Mono /
Multi-Parameter
Analyser

awa instruments

# CX SERIES


- Multi-languages with touch screen technology
- Compact size
- 10-years lamp lifetime
- Measuring time within 10 seconds for most parameters
- No reagent (except NaOH for Ammonia)
- Accept unfiltered waste water
- Built-in automatic cleaning system
- Data logging with optional RS232 download

# INTRODUCTION

Based on a 20-years experience, the UVpcx is a state-of-the-art water monitoring system specially designed for high reliability, low operating cost and small size. Ultra-Violet spectroscopy, the most reliable and stable method, is used to analyse the specific parameters: Ammonia, COD, Hydrocarbons, Nitrate, Chlorophyll A and Color. Optical methods are also used for turbidity and color while electrodes are used for pH dissolved oxygen and conductivity.
Based on a modular design, the UVpcx can be configured as

- **Mono-parameter system:**
  On many process control applications, only one parameter is critical. In that case, the Uvpcx offers a cost-competitive solution.
- **Multi-parameter system:**
  Water chemistry is complex and to meet the regulations for drinking water or waste water, many parameters have to be taken in account.

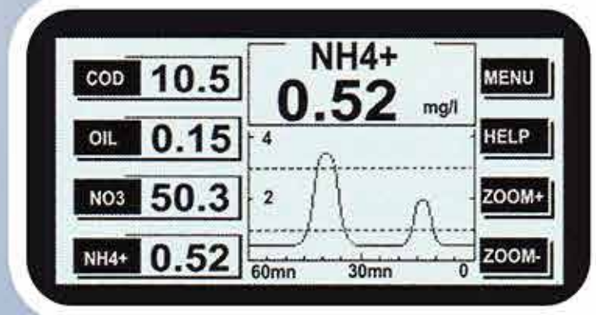
Designed in compliance with CE electromagnetic standards and using a watertight IP54 box, the PCX is the ideal instrument for industrial applications such as:

- Water treatment plants
- Industrial effluents monitoring
- River monitoring
- Chemical, oil and food industries

Mono /
Multi-Parameter
Analyser

CX SERIES

# STANDARD METHODS & ON-LINE ANALYSIS




The standard methods are based on traditional and well-known chemical methods that are convenient for laboratory use but not applicable for on-line analysis.

The automation of such methods lead to complex system requiring a high maintenance and having a poor reliability. Moreover, the cost of reagent is prohibitive and some of them are dangerous pollutants.

Also, the measuring time is generally not compatible with process control.

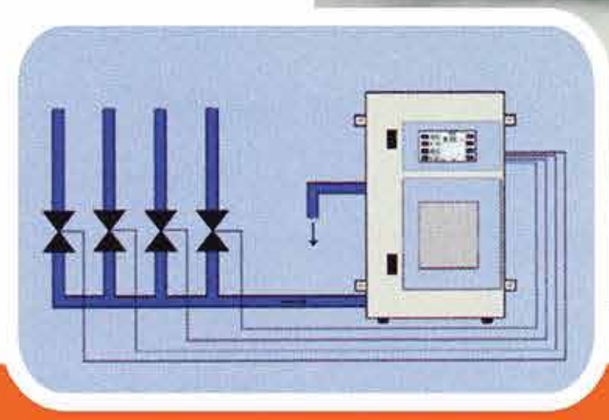
It's the reasons for which the UVpcx use direct optical methods for the specific parameters for stable, fast and reliable measurements.

No drift or limited lifetime is to be feared as with electrode-based systems that avoids the need ofcostly standard solutions.

On some applications, the result on UVpcx can be more accurate than those obtained by standard colorimetric methods that are subject to many interferences, for examples chloride for nitrate and COD analysis.

# FEATURES

- UV lamp 10 years life time
- Better reliable sampling pump (pumping height up to 5 meters)
- Good performance stainer prevents large suspended solid
- No filtering with River Water or Waste Water
- Datalog with RS232 download (no specific software is required)
- Connectivity and web enabled
- Multiplaxing configuration



# TECHNICAL DATA

| SPECIFICATION | RELEVENT STANDARD |
|---|---|
| Response time | 5 sec |
| Cleaning mechanism | Automatic cleaning system using 5%-10% H2SO4 |
| Accuracy | ±5% |
| Calibration | Manual Calibration |
| Display | 240 x 128 pixel LCD with backlight |
| Power Supply | 110-130VAC or 220-240VAC / 50-60Hz |
| Operating Temperature | 0-50°C / No Freezing |
| Humidity | 0-99% |
| CE Standard | Electromagnetic compatibility EN50081-2, EN50082-2, EN55011 |
| Output | 4-20mA Output |
| Communication | MRS232 – No special software, Excel compatible (standard), MRS485 (Optional) |
| Alarm output | 4 programmable relay signal output |
| Enclosure | IP54, Coated Steel |
| Dimensions | Standard – H 600 x W 409 x D 230 mm |
| Weight | 20kg |
| Preocess connection | 3/8" OD |
| Inlet pressure | Max: 1 bar |
| Pumping Height | Up to 5 meters |

