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ADVANCED APPLIED TECHNOLOGIES

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Quality Control using Turbidity Measurements

- AMCO®-standards
- AQA functions
- US EPA

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

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.

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.

Which light source – infrared (IR) or white light (tungsten)?

An infrared light source minimizes or even eliminates the influence of coloration in a solution, because there is practically no absorption at a wavelength of 860 nm. The detection sensitivity for small particles, on the other hand, is somewhat lower at this wavelength because of the generally lower light scattering of small particles.

White light has a higher sensitivity for small particles, however the inherent coloration of the solution has a stronger disturbing effect in this case.

The IR measurement is required by DIN ISO, the white light measuring by US EPA.

Nephelometric or transmittance measuring?

The nephelometric measuring with 90° scattered light is advantageous for the lower turbidity range. In contrast, the transmittance method is better suited for medium to high turbidities, where there are stronger light scattering and shadowing effects among the larger-sized particles. In this case, the diminution of light intensity gives a more accurate result than a 90° scattered light metering. Laboratory instruments for higher turbidity ranges therefore offer significantly more measuring options.

The Right Instrument for the right Use!

4 models to choose from:

2 portable models, each with either IR or tungsten light source, and
2 laboratory meters with IR or Tungsten light source:

Applications					
	Applications	Light source	Measuring range	Calibration	Special features
 <p>Turb 355 T/IR</p>	Portable use for waste water, surface water and ground water applications	Tungsten lamp/IR LED	0-1100 NTU/FNU	Automatic 1-3 point	Portable field meter
 <p>Turb 430 T/IR</p>	<p>Portable use for all water testing applications incl. drinking water, wine industry, process control</p> <p>Laboratory use; optional for all applications up to 1100 NTU/FNU with LabStation</p>	Tungsten lamp/IR LED	0-1100 NTU/FNU	Automatic 3 point	<p>Portable field meter</p> <p>Calibration interval Calibration documentation Storage for measured values Optional: LabStation for -Easy data evaluation with LSdata -Laboratory use -As a charging station</p>
 <p>Turb 550/Turb 550 IR</p>	Routine meter for laboratories; drinking water	Tungsten lamp/IR LED	0-1000 NTU/FNU	Automatic 1-3 point	AQA Flow-through measurement (unpressurized)
 <p>Turb 555/Turb 555</p>	Routine meter for precision measurements	Tungsten lamp/IR LED	0-10000 NTU/FNU/FAU	Automatic 1-5 point	AQA complete with password protection, ratio method for the reduction of interferences; transmission, flow-through measurement (unpressurized/ up to 4 bar)

Turbidity Laboratory Turbidity Meters

Turb 550 / Turb 550 IR



- AutoRange
- Automatic 1-3 point calibration
- Flow-through 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, 3 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-through adapter is available for continuous measurements.



Technical Data

	Turb 550	Turb 550 IR	Turb 555	Turb 555 IR
Measuring principles	Nephelometric	Nephelometric	Nephelometric ratio methode transmission	Nephelometric ratio methode 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 fulfil quality assurance requirements for measured values and are all also included in the documentation of the measurements.

Units come complete with all accessories required for accurate measurements.

Continuous flow-through measurements are possible up to a pressure of 4 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-through 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-through vessels, calibration standards and other accessories 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.

Turbidity Portable Turbidity Meters

Turb 430 IR / Turb 430 T

- Scattered light characteristics according to Pharmacopoeia 5.0
- Multifunctional LabStation
- GLP/AQA conform documentation



NEW

IP 67



CETLus

2 Year
Warranty



NEW: A turbidity measuring lab for in the field – the new Turb 430IR/T sets



Lab accuracy & comfort in portable field instrument

With the new turbidimeters **Turb 430 T** and **Turb 430 IR**, the user now has the choice to perform nephelometric measurements at 90° scattered light according to the application and standard required.

The **Turb 430 IR** meets the DIN 27027/ISO7027 requirements, the **Turb 430 T** those of US EPA 180.1. The measuring range is from 0 to 1100 NTU/FNU and is identified automatically. Accurate measurements in the lower range, e.g. in drinking water are no problem!

