

# Turbidity/Colorimetry

Cloudy appearance of a fluid caused by suspended microscopic particles.

The measurement of a parameter whose concentration is proportional to the colour intensity with the help of added reagent.



*“With Eutech colorimeters, we are confident that our swimming pool water is properly maintained.”*



## Handheld:

1. TN 100 Turbidimeter

## Bench:

1. CyberScan TB 1000

## Handheld:

1. C 401 Colorimeter
2. C 301 Colorimeter
3. C 201 Colorimeter
4. C 105 Colorimeter
5. C 103 Colorimeter

## About Turbidity & Colorimetric Measurement

### About Turbidity

Turbidity, measured in Nephelometric Turbidity Units (NTU), refers to the concentration of undissolved, suspended particles present in a liquid. It is a measure of sample clarity, not colour. The cloudier a sample, the higher the turbidity reading. High turbidity is caused by particles such as silt, clay, microorganisms and organic matter. By definition, turbidity is not a direct measure of these particles, but how these particles scatter light.

Turbidity is an important parameter in many manufacturing operations, such as food and beverage and potable water treatment plants. In drinking water applications, the turbidity of water may indicate the presence of bacteria, pathogens or particles that can shelter harmful organisms from the disinfectant process; in industrial processes, turbidity is a parameter to measure the effectiveness of treatment of manufacturing processes.

#### Good Turbidity Measurement Techniques

Turbidity is a complex analytical measurement which may be affected by several factors. Some are inherent in the instrument's design such as angle of detection, light beam aperture, incident beam wavelength and colour sensitivity of the photocell. However, there are other factors such as stray light, air bubbles and damaged vials which can be prevented through proper care of equipment and accessories.

1. **Maintain sample vials in good condition.** Vials should be meticulously cleaned and free from significant scratches. Treat the outside of each vial with a thin coat of silicon oil to mask minor imperfections and scratches that may catch stray light during measurement. Handle sample vials by the top to avoid fingerprints that may interfere with the light path. If vials are scratched or stained, discard immediately.
2. **Timeliness of sample.** Samples may change over time due to temperature change or settling of particulates. Temperature can affect particle characteristics or create more particles if precipitates form. Similarly, dilution water may change particle characteristics or dissolve particles. Samples should therefore not be drawn and allowed to sit while the meter warms up.
3. **Swirl samples gently.** Shaking samples violently may cause particles to break apart, or air bubbles to form.
4. **Do not mix and match accessories.** Sample vials should be used only with the instruments that are intended for.
5. **Perform visual observation of sample vial before each measurement.** Ensure no visible bubbles are in the sample.
6. **Samples placed in the turbidimeter should be at the same temperature as the process flow samples.** Temperature change may cause precipitation of soluble compounds and affect readings.

**The Eutech CyberScan TB 1000 turbidimeter meets the performance criteria specified by the US EPA method 180.1 for NTU measurement; the infrared light source models also meet the ISO 7027 standards of measurement. The Eutech waterproof handheld, TN 100 turbidimeter, features laboratory accuracy and excellent repeatability with US EPA approved non-formazin standards. It similarly meets the ISO 7027 standards of measurement.**

### About Colorimetry

Different chemical substances absorb different visual light frequencies. Since the absorbance of a substance is proportional to its concentration (ie. a more concentrated solution gives a higher absorbance reading), the concentration of a known solute can be measured using a colorimeter.

Colorimetry is most widely used in swimming pools, spas, public utilities, industrial wastewater plants, municipal water, treated water, water conditioning systems and paper and pulp mills. The effectiveness of the disinfectants used depends on your system's overall water chemistry, and not just on the disinfectants' concentrations alone.

**Chlorine.** Chlorine and chlorine-release compounds are frequently used as disinfectants in swimming pools, drinking water and other water treatment systems. Routine chlorination kills harmful microorganisms. The disinfection efficiency is a direct function of the level of free chlorine in a system. Total chlorine is the sum of combined and free chlorine. In applications where there is human contact with the water e.g. in swimming pools and spas, it is essential that the right amount of chlorine is present. Insufficient chlorine will decrease the disinfectant efficiency; while excess chlorine will cause skin and eye irritation and become a health hazard. **Eutech's C 401, C 301 and C 201 colorimeters measure free and total chlorine over the range of 0 mg/L to 6 mg/L.**

**Chlorine Dioxide.** The use of chlorine dioxide as a disinfectant is seeing growth in many industrial applications. Unlike chlorine, chlorine dioxide remains a true gas dissolved in solution. The lack of any significant reaction of chlorine dioxide with water is partly responsible for its retaining its disinfecting effectiveness over a wide pH range. This property makes it a logical choice for cooling systems operated in the alkaline pH range, or cooling systems with poor pH control. **Eutech's C 103 colorimeter measures chlorine dioxide over the range of 0 ppm to 11.4 ppm.**

