

# How to Measure BOD and COD Online

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# Today's Topics

- ① Xylem Intro
- ② Introduction of UV-Vis sensors
- ③ Live Demo in our Lab
- ④ Question & Answer Session

## House Keeping

- We are recording!
- A link to the recording & a pdf version of this presentation will be shared in a follow up email
- Ask your question at any time in the “question” section of your Zoom screen
- All questions will be answered at the end of the webinar

# What is Xylem?



**Xylem (XYL)** is a leading global water technology company committed to developing innovative technology solutions to the world's water challenges.



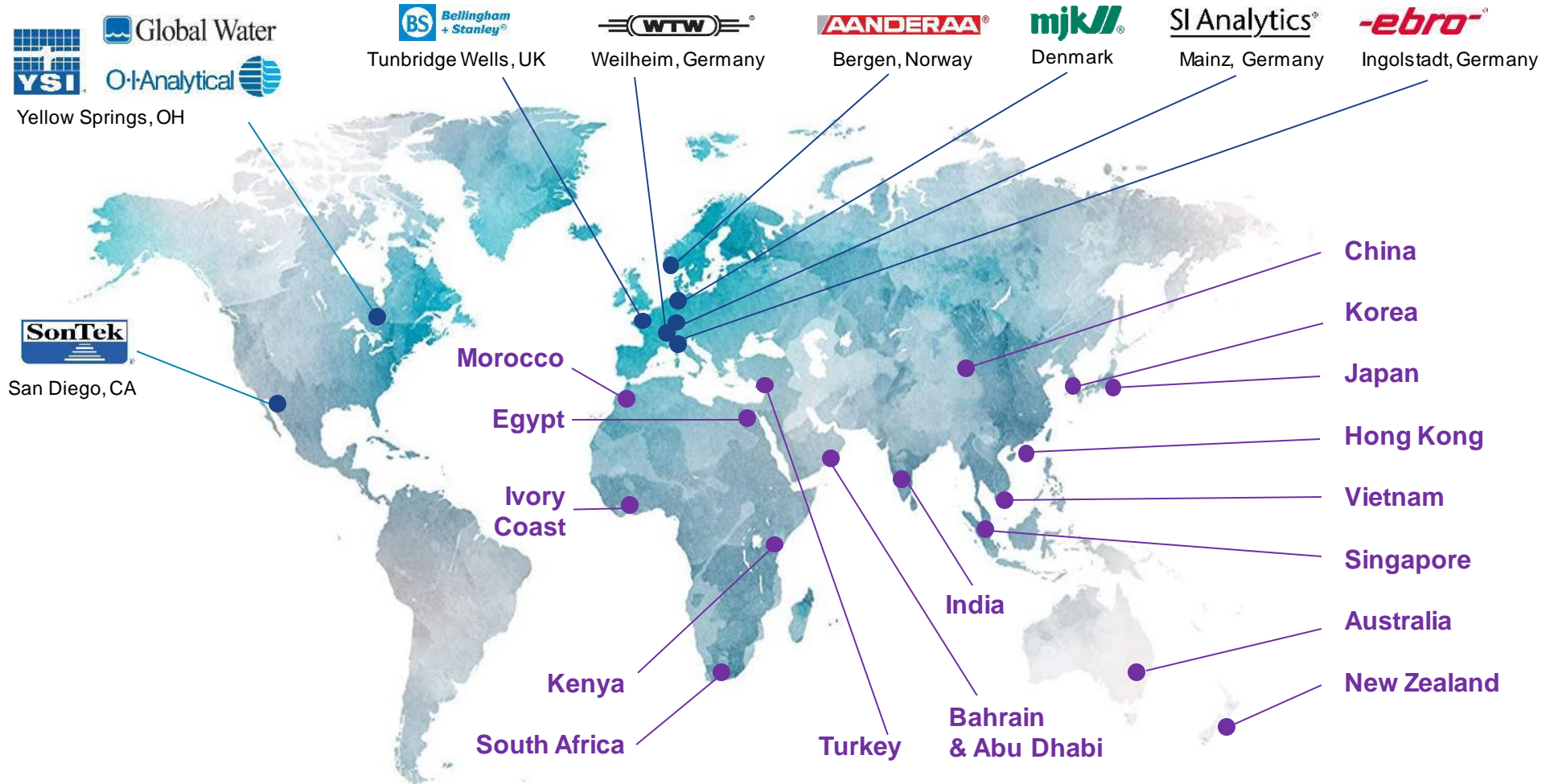
# “Analytics” Factories & Local Offices

**xylem**  
Let's Solve Water

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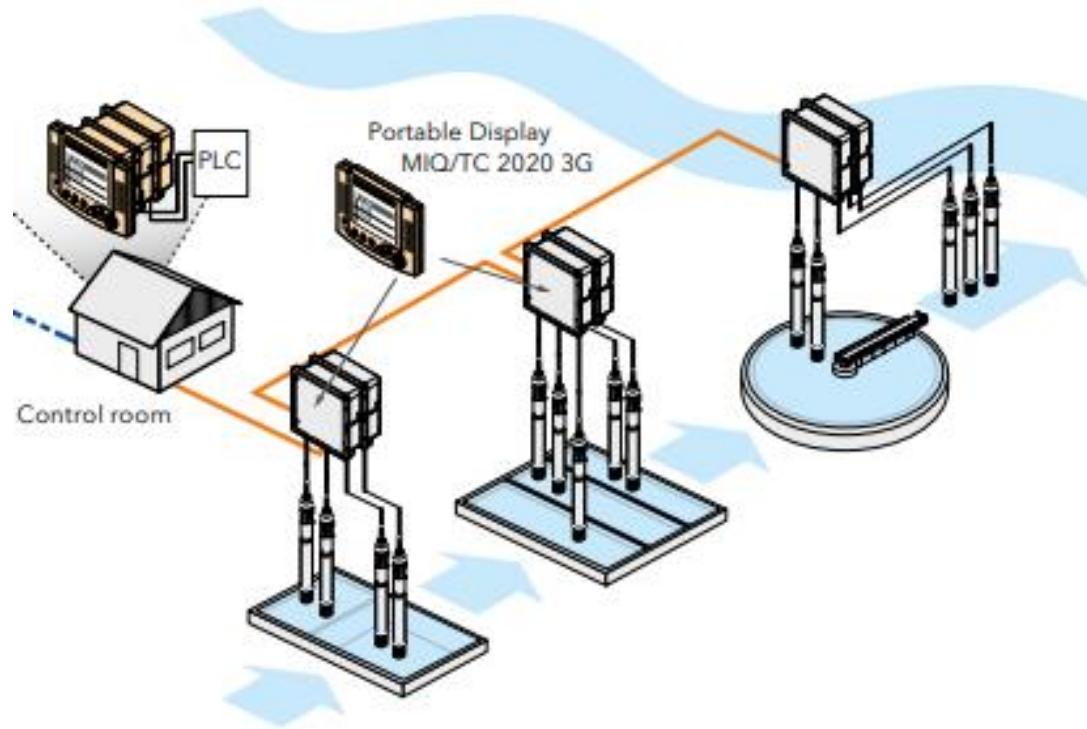
**Analytics:**

- 60** Facilities
- 23** Companies
- 3300** employees





## Process / Online



## Laboratory



Optical Reagent Free measurement webinar :

