

# Dissolved Oxygen ::

The measure of the amount of gaseous oxygen dissolved in a solution.



## About Dissolved Oxygen Measurement

### What is Dissolved Oxygen?

Dissolved Oxygen (DO) is a measure of the amount of dissolved gaseous oxygen in a solution. Some gases, such as ammonia, carbon dioxide and hydrogen chloride, react chemically with water to form new compounds. However, gases such as nitrogen and oxygen merely dissolve in water without chemically reacting with it, and exist as microscopic bubbles between water molecules.

There are two main ways in which dissolved oxygen occurs naturally in water: From the surrounding atmosphere, where oxygen in the surrounding air dissolves readily when mixed into water, up to saturation, during water movements; Via photosynthesis when oxygen is produced by aquatic plants and algae as a by-product of photosynthesis. The amount of oxygen dissolved in water is usually measured in percent saturation, or expressed as a concentration in milligrams per litre water. Accurate measurement of dissolved oxygen is essential in processes where oxygen content affects reaction rates, process efficiency or environmental conditions, such as biological wastewater treatment, wine production, bio-reactions, environmental water testing.

### Basic Principle in DO Measurement

In theory, the amount of DO in a solution is dependent on three factors, namely temperature, salinity and atmospheric pressure.

#### 1. Water Temperature

Solubility of oxygen reduces as temperature increases. Hence, the colder the water, the more dissolved oxygen it contains. Since temperature affects both the solubility and diffusion rate of oxygen, temperature compensation is necessary for any standardized DO measurements.

**All Eutech DO meters come with automatic temperature compensation for accurate readings even in varying temperature conditions.**

#### 2. Salinity

The amount of dissolved oxygen increases as salinity level decreases. In other words, freshwater holds more oxygen than saltwater. Since the presence of dissolved salts limits the amount of oxygen that can dissolve in water, the relationship between the partial pressure and concentration of oxygen varies with the salinity of the sample.

**Eutech meters feature manual salinity correction to compensate for variations in ionic concentration. Simply enter the salinity of the sample in parts per thousand (ppt) to ensure the correct DO measurements.**

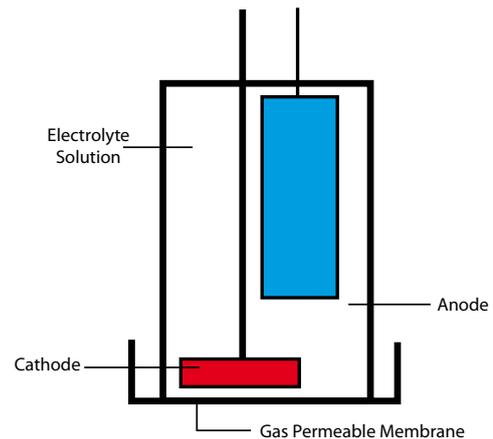
#### 3. Atmospheric Pressure

There is a direct proportional relationship between the solubility of dissolved oxygen and the surrounding atmospheric pressure. As pressure decreases with increase in altitude, the amount of dissolved oxygen found in water reduces.

To ensure that your dissolved oxygen is not affected by atmospheric pressure, Eutech meters come with manual barometric pressure compensation, with an Atmospheric Pressure Correction Chart included in the manuals for convenient referencing.

**Eutech DO instruments automatically compensate for temperature, salinity and barometric pressure. The salinity value and barometric pressure are either measured by the instrument or entered by the user.**

### DO Electrodes



The measurement of DO requires a special DO electrode that is made up of an anode, a cathode, electrolyte solution and a gas permeable membrane. The material of the membrane is specially selected to permit oxygen to pass through. Oxygen is consumed by the cathode which will create a partial pressure across the membrane. Oxygen then diffuses into the electrolyte solution. In short, a DO meter actually measures the pressure caused by movements of oxygen molecules in water or any other medium. Currently, galvanic and polarographic electrodes are the predominant methods for measuring dissolved oxygen.

**Galvanic Electrodes** produce a millivolt output directly proportional to the oxygen present in the sample. The electrode reaction is instantaneous and a result is obtained immediately.