Menu driven calibration with up to 3 points and all measurement function are easy for even the most inexperienced operator to perform accurate and precise measurements. The calibration is via an AMCO® standards set (0.02-10-1000 NTU). Up to 1000 data sets with ID nos. can be stored and subsequently output via the LabStation in combination with the powerful LSdata software. The quality of the measurement results is supported by adjustable calibration intervals with documentation. (Order no. 251301. see p. 3).

The Turb 430 is not only a field measuring instrument (especially with the practical field case), but also a “small lab instrument” for applications up to 1100 NTU/FNU and with optimum data management.

Optional: Field case and rechargeable battery set (see p. 4 and brochure “Product Details” p. 71).

Turb 355 T / Turb 355 IR

Small portable turbidimeter for control purposes

Battery-operated portable turbidity meter with Tungsten lamp according to US EPA or infrared LED (860 nm) for nephelometric measurements according to ISO 7027 / DIN/ EN 27 027 (EN ISO 7027): Handy, lightweight and easy to operate.

The Turb 355 T / IR comes in a handy carrying case. All necessary accessories (calibration standards 0,02 – 10,0 and 1000 NTU, empty cuvettes and batteries) are included. The instrument is powered by 4 AAA batteries.

0 - 1100 NTU/FNU

Easy operation



IP 67



2 Year Warranty

Technical Data

	Turb 430 IR / Turb 430 T	Turb 355 T / 355 IR
Measuring principles	Nephelometric (90° scatter)	Nephelometric (90° scatter)
Light source	IR-LED/Tungsten lamp	Tungsten lamp/IR-LED
Measuring range NTU FNU	0 ... 1100 / 0-1100 0 ... 1100	0 ... 1100 0 ... 1100
Resolution	0.01 from 0.00 ... 9.99 0.1 from 10 ... 99.90 1 from 100 ... 1100	0.01 NTU from 1 ... 9.99 0.1 NTU from 10.0 ... 99.9 1 NTU from 100 ... 1000
Accuracy	0.01 NTU or ±2 % of the measured value	±2 % of the measured value or ±0,1 NTU last decimal place in range 1 ... 500 NTU ±3 % of the measured value in range 500 ... 1100 NTU
Reproducibility	<0.5% of the measured value or 0,01 NTU/FNU	±1% of the measured value or ±0,05 NTU/FNU
Calibration	Automatic 3 point calibration	Automatic 1...3 point calibration
Response time	Approx. 3 seconds (IR) / approx. 7 seconds (T)	14 seconds
Cuvettes	1.10x2.36 in. (28x60 mm), 20 ml sample volume	0.98x1.77 in (25x45 mm), 15 ml sample volume
Interface	RS 232, USB via adapter	
Special functions		
Calibration protocol	Yes	—
Storage of measured value	1000	—
RS 232	Yes	—
Date/Time	Yes	—
Data evaluation	Yes	—
Rechargeable battery	Optional	—
Operating temp.	32 ... 122 °F (0 ... +50 °C)	32 ... 122 °F (0 ... +50 °C)
Power supply	4 x AA batteries for approx 3,000 measurements	4 micro (AAA) alkaline manganese batteries suitable for more than 1,500 measurements

Ordering Information

Model		Order No.
Turb 355 IR	Portable turbidity meter according to ISO 7027 / DIN EN 27 027 (EN ISO 7027) in professional case with 4 micro (AAA) alkaline manganese batteries, 3 calibration standards 0.02 – 10.0 – 1000 NTU and 2 empty cuvettes	600 311
Turb 355 T	same as Turb 355 IR, but with tungsten lamp according to US EPA	600 312
Turb 430 IR	Portable turbidity measuring instrument for nephelometric measurements (90°) according to DIN EN 27027, incl. calibration kit (0.02 - 10 - 1000), 2 empty cuvettes, cleaning tissues, batteries (4 x AA), suited for drinking water. (Optional LabStation or rechargeable battery pack, see brochure "Product Details" p. 71)	600 320
Turb 430 T	Portable turbidimeter for nephelometric measurement (90°, tungsten) acc. US EPA 180.1, incl. calibration standard kit (0.02-10-1000 NTU) and accessories: 2 empty cuvettes (28 mm), cleaning tissues, batteries (4 x AA); suitable for drinking water. Optional: LabStation or rech.batt. pack or as set (see brochure "Product Details" p.71)	600 325

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