Webinar Available > <https://youtu.be/xPaxo28p0H8>

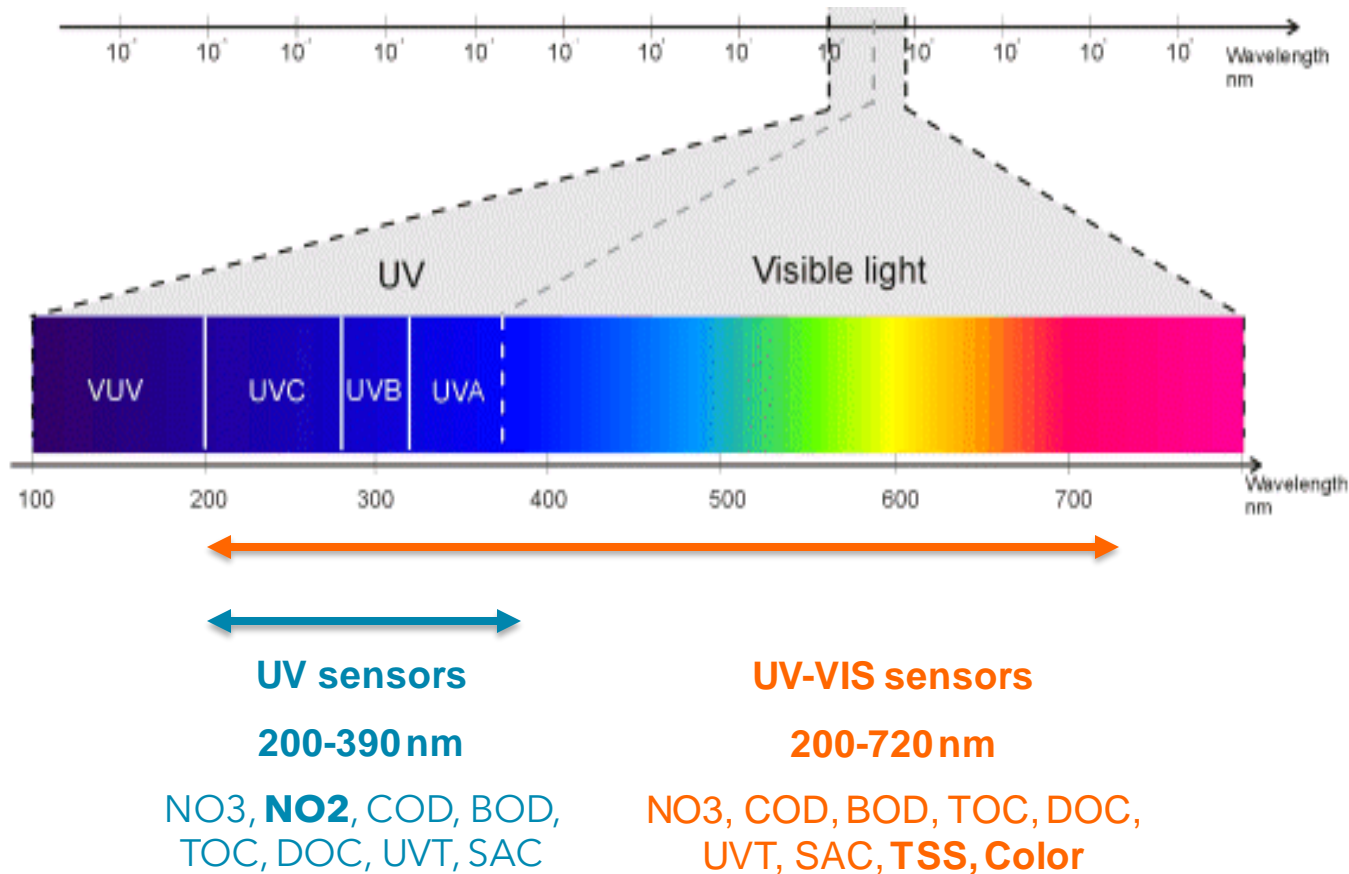
# UVVIS and UV Spectral Sensors

NO<sub>3</sub>, NO<sub>2</sub>, COD, BOD, TOC, DOC, UVT, SAC, TSS & Color measurement

# Theory-Principle

Waterproof, miniaturized UV-VIS or UV spectrophotometer:

Measuring of total spectrum from ultraviolet (UV) to visible (VIS) light



# Theory-Principle

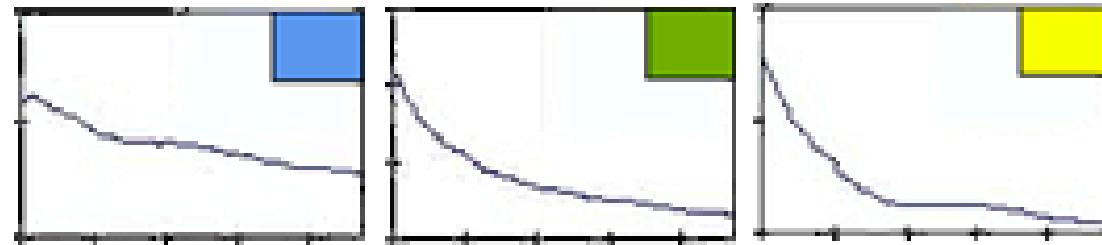
Analysis models for e.g. municipal WWTP like