**Galvanic electrodes are available with most Eutech Instruments DO meters such as the EcoScan DO 6, CyberScan DO 110 and DO 300.**

**Polarographic Electrodes** require voltage input from the meter to polarize the electrodes. Since the voltage from an external source may take up to 15 minutes to stabilize, polarographic probes usually need to warm up before use to ensure proper polarization of the electrodes.

**Polarographic self-stirring DO/BOD probes are available for use with the Eutech CyberScan research-grade bench meters DO 6000 and PCD 6500 in US EPA-approved auto five-day BOD testings.**

### Biochemical Oxygen Demand (BOD)

The BOD test measures the molecular oxygen utilized in the biodegradation of organic material and the oxidation of inorganic material. By measuring the amount of oxygen dissolved in samples at the beginning and end of a specified incubation period, the relative oxygen requirements of wastewaters, effluents, and polluted waters can be determined.

$$\text{BOD}_t \text{ (mg/L)} = \frac{D_1 - D_2}{P}$$

$\text{BOD}_t$  = Oxygen uptake during incubation period t

$D_1$  = DO of diluted sample immediately after preparation (mg/L)

$D_2$  = DO of diluted sample after incubation period t (mg/L)

P = Decimal volumetric fraction of sample used

BOD is similar to the Chemical Oxygen Demand (COD), which also measures relative oxygen-depletion. However, the possible presence of non-biologically oxidisable may render the COD test to be less accurate.

Fast, intuitive and powerful – the CyberScan DO 600 offers one of the widest measurement ranges and biggest memory spaces offered in the DO handheld market today. Data-transfer is easy with the incorporated IrDA wireless communications technology: No wires, no cables. Send data with the press of a button!



Large backlit screen with multi-data display and intelligent prompt messages

Intuitive soft-key operation

Rugged and IP67 waterproof



Wireless data transfer



Waterproof external power input



Data acquisition software included



Sturdy rubber boot doubles up as meter stand

**Wide Measurement Range**

- Measures oxygen concentration up to 90.00 mg/L and saturation up to 600.0 %
- Accurate readings even in varying conditions with Temperature, Salinity and Barometric Pressure Compensation

**User-Friendly**

- Cal-due alarm for periodic calibration updates
- IP67 waterproof design for applications in harsh environments
- High/low alarm limits

**Advanced Data-Management**

- Auto-logging function that automatically records up to 500 data sets in GLP-compliant format
- RS232 through LED\*, IrDA wireless communications technology

\*RS232 (LED) interface adapter available as separate accessory (order code: 01X344201)



**CyberScan DO 600**

Dissolved Oxygen/°C/°F

**Applications**

**Aquacultural:** Use to monitor oxygen levels in catfish and shrimp farming; game stocking ponds; ornamental fish tanks and ponds; and in other fish farming applications.

**Industrial:** Ideal for checks on the quality of plant water intake and discharge, wastewater and water treatment, recirculating systems and industrial process systems.

**Environmental:** Use to test water quality, monitor health of aquatic ecosystems, survey surface and ground water drinking supplies, and meet EPA regulations.

**Educational:** Ideal for quick, accurate DO readings in laboratories and schools.

Designed to meet the rigours of outdoor field measurement, Eutech's waterproof CyberScan DO 300 is IP67-rated waterproof and even floats on water for easy retrieval. Its galvanic probe requires no warm-up time, delivers repeatable, stable readings and calls for almost no maintenance.

## CyberScan DO 300

Dissolved Oxygen/°C/°F



Back-lit display keeps meter reader-friendly in the dark



Rubber sleeve protects connector



Meter floats



Waterproof to IP67 standards

Rubber grips for firmer grip

Galvanic electrode with built-in ATC and 3 m waterproof cable

- Custom dual-display LCD that shows DO readings in ppm, mg/L or % saturation and temperature in °C and °F
- Non-volatile memory stores up to 50 data sets with temperature readings
- Auto-compensation of Salinity and Barometric Pressure with manual input
- Independent 100 % and zero adjustment calibrations
- Adjustable backlit display
- GLP-compliant, self-diagnostic for easy trouble-shooting and sturdy with IP67-compliant housing



Accurate with sophisticated features, yet so user-friendly – the CyberScan DO 110 delivers repeatable, stable measurements with its unique galvanic electrode – no warm-up time required!



