

# Turbidity

## Quality Control using Turbidity Measurements

Typical turbidity values for various liquids

Liquid	NTU
Deionized water	0.02
Drinking water	0.02 ... 0.5
Spring water	0.05 ... 10
Wastewater (untreated)	70 ... 2000
White water (paper industry)	60 ... 800



Turbidity measurements are of extreme importance in quality monitoring in water, wastewater, beverage production, electroplating and petrochemical applications.

Light passing through liquid which contains undissolved solids, such as algae, mud, microbes and other insoluble particles, is both absorbed and scattered. Turbidity increases with the amount of undissolved solids present in the sample. However, the shape, size and composition of the particles also influence the degree of turbidity. Turbidity has been determined by simply measuring light passing through the sample. Measuring the **scattered light at an angle of 90°** has proved to be a more accurate method particularly at lower measuring ranges. Instruments that use this method are also referred to as **nephelometers**.

Turbidity or nephelometers instruments differ by the light source they utilize. Infrared units (IR-LED) with a wavelength of 860 nm are required for methods: ISO 7027/ DIN EN 27027 (EN ISO 7027). Standard methods specifies the use of units that use white light by a tungsten wide-band lamp for water and wastewater analysis.

### Calibration and Standards

Formazine is recognized throughout the world as a primary standard. Standards with lower turbidity values can be prepared by dilution from a formazine standard solution with 4000 NTU. However, apart from common dilution mistakes (often 10%), the major disadvantage is the limited shelf life of formazine, which should only be used when fresh. Due to a favorable distribution of particle size, newly applied materials such as the AMCO® standard provide improved accuracy and save having to work with formazine. They have the additional advantage of a minimum shelf life of 12 months.

### AMCO® Standards – for use in Drinking Water Analysis

All WTW turbidity instruments come complete with AMCO® standards. AMCO® standards are the US EPA approved primary standard for drinking water analysis. AMCO® is also recognized as a secondary standards by DIN ISO regulations.

## The Right Instrument for the right Use!

### 4 models to choose from:

- 2 portable IR or Tungsten models and
- 2 laboratory meters with IR or Tungsten light source:

**NEW**



## Applications

	Turb 430 IR	Turb 355 T/IR	Turb 550/ Turb 550 IR	Turb 555/ Turb 555 IR
<b>Applications</b>	Portable use for all water testing applications incl. drinking water, wine industry, process control	Portable use for waste water, surface water and ground water applications	Routine meter for laboratories; drinking water	Routine meter for precision measurements
<b>Light source</b>	IR LED	Tungsten lamp/IR LED	Tungsten lamp/IR LED	Tungsten lamp/IR LED
<b>Measuring range</b>	0-1100 NTU/FNU	0-1100 NTU/FNU	0-1000 NTU/FNU	0-10000 NTU/FNU/FAU
<b>Calibration</b>	Automatic 3 point	Automatic 1-3 point	Automatic 1-3 point	Automatic 1-5 point
<b>Special features</b>	Portable field meter	Portable field meter	AQA Flow-thru measurement (unpressurized)	AQA complete with password protection, ratio method for the reduction of interferences; transmission, flow-thru measurement (unpressurized/up to 1 bar)

### Please note:

As floating and moving particles are measured in turbidity, slight measurement deviations are possible. In order to achieve results which are as representative as possible, attention should be paid to the following:

- samples should be measured immediately, as particle otherwise settle.
- constant lamp operating temperature.
- condensation on samples should be avoided.
- the position of the standards should be marked to exclude the influence of glass inhomogeneities.

- AMCO®-standards
- AQA functions
- US EPA

# Turbidity Laboratory Turbidity Meters

## Turb 550 / Turb 550 IR



- AutoRange
- Automatic 1-3 point calibration
- Flow-thru measurement

### THE professional turbidity meter – Up to 1,000 NTU

Laboratory turbidity meters for nephelometric measurements with automatic 1-3-point calibration and calibration interval monitoring. Measuring range selection from 0.01 ... 1000 NTU is carried out automatically and for comparative measurements the current and previous values can be shown on the 2-line display.

Standard equipment includes instrument with built-in short operating instructions, 2 empty cuvettes and 3 standards (0.02 – 10.0 – 1000 NTU, AMCO® standards with approval for drinking water as primary standards according to US EPA and according to EN ISO 7027).