1. Influent
2. Aeration
3. Effluent



**Measurement procedure:**

1. Measuring spectra
2. Calculation of concentrations according to algorithms

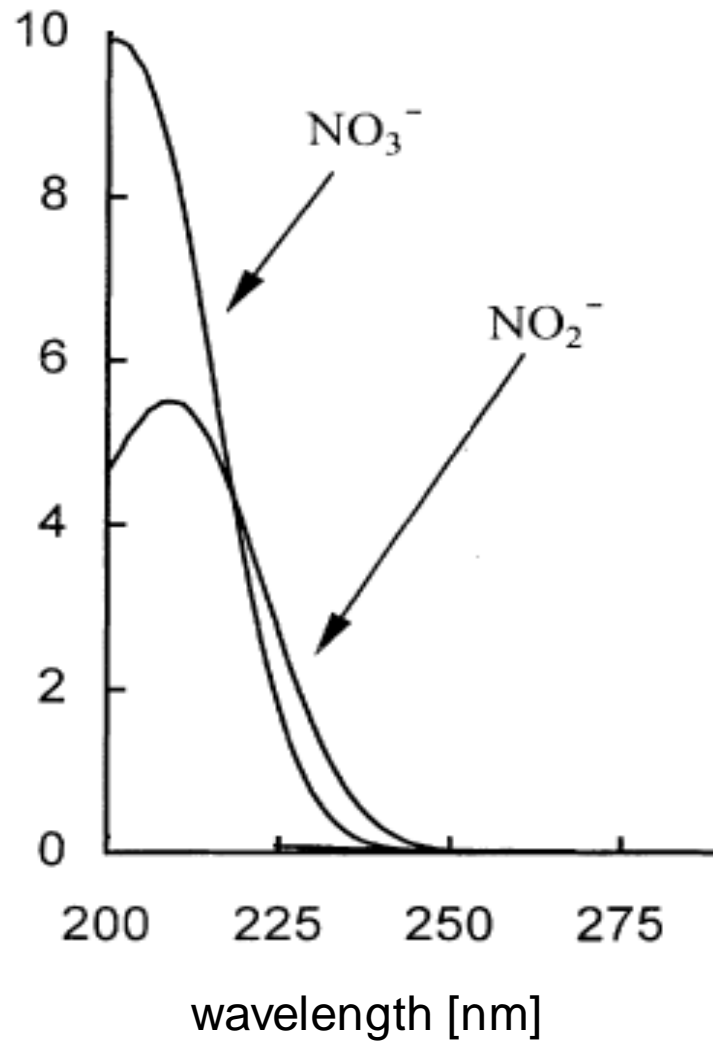


Mathematics

COD, TOC, BOD, DOC, NO<sub>3</sub>-N, NO<sub>2</sub>-N, TSS, Color } mg/l



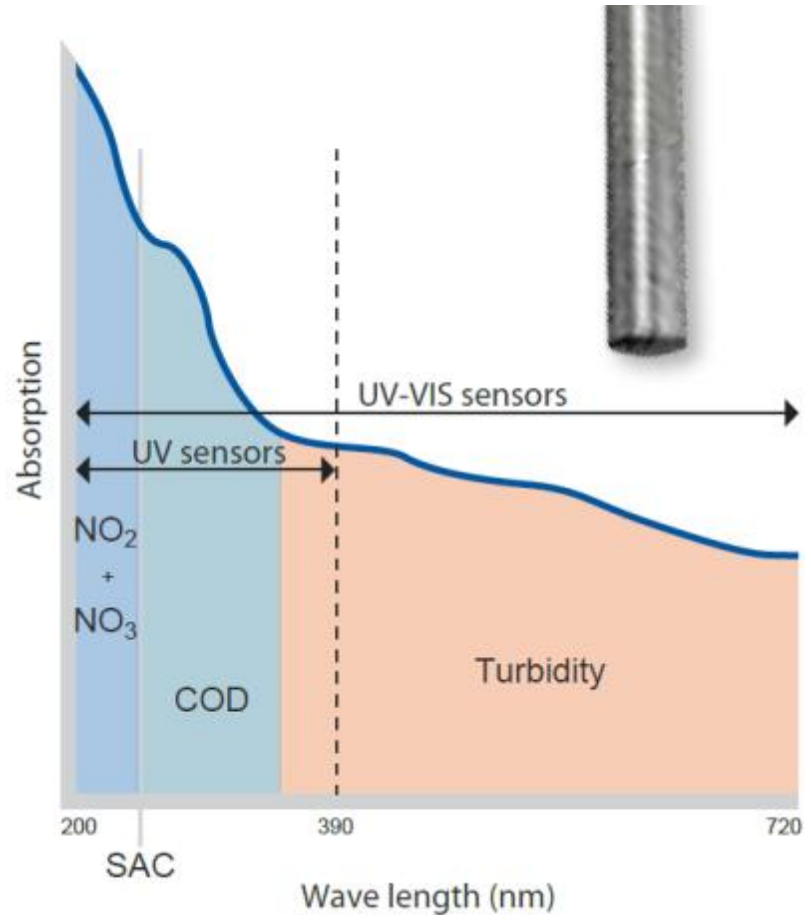
# Difference between UV and UVVIS sensors



## UV sensors:

Wavelength resolution of 0,74 nm allows separation of  $\text{NO}_2$  and  $\text{NO}_3$

# Difference between UV and UV-VIS sensors



## UV sensors:

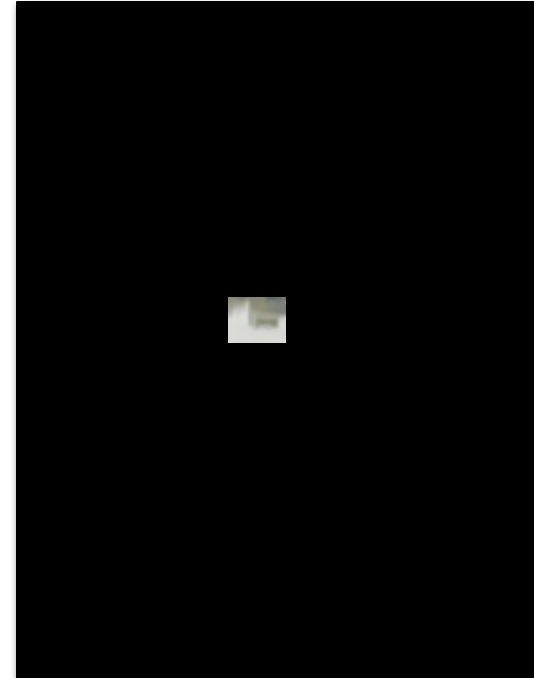
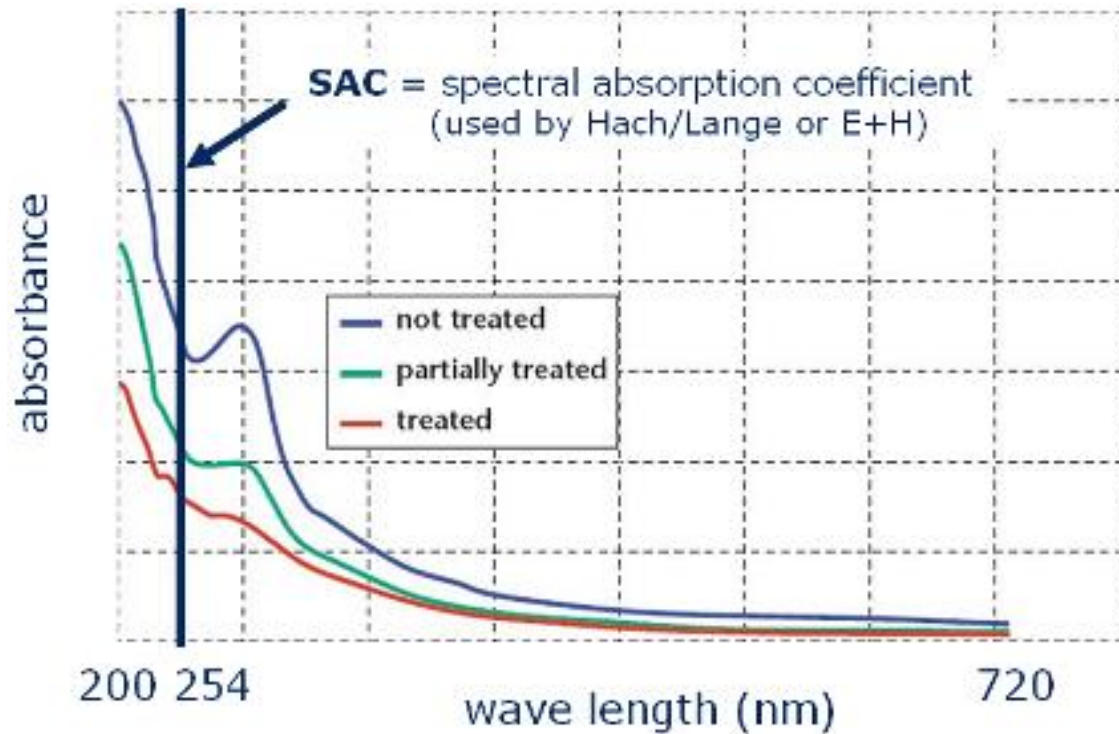
- C-Parameters
- NO<sub>3</sub>
- NO<sub>2</sub>