RS232 output allows direct data transfer from meter to PC



Adjustable hinge acts as a table stand

- Custom dual-display LCD that shows DO readings in mg/L (ppm) or % saturation and temperature in °C and °F
- Auto-compensation of Salinity and Barometric Pressure with manual input
- Stores up to 100 data sets with temperature readings
- Direct data transfer via RS232 output
- Independent 100 % and zero adjustment calibrations
- One-glance monitoring of electrode performance with electrode data display
- Self-diagnostic for easy trouble-shooting and sturdy with IP54 splashproof housing



## CyberScan DO 110

Dissolved Oxygen/°C/°F

### Applications

**Aquacultural:** Use to monitor oxygen levels in catfish and shrimp farming; game stocking ponds; ornamental fish tanks and ponds; and in other fish farming applications.

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**Environmental:** Use to test water quality, monitor health of aquatic ecosystems, survey surface and ground water drinking supplies, and meet EPA regulations.

**Educational:** Ideal for quick, accurate DO readings in laboratories and schools.

The Eutech EcoScan DO 6 offers high performance at an economical price. Rugged and user-friendly, this no-frill meter comes with a protective rubber boot that conveniently doubles up as a benchtop stand. Measures in mg/L (ppm), or % saturation.

## EcoScan™ DO 6

Dissolved Oxygen/°C



Splashproof keypad



Protective rubber boot doubles up as meter stand



Toggles between various modes easily with a press of the button

IP54-rated housing protects against dust and water splashes

- Push-button calibration with auto-buffer recognition for quick and easy calibrations with no mistakes
- Calibration can be performed at 100 % and/or 0 % solution
- Auto-compensation of Salinity and Barometric Pressure with manual input
- Galvanic probe eliminates polarisation delay and delivers quick, stable response
- Non-volatile memory holds meter readings, even when batteries run out
- Hold function freezes readings for easy reference
- Auto-off conserves energy and lengthens battery life-span
- Easy troubleshooting with comprehensive self-diagnostic messages



Dissolved Oxygen Handheld Meters Specifications		CyberScan Dual-Display			EcoScan Single-Display
		DO 600	DO 300	DO 110	DO 6
Measuring Parameter		Dissolved Oxygen/°C/°F			Dissolved Oxygen/°C
Highlights		Waterproof, GLP, RS232C, IrDA	Waterproof, back-lit display	Standard handheld, RS232	Economical DO meter
Dissolved Oxygen	Range	0 to 90.00 mg/L or ppm			0.00 to 19.99 mg/L or ppm
	Resolution	0.01 mg/L or ppm			0.01 mg/L or ppm
	Accuracy	±0.20 mg/L			±1.5 % Full scale
% Saturation of Oxygen	Range	0 to 600.0 %			0.0 to 199.9 %
	Resolution				0.1 %
	Accuracy	±2.0 %			±1.5 % Full scale
Temperature	Range	0.0 to 50.0 °C/32 to 122 °F			
	Resolution	0.1 °C/0.1 °F			0.1 °C
	Accuracy	±0.3 °C/±0.5 °F			±0.5 °C
	Compensation	ATC/MTC (0.0 to 50.0 °C)			
Salinity Correction	Range	0.0 to 50.0 ppt			
	Resolution	0.1 ppt			
	Method	Automatic correction after manual input			
Barometric Pressure Correction	Range	450 to 825 mmHg or 59.9 to 109.9 kPa	500 to 1499 mmHg or 66.6 to 199.9 kPa		
	Resolution	0.1 mmHg or 0.1 kPa			
	Method	Automatic correction with in-built sensor	Automatic correction after manual input		
Calibration		2 Point (0 %, 100 %), 1-point (mg/L)			
Operating Range		0 to 50 °C			
Probe	Type	Galvanic			
Meter Features	Auto-Off	2 to 30 Mins after last key pressed	20 Mins after last key pressed		
	Memory	500 Data sets	50 Data sets	100 Data sets	-
	Datalogging	Yes	No		
	Date/Time Stamp (GLP)	Yes		-	
	Average/Stability	Yes (Selectable)			-
	Input	DC Phono sockets, 6 pin connector		DC Socket, 6 pin connector	BNC, 2.5 mm Phono socket
	Output	RS232C, IrDA	-	RS232C	-
	Power Requirements	4x 1.5 V 'AA' Alkaline batteries or 9V DC adapter, 500 mA	4x 1.5 V 'AAA' Alkaline batteries	4x 1.5 V 'AAA' Alkaline batteries or 9V DC adapter, 200 mA	4x 1.5 V 'AAA' Alkaline batteries
	Battery Life	> 400 Hours	> 700 Hours	> 700 Hours	> 100 Hours
Waterproof/Dustproof (IP67)	Yes		No		
Dimensions (LxWxH); Weight	Meter	18.3 x 9.5 x 5.7 cm ; 460 g	19 x 10 x 4.5 cm ; 320 g	18 x 9 x 4 cm ; 220 g	14 x 7 x 3.5 cm ; 200 g
	Boxed	23.5 x 16 x 15.5 cm ; 800 g	41 x 25 x 9 cm ; 1400 g	41 x 25 x 9 cm ; 1200 g	24 x 17 x 8 cm ; 550 g

