

D.O.

Oxygen

On-Line Dissolved Oxygen Measurement

Measuring · Monitoring · Controlling



-  **Water / Wastewater Treatment**
-  **Water Pollution Control**
-  **Aquaculture**

Distributed by:

 **Carl Stuart Limited**

ADVANCED APPLIED TECHNOLOGIES

Contact Us:

Irl Ph: 01 4523432

UK Ph: 08452 30 40 30

Web: www.carlstuart.com

Email: info@carlstuart.com

Reliable and continuous measurements of dissolved oxygen have become of vital importance in many areas of the water/ wastewater treatment facilities. The availability of accurate and timely measured concentration values is an absolute need for process monitoring and dynamic process control to ensure an efficient plant operation.

For more than 50 years now, WTW has been recognized as a leader in the field of Dissolved Oxygen measurements. Innovative technologies, creative and continuous product development, and extensive application expertise have resulted in superior instruments and systems of outstanding performance, reliability and design for the most precise online measurements available.

Dissolved Oxygen Measurement

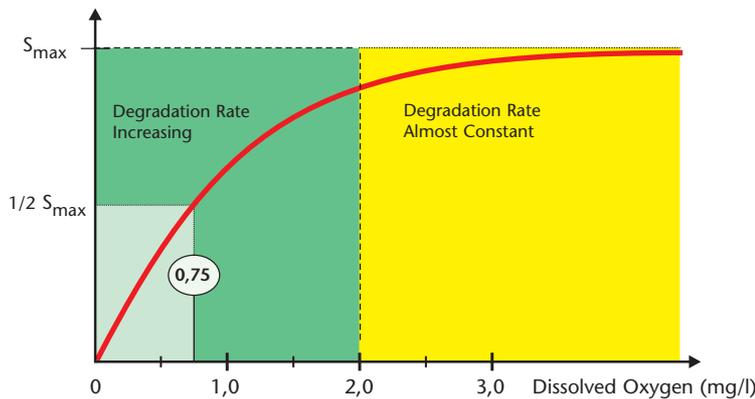
D.O. Monitoring and Control

In the biological nutrient removal process of wastewater treatment plants, continuous and precise measurement of dissolved oxygen concentration is of vital importance to an optimal and trouble free operation of the water/wastewater treatment facility. The efficiency of the purification process, either in the nitrification and denitrification phase, is mainly determined by the performance of the aeration control system; i.e., by a load-rate controlled oxygenation in the aeration basin.

In the presence of dissolved oxygen, the nitrifying bacteria convert ammonia to nitrate. The activity of the microorganisms depend on the oxygen concentration, with an economical limit at about 2 mg/l. Higher oxygen concentrations do not increase the rate of degradation.

NH₄-N Degradation Rate vs. D.O. Concentration

Degradation Rate



Controlling the aerator operation to a minimum run time, depending on the required oxygen concentration, helps in saving energy and maintenance costs. This is because the aerator equipment is the most energy consuming part of a biological wastewater treatment plant.

The residual dissolved oxygen in the sludge, however, has a negative effect on the conditions in the denitrification stage. For this reason, a minimal D.O. concentration is desirable but which, on the other hand, is sufficient for a total nitrification in the activated sludge. Only the use of precise and reliable on-line measuring instruments will ensure an efficient and energy saving control of the process.

WTW D.O. Measurement Systems

WTW has been continuously designing, manufacturing and satisfying the demands for reliable dissolved oxygen measurements with the most advanced online systems available anywhere.

The WTW product line includes a wide range of precision D.O. sensors and monitors as well as the revolutionary IQ SENSOR NET system so that the optimum system configuration can be chosen for the particular application.

TriOxymatic®

Oxygen Sensors

The ECDO: proved and tested...

ECDO

stands for **Electrochemical Dissolved Oxygen Sensor**. 50 years ago, Clark's cell was introduced and WTW was among the first manufacturers to advance this principle for water and wastewater applications. Today, WTW's DO measuring technology is considered the standard in water analysis.

High accuracy

WTW sensors feature extremely low maximum errors of 1% of the measured value (i.e. 0.02 mg/ml at a measured value of 2 mg/ml), regardless of whether measuring in the upper or in the lower range of the instrument.

No replacement of the membrane cap

No regular replacement of the membrane cap is required. (At most, this may be required after several years of operation, depending on process conditions.)

Maintenance-free due to special membrane

The membrane or the membrane cap plays a decisive role in all DO measuring techniques. Fouling or mud covering of the membrane or of the cap will affect the measurement reading. Unlike conventional membranes, e.g. silicone etc., the teflon membranes used by WTW are highly resistant to fouling. This allows operation without the use of additional cleaning accessories in most cases.