**Specifications subjected to change without prior notice.*

Mono /
Multi-Parameter
Analyser

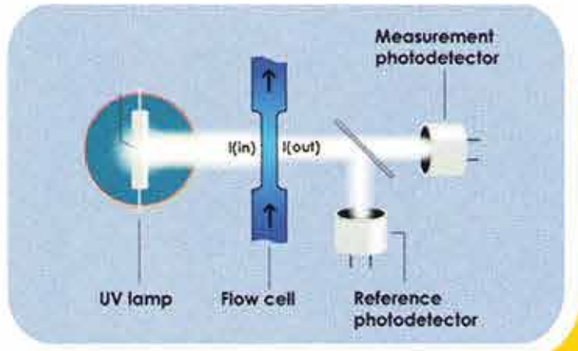
## CX SERIES


COD ONLINE ANALYSER

# CX3000 SERIES

# MEASURING PRINCIPLE

The measuring principle is based on the UV light absorption by unsaturated organic molecules at 254nm according to the Beer-Lambert law:
[C] = k log (Iin/ Iout)
With:
[C]: concentration of the sample
k: absorption coefficient (specific to each molecule)
Iin: light intensity at the input of the sample
Iout: light intensity at the output of the sample




# THE APPROXIMATE RATIO COD/UV (PPM.ABS-1.M) IS GIVEN BELOW FOR A FEW CHEMICALS :

| | |
|---|---|
| Acrolein | 3 |
| Benzene | 5 |
| Chlorobenzene | 5 |
| Dimethyldisulfide | 3.5 |
| Hydrogen peroxide | 1.5 |
| Nitro benzene | 0.15 |
| Phenol | 5 |
| Styrene | 0.25 |
| Tetrachloroethylene | 0.5 |
| Toluene | 5 |
| Triethylamine | 1 |
| Xylene | 7 |

Generally , the sample is a mixture of many different molecules giving an average absorption coefficient.

That means that the instrument must be calibrated according to a COD laboratory measurement before using.

Also, the ratio of the different molecules must remains approximately constant to assume a good correlation with laboratory COD.

The UV absorption can be considered as an alternative method for COD (Chemical Oxygen Demand) when fast, reliable and inexpensive measurements with very low maintenance are required.

The correlation for industrial wastewater may need an experimentation to be validated while results are guaranteed on river water or urban wastewater.
Turbidity, suspended solid or dirty on the flow cell is automatically compensated by a differential measurement with a second detector at a reference wavelength.

This method is in accordance with DIN38404-C3 standard and can be considerate as an alternative method referring to AFNOR XPT90-210 standard.

# AVALIABLE SERIES AND RANGES

| Analyser Series | | Ranges | | | |
|---|---|---|---|---|---|
| CX3000 Series COD Analyser | | 0-200mg/l | 0-800mg/l | 0-2000mg/l | 0-20000mg/l |
| CX3100 Series (multiparameter) | COD | 0-200mg/l | 0-800mg/l | 0-2000mg/l | 0-20000mg/l |
| | SS | 0-300NTU | 0-500NTU | 0-1000NTU | 0-3000NTU |
| CX3200 Series (multiparameter) | COD | 0-200mg/l | 0-800mg/l | 0-2000mg/l | 0-20000mg/l |
| | BOD | 0-100mg/l | 0-400mg/l | 0-1000mg/l | 0-10000mg/l |
| CX3300 Series (multiparameter) | COD | 0-200mg/l | 0-800mg/l | 0-2000mg/l | 0-20000mg/l |
| | TOC | 0-66mg/l | 0-264mg/l | 0-660mg/l | 0-6600mg/l |
| CX3400 Series (multiparameter) | COD | 0-200mg/l, 0-800mg/l, 0-2000mg/l, 0-20000mg/l | | | |
| | NH4 | 0-10mg/l, 0-30mg/l, 0-100mg/l, 0-300mg/l, 0/1000mg/l | | | |
| CX3500 Series BOD Analyser | BOD | 0-100mg/l | 0-400mg/l | 0-1000mg/l | 0-10000mg/l |
| CX3600 Series TOC Analyser | TOC | 0-66mg/l | 0-264mg/l | 0-660mg/l | 0-6600mg/l |
| CX3900 Series (multiparameter) | COD | 0-200mg/l | 0-800mg/l | 0-2000mg/l | 0-20000mg/l |
| | BOD | 0-100mg/l | 0-400mg/l | 0-1000mg/l | 0-10000mg/l |
| | TOC | 0-66mg/l | 0-264mg/l | 0-660mg/l | 0-6600mg/l |
| | SS | 0-300NTU | 0-500NTU | 0-1000NTU | 0-3000NTU |