Order Code	Part No.	Description
ECDOWP60042K	01X419503	Waterproof CyberScan DO 600 Dissolved Oxygen handheld meter with 25 ft cable electrode, ECDOHANDY8M, DAS software, power adapter & carrying kit set
ECDOWP60041K	01X419502	Waterproof CyberScan DO 600 Dissolved Oxygen handheld meter with 10 ft cable electrode, ECDOHANDYNEW, DAS software, power adapter & carrying kit set
ECDOWP30001K	01X262307	Waterproof CyberScan DO 300 Dissolved Oxygen handheld meter (backlit) with 3 m cable electrode, 1 assembled membrane cap housing, refilling electrolyte & neutral carrying kit set (ECWPDRYKIT)
ECDO11001K	01X403502	CyberScan DO 110 Dissolved Oxygen handheld meter with 3 m cable electrode, DAS, RS232C cable (ECCA02M09F09), electrode, 1 assembled membrane cap housing, refilling electrolyte & neutral carrying kit set (ECWPDRYKIT)
ECDO11002K	01X403503	CyberScan DO 110 Dissolved Oxygen handheld meter with 8 m cable electrode, DAS, RS232C cable (ECCA02M09F09), electrode, 1 assembled membrane cap housing, refilling electrolyte & neutral carrying kit set (ECWPDRYKIT)
ECDO602K	01X370107	EcoScan DO 6 Dissolved Oxygen handheld meter with 3 m cable electrode, 1 assembled membrane cap housing, refilling electrolyte & Dissolved Oxygen carrying kit set (ECECODOKIT)
ECDO601K	01X370104	EcoScan DO 6 Dissolved Oxygen handheld meter with 1 m cable electrode, 1 assembled membrane cap housing, refilling electrolyte & Dissolved Oxygen carrying kit set (ECECODOKIT)
<b>Accessories</b>		
ECDO6HANDY3M	01X233916	Galvanic Dissolved Oxygen electrode with ATC, 3 m cable (for DO 6)
ECDO6HANDY	01X233913	Galvanic Dissolved Oxygen electrode with ATC, 1 m cable (for DO 6)
ECDOHANDYNEW	01X239601	Galvanic Dissolved Oxygen electrode with ATC, 3 m cable (for DO 110/300/600)
ECDOHANDY8M	01X239606	Galvanic Dissolved Oxygen electrode with ATC, 8 m cable (for DO 110/300/600)
ECWPDRYKIT	01X266804	CyberScan neutral carrying kit set – plastic carrying case comprises 4 empty sample bottles (60 ml)

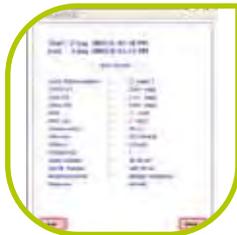
Versatile and user-friendly, the CyberScan DO 6000 is one of the most advanced benchtop meters for dissolved oxygen measurement available. Extensive set-up functions let you customise the meter according to your specific needs, while extensive communication capabilities give you the flexibility to send your data via any format to anywhere you want.

