2100 Series Laboratory Turbidimeters

Features and Benefits

Four Models for Specific Requirements

- **2100N and 2100N IS Turbidimeters—***With Hach's patented* optical system and 40 years of design evolution, the 2100N and 2100N IS Turbidimeters meet the needs of most laboratories for fast, accurate turbidity testing over a wide range of samples. The 2100N is equipped with a tungsten lamp, while the 2100N IS is equipped with an 860 nm LED light source.*

- **2100AN and 2100AN IS Turbidimeters—***In addition to providing all the capabilities of the above models, the 2100AN and 2100AN IS Turbidimeters are ideal for testing colored samples and higher ranges of turbidity. Many features, such as signal averaging and recorder outputs, are programmable in the 2100AN and 2100AN IS models. Enhanced features include interchangeable color filters and user-defined, Application-Specific Calibration (ASC).*

** U.S. Patents 4198161, 0363676, and 5604590*

Ratio Measurement

One keystroke initiates Ratio Measurement (not available for all models) and activates an array of detectors in addition to the 90-degree nephelometric detector. Ratio Measurement corrects for color interference, enhances calibration stability, and allows the measurement of turbidity at levels greater than 1,000 NTU.

Regulatory Reporting

The 2100N and 2100AN Turbidimeters are equipped with a stable halogen-filled, tungsten filament lamp to meet the reporting requirements of EPA Method 180.1. The 2100N IS and 2100AN IS Turbidimeters are equipped with an 860 nm LED light source to meet ISO 7027 Turbidity Measurement Standards.

Air Purge Prevents Condensation in Sample Chamber

Measure cold and hot samples. A built-in connection is provided to purge the sample compartment with dry air to prevent light scattering caused by condensation.

Hach 2100 Series Laboratory Turbidimeters are engineered to provide superior accuracy and sensitivity in any application. Since Hach introduced the first laboratory turbidimeter for testing drinking water more than 40 years ago, the system has evolved to include advances in optics, digital signal processing, and software.

Smart Self-Diagnostics

Relax. The instrument will alert you if you make a mistake—such as inserting the wrong calibration standard.

StablCal® Stabilized Formazin Standards

Hach's patented* StablCal Stabilized Formazin is true non-toxic Formazin, not a synthetic. It scatters light exactly like a freshly diluted, conventional formazin standard. But StablCal is delivered at precisely the required concentration. It requires no preparation and its stability is guaranteed for a minimum of one year. Only StablCal and Hach-prepared Formazin guarantee the reproducibility necessary for optimal turbidimeter performance. Unlike conventional Formazin, StablCal is available in ready-prepared sets of sealed sample vials, customized for full-range calibration of all 2100 Series turbidimeters. These standards are also available in bottles.

**US Patent 5,777,011*

Laboratory Accessories

A complete selection of accessories is available to speed up routine testing and improve accuracy.

- **Flow cell kit—***Convert the testing process into a nearly continuous operation.*
- **Sample conditioning accessories and special filter modules—***Eliminate error caused by entrained gases and color interference.*

DW PW IW E FB

DW = drinking water WW = wastewater municipal **PW = pure water / power**
IW = industrial water **E = environmental** C = collections **FB = food and beverage**

