FORBES MARSHALL

Accurate Online Measurement of COD/BOD/TSS/pH/TOC

CX2000 multi-parameter analyser for water and wastewater

CX2000 Multiparameter Analyser

Wastewater contains microorganisms and harmful chemicals that pose a risk to human health and the environment. Discharging untreated wastewater into water bodies leads to contamination, and thereby negative effects on local communities and ecosystems. Regulatory bodies require wastewater treatment to be monitored to ensure that the water is safe before being released into the environment.

Besides wastewater, it is important that the quality of water used in industrial processes is maintained. Detection of factors like improper water chemistry and high carbon content can enable timely action to eliminate issues.

Real time analysis for traditional chemical methods is a complex and time intensive process. These methods also require hazardous reagents. UV optical methods overcome these limitations, and hence are the preferred methods for on-line analysis and real time data reporting.

For over 75 years Forbes Marshall has been providing innovative solutions to help businesses improve their process and energy efficiency and be more environmentally responsible. Our UV series CX2000 optical analysers for water quality monitoring use UV vis spectroscopy to analyse specific parameters such as COD, BOD, TOC, TSS, ammonia, nitrate, hydrocarbons and sulphides. They are designed for higher reliability with lower operating cost and compact footprint.

Water chemistry is complex. To meet the regulations for effluent discharge, sewage and waste water treatment, several parameters need to be taken into account, and monitored on a real time basis.

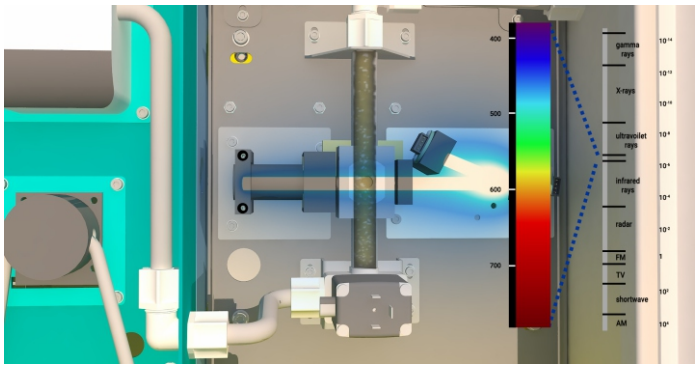
The CX2000 series analyser can monitor multiple parameters for water and waste water treatment. It is designed on a modular platform and housed in a dual compartment cabinet. The electronics and hydraulics are separated making it suitable for demanding industrial applications.

These analysers meet the electromagnetic compatibility requirements in accordance with IEC standards and TUV Rheinland certified system. The IP54 rated enclosure is designed to IEC 60529 standards, under SGS certification with NABL accreditation.

The UV VIS CX2000 series optical platform analysers are the ideal solution for real time monitoring in

- Industrial effluent treatment [OCEMS]
- Municipal water treatment plants
- River water monitoring
- Demanding applications in chemical, food and oil refinery processes that have harsh and untreated chemicals, carbon load, high concentration of acids or bases, high temperatures, or are highly corrosive in nature

Measuring Principle



[C] = k log (lin/lout) with :

[C] : concentration of the sample

k: absorption coefficient (specific to each molecule)
lin : light intensity at the input of the sample

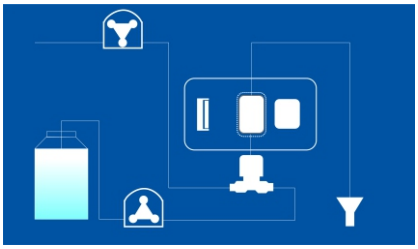
Iout: light intensity at the output of the sample

The measuring principle of the system is based on UV-Visible absorption spectroscopy which involves measuring the intensity of light absorbed by a sample at UV and visible wavelengths.

The concentration of a particular molecule in the sample is determined by the ratio of the light intensity at UV wavelength at the input of the sample to the light intensity at the output of the sample, and an absorption coefficient specific to each molecule.

This technique automatically compensates for intensity fluctuations of the lamp, turbidity, suspended solids, or dirt on the flow cell by using a differential measurement with a second detector at a reference wavelength. It is in accordance with the DIN38404-C3 standard, and can be considered as an alternative method referring to the AFNOR XPT90-210 standard.

Auto Cleaning and Auto Zero Calibration System



The state-of-art automatic cleaning feature of the CX2000 is ideal for waste water monitoring. It uses a low cost solution of DM/DI water with a 10% acid mix to automatically clean the flow cell on a daily basis. This helps remove build-up of contamination or residue on the optical windows, thereby eliminating measurement drift or interference from colour tints.

