



# Oxi 170, pH 170, LF 170

# QuadroLine® Oxi 296, pH 296, LF 296



- Built-in lightning protection
- No EMC Interference
- Galvanically isolated inputs and outputs
- IP 66 housing or 3.78 x 3.78 in. (96 x 96 mm) panel mounting



EcoLine 170



QuadroLine® 296

## Outstanding price/performance ratio

State-of-the-art technology, easy of use and maximum operating safety at an attractive price were the basic design criteria for the development of the EcoLine monitors. As a result of the logical further development of the successful EMC concept, WTW has also been able to make these advantages available to customers at an attractive price.

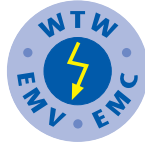
With the EcoLine series WTW offers an economical and technically flexible and reliable system solution which is suitable for a wide range of applications water and wastewater applications.





The QuadroLine® series is an extremely powerful monitor in a compact form and at an attractive price-performance ratio. These monitors are intended to be built into control panels and fulfill all the requirements which industrial practice demands from such systems today. Based on the proven technology of the WTW monitors of the EcoLine family, the QuadroLine® instruments have the same impressive performance features such as built-in lightning/overvoltage protection, galvanic separation of the inputs and outputs and increased EMC stability. EcoLine and QuadroLine® monitors are the right choice when single point measurements require a dedicated monitor.





# TriOxmatic® Dissolved Oxygen Sensors



-  **Drift-free > 6 months**
-  **Calibration-free > 6 months**
-  **Self-cleaning**
-  **Maintenance-free**



TriOxmatic® 700

TriOxmatic® 700 IQ

### TriOxmatic®

The most critical component of every Dissolved Oxygen measurement system is its sensor. TriOxmatic® series D.O. sensors are the most advanced and reliable instruments available. These sensors have been designed and manufactured to meet the demanding application requirements for performance/reliability and maintenance. Based upon the continuous efforts of improvement, the D.O. sensors of the TriOxmatic® Series are acknowledged today as the most advanced and reliable instruments available on the market.

Unlike conventional D.O. sensors, the WTW polarographic membrane sensors all feature a potentiostatic 3-electrode system. This unique measuring principle results in superb accuracy and enhanced stability of the sensor, and provides comprehensive self-diagnostics capability.

TriOxmatic® sensor's proven stability makes calibration necessary only once a year-if at all!

The TriOxmatic® sensor is maintenance free over its entire service life. Only extreme applications after years of use require routine maintenance.





# Practical experience... *Dissolved Oxygen Sensors*

## Practice

### ...put into practice

Parameter section

Dissolved Oxygen

pH/ORP

Conductivity

Turbidity/  
Suspended Solids

Nitrogen

Phosphate

Carbon:  
COD/TOC/DOC/  
BOD/SAC

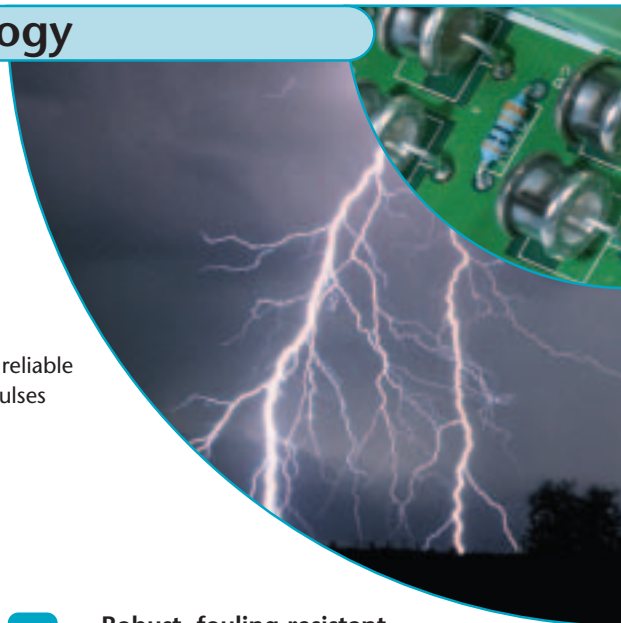
## Perfected technology

### 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

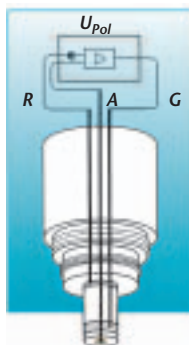
The highly efficient, built-in lightning protection device provides reliable protection to the sensor and transducer against high energy impulses often released by lightning strikes.



## 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.

### System monitoring

The sensor's built-in comprehensive monitoring system alerts the user of membrane damage. In addition, further important parameters are under constant monitoring, thus considerably improving operation safety.