## UV-VIS sensors:

- C-Parameters
- NO<sub>3</sub>
- TSS
- Color

Only substances which absorb UV or UV-VIS light can be detected. For example:  
*Alcohols and sugars are not detectable*

# Multi wavelength vs single wavelength



Single Wavelength=  
A part of the whole picture only



Spectral=  
Info about the whole picture

Spectra: more information, more reliable data

# Innovative optical design

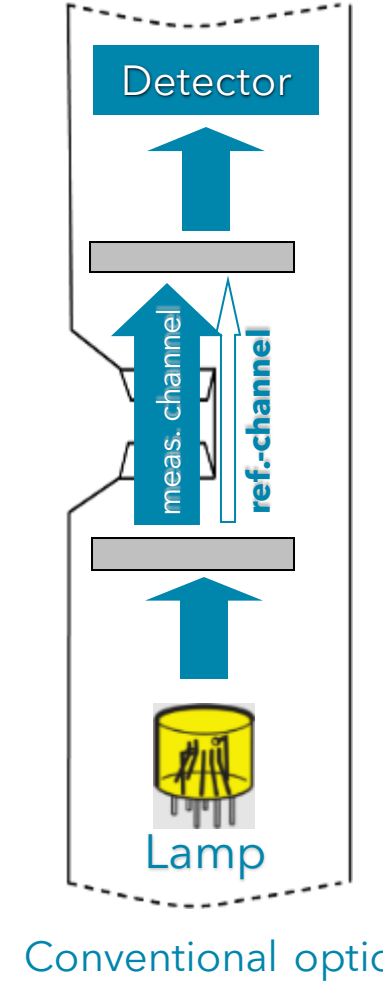
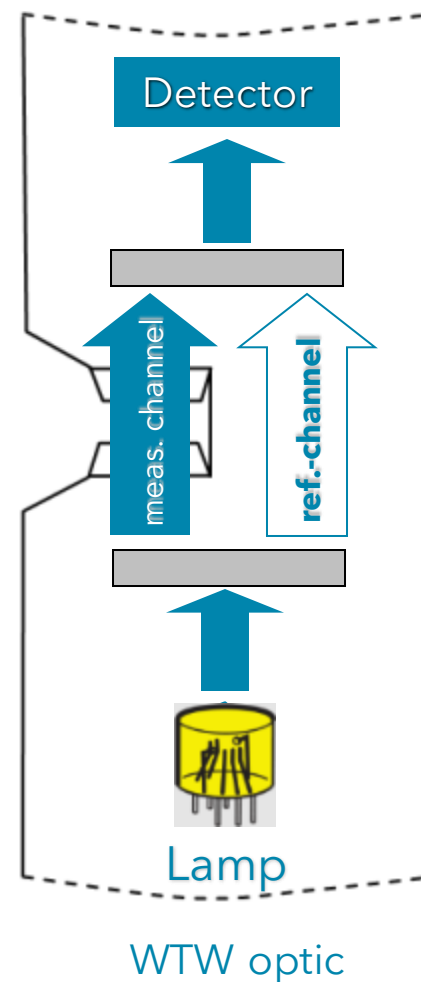
## Symmetry of measuring and reference channel

Identical

- Optical components
- Light intensity
- Amount of light
- Optical path lengths

## Optical components age the same way → optimal referencing

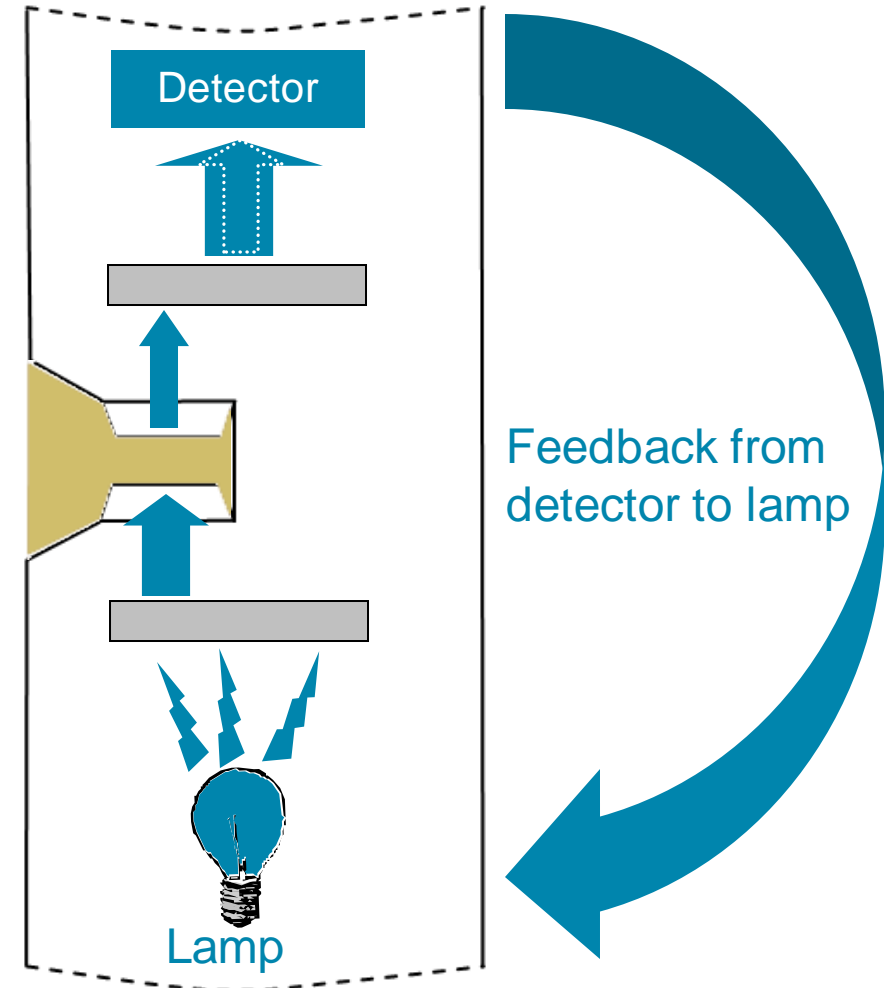
- High accuracy
- High repeatability
- High long-term stability
- Automatic drift compensation, no regular zeroing





# New measuring principle

**Auto-adjustment of amount of flashes to the sample**



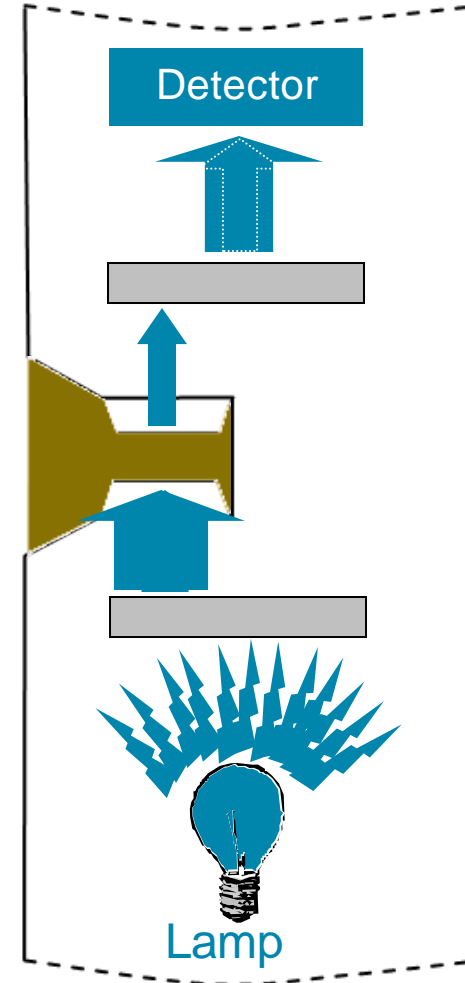
# New measuring principle

## Auto-adjustment before every measurement

- No over saturation or too low light signal
- Very low signal/noise ratio
- Reliable data
- No regular manual sensor check needed