**Other ranges on request.*

## Other Add-on parameters

- pH
- Dissolved Oxygen
- Conductivity
- Turbidity
- Chlorine

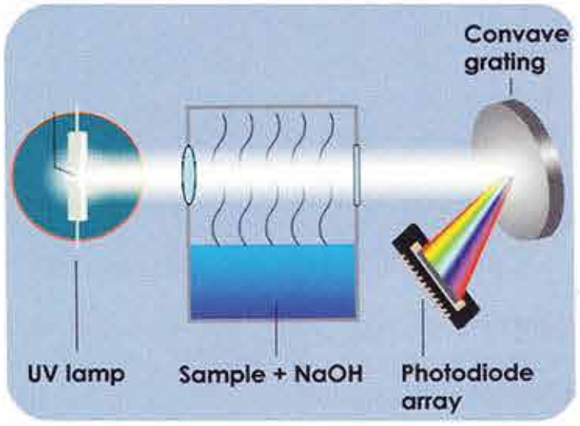
Mono / Multi-Parameter Analyser

CX SERIES

AMMONIA ONLINE ANALYSER

# CX4000 SERIES

## MEASURING PRINCIPLE




The measuring principle is based on UV light absorption spectrum of ammonia gas NH3 in equilibrium with dissolved ammoniac gas in the water sample.

A small quantity of sodium hydroxide (NaOH) is added to the sample to increase the pH for transforming NH4+ to NH3.
A Fast Fourier Transform (FFT) is applied on the spectrum to extract the absorption signal typical to ammoniac gas. This method is very selective and no interference is known on river or waste water.

Moreover, turbidity or color of the water has no influence as the measurement has no influence as the measurement is performed in the gaseous phase.

Waste water with suspended solids as activated sludge can be admitted without filtering.

This method us known since 1956* but requires strong mathematical signal processing that only powerful-microprocessor-based instruments can handle.

The stability of the measurement (at the opposite of the electrodes) avoids the use if costly standard solution. An auto-zero is performed at each measuring cycle.

The detecting system is in a separate enclosure for a good accessibility.

## APPLICATION ON RIVER WATER

The concentration of ammonia in river water is an important parameter for drinking water treatment plants.

Stability, reliability and low maintenance are the major concerns for these applications that only UV spectroscopy method can archive. The graph below shows typical measurements on river water.


## APPLICATION ON WASTE WATER

Waste water treatments plants need a fast and reliable ammonia measurement to control the nitrogen removal process that only UV spectroscopy method can really achieve.

The measurement on the gaseous phase avoids any interference with turbidity or suspended solid and the use of large bore tubing make possible the measurement on activated sludge.

The automatic cleaning system maintains the tubing clean.

## RANGES

| Analyser Series | Ranges |
|---|---|
| CX4000 Series NH4 Analyser | 0-10mg/l, 0-30mg/l, 0-100mg/l, 0-300mg/l, 0/1000mg/l |

### Other Add-on parameters

- pH
- Dissolved Oxygen
- Conductivity
- Turbidity
- Chlorine

## Specific Technical Data

| Specification | Relevent Standard |
|---|---|
| Zero drift | 5.00% |
| Full range drift | 6.00% |
| Measuring time | 15 mins |

