

# TL23 SERIES BENCHTOP TURBIDIMETER

## Applications

- Food and beverage
- Pharmaceutical
- Chemical
- Power
- Metal and Mining
- Agriculture
- Wastewater



## Trusted measurement for high range turbidity applications; simplified.

The new TL23 Series laboratory turbidimeters blend trusted technology and improved features to simplify testing in the most demanding industrial and wastewater applications.

### Improved and intuitive design

The TL23 Series' large full colour touch screen display and intuitive user interface accelerate setup, calibration and measurement. An easy interface and guided procedures give you confidence in your results.

### A smart device for more reliable measurements

The TL23 Series ensures stable readings and accurate analysis by capturing turbidity readings once the device detects sample stability. This quality step removes subjectivity and the need for repeated measurements.

### Easy to use. Easy to Be Right

The TL23 Series provides everything you need at your fingertips. With a USB port for easy data export, sample identification for traceability, and self-diagnostics for quality assurance, Hach® makes it easy to Be Right.

## Technical Data\*

Model	TL2300 EPA	TL2310 ISO	TL2350 EPA	TL2360 ISO
<b>Measurement method</b>	Nephelometric			
<b>Regulatory</b>	Meets EPA Method 180.1	Meets ISO 7027, DIN EN 27027, DIN 38404 and NFT 9033	Meets EPA Method 180.1	Meets ISO 7027, DIN EN 27027, DIN 38404 and NFT 9033
<b>Display</b>	17.8 mm colour touch screen			
<b>Light source</b>	Tungsten filament lamp	Light-emitting diode (LED) at 860 ± 30 nm	Tungsten filament lamp	Light-emitting diode (LED) at 860 ± 30 nm
<b>Units</b>	NTU and EBC	FNU and NTU	NTU, EBC, Abs (absorbance), %T (% transmittance) and mg/L	FNU, FAU, NTU, EBC, Abs (absorbance), %T (% transmittance) and mg/L
<b>Measuring range</b>	NTU (Ratio on): 0 - 4000 NTU (Ratio off): 0 - 40 EBC (Ratio on): 0 - 980 EBC (Ratio off): 0 - 9.8	NTU/FNU: 0 - 1000	NTU (Ratio on): 0 - 10000 auto decimal NTU (Ratio off): 0 - 40 EBC (Ratio on): 0 - 2450 auto decimal EBC (Ratio off): 0 - 9.8 Absorbance (auto range): 0 - 1.0 Transmittance (%): 1.0 - 100 Degree (mg/L): 1 - 100	FNU (Ratio on): 0 - 1000 FNU (Ratio off): 0 - 40 FAU (auto range): 20 - 10000 NTU (Ratio on): 0 - 10000 auto decimal NTU (Ratio off): 0 - 40 EBC (Ratio on): 0 - 2450 auto decimal EBC (Ratio off): 0 - 9.8 Absorbance (auto range): 0 - 2.00 Transmittance (%): 1.0 - 100 Degree (mg/L): 0 - 100
<b>Accuracy</b>	Ratio on: ±2% of reading plus 0.01 NTU from 0 - 1000 NTU, ±5% of reading from 1000 - 4000 NTU based on formazin primary standard  Ratio off: ±2% of reading plus 0.01 NTU from 0 - 40 NTU	±2% of reading plus 0.01 FNU/NTU from 0 - 1000 FNU/NTU	Ratio on: ±2% of reading plus 0.01 NTU from 0 - 1000 NTU, ±5% of reading from 1000 - 4000 NTU ±10 % of reading from 4000 - 10000 NTU  Ratio off: ±2% of reading plus 0.01 NTU from 0 - 40 NTU	FNU: ±2% of reading plus 0.01 FNU from 0 - 1000 FNU  FAU: ±10% of reading from 20 - 10000 NTU  NTU: ±2% of reading plus 0.01 NTU from 0 - 1000 NTU, ±5% of reading from 1000 - 4000 NTU, ±10% of reading from 4000 - 10000 NTU
<b>Absorbance</b>			Absorbance: ±0.01 Abs from 0 - 0.5 Abs at 455 nm, ±2% Abs from 0.5 - 1 Abs at 455 nm  Transmittance: 2% T from 10 - 100% T at 455 nm	Absorbance: ±0.005 Abs from 0 - 1 Abs at 860 nm  Transmittance: 0.12% T from 10 - 100% T at 860 nm
<b>Resolution</b>	Turbidity: 0.001 NTU/EBC (on lowest range)		Turbidity: 0.001 NTU/EBC  Absorbance: 0.001 Abs  Transmittance: 0.1% T	
<b>Repeatability</b>	±1% of reading or 0.01 NTU, whichever is greater (under reference conditions)			
<b>Response time</b>	Signal averaging off: 6.8 seconds / Signal averaging on: 14 seconds (when 10 measurements are used to calculate the average)			