## CyberScan DO 6000

Dissolved Oxygen/BOD/OUR/SOUR/°C/°F



Auto five-day BOD testing, OUR and SOUR with self-stirring probe that complies with EPA method requirements



Plain language prompts and automatic calculation base on BOD parameters entered



- DO measurement includes five-day BOD testing, OUR, and SOUR
- Advanced real-time on-screen graphing function provides useful indication for specific measurements
- Extensive setup screens enable you to customise meter to your needs, e.g. Barometer and Salinity setting, BOD/OUR/SOUR configuration, alarm limits and other functions
- Windows® CE-driven, full-color touchscreen provides unmatched ease of use in operations and setups with user-friendly icons, user prompts and context specific 'help' screens
- Secure log-in for up to ten users



Eutech's CyberScan DO 1500 is designed for optimal performance and versatility, while preserving Eutech's signature user-friendly qualities. Self-diagnostic, intuitive, with advance set-up options for user-customisation, the meter features BOD testing capabilities and comes with bi-directional RS232 interface for seamless data transfer.



## CyberScan DO 1500

Dissolved Oxygen/°C/°F

- Measures Dissolved Oxygen (DO) in % saturation, ppm and mg/L
- Polarographic self-stirring DO/BOD probe (US EPA approved)
- Automatic calibration at 100 % and independent 0 % calibration enhances sensitivity for low oxygen measurement
- Auto-compensation after manual input of Barometric Pressure and Salinity values



Dissolved Oxygen Bench Meters Specifications	CyberScan Premium Bench	
	DO 6000	DO 1500
Measuring Parameter	Dissolved Oxygen/BOD/OUR/SOUR/°C/°F	
Highlights	Windows® CE, BOD, OUR and SOUR measurement, color touchscreen LCD	Self-stirring BOD probe compatible
Dissolved Oxygen	Range	0 to 60 mg/L or ppm (0 to 1272 mbar)
	Resolution	0.01 mg/L or ppm (0.1 mbar)
	Accuracy	±0.1 + 1 LSD
% Saturation of Oxygen	Range	0 to 600 %
	Resolution	0.1 %
	Accuracy	±0.1 % + 1 LSD
Temperature	Range	-5.0 to 46.0 °C
	Resolution	0.1 °C
	Accuracy	±0.1 °C
Salinity Correction	Range	0 to 45 ppt
	Resolution	0.1 ppt
Barometric Pressure Correction	Range	450 to 825 mmHg
	Resolution	1 mmHg
	Accuracy	±1 % + 1 LSD
Meter Features	Memory	Up to 1000 data sets per parameter
	Inputs	DC Socket, DIN connector, SD reader, USB, RJ45, phono socket
	Output	USB, IrDA, RS232C
	Power Requirements	9 V DC Adapter, 3.3 mA (100/240 VAC, SMPS)
Dimensions (LxWxH) ; Weight	Meter	16.5 x 23.5 x 8.9 cm ; 1100 g
	Boxed	49 x 28 x 16 cm ; 3700 g

Order Code	Part No.	Description
ECDO600042	01X373905	CyberScan DO 6000 Dissolved Oxygen/BOD/OUR/SOUR bench meter with USB, RJ 45, IrDA, SD card reader, RS232C, self-stirring Dissolved Oxygen/BOD probe (EC620SSP) & SMPS power adapter
ECDO150042	01X296407	CyberScan DO 1500 Dissolved Oxygen bench meter with RS232C, self-stirring Dissolved Oxygen/BOD probe (EC620SSP) & SMPS adapter
Accessories		
EC620SSP	01X295704	Dissolved Oxygen/BOD electrode with self-stirring mechanism, 1 m cable



<< Shrimp Farming  
>> Drinking Water



<< Wastewater Treatment  
>> Laboratories