**Ozone.** Ozone is one of the strongest and most rapid oxidisers and disinfectants available. It does not corrode nor cause scaling. In addition, ozone has a pungent smell at low levels, but it rapidly reacts and disinfects the water. Although more expensive than traditional disinfectants like chlorine and bromine, because it does not cause corrosion nor scaling, the long-term maintenance cost of a water system which uses ozone as a disinfectant may be reduced compared to using chlorine. Ozone is gaining popularity in top spas and certain swimming pools. **Eutech's C 105 colorimeter measures ozone over the range of 0 ppm to 4.1 ppm.**

**Cyanuric Acid.** In applications where chlorine is used for disinfection, cyanuric acid is often present as a chlorine stabiliser. Low levels of cyanuric acid are beneficial as they prevent wastage of free chlorine by the sun's UV rays. High levels of cyanuric acid cause the chlorine to take a longer time to kill the micro-organisms. It is important to determine how much cyanuric acid should be added to maximise chlorine efficiency. **Eutech's C 401 colorimeter measures cyanuric acid over the range of 5 ppm to 90 ppm.**

**pH.** The pH value affects the amount of free chlorine that is formed, and therefore determines the effectiveness of chlorine as a disinfectant. As pH increases, the disinfecting power of chlorine decreases. High pH causes scaling of water surfaces, pipework and fittings; this may result in cloudy water. Low pH can corrode metals in pipework and fittings; this may cause metal oxides to stain water surfaces. **Eutech's C 401 and C 301 colorimeters measure pH over the range of 5.9 - 8.2.**

## CyberScan TB 1000

Turbidity

### Turbidity

Deluxe Bench &  
Waterproof Turbidity Meters

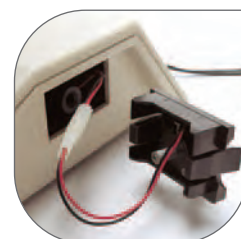
Whether it's field measurements on-the-go or laboratory work with stringent requirements, turbidity measurement is a breeze with Eutech's TN 100 and Cyberscan TB 1000 turbidimeters. ISO 7027 compliant and equipped with automatic multi-point push button calibrations, Eutech's auto-ranging turbidity instruments are your assurance to high-quality full-range accuracy every time you measure.

Direct meter-to-PC data transfer through RS232C communication



Quick reference slide-out guide

Pour-through assembly module for instantaneous sampling without the need for cuvettes\*



Quick connect light source for low maintenance

### Cyberscan TB 1000

- Up to 3-point push-button calibration and full-range accuracy of  $\pm 2\%$  full scale accuracy
- Auto-ranging
- For fast response and best resolution (up to 0.01 NTU) over wide measurement range
- White light TB 1000 designed to meet US EPA method 180.1 ; infrared TB 1000 designed to meet ISO 7027 and DIN 27027 specifications for turbidity measurements
- Prompts at user-defined interval to ensure regularly scheduled recalibration
- GLP-compliant time/date stamp
- Self-diagnostic

\* Optional pour-through assembly accessory (order code: ECPORHASSY)



## TN 100

Turbidity

### TN 100

- Full range lab-accurate results with 4-point push-button calibration – no need to follow sequential order during calibration
- Rapid meter response requires only 6 seconds for full-step change
- 1200 tests on a single set of AAA batteries with advanced power management design
- Lightweight, waterproof to IP67 standard & floats on water
- US EPA-approved non-formazin standards – more stable and easier to use
- Comes complete in sturdy carry kit with calibration standards, cuvettes, batteries & instruction manual



Large custom-designed LCD




### Applications

Ideal for beverage production, drinking water, swimming pool, aquariums, aquaculture and environmental applications.