Model	TL2300 EPA	TL2310 ISO	TL2350 EPA	TL2360 ISO
<b>Stabilisation time</b>	Ratio on: 30 minutes after start-up  Ratio off: 60 minutes after start-up	Immediately	Ratio on: 30 minutes after start-up  Ratio off: 60 minutes after start-up	Immediately
<b>Reading modes</b>	Single, continuous, Rapidly Settling Turbidity, signal averaging on or off, ratio on or off	Single, continuous, Rapidly Settling Turbidity, signal averaging on or off	Single, continuous, Rapidly Settling Turbidity, signal averaging on or off, ratio on or off	Manual or auto range, signal averaging on and adjustable or off, ratio on or off
<b>Communication</b>	USB			
<b>Interface</b>	2 USB-A ports for USB flash drive, external printer, keyboard and barcode scanner			
<b>Data logging</b>	2000 total logs, includes reading log, verification log and calibration log			
<b>Air purge</b>	Dry nitrogen or instrument grade air (ANSI MC 11.1, 1975)  0.05 L/s at 69 kPa (10 psig); 138 kPa (20 psig) max  Hose barb connection for 1/8-inch tubing			
<b>Sample cell compatibility</b>	Round cells 95 x 25 mm (3.74 x 1 in.) borosilicate glass with rubber-lined screw caps  Note: Smaller sample cells (less than 25 mm) can be used when a cell adapter is used.			
<b>Sample requirements</b>	25 mm sample cell: 20 mL minimum  0 to 70 °C (32 to 158 °F)			
<b>Certifications</b>	CE, KC, RCM			
<b>Power requirements</b>	100 - 240 V AC, 50/60 Hz, 3.4 A			

*\*Subject to change without notice.*

## Principle of Operation

TL2300 and TL2350 Turbidimeters: The optical system is comprised of a tungsten-filament lamp, lenses and apertures to focus the light, a 90° detector, forward-scatter light detector, a backscatter detector (TL2350 only) and a transmitted-light detector. The instrument permits turbidity measurements at less than 40 NTU to be performed using only the 90° scattered-light detector or from 4000 NTU (TL2300) to 10000 NTU (TL2350) using the complete set of detectors (Ratio Measurement). With the Ratio Measurement on, the instrument's microprocessor uses a mathematical calculation to ratio signal s from each detector. The benefits of using Ratio on for measurements include excellent linearity, calibration stability and the ability to measure turbidity in the presence of colour.

TL2310 Turbidimeter: The optical system includes an 860 ±30 nm light emitting diode (LED) assembly and a 90° detector to monitor scattered light. The instrument measures turbidity up to 1000 FNU or NTU using the single 90° detector. The instrument does not utilise ratio measurements.

TL2360 Turbidimeter: The optical system includes an 860 ±30 nm light emitting diode (LED) assembly and a 90° detector to monitor scattered light, a forward-scatter light detector, a transmitted-light detector and a back-scatter light detector. The instrument measures turbidity up to 1000 units in FNU measurement mode using the ratio detectors. Attenuation measurements of up to 10000 FAU units can be made using a single transmitted detector. The instrument measures turbidity at less than 1000 NTU using only the 90° scattered-light detector or up to 10000 NTU using the complete set of detectors (ratio mode).

## Order Information

### Instruments

<b>LPV444.99.00210</b>	TL2300 Tungsten Lamp Turbidimeter, EPA, 0 - 4000 NTU
<b>LPV444.99.00120</b>	TL2310 LED Turbidimeter, ISO, 0 - 1000 NTU
<b>LPV444.99.00310</b>	TL2350 Tungsten Lamp Turbidimeter, EPA, 0 - 10000 NTU
<b>LPV444.99.00320</b>	TL2360 LED Turbidimeter, ISO, 0 - 10000 NTU

### Replacement Parts

<b>9647700</b>	Cover, lamp access
<b>9649100</b>	Dust cover
<b>9653500</b>	Colour filter module for EPA compliance
<b>4708900</b>	Lamp replacement kit
<b>4707600</b>	Polishing cloth
<b>126936</b>	Silicone oil

### Accessories

<b>2662110</b>	Stabcal turbidity standards calibration kit, 100 mL bottles
<b>2662100</b>	Stabcal turbidity standards calibration kit, 500 mL bottles
<b>246142</b>	Formazin turbidity standard, 4000 NTU, 100 mL
<b>246149</b>	Formazin turbidity standard, 4000 NTU, 500 mL
<b>4397500</b>	Test kit, sample degassing
<b>4397510</b>	Test kit, sample filtration & degassing
<b>2723342</b>	Stabcal turbidity standard, 0.10 NTU, 100 mL
<b>2697942</b>	Stabcal turbidity standard, 0.30 NTU, 100 mL
<b>2698042</b>	Stabcal turbidity standard, 0.50 NTU, 100 mL

### Service Packages

#### Start-up:

Commissioning, Instruction and Training of your operating personnel to ensure you get the best performance from your instrumentation from the first day you use it.

#### Instrument Qualification:

IQ/OQ to give you documented proof of your system operation functionality.

#### Service Agreement:

Hach offers a wide range of service agreements that can be tailored to you to help maximise your measurement reliability and instrument uptime.

*Contact us to get a service offering designed for you.*