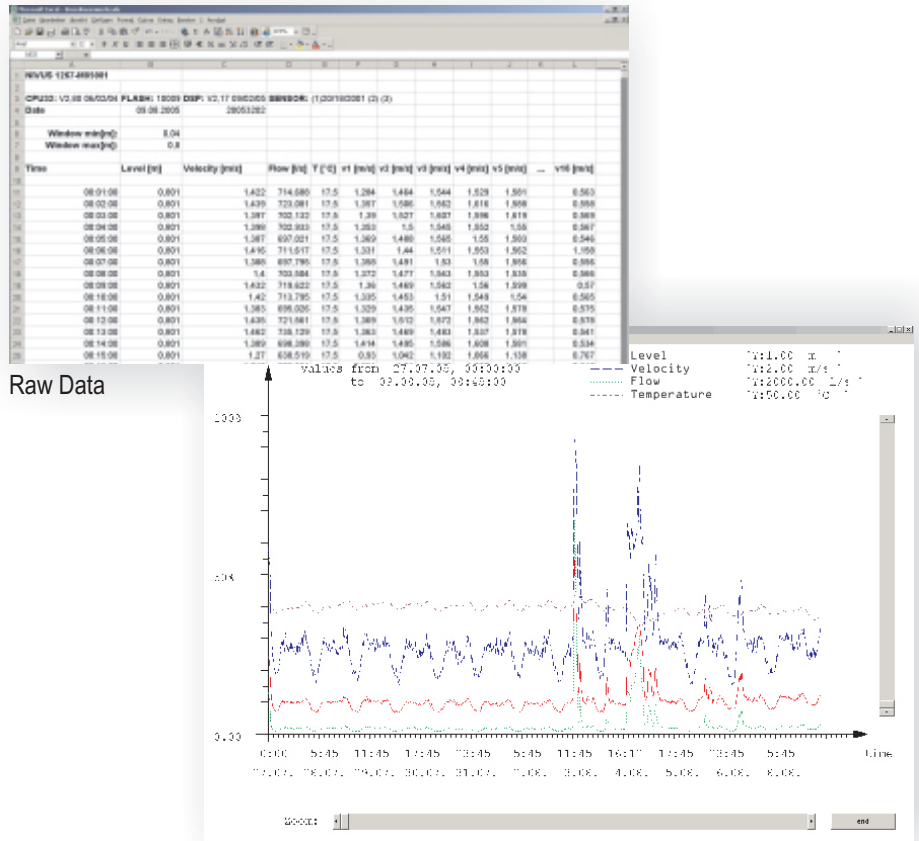
## Storage (data logging)

If the OCM Pro -active- is equipped with a flash card, all recorded values as well as 4 additional external analog signals can be stored in selectable intervals. The data is stored as txt-files and hence can be evaluated and processed with the software NivuDat Pro or other current software, e.g. Excel or similar.

System failures or irregularities which may occur will be saved on this memory card and hence are available for diagnostic or service purposes.

The parameters set will be saved on the same storage medium as standard.

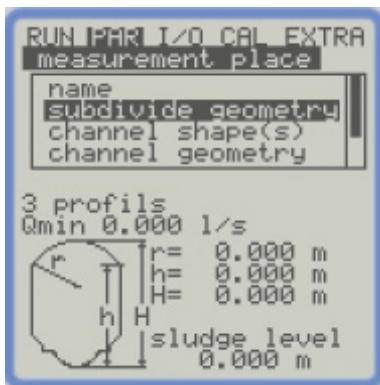
The 64 MB memory enables up to 20 years of capacity per interval and input number.



Measurement value screen of the NivuDat Pro software

## Programming

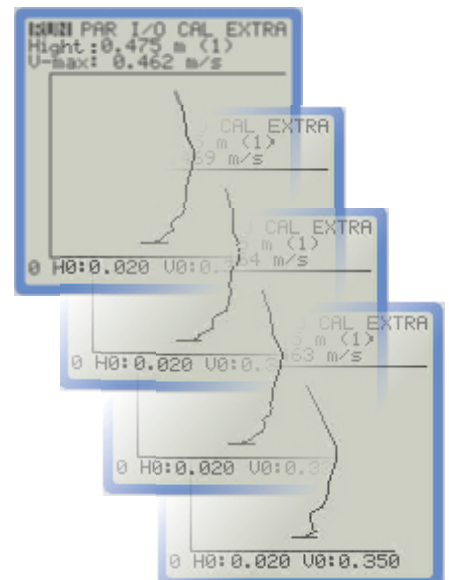
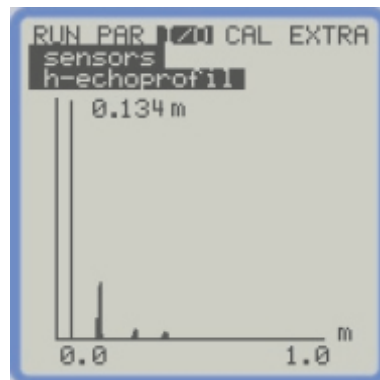
The programming is easy to operate. The comprehensive windows-like user interface in addition with the large graphical display guides the user setting up the system through the menu. Programmed settings are displayed graphically as standard, e.g.