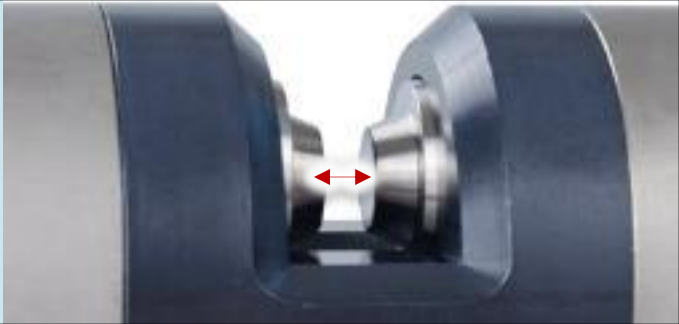
**Few flashes** → clear sample/ low concentrations

**Lots of flashes** → polluted sample/ high concentration →



# Fixed gap vs adjustable gap

## Linear influence of optical path length on the absorption!

Lambert-Beer law		$E_{\lambda} = \varepsilon_{\lambda} \cdot c \cdot d$	<p><math>E</math> = absorbance <math>\varepsilon</math> = molar extinction coefficient <b><math>d</math> = path length in cm</b> <math>c</math> = molar concentration</p>
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## WTW spectral probes: fixed 1 or 5 mm gap

- gap made of extreme robust and durable PEEK
- Highly precise factory adjusted, fixed and calibrated at accuracies of 0,01 mm!
- → **Highly accurate and reliable data!**

# Cleaning technologies

## Customer needs:

Lowest possible manual maintenance efforts at lowest cost!!!

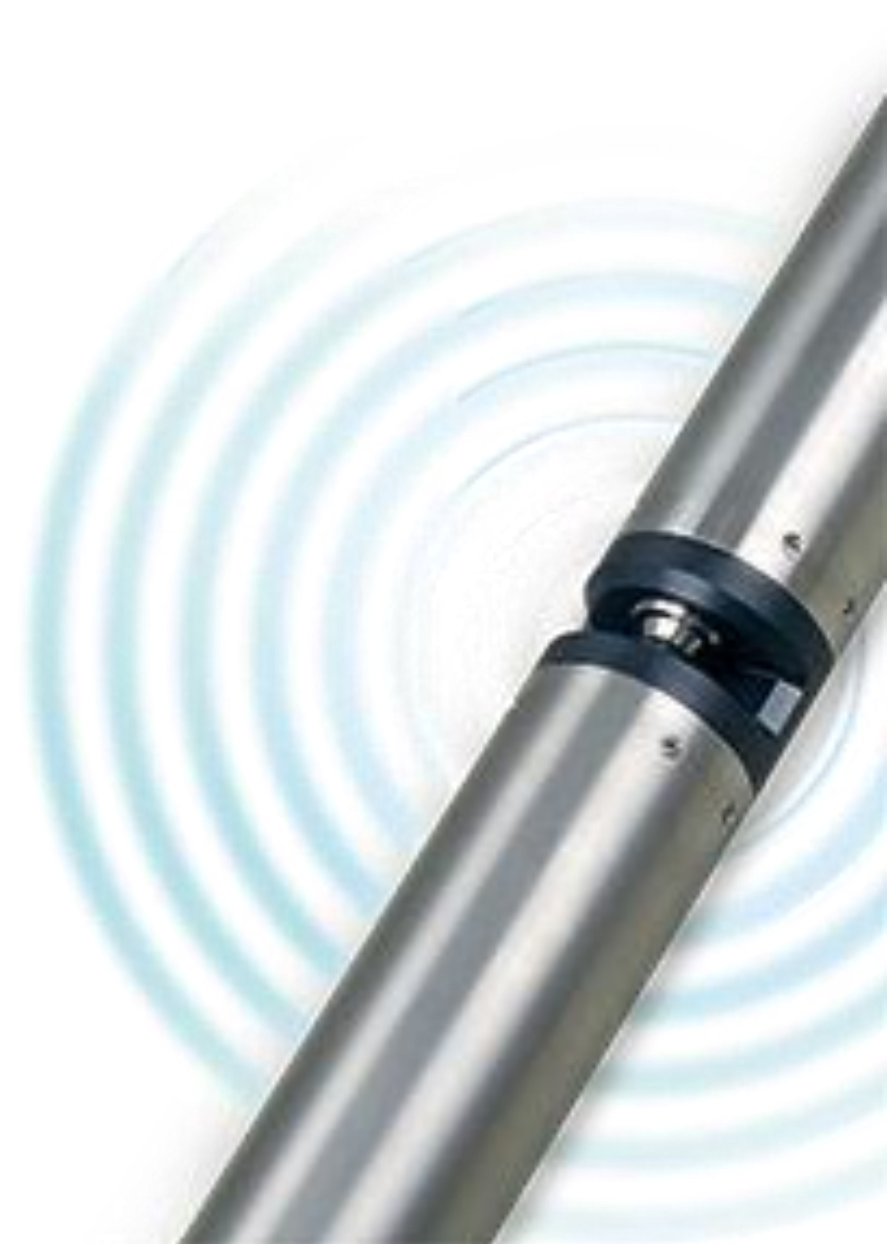
## Solution:

WTW optical probes

Unique maintenance-free ultrasonic cleaning technology

**Advantages:**  **No problems**

- Completely closed housing
- No wear parts no maintenance
- No moving parts like axes
- No risk of penetrating water





# Optional compressed air cleaning

For extremely harsh applications:  
Additional air cleaning

**Integrated air jet !**



Just connect a compressor directly to the sensor, that's it!