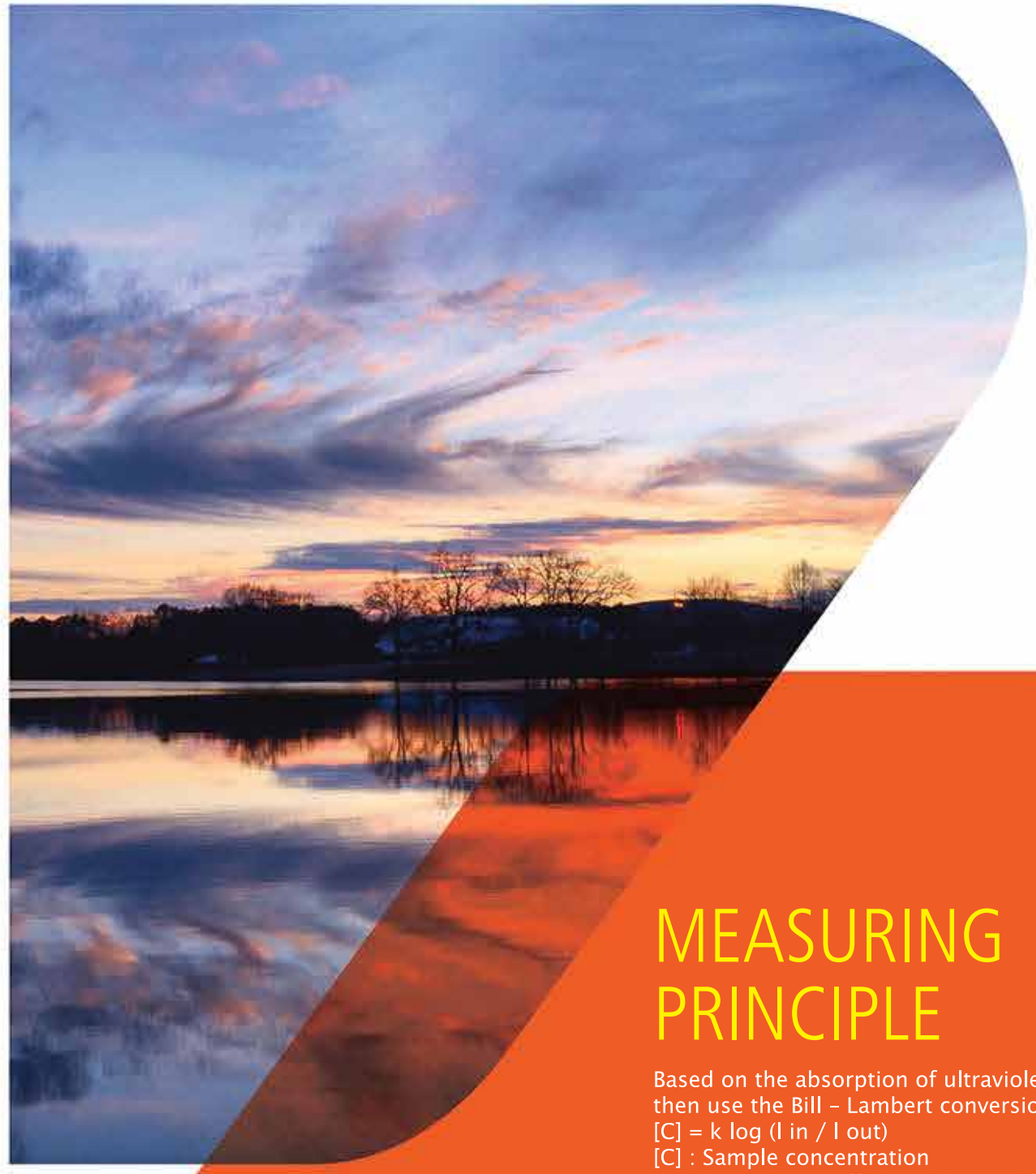
**Above informations subjected to change without prior notice.*

Mono /
Multi-Parameter
Analyser

## CX SERIES


COLOR ONLINE ANALYSER

# CX5000 SERIES



## MEASURING PRINCIPLE

Based on the absorption of ultraviolet light, and then use the Bill – Lambert conversion law:
[C] = k log (I in / I out)
[C] : Sample concentration
k : Absorption coefficient (the specific numerator each)
I in: Incidence light intensity
I out : Transmission light intensity

## RANGES

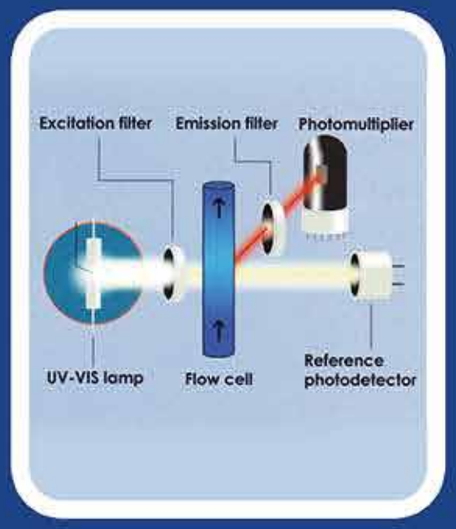
| Analyser Series | Ranges |
|---|---|
| CX5000 Series Color Analyser | 0-100Pt-Co, 0-500Pt-Co, 0-1000Pt-Co |

Mono / Multi-Parameter Analyser

**CX SERIES**

# OIW ONLINE ANALYSER
# CX6000 SERIES

## MEASURING PRINCIPLE




The measuring principle is based on fluorescence: when light at a specific wavelength (excitation), some chemicals re-emit (emission) at a longer wavelength.