Self-check for safe operation

All relevant parts such as the membrane are monitored for damage and defects by the sensors' diagnostics are displayed. No regular visual inspections or preemptive replacements of the membrane caps are required.



Dissolved Oxygen Sensors

Stable readings right from the start

All WTW ECDOs provide stable and reproducible readings right from the start:

- No break-in
- No long-term drift
- No zero point drift due WTW's patented TriOxmatic® principle.

The Best News

WTW's ECDO technology has been thoroughly proven in 20 years of field use: More than 20,000 installations can be found in reliable operation worldwide.



Practical experience... ...put into practice

Perfected technology

Optimum immunity to interference

High level of accuracy and immunity to interference through built-in preamplifier. Its active electronics, located directly in the sensor, process the sensitive sensor signal on-site and convert it into a low impedance signal, which is immune to interference.

Integrated lightning protection

The highly efficient, built-in lightning protection device provides reliable protection to the sensor and transducer against high energy impulses often released by lightning strikes.

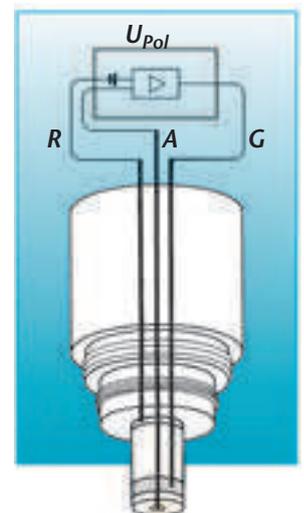


Patented Technology

3-electrode system

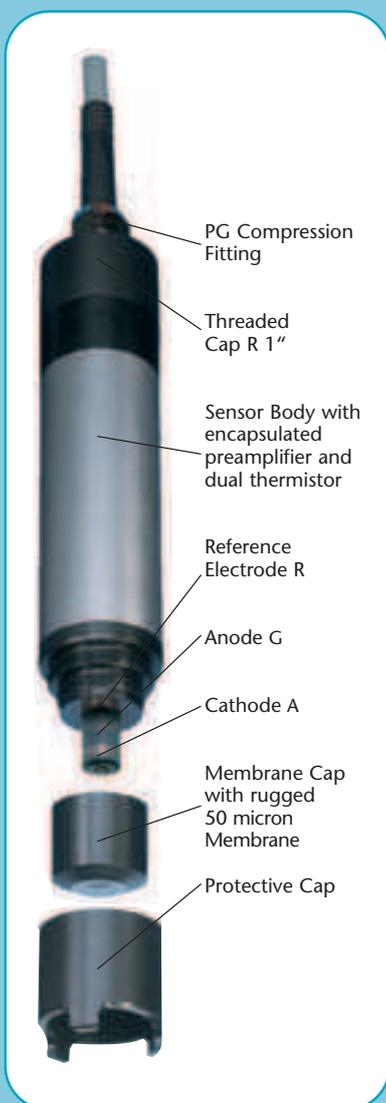
In contrast to conventional membrane covered oxygen sensors equipped with 2-electrode technology, the TriOxmatic® sensor functions with a potentiostatically driven 3-electrode system. In terms of measuring technology, this means that the measuring system has two silver electrodes and a gold cathode (A). One silver functions as a non-current bearing reference electrode (R). And, the other is the live, counter electrode (G). The reference electrode thus displays significantly improved potential constancy, which in turn leads to considerably improved sensor signal stability and thus higher measuring accuracy.

The 3-electrode technology additionally allows precise monitoring of the electrolyte supply, i.e. the system displays when the electrolyte solution needs to be replaced.





IQ Sensor connection



PG Compression Fitting

Threaded Cap R 1"

Sensor Body with encapsulated preamplifier and dual thermistor

Reference Electrode R

Anode G

Cathode A

Membrane Cap with rugged 50 micron Membrane

Protective Cap

IP 68

UL CUL

2 Years Warranty

TriOxmatic®

To optimally satisfy the various requirements for a wide range of wastewater and water applications, the TriOxmatic® Series offers the choice of several D.O. sensors with different operating specifications. All models are based on the potentiostatic 3-electrode principle (except TriOxmatic® 700 IN) and have the same reliability and precision; however, their resolutions, response times and required flow rates are adapted to suit different applications.

Analog

TriOxmatic® 700/700 IN

The standard Model TriOxmatic® 700 is a rugged dissolved oxygen sensor with a very durable 50 micron thick hydrophobic membrane, a minimal flow rate of 0.5 cm/sec and a medium response time of less than 180 sec. With these features, this membrane sensor is ideally suited for any D.O. measurement in biological purification stages of municipal waste water treatment plants; e.g. **control of the oxygenation**. The response of the sensor prevents signal disturbances due to rising air bubbles thus eliminating false readings and improved stability. This is specially important for measurements in aeration tanks.