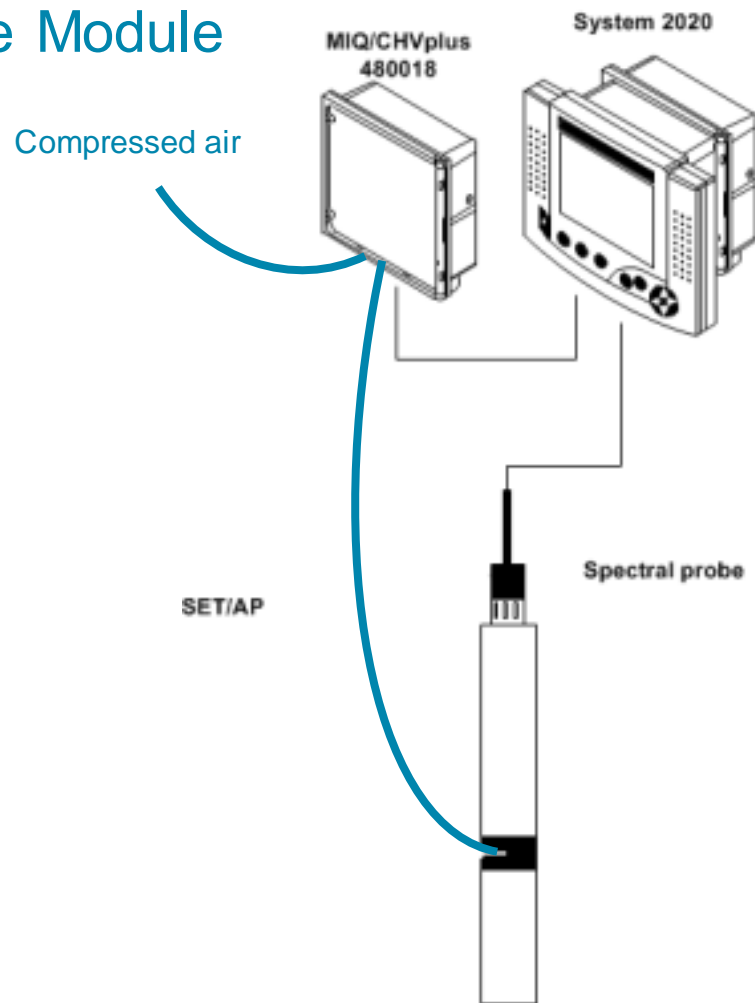
**No whipers**



# Optional compressed air cleaning

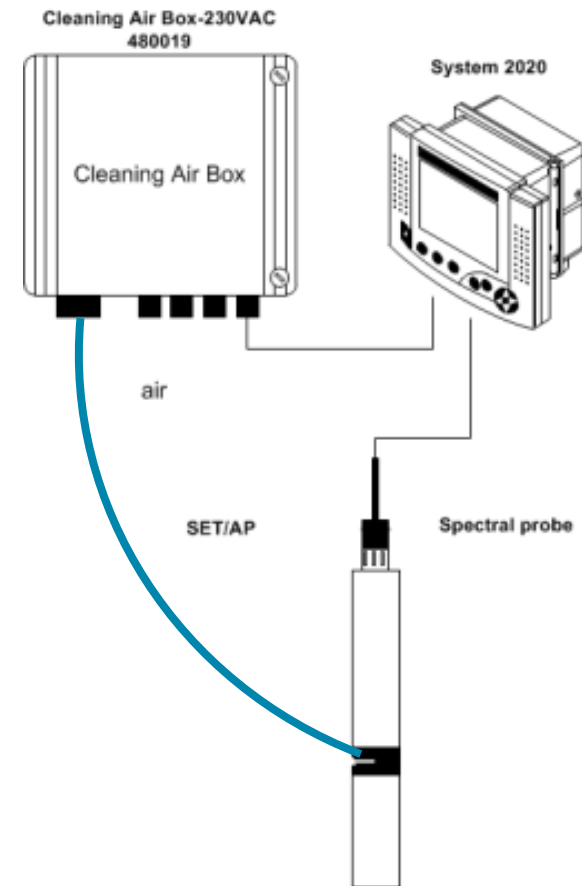
Compressed air available

→ Valve Module



Compressed air not available

→ Compressor CAB

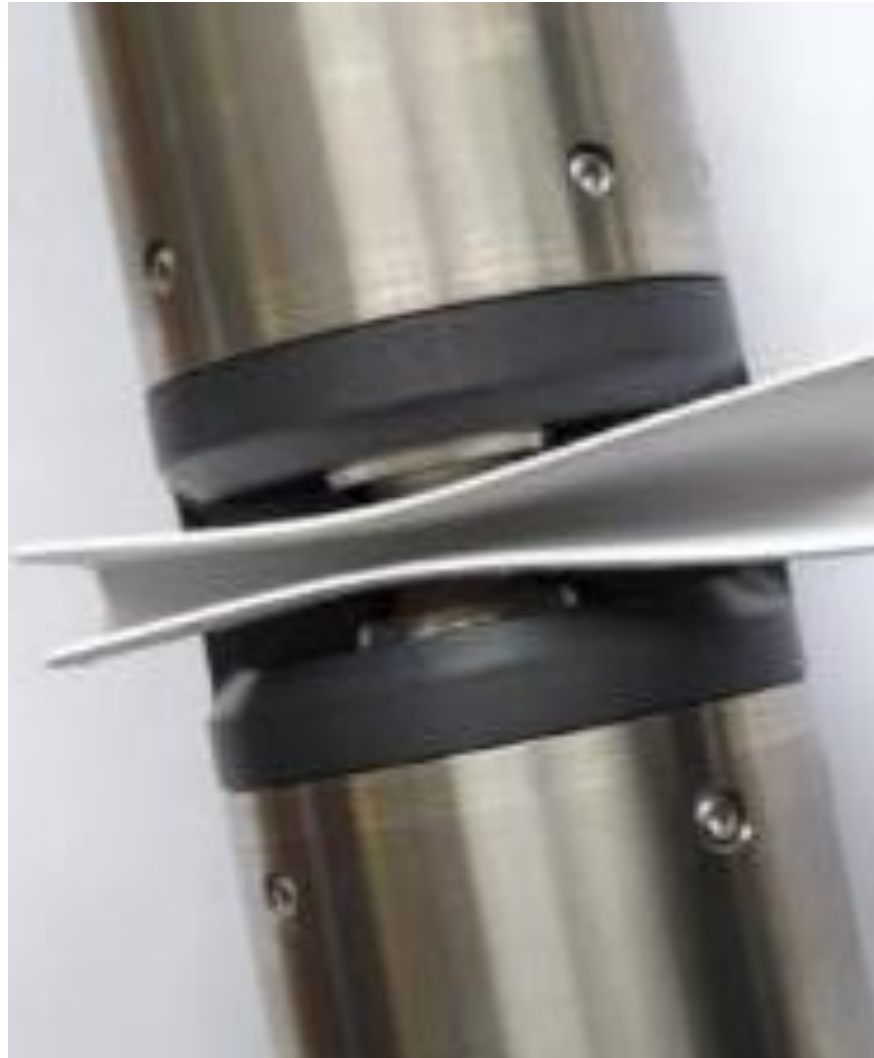


Retrofitting  
always possible!

# Example – wwtp in UK



# Manual Cleaning





# Material

## WTWs optical sensors:

Housing made of Titanium (even the screws),  
PEEK and sapphire glass optical windows

→ Extremely Corrosion Resistant



# Installation Accessories

For vertical mounting



EH/U 170 (109320)

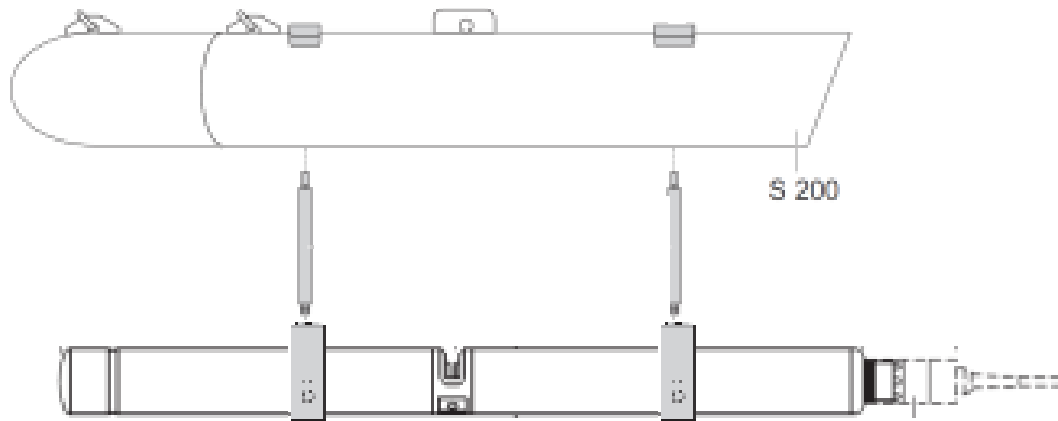
For horizontal mounting



VIS Set/EH (481073)