HACH®

Be Right™

Specifications*

	2100N	2100N IS	2100AN	2100AN IS
Measurement Method	Nephelometric			
Regulatory	Meets EPA Method 180.1	Meets EN ISO 7027, DIN EN 27027, DIN 38404 and NFT 9033	Meets EPA Method 180.1	Meets EN ISO 7027, DIN EN 27027, DIN 38404 and NFT 9033
Light Source	Tungsten lamp	870 ±30 nm LED	Tungsten lamp	870 ±30 nm LED
Ranges				
NTU Mode				
RATIO ON: Manual	0 to 0.999; 0 to 9.99; 0 to 99.9; 0 to 4000		0 to 0.999; 0 to 9.99; 0 to 99.9; 0 to 10,000	0 to 0.999; 0 to 9.99; 0 to 99.9; 0 to 10,000
RATIO ON: Auto	0 to 4000 auto decimal		0 to 10,000 auto decimal	0 to 10,000 auto decimal
RATIO OFF	0 to 40.0	0 to 0.999 (manual) 0 to 9.99 (manual) 0 to 99.9 (manual) 0 to 1000 (auto or manual)	0 to 40.0	0 to 1000
Nephelo Mode				
RATIO ON: Manual	0 to 9.99; 0 to 99.9 0 to 26,800		0 to 9.99; 0 to 99.9 0 to 67,000	
RATIO ON: Auto	0 to 26,800 auto decimal		0 to 67,000 auto decimal	
RATIO OFF	0 to 268		0 to 268	
EBC Mode				
RATIO ON: Manual	0 to 0.999; 0 to 9.99; 0 to 99.9; 0 to 980		0 to 0.999; 0 to 9.99; 0 to 99.9; 0 to 2450	0 to 0.999; 0 to 9.99; 0 to 99.9; 0 to 2450
RATIO ON: Auto	0 to 980 auto decimal		0 to 2450 auto decimal	0 to 2450 auto decimal
RATIO OFF	0 to 9.8		0 to 9.8	0 to 9.8
FNU Mode				
Manual		0 to 0.999; 0 to 9.99; 0 to 99.9; 0 to 1000		0 to 0.999; 0 to 9.99; 0 to 99.9; 0 to 1000
Auto		0 to 1000		0 to 1000
FAU Mode				
Manual				20 to 99.9; 20 to 10,000
Auto				20 to 10,000
Absorbance (ABS)				
Manual			0 to 0.999; 0 to 2.00	0 to 0.999; 0 to 2.00
Auto			0 to 2.00	0 to 2.00
Transmittance (%)			1.0 to 100	1.0 to 100
Color (@455 nm) (CU)			0 to 500	
Accuracy	*Ratio ON:* ±2% of reading plus 0.01 NTU from 0 to 1000 NTU; ±5% of reading from 1000 to 4000 NTU *Ratio OFF:* ±2% of reading plus 0.01 NTU from 0 to 40 NTU (under reference conditions)	±2% of reading plus 0.01 FNU/NTU from 0 to 1000 FNU/NTU	*Ratio ON:* ±2% of reading plus 0.01 NTU from 0 to 1000 NTU; ±5% of reading from 1000 to 4000 NTU; ±10% of reading from 4000 to 10,000 NTU *Ratio OFF:*±2% of reading plus 0.01 NTU from 0 to 40 NTU Color: ±2 CU from 0 to 30; ±5 CU from 0 to 500 CU	*FNU:* ±2% of reading plus 0.01 FNU from 0 to 1000 FNU; *FAU:* ±10% of reading from 20 to 10,000 FAU; *NTU:* ±2% of reading plus 0.01 NTU from 0 to 1000 NTU; ± 5% of reading from 1000 to 4000 NTU; ±10 % of reading from 4000 to 10,000 NTU
Resolution	Turbidity: 0.001 NTU/FNU/EBC, Abs on lowest range (as appropriate) Transmittance (where available): 0.1 %T Color (where available): 1 CU			
Repeatability	± 1% of reading or ± 0.01 NTU/FNU, whichever is greater (under reference conditions)			
Response Time	6.8 seconds with signal averaging off; 14 seconds with signal averaging on			
Operating Modes	Manual or Auto Range; Signal Average on or off; Ratio on or off (2100N only)		Manual or Auto Range; Signal Average on and adjustable or off; Ratio on or off	
Measurement Modes	NTU, EBC, NEP	FNU, NTU	NTU, EBC, NEP, ABS, %T, color units, two user-defined units	FNU, FAU, NTU, EBC, ABS, %T, two user-defined units
Printer	N/A		Built-in (thermal, 58-mm, up to 28 column)	
Sample Cells	Borosilicate glass with rubber-lined screw caps; 95 x 25 mm (3.74 x 1 in.)			
Sample Volume	20 ml (0.7 oz.), minimum			
Operating Temperature	0 to 40°C (32 to 104°F)			
Sample Temperature	0 to 95°C (32 to 203°F)			
Storage Temperature	-40 to 60°C (-40 to 140°F)			
Operating Humidity	non-condensing; 0 to 90%, @ 25°C; 0 to 75% @ 40°C			
Instrument Stabilization Time	30 min. with ratio on, 60 min. with ratio off; typical application leaves instrument on 24 hour/day	Instantaneous	30 min. with ratio on, 60 min. with ratio off; typical application leaves instrument on 24 hour/day	Instantaneous
Air Purge	0.1 scfm at 69 kPa (10 psig), dry nitrogen or instrument grade air (ANSI MC 11.1, 1975)			
Air Purge Connection	Tubing: hose barb for 1/8-in.; Pressure: 138 kPa (20 psig) maximum			
Power Requirement	115/230 Vac or 230 Vac ±17%, 50/60 Hz, 60 VA maximum (Automatic Power Selection)			
Input/Output	RS232C serial interface via DB9 subminiature D-shell connector for data output to computer or printer, and data input (command). No handshaking. Baud rate 1200, one stop bit, no parity, 8-bit character length. Additional options on 2100AN and 2100AN IS.			
Compliance	Listed to UL 1262 and certified to CSA 22.2 No. 1010.1 by Edison Testing Laboratories (ETL). Carries the CE compliance mark.			
Enclosure	High-impact polycarbonate plastic			
Dimensions	30.5 x 40 x 15.6 cm (12 x 15.8 x 6.1 in.)			
Weight	3.4 kg (7.8 lb.)	3.8 kg (8.5 lb.)		
Warranty	2 years			