## Turbidity

Turbidity Meters  
Specifications  
& Ordering Information

Models	CyberScan Deluxe Bench Turbidity Meters		Waterproof Turbidity Meter
	TB 1000W	TB 1000IR	TN 100
<b>Turbidity Meters Specifications</b>			
Measuring Parameter	Turbidity		
Highlights	Turbidity bench, GLP, RS232C		Light weight, IP67 waterproof meter
Principle	Nephelometric non-ratio / ISO7027 compliant		
Range	0 to 1000 NTU		
Automatic Range Selection	0.00 to 9.99 NTU 10.0 to 99.9 NTU 100 to 1000 NTU		0.01 to 19.99 NTU 20.0 to 99.9 NTU 100 to 1000 NTU
Resolution	0.01 NTU (0 to 9.99 NTU) 0.1 NTU (10 to 99.9 NTU) 1 NTU (100 to 1000 NTU)		0.01 NTU (0 to 19.99 NTU) 0.1 NTU (20.0 to 99.9 NTU) 1 NTU (100 to 1000 NTU)
Accuracy	±2 % of reading		±2 % of reading ±1 digit for 0 to 500 NTU ±3 % of reading ±1 digit for 501 to 1000 NTU
Repeatability	≤ ±1 % of reading		
Calibration	1 to 3-points (automatic)		4-points
Calibration Standards	0.02 NTU, 10.0 NTU, 1000 NTU		0.02 NTU, 20.0 NTU, 100 NTU, 800 NTU
Response Time	< 6 secs for full step change		
Sample Volume	30 ml		10 ml
RS232C Output	Yes		–
Light Source	White light (tungsten)	Infra-red	Infrared-emitting diode (850 nm wavelength)
Operating Temperature Range	0 to 40 °C		0 to 50 °C
Sample Temperature Range	0 to 50 °C		
Enclosure Type & Rating	ABS plastic		ABS plastic & IP67 rated
Power	UL, CSA approved 12 V DC adapter		4 x 1.5 V 'AAA' alkaline batteries (>1200 reading)
Dimensions	Meter	25.4 x 23.7 x 12.1 cm ; 1550 g	15.5 x 6.8 x 4.6 cm ; 200 g
(LxWxH); Weight	Boxed	35.5 x 31.5 x 25 cm ; 2380 g	35.5 x 16.5 x 10.5 cm ; 1160 g

Turbidity Meters												
Item	Order Code	Part No.	Parameter	Light Sources			Accessories					
			Turbidity	White Light	Infra-Red Light	Calibration Kit (ECTBDWCALKT)	Calibration Kit (ECTBDIRCALKT)	Calibration Kit (ECTN100CALKT)	220 VAC Power Adapter	120 VAC Power Adapter	3 Sample Vials	Turbidimeter Carry Case
TB 1000W	ECTBDW100020	01X259106	•	•		•			•			
TB 1000W	ECTBDW100010	01X259105	•	•		•				•		
TB 1000IR	ECTBDIR100020	01X259104	•		•		•		•			
TB 1000IR	ECTBDIR100010	01X259103	•		•		•			•		
TN 100	ECTN100IR	01X357301	•		•			•			•	•

Accessories			
Used With	Description	Order Code	Part No.
TB 1000W / TB 1000IR	Pack of 3 sample cuvettes	ECTBDCUV03KT	01X265701
TB 1000W / TB 1000IR	RS232C communication cable	ECMICRO100CBL	30X219502
TB 1000W / TB 1000IR	110 / 120 VAC power adapter (50 / 60 Hz); 2-flat pin US type, 12 VDC 800 mA	EC120ADA800	60X030110
TB 1000W / TB 1000IR	220 / 230 VAC Power adapter (50 / 60 Hz); 2-round pin Euro type, 12 VDC 800 mA	EC220ADA800	60X030109
TB 1000W	Calibration kit set – standard solutions (0.02, 10.0, 1000 NTU)	ECTBDWCALKT	01X265101
TB 1000W	Tungsten filament lamp module	ECTNGSTNLMP	01X265301
TB 1000IR	Calibration kit set – standard solutions (0.02, 10.0, 1000 NTU)	ECTBDIRCALKT	01X265102
TB 1000IR	Infrared lamp module	ECINFRDLMP	01X265302
TN 100	Calibration kit set – standard solutions (0.02, 20.0, 100, 800 NTU)	ECTN100CALKIT	01X274802
TN 100	Pack of 3 sample cuvettes	ECTN100CUVKIT	01X274902
TN 100	Silicone oil (10 ml)	ECSILICONEOIL	01X358701
TN 100	Internal batteries (pack of 2)	ECBATT3032	01X265901



## C 401 ; C 301 ; C 201 ; C 105 ; C 103 Colorimeters

Free & Total Chlorine/Cyanuric Acid/pH ; Free & Total Chlorine/pH ; Free & Total Chlorine ; Ozone ; Chlorine Dioxide

**Colorimetry**  
Waterproof Colorimeters

Fuss-free and easy to use with no need for pre-calibration! Eutech's range of colorimeter provides quality, highly-repeatable results in just three simple steps. Each colorimeter comes complete with reagents and sample vials in a rugged carrying case – convenient for testing in the field.