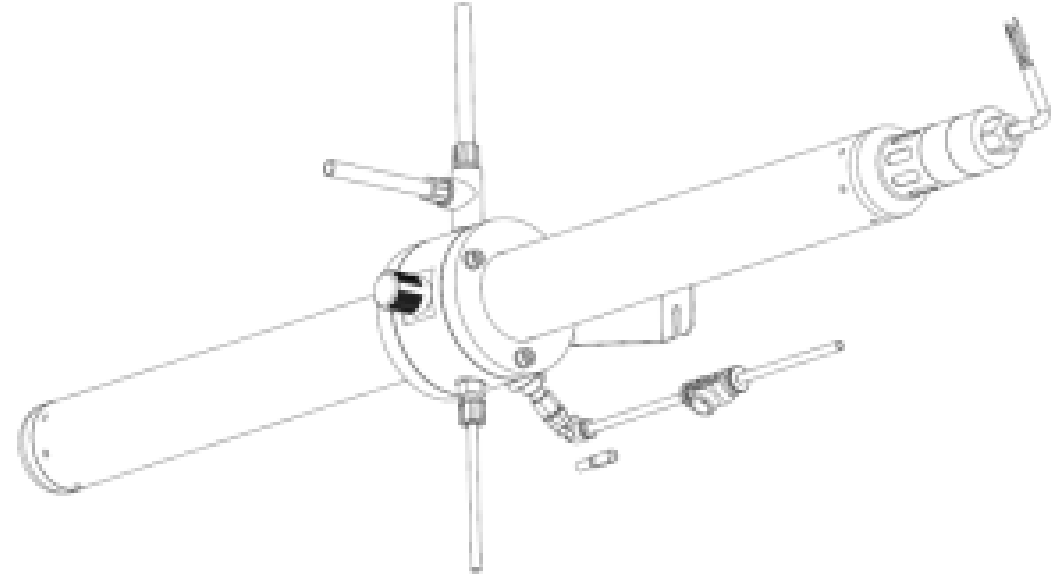
# Installation Accessories

For heavily fluctuating water levels



New VIS Set-F (481080) for installation on the float S 200

For flow-through measurement

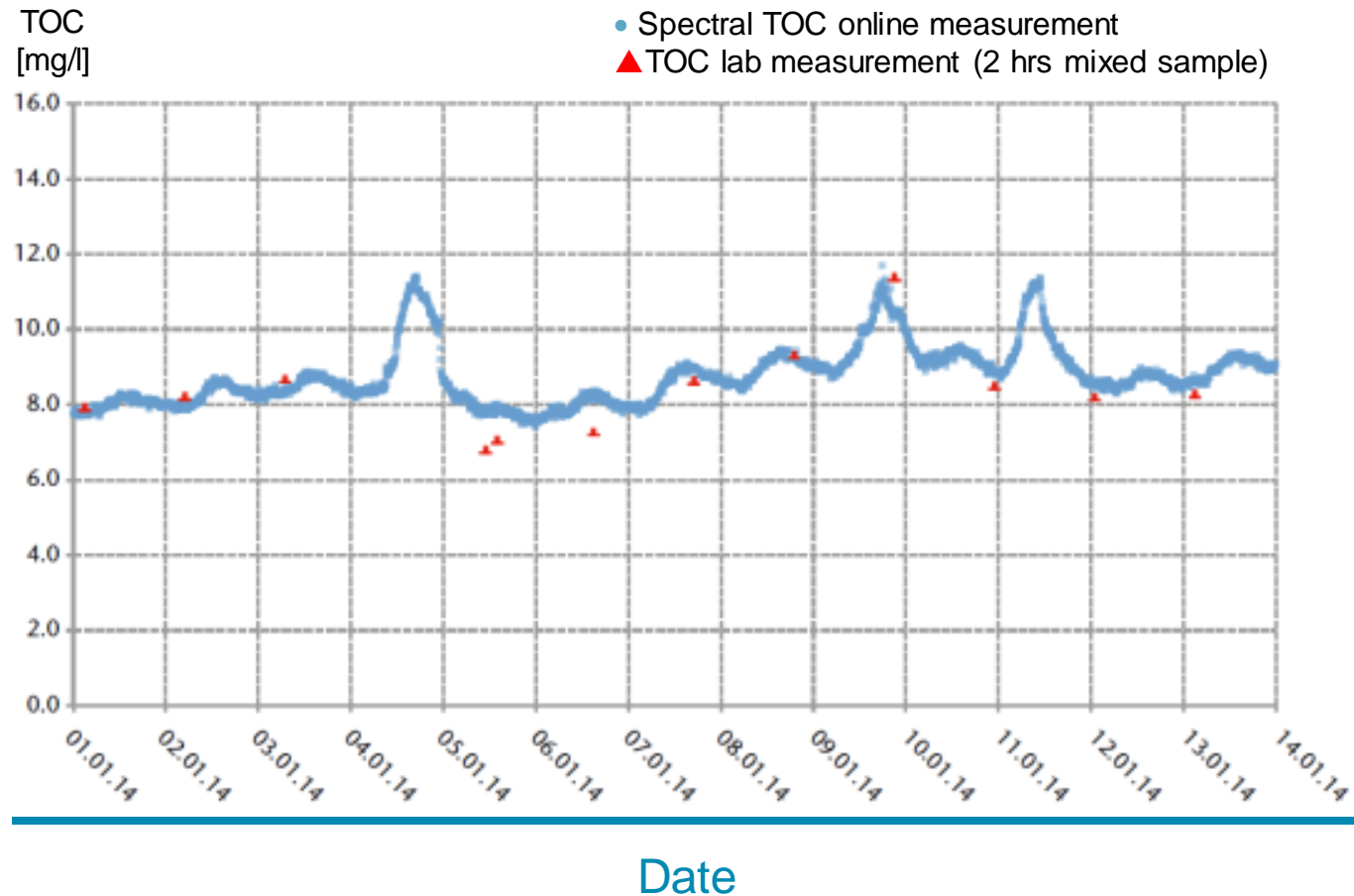


Flow through armature VIS FT-1 (480080)