An unpressurized flow-thru adapter is available for continuous measurements.



## Technical Data

	Turb 550	Turb 550 IR	Turb 555	Turb 555 IR
Measuring principles	Nephelometric	Nephelometric ratio method	Nephelometric ratio method transmission	Nephelometric ratio method transmission
Light source	Tungsten lamp	IR-LED	Tungsten lamp	IR-LED
Measuring range	NTU 0 ... 1000 FNU – EBC – Nephelos – FAU –	0 ... 1000 0 ... 1000	0 ... 10000 – 0 ... 2450 0 ... 67000	0 ... 10000 0 ... 10000 0 ... 2450 – 0 ... 10000
Resolution	0.01 NTU from 0.00 ... 9.99 0.1 NTU from 10.0 ... 99.9 1 NTU from 100 ... 1000		0.0001 NTU from 0.0001 ... 9.9999 NTU 0.001 NTU from 10.000 ... 99.999 NTU 0.01 NTU from 100.00 ... 999.99 NTU 0.1 NTU from 1000.0 ... 9999.9 NTU	
Accuracy	±2% of value or ±0.01 NTU		0 ... 1000 NTU: ±2% of value or ±0.01 NTU 1000 ... 4000 NTU: ±5% of value 4000 ... 10000 NTU: ±10% of value	
Reproducibility	±1% of value or ±0.01 NTU			
Calibration	Automatic 1...3 point calibration		Automatic 1...5 point calibration	
Response time	< 3 seconds		< 6 seconds	
Cuvettes	1.1 x 2.76 in (28 x 70 mm) round cuvette, 25 ml sample volume			
AQA functions	Calibration interval monitoring Calibration protocol		Calibration interval monitoring Calibration protocol Password-protected access to calibration and configuration time-controlled data transmission	
Operating temp.	50 ... 104 °F (+10 ... +40 °C)		32 ... 122 °F (0 ... +50 °C)	
Power supply	Plug-in power supply 100 - 240 VAC ±10% / 47 - 63 Hz			

### Turb 555 / Turb 555 IR



#### The ADVANCED professional meter – Measuring range up to 10,000 NTU

High-precision laboratory turbidity meter with a wide measuring range of 0.0001 to 10000 NTU (automatic measuring range switching) for all turbidity measuring applications from ultrapure and drinking water measurements, through quality assurance in soft drinks and wastewater treatment.

The measuring system with its 4 detectors allows not only nephelometric (90° scatter) measurements and transmittance measurements, but also ratio measurements in which the influences of stray light and sample color are reduced.

Comprehensive AQA functions such as monitoring the calibration interval or password protection for calibration and setup access help to assure the quality of the measurements and are all also included in the documentation of the measurements.

Units come complete with all accessories required for accurate measurements.

Continuous flow-thru measurements are possible up to a pressure of 1 bar with FLOW-THRU-TURB vessel.



- Measuring range 0.0001 to 10000 NTU with AutoRange function
- Automatic 1...5 point calibration
- Values displayed in
  - NTU
  - EBC
  - FNU, FAU (Turb 555 IR)
  - Nephelos (Turb 550)
- Flow-thru measurement



## Ordering Information

Model		Order No.
Turb 550	Laboratory turbidity meter with universal power supply 90 ... 250 V, 3 calibration standards 0.02 – 10.0 – 1000 NTU, 2 empty cuvettes	600 100
Turb 550 IR	Laboratory turbidity meter for measurements according to DIN EN 27 027, ISO 7027 (EN ISO 7027) universal power supply 90 ... 250 V, 3 calibration standards 0.02 – 10.0 – 1000 NTU, 2 empty cuvettes	600 110
Turb 555	High-end laboratory turbidity meter according to US EPA with universal power supply 90 ... 250 V, 4 calibration standards 0.02 – 10.0 – 100 – 1750 NTU, 3 empty cuvettes	600 200
Turb 555 IR	High-end laboratory turbidity meter according to DIN/ISO (EN ISO 7027) with universal power supply 90 ... 250 V, 4 calibration standards 0.02 – 10.0 – 100 – 1750 NTU, 3 empty cuvettes	600 210

Flow-thru vessels, calibration standards and other accessories see brochure "Product Details"

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