TriOxmatic® 690

This cost-effective D.O. sensor offers the same specifications and features as the Model TriOxmatic® 700, except it does not have the sensor monitoring function. This unit is primarily designed for conventional D.O. measurements, where a continuous membrane check is not needed; e.g. general applications in water quality analysis.

TriOxmatic® 701

Equipped with a special 25 micron thick membrane, the Model TriOxmatic® 701 features an enhanced resolution and a faster response time. This sensor is ideally suited for low level concentration applications; e.g. measurements of **residual oxygen** in the **denitrification** of biological sewerage treatment.

Digital

TriOxmatic® 700 IQ

Universal oxygen sensor for **measuring and controlling oxygen input in biological sewage treatment processes in wastewater treatment plants**. Membrane, flow rate and response times equivalent to TriOxmatic® 700, however as digital sensor with calibration value memory for connection to IQ SENSOR NET.

TriOxmatic® 701 IQ

O₂ sensor with increased resolution and improved response times. Technical specifications equivalent to TriOxmatic® 701, however as digital sensor with calibration value memory for connection to IQ SENSOR NET.

TriOxmatic® 702 IQ

Providing similar performance data as the TriOxmatic® 701, the 702 IQ model is specifically designed for trace level measurements in the ppb range. This sensor is ideally suited for use in ultra-pure water applications; e.g. monitoring of boiler feed water or drinking water purification. The applied digital technology permits integrated storage of calibration values and simple connection to IQ SENSOR NET.

Dissolved Oxygen Sensors

Analog

Digital

Technical Data

TriOxmatic®	690/700 (SW*)/700 IN	701	700 IQ (SW*)	701 IQ	702 IQ
Measuring Ranges (25 °C)					
O ₂ concentration	0.0 ... 60.0 mg/l	0.00 ... 20.00 mg/l 0.0 ... 60.0 mg/l	0.0 ... 60.0 mg/l	0.00 ... 20.00 mg/l 0.0 ... 60.0 mg/l	0 ... 2000 µg/l 0.00 ... 10.00 mg/l
O ₂ saturation	0 ... 600%	0.0 ... 200.0% 0 ... 600%	0 ... 600%	0.0 ... 200.0% 0 ... 600%	0 ... 110%
	(depending upon the selected monitor model)				
Resolution					
O ₂ concentration	0,1 mg/l	0,01 mg/l 0,1 mg/l	0.1 mg/l	0.01 mg/l 0.1 mg/l	0.001 mg/l 0.01 mg/l
O ₂ saturation	1%	0,1 % 1%	1%	0.1% 1%	0.1%
Response time at 25 °C	t ₉₀ : 180 s	t ₉₀ : 30 s t ₉₉ : 90 s	t ₉₀ : 180 s	t ₉₀ : 30 s t ₉₉ : 90 s	t ₉₀ : 30 s t ₉₉ : 110 s
Minimum flow rate	0.05 m/s	0.23 m/s	0.05 m/s	0.23 m/s	0.3 m/s
SensCheck	SensLeck (700/700IN) SensReg (700/700 SW)	SensLeck SensReg	SensLeck SensReg	SensLeck SensReg	– SensReg
Signal output	Analog	Analog	Digital	Digital	Digital
Sensor memory for calibration values	–	–	Yes	Yes	Yes
Power consumption	–	–	0.2 Watt	0.2 Watt	0.2 Watt
Temp. measurement	Integrated NTC, 23 ... 122 °F (-5 °C ... +50 °C)		Integrated NTC, 23 ... 140 °F (-5 °C ... +60 °C)		
Temp. compensation	32 ... 122 °F (0 °C ... +50 °C)		32 ... 140 °F (0 °C ... +60 °C)		
Maximum pressure	10 bar		10 bar (incl. sensor connection cable)		
Ambient conditions	Operating temperature: 32 ... 122 °F (0 °C ... +50 °C) Storage temperature: 32 ... 122 °F (0 °C ... +50 °C)		Operating temperature: 32 ... 140 °F (0 °C ... +60 °C) Storage temperature: 23 ... 149 °F (-5 °C ... +65 °C)		
Electrical connections	Integrated PU connecting cable with fitted 7-pole screw connector (IP 65)		2-wire shielded cable with quick fastener to sensor		
Input power	Powered by WTW D.O. monitor		Powered by IQ SENSOR NET		
Transient voltage protection	Yes		Yes		
EMI/RFI Conformance	EN 61326 class B, FCC Class A		EN 61326 class B, FCC Class A Intended for indispensable operation		
Certifications	CUL, UL		CE, cETLus		
Mechanical	Membrane head assembly, locking cap: POM Sensor body: 316 Ti stainless steel Protection rating: IP 68		Membrane head assembly, locking cap: POM Sensor body: 316 Ti stainless steel Protection rating: IP 68		
Dimensions (length x diameter)	7.83 x 1.57 in. (199 x 40 mm) SW: 8.90 x 2.34 in. (226 x 59.5 mm)		14.17 x 1.57 in. (360 x 40 mm), incl. connection thread of SACIQ sensor connection cable; SW: 14.17 x 2.34 in. (360 x 59.5 mm)		
Weight	Approx. 1.46 lb (660 g); SW: approx. 1.90 lb (860 g)		Approx. 1.46 lb (660 g, without sensor connection cable); SW: approx. 2.58 lb (1.170 g)		