# Application Example 1

## Effluent TOC monitoring

-WWTP Neuruppin, Germany-

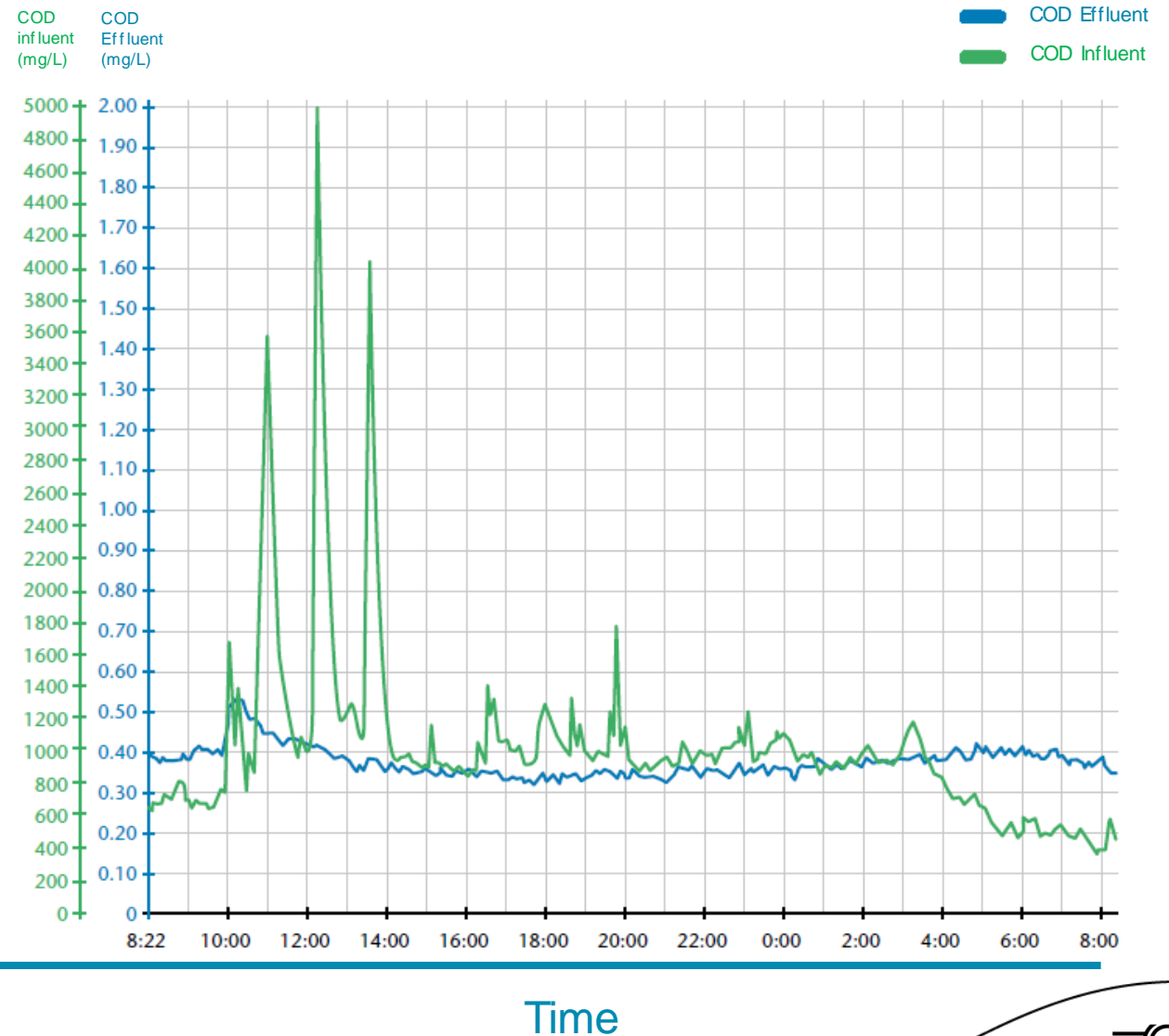




# Application Example 2

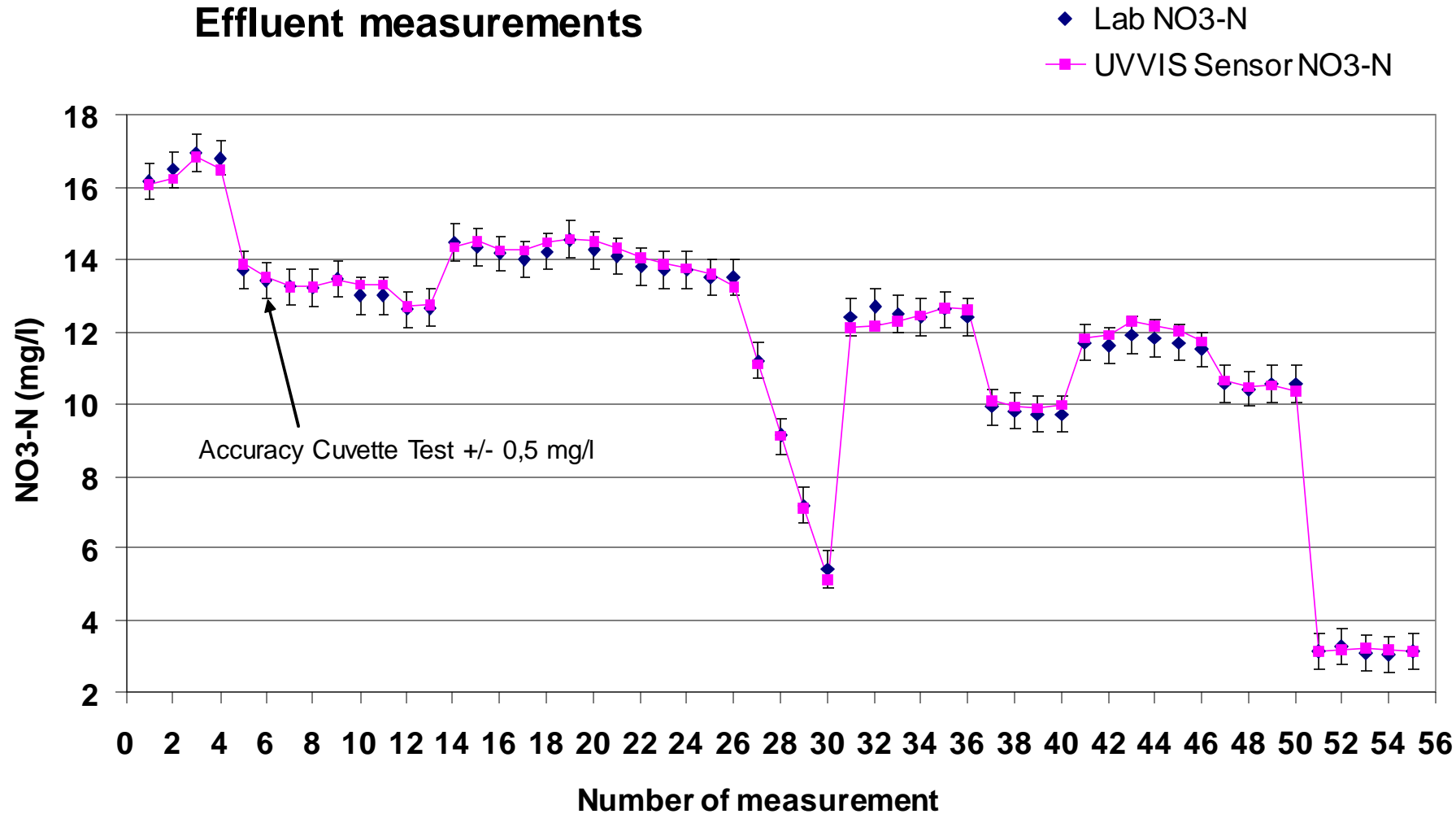
## Influent detection of COD organic load peaks

-WWTP Salzgitter Nord, Germany-



# Application Example 3

## NO3-N measurement- effluent municipal WWTP



# Questions?

## CONTACT US

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*\*\*An email will be sent out in the next few days that will include a link to the recording*