Auto zero calibration is performed simultaneously. This ensures accurate and reliable measurements.

No Filtering of Samples

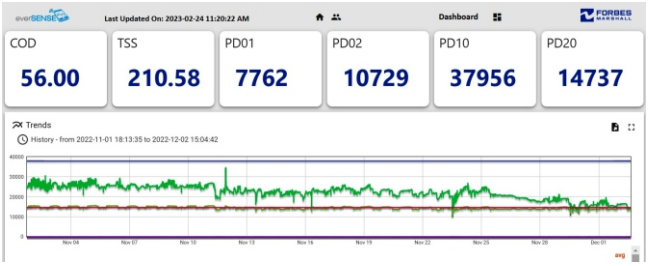
The large bore tubing of flow cell, non-metallic MOC and specialised 3-way electric valve with pivoting armature in CX2000 series allow for unfiltered samples to be analyse without the risk of clogging.

User Interface Benefits

The CX2000 modular platform uses a 7” TFT 64K backlit colour display with a resolution of 800 X 480 pixel. Vital information like daily / monthly / yearly trend mapping can be easily viewed on the display. A three-month data log is also available.

The system is configured for two level password protection and menu prompts. Alarms can be programmed for loss of sample, cleaning solution levels and sample temperature fluctuations.

Digital Services for Enhanced Uptime



- Compliance with regulatory norms
- >95% uptime with real time monitoring
- Data integrity
- Remote diagnostics and maintenance assistance
- Proactive and predictive spares management

Guidelines issued by regulatory bodies for OCEMS specify a minimum of 85% data availability from the system installed. Non-compliance can lead to heavy penalties, and even plant closures.

Forbes Marshall assists plants to comply with these norms by creating a digital ecosystem to enhance the uptime of OCEMS measuring devices. An expert team works round the clock to analyse the monitoring data and provide remote assistance for maintenance of the system.

This Enhanced OCEMS Uptime Service for Forbes Marshall devices facilitates a participative approach to ensuring compliance to regulatory norms.

Specifications	
General	
Method	COD/BOD/TSS/TOC : UV-VIS absorption dual beam spectrophotometry at 190~750nm pH : potentiometric with combination pH sensor BOD/TOC are co-relation with COD
Calibration	Online auto zero calibration for COD/TSS with OFFSET correction Manual SPAN calibration for COD/BOD/TSS/pH (in-place)
Operation cycle	Continuous or batch type
Cleaning	Automatic built-in cleaning function. User programmable
Operation	Reagent and chemical free analysis
Compensation	Auto turbidity and color compensation
Interferance	Independent of flow and pressure variations
Sample Conditions	
Temperature	+5 to +80 Deg. C
Pressure	0.3-1 bar
Flow rate	5-50 LPH
Filtration	Not required
Analyser	
Type	Advanced Microprocessor Based System - ARM CORTEX-M4 CORE, 168 MHZ CPU
Display	7" TFT color display with backlit, resolution 800 X 480 pixel, resistive touch
Graphical analysis	Graphical trend analysis, time based - 15 min : day/week/month (3 months trend)
Accuracy	± 2%-5% [standard solution], 5%-10% process validation; for pH : 0.1 pH
Response time	Within10 Sec
Measuring cycle	Programmable / normally 3-5 minutes
Analog output	4-20 mA. DC, isolated
Certifications	TUV IEC 60529 IP54
MOC and Dimension	MS Epoxy Coated, 604mm (H) x 414mm (W) x 240mm (D)
Relay outputs	8 relay contacts, low and high set points
Power supply	110- 230V AC,50/60Hz; 150 VA
Ambient temperature	0 to 50 Deg. C
Communication	RS485 MODBUS RTU+ diagnostics
Diagnostics	Detector healthiness, cleaning tank empty, sample temperature, last 10 calibrations, date / time stamping on calibration data; scale & cal factor, error codes over MODBUS – for connection to DCS/PLC
Data Storage	Analyser : 3 months with 15 mins cycle time At CPCB server : Continuous data monitoring storage and trends available.

Analyser Models

Model	COD	BOD	TSS	pH	TOC
CX2000-3912	0-300 mg/l	0-150 mg/l	0-450 mg/l	0-14 pH	0-99 mg/l
CX2000-3922	0-800 mg/l	0-400 mg/l	0-750 mg/l	0-14 pH	0-264 mg/l
CX2000-3932	0-2000 mg/l	0-1000 mg/l	0-1500 mg/l	0-14 pH	0-660 mg/l
CX2000-3952*	0-5000 mg/l	0-2500 mg/l	0-2000 mg/l	0-14 pH	0-1650 mg/l

*Consult Factory / Forbes Marshall Engineer

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