### Three Easy Steps



Comes with accessories, conveniently packed in a rugged carry kit

One-time blanking, great for multi-parameter analysis or repeated measurements

Lightweight meter floats



IP67 waterproof

Straightforward keypad



High quality, custom-formulated powder reagents for exceptional accuracy, repeatability and stability



**Step 1:** To blank the meter, place a vial of sample liquid into the meter's sample well. Press the 'ZERO' button. The meter flashes 'STDBY' while blanking is in progress and displays 'ZERO' to confirm that blanking is complete



**Step 2:** Add reagent into sample vial (according to the specified parameter test procedure). Secure vial in meter sample well



**Step 3:** Press 'READ/ENTER' to measure desired parameter

- Excellent test-to-test repeatability, auto-ranging and convenience with only one-vial-one-sachet per test
- Fuss-free meter operation with one-time blanking for all parameters and ranges. No pre-calibration required for chlorine and cyanuric acid
- No detachable parts, no flip covers – high quality customised vials fit perfectly into the sample vial
- Chlorine measurements are based on US EPA-approved DPD method
- Custom formulated high quality powder reagents provide excellent accuracy, repeatability and stability
- 100 % dustproof and waterproof to IP67 standards
- Advanced power management with more than 3000 tests per set of four new 'AAA' alkaline batteries and auto-off function






### Applications

• Swimming pools • Spas • Public utilities  
• Industrial wastewater plants • Municipal water • Treated water • Water conditioning systems • Paper and pulp mills



## Colorimetry

### Colorimeters Specifications & Ordering Information

Models	Colorimeters							
				C 401	C 301	C 201	C 105	C 103
<b>Colorimeters Specifications</b>	Range	Resolution	Accuracy					
	Chlorine, Free & Total	0 to 1.99 ppm 2.0 to 6.0 ppm	0.01 ppm 0.1 ppm	±0.02 ppm ±0.2 ppm	✓	✓	✓	–
	pH	5.9 to 8.2 pH	0.1 pH	±0.1 pH	✓	✓	–	–
	Cyanuric Acid	5 to 90 ppm	1 ppm	±4 ppm	✓	–	–	–
	Chlorine Dioxide	0 to 3.79 ppm 3.8 to 11.4 ppm	0.01 ppm 0.1 ppm	±0.02 ppm ±0.2 ppm	–	–	–	✓
	Ozone	0 to 1.39 ppm 1.4 to 4.1 ppm	0.01 ppm 0.1 ppm	±0.02 ppm ±0.2 ppm	–	–	✓	–
Measurement Method	Photometric							
Light Source	Light emitting diode (LED)							
Wavelength	525 nm							
Detector	Silicon photodiode							
Absorbance Range	0 to 2.5 Abs							
Photometric Precision	±0.0015 Abs							
Cal. Points	User-selectable ; 1-point per colorimetric test							
LCD Display	4-digit 14-segments customised LCD with annunciations							
Sample Vials	Borosilicate glass with screw caps, fill line and indexing mark (height x diameter: 5.1 x 2.5 cm)							
Sample Required	10 ml (0.33 oz)							
Operating Temperature Range	0 to 50 °C / 32 to 122 °F							
Sample Temperature Range	0 to 50 °C / 32 to 122 °F							
Operating Humidity Range	0 to 90 % RH non-condensing at 30 °C							
Power	4 x 1.5 V AAA alkaline batteries							
Battery Life	> 3000 tests							
Electromagnetic Compliance (EMC)	Emitted interference - EN 61326 Immunity to interference - EN 61326							
IP67	Yes							
Insulation Rating	Pollution degree 2							
Dimensions	Meter	15.5 x 6.8 x 4.6 cm ; 200 g						
(LxWxH); Weight	Boxed	35.5 x 16.5 x 10.5 cm ; 1170 g						

Colorimeters														
Item	Order Code	Part No.	Parameters					Accessories						
			Chlorine, Free & Total	pH	Cyanuric Acid	Chlorine Dioxide	Ozone	Reagent (94X377001)	Reagent (94X377002)	Reagent (94X377003)	Reagent (94X377004)	Reagent (94X377005)	4 Sample Vials	Colorimeter Carry Case
C 401	ECC401	01X376906	•	•	•			•	•	•	•		•	•
C 301	ECC301	01X376905	•	•				•	•		•		•	•
C 201	ECC201	01X376904	•					•	•				•	•
C 103	ECC103	01X376915				•		•				•	•	•
C 105	ECC105	01X376917					•		•				•	•

Accessories			
Used With	Description	Order Code	Part No.
C 401 / C 301 / C 201 / C 103 / C 105	Chlorine colour reference kit set	ECCLCOLORREF	01X274806
C 401 / C 301 / C 201	Free chlorine (DPD) reagent kit, pack of 100 pouches	94X377001	94X377001
C 401 / C 301 / C 201	Total chlorine (DPD) reagent kit, pack of 100 pouches	94X377002	94X377002
C 401 / C 301	pH indicator (phenol red) reagent kit, 1 bottle	94X377004	94X377004
C 103	Chlorine dioxide (glycine) reagent kit, pack of 100 pouches	94X377005	94X377005