Very few chemicals are fluorescent giving a highly selective measurement.

The table below gives the relative intensity of some aromatic hydrocarbons.

| | |
|---|---|
| Anthracene | 42 |
| Benzene | 10 |
| Biphenyl | 20 |
| Chlorobenzene | 7 |
| Fluorobenzene | 10 |
| Naphtalene | 35 |
| Phenanthrene | 25 |
| Phenol | 18 |
| Propybenzene | 17 |
| Styrene | 10 |
| Toluene | 17 |
| Xylene | 22 |

The emission light is detected by a high sensitivity photomultiplier to detect low concentrations from a few ppb.

The excitation light is controlled by a detector to compensate any variation of the source.

The application (aromatic hydrocarbons, Chlorophyll A, Rhodamine or fluorescein) needs to be specified when ordering the instrument.
It can be modified by the user by changing the optical filters.

A higher sensitivity than falling stream flow cell is obtained due to the absence of parasite light reflections.

The flow and pressure of the sample may vary in a wide range at the opposite of falling stream flow cells that need a complex hydraulic system to control the flow.

## APPLICATION ON LAKE, RESERVOIR AND RIVER WATER

Hydrocarbons are dangerous pollutants that have to be detected very early on reservoir or river for producing drinking water.

Fast and reliable measuring system is necessary and the UV fluorescence is the only method matching these requirements.

## APPLICATION FOR COOLING WATER

The concentration of hydrocarbons in cooling water is a critical parameter or refineries. A fast and reliable on-line measuring system is necessary and the UV fluorescence is the only method matching these requirements.

## APPLICATION FOR WASTE WATER

The effluents of refineries and chemical plants have to stay below limits to meet the environmental regulations.

A reliable and low maintenance measuring system is required that only UV fluorescence can achieve.

The automatic cleaning system of UVpcx maintains clean the flow cell avoiding any manual operation to clean a calibrated aperture as with open flow cell systems.

## RANGES

| Analyser Series | | Ranges | | |
|---|---|---|---|---|
| CX6000 Series OIW Analyser | OIL | 0-10ppm | 0-100ppm | 0-1000ppm |
| CX6000 Series OIW Analyser | Phenol | 0-1ppm | 0-10ppm | 0-100ppm |

### Other Add-on parameters

- pH
- Dissolved Oxygen
- Conductivity
- Turbidity
- Chlorine

Mono /
Multi-Parameter
Analyser

CX SERIES


CHLOROPHYLL ONLINE ANALYSER

# CX7000 SERIES

## MEASURING PRINCIPLE

Based on the principle of fluorescent measurement method:
When the light to a specific wavelength injection (excited state) by certain chemicals substances, these substances will be reflecting a longer wavelength fluorescence (emission state). High-precision photomultiplier can monitor such fluorescence, Chlorophyll Online Analyzer, designed by the characteristics of the chemical substances.

## RANGES

| Analyser Series | Ranges |
|---|---|
| CX7000 Series Chorophyll Analyser | 0-300ppb |

Mono /
Multi-Parameter
Analyser

CX SERIES


NITRATE ONLINE ANALYSER

# CX8000 SERIES

# MEASURING PRINCIPLE

The measuring principle is based on the strong UV light absorption of the chromophore NO at 210 – 220nm according to the Beer-Lambert law:
[C] = k log (Iin/Iout)

With:
[C]: sample concentration
k: absorption coefficient
Iin: light intensity at the sample input
Iout: light intensity at the sample output

An automatic internal linearisation compensates the inherent non-linearity of Beer-Lambert law for high concentrations.
The measurement is the weighted sum of NO2 and NO3 concentration, but in most applications the NO2 concentration is negligible regarding NO3 concentration.
Turbidity, organic matter, suspended solid or dirty on the flow cell are automatically compensated by a differential measurement with a second detector at a reference wavelength.
Chlorates and chlorites at high concentration are the only inorganic cause of interference but hopefully they are not encountered on drinking water or urban waste water.

# RANGES

| Analyser Series | Ranges | | |
|---|---|---|---|
| CX8000 Series NO3 Analyser | 0-30mg/l | 0-100mg/l | 0-250mg/l |