* SW: Sensor in sea water design (with plastic armouring (POM))

Ordering Information

		Order No.
TriOxmatic® 700-7	D.O. sensor for water/wastewater; oxygenation determination; cable length 23 ft. (7.0 m)	201 670
TriOxmatic® 690-7	Same as model 700-7, but without SensCheck function; cable length 23 ft. (7.0 m)	201 690
TriOxmatic® 701-7	D.O. sensor for water/wastewater; oxygenation/residual oxygen determination; cable length 23 ft. (7.0 m)	201 678
TriOxmatic® 700 IN-7	D.O. sensor for highly polluted industrial wastewater; cable length 23 ft. (7.0 m)	201 695
TriOxmatic® 700 IQ	D.O. sensor for water/wastewater; oxygenation determination	201 640
TriOxmatic® 701 IQ	D.O. sensor for water/wastewater; oxygenation/residual oxygen determination	201 644
TriOxmatic® 702 IQ	D.O. sensor, ppb measuring range; ultrapure water/boiler feedwater	201 646
SACIQ-7,0	Sensor connection cable for all IQ sensors, cable length 23 ft. (7.0 m)	480 042
Further cable lengths and special seawater/brackwater designs see brochure "Product Details"		

For information visit www.WTW.com for a customer care center near you or inside US: call WTW 800 645 5999.



Contact Us:

Irl Ph: 01 4523432

UK Ph: 08452 30 40 30

Web: www.carlstuart.com

Email: info@carlstuart.com

Configuration Guide

		Oxi 170 Field Monitor	Oxi 296 Panel Mount	IQ SENSOR NET Systems 182/184 XT/2020 XT
		1. Measuring Ranges 2. Response Time t_{90} 3. SensCheck Function		
Analog	TriOxmatic® 690 D.O. sensor for water/wastewater	1.: 0.0 ... 60.0 mg/l 0 ... 600 % 2.: < 180 s 3.: –	<ul style="list-style-type: none"> • Low-cost system without sensor diagnostic • Water/wastewater • Oxygenation 	—
	TriOxmatic® 700 D.O. sensor for water/wastewater	1.: 0.0 ... 60.0 mg/l 0 ... 600 % 2.: < 180 s 3.: SensLeak SensReg	<ul style="list-style-type: none"> • Water/wastewater • Oxygenation 	—
	TriOxmatic® 700 IN D.O. sensor for water/wastewater with permanent polarization	1.: 0.0 ... 60.0 mg/l 0 ... 600 % 2.: < 180 s 3.: SensLeak	<ul style="list-style-type: none"> • Industrial wastewater • Oxygenation 	—
	TriOxmatic® 701 D.O. sensor for water/wastewater	1.: 0.00 ... 20.00 mg/l 0.0 ... 60.0 mg/l 0.0 ... 200.0 % 0 ... 600 % 2.: < 30 s 3.: SensLeak SensReg	<ul style="list-style-type: none"> • Water/wastewater • Oxygenation • Residual D.O. 	—
Digital	TriOxmatic® 700 IQ D.O. sensor for water/wastewater	1.: 0.0 ... 60.0 mg/l 0 ... 600 % 2.: < 180 s 3.: SensLeak SensReg	—	<ul style="list-style-type: none"> • Water/wastewater • Oxygenation
	TriOxmatic® 701 IQ D.O. sensor for water/wastewater	1.: 0.00 ... 20.00 mg/l 0.0 ... 60.0 mg/l 0.0 ... 200.0 % 0 ... 600 % 2.: < 30 s 3.: SensLeak SensReg	—	<ul style="list-style-type: none"> • Water/wastewater • Oxygenation • Residual D.O.
	TriOxmatic® 702 IQ Trace Level D.O. Sensor	1.: 0 ... 2000 µg/l 0.00 ... 10.00 mg/l 0 ... 110 % 2.: < 30 s 3.: SensReg	—	<ul style="list-style-type: none"> • ppb measuring range • Ultrapure water • Boiler feedwater

— Not Applicable