This is why incorrect programming is almost impossible. Access protection options to prevent unauthorized or wrong adjustment are standard.

## Display

The large backlit display allows for easy and obvious programming as well as simply requesting inputs, outputs, sensor data, echo profiles and much more.



Direct flow profile indication on the display.

This enables the user to get information about the system status, errors, day quantities, memory capacity, controller parameters and more at any time. For this reason eventual troubleshooting is easily facilitated.

## Advantages in relation to other methods

The OCM Pro -active- stands out with a high accurate flow velocity determination. The measured velocities can be accurately allocated spatially and are displayed on a large backlit display. This makes it easy to hydraulically assess the selected measurement place and critical applications are recognized or avoided even by inexperienced users.

The system operates with a high velocity resolution. Even lowest medium movements within a range of a few mm/s are recognized and evaluated safely in contrast to common magnetic inductive systems. Depending on the channel geometry measurement dynamics up to 1 : 10 000 at partial filling are possible.

The OCM Pro -active- is based on ultrasonic. Thus, it is independent of medium conductivity or electrode covering by oil films or bacteria coating. In contrast to magnetic-inductive methods the system is completely drift-free. Sensor cleaning is not necessary.



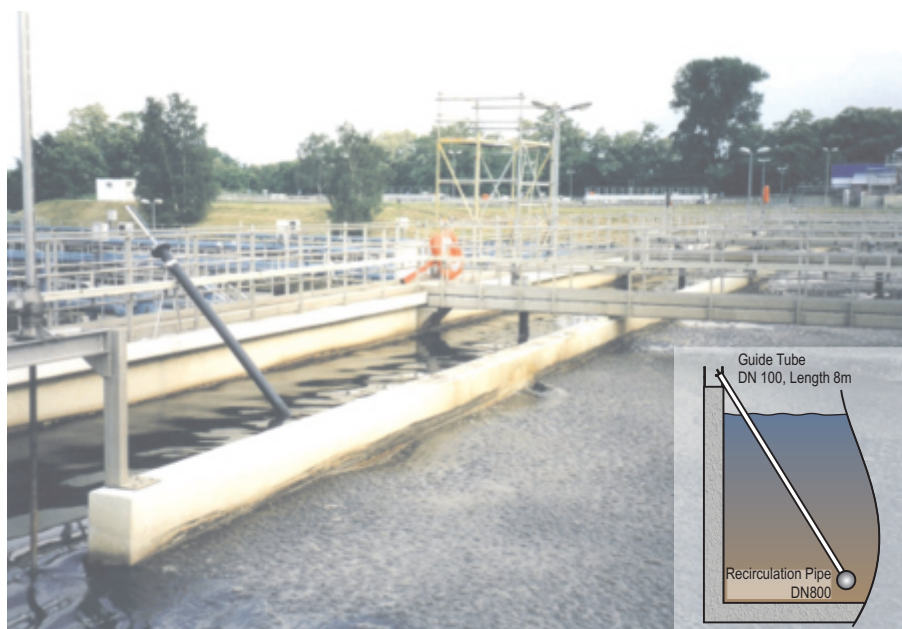
The system can be applied in existing channels, pipes, constructions and more. Additional modifications, throats, inverted syphons or similar constructions will not be required. For that reason it is possible to install an accurate and reliable system even in large channels in a short time at low costs and without additional constructions.



In spite of soiling the sensor operates reliably.



Special application in a silty channel



## Successful operation

NIVUS measurement technology is synonymous for innovation and accuracy.

Thanks to decades of experience and application know-how of our engineers, technicians and authorized staff even almost impossible applications mean a challenge to us. Where other tested systems failed, we succeeded in creating uncommon solutions which completely satisfied our customers.

**Just talk with us.**

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