### Robust, fouling resistant special membrane

The proper sensor operation, especially in harsh industrial environments, e.g. found in wastewater treatment plants, can only be assured using a rugged and highly fouling resistant membrane. Therefore, WTW sensors are equipped with an optimally designed membrane using a specially selected, dirt repelling and durable material. Maintenance free operation of the sensors for several months is possible.

### Drift-free/Calibration-free **NEW**

As a result of the further development of the potentiostatically driven 3-electrode system, a degree of sophistication has been achieved, which is so high that factors such as drift have become irrelevant due to their negligibility. Frequent sensor calibration is therefore no longer required.

### Maintenance-free **NEW**

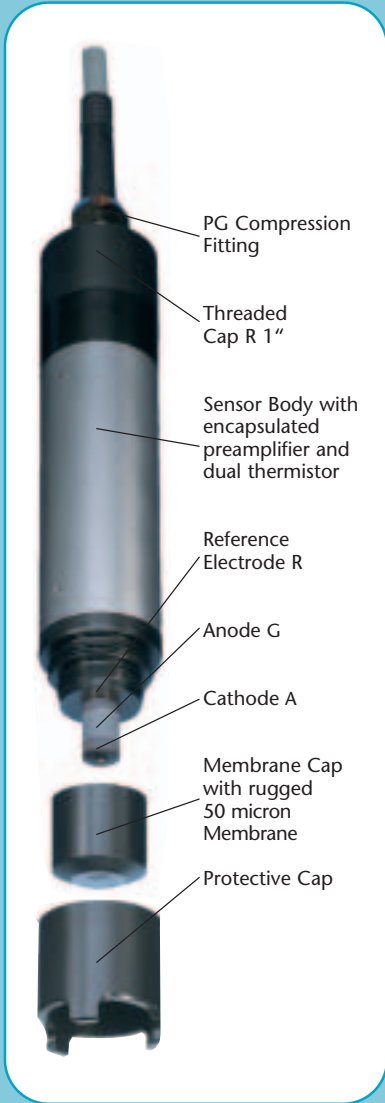
The membrane's high durability combined with its self-cleaning ability, the reduced electrolyte consumption and its superior stability result in a system which can operate reliably for years without requiring any maintenance.



IQ Sensor connection

## 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.



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

## 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

O<sub>2</sub> 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®	690/700/700 IN	701	700 IQ	701 IQ	702 IQ
Measuring Ranges (25 °C)					
O <sub>2</sub> 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 ... 20.0 mg/l 0.0 ... 60.0 mg/l	0 ... 2000 µg/l 0.00 ... 10.00 mg/l
O <sub>2</sub> 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 <sub>2</sub> 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 <sub>2</sub> saturation	1%	0,1 % 1%	1%	0.1% 1%	0.1%
Response time at 25 °C	t <sub>90</sub> : 180 s	t <sub>90</sub> : 30 s t <sub>99</sub> : 90 s	t <sub>90</sub> : 180 s	t <sub>90</sub> : 30 s t <sub>99</sub> : 90 s	t <sub>90</sub> : 30 s t <sub>99</sub> : 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)	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		
Certifications	CE, CUL, UL		CE, UL, CAN/CSA		
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)		14.17 x 1.57 in. (360 x 40 mm), incl. connection thread of SACIQ sensor connection cable		
Weight	Approx. 1.46 pounds (660 g)		Approx. 1.46 pounds (660 g, without sensor connection cable)		

### Ordering Information

		Order No.
TriOxmatic® 700-7	D.O. sensor for water/wastewater; oxygenation determination; cable length 7.66 yds (7,0 m)	201 670
TriOxmatic® 690-7	Same as model 700-7, but without SensCheck function; cable length 7.66 yds (7,0 m)	201 690
TriOxmatic® 701-7	D.O. sensor for water/wastewater; oxygenation/residual oxygen determination; cable length 7.66 yds (7,0 m)	201 678
TriOxmatic® 700 IN-7	D.O. sensor for highly polluted industrial wastewater; cable length 7.66 yds (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 7.66 yds (7,0 m)	480 042
Further cable lengths see brochure "Product Details"		



## Configuration Guide

			Oxi 170 Field Monitor	Oxi 296 Panel Mount	IQ SENSOR NET
		1. Measuring Ranges 2. Response Time $t_{90}$ 3. SensCheck Function			
<b>Analog</b>	<b>TriOxmatic® 690</b> 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"> <li>• Low-cost system without sensor diagnostic</li> <li>• Water/wastewater</li> <li>• Oxygenation</li> </ul>	—
	<b>TriOxmatic® 700</b> 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"> <li>• Water/wastewater</li> <li>• Oxygenation</li> </ul>	—
	<b>TriOxmatic® 700 IN</b> 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"> <li>• Industrial wastewater</li> <li>• Oxygenation</li> </ul>	—
	<b>TriOxmatic® 701</b> 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"> <li>• Water/wastewater</li> <li>• Oxygenation</li> <li>• Residual D.O.</li> </ul>	—
<b>Digital</b>	<b>TriOxmatic® 700 IQ</b> 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"> <li>• Water/wastewater</li> <li>• Oxygenation</li> </ul>
	<b>TriOxmatic® 701 IQ</b> 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"> <li>• Water/wastewater</li> <li>• Oxygenation</li> <li>• Residual D.O.</li> </ul>
	<b>TriOxmatic® 702 IQ</b> 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"> <li>• ppb measuring range</li> <li>• Ultrapure water</li> <li>• Boiler feedwater</li> </ul>

— Not Applicable



## EcoLine/QuadroLine®

### Technical Data EcoLine Oxi 170/QuadroLine® Oxi 296

		D.O. Measurement
Measuring Ranges		0.0 ... 60.0 mg/l or 0 ... 600 % saturation, user-selectable
Resolution		0.1 mg/l or 0.01 mg/l; 1 % or 0.1 % (depending upon the sensor)
Accuracy		±1 % of value, ±1 digit
Signal Input		Low-impedance, isolated from output
Temperature Measurement		NTC resistor (integrated in the sensor), 23 °F ... 122 °F (-5 °C ... +50 °C); 0,1 K resolution
Temperature Compensation		Range: 23 °F ... 122 °F (-5 °C ... +50 °C)
Atmospheric Pressure Correction		Range: 500 ... 1100 mbar; manual parameter input
Salinity Correction		2.0 ... 70.0
Relay Outputs		1 Sensor alarm relay (SensReg/SensLeck function) 2 programmable relays (setpoints, delay, hysteresis), ①+② Relays are form C rated 5A at 230 VAC, max. 5A @ 30 VDC resistive
Analog Outputs		Two isolated 0/4 - 20 mA outputs for D.O. and ①+② temperature, max. load 600 Ω, basic accuracy 0.1%; Output span and recorder damping adjustable by software
Digital Interface		RS 485 interface; bus operation possible with up to 31 units ②
Ambient Conditions		Operating temperature: -13 °F ... 131 °F (-25 °C ... +55 °C); Storage temperature: -13 °F ... 149 °F (-25 °C ... +65 °C); Clima class 4 (VDI/VDE 3540)
Electrical Connections	Oxi 170	Sensor input: quick disconnect 7-pole receptacle Outputs, mains supply: via plug-in terminal strips
	Oxi 296	Sensor input, signal inputs and outputs, mains supply: via plug-in terminal strips; accessible from rear
Input Power		115/230 VAC (-15/+10 %), 48 ... 62 Hz (18 VA max.), 24 VAC (-15/+10 %), 24 VDC (-30/+20 %)
Integrated Lightning Protection		Coarse and fine protection, surpasses EN 61326 requirements
EMI/RFI Conformance		EN 61 326 Class B, FCC Class A
Certifications		CE, CUL, UL (pending)
Housing	Oxi 170	Watertight housing (PC/GF20) with threaded receptacle and four cable feed-through connections (PG compression fittings, 10-14 mm dia.); Protection rating IP66 (exceeds NEMA 4X).
	Oxi 296	Fiberglass-reinforced Noryl housing with membrane keypad (Polyester); Protection rating IP 54 (front panel)
Dimensions (W x H x D)	Oxi 170	8.74 x 7.95 x 4.13 in. (222 x 202 x 105 mm)
	Oxi 296	3.78 x 3.78 x 7.32 in. (96 x 96 x 186 mm)
Weight	Oxi 170	Approx. 7.7 lb (3.5 kg)
	Oxi 296	Approx. 2.2 lb (1 kg)
		① R-T-version      ② R-T-RS-version

### Ordering Information EcoLine Oxi 170/QuadroLine® Oxi 296

EcoLine Oxi 170		Order No.
Oxi 170, 230 VAC	D.O. field monitor, 230 VAC 50/60 Hz; standard model	281 112
Oxi 170 RT, 230 VAC	Same as standard model, with 2 programmable relays and second analog output for temperature	282 212
Oxi 170 RT RS, 230 VAC	Same as standard model, with 2 programmable relays and second analog output for temperature and RS 485 interface	282 222
QuadroLine® Oxi 296		Order No.
Oxi 296, 230 VAC	D.O. panel mount monitor, 230 VAC 50/60 Hz; standard model	291 112
Oxi 296 RT, 230 VAC	Same as standard model, with 2 programmable relays and second analog output for temperature	292 212
Oxi 296 RT RS, 230 VAC	Same as standard model, with 2 programmable relays and second analog output for temperature and RS 485 interface	292 222
Other power supplies see brochure "Product Details"		