**Specifications subject to change without notice.*

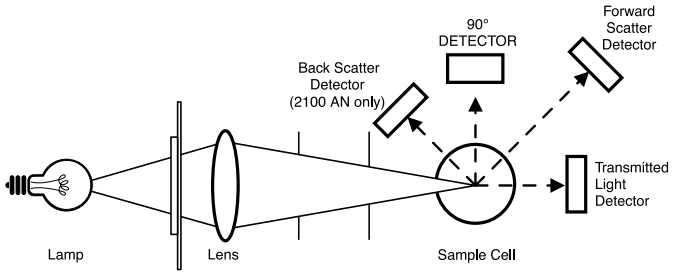
Engineering Specifications

1. The turbidimeter shall be a laboratory nephelometer with a primary detector centered at 90° from the incident light beam.
2. Forward scatter and transmitted detectors also shall be present to extend the measurement range, compensate for component aging, increase calibration stability, and compensate for interferences due to sample color (not applicable to 2100N IS model).
3. Ratio and non-ratio turbidity measurements shall be selectable using a single key located on the front panel (not applicable to 2100N IS model).
4. The light source shall be a tungsten bulb operating at a color temperature of 2650 to 3000ºK or an LED at 870 ±30 nm.
5. Peak spectral response of the system shall be between 400 and 600 nm (2100N and 2100AN).
6. The instrument must meet USEPA design criteria as specified in USEPA Method 180.1 (2100N and 2100AN models only) or EN ISO 7027, DIN EN 27027, DIN 38404 and NFT 9033 criteria (2100N IS and 2100AN IS models only).
7. Measurement range of the turbidimeter shall be 0 to 1000 or 0 to 10,000 NTU (depending on model) with automatic ranging and decimal point placement.
8. Stray light must be < 0.02 NTU.
9. Display resolution must be 0.001 NTU in the lowest range.
10. A range key shall be provided for automatic or manual range selection.
11. A key also shall be provided for selecting automatic signal averaging. Pressing the key shall toggle signal averaging on or off.
12. Calibration shall be with formazin primary standards or StablCal stabilized formazin plus a measurement of the dilution water to establish a blank value.
13. Calibration shall be completed using the instrument's keyboard.
14. There shall be no potentiometers to adjust to complete calibration.
15. The instrument shall automatically compensate for the turbidity of the dilution water when measuring the lowest calibration standard.
16. The instrument shall provide standard RS232 serial communication.
17. A built-in air purge system must be included to minimize moisture condensation on the sample cell.
18. The instrument shall be capable of operating using 115 or 230 Vac, 50 or 60 Hz. Automatic power sensing and switching shall be built into the instrument.
19. Standard accessories shall include sample cells, a primary standards set, and a complete illustrated instrument manual.
20. Compliance for the instrument shall be as follows: Listed to UL 1262 and certified to CSA 22.2 No. 1010.1 by Edison Testing Laboratories (ETL), carries the CE compliance mark.
21. The manufacturer shall warrant the instrument for two years from date of shipment against defects in materials and workmanship.
22. The instrument shall be a model of the 2100 Series Turbidimeter, manufactured by Hach Company.

Principle of Operation

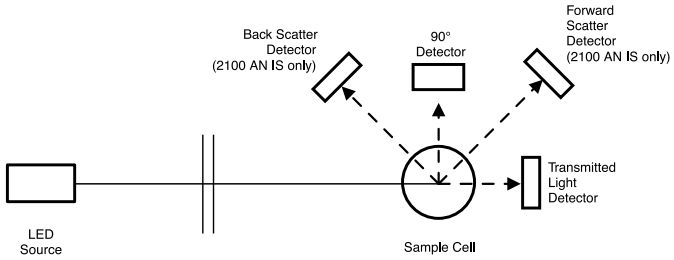
2100N and 2100AN Turbidimeters

The optical system is comprised of a tungsten-filament lamp, lenses and apertures to focus the light, a 90-degree detector, forward-scatter light detector, a backscatter detector (2100 AN only),and a transmitted-light detector. The instrument permits turbidity measurements at less than 40 NTU to be performed using only the 90 degree scattered-light detector or 4000 NTU (2100N) to 10,000 NTU (2100AN) using the complete set of detectors (Ratio Measurement). With the Ratio Measurement on, the instrument's microprocessor uses a mathematical calculation to ratio signals 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 color.



2100AN IS Turbidimeters

The optical system includes an 870 ±30 nm light emitting diode (LED) assembly, 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 10,000 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 10,000 using the complete set of detectors (ratio mode).



2100N IS Turbidimeters

The optical system includes an 870 ±30 nm light emitting diode (LED) assembly and a 90º detector to monitor scattered light. The instrument measures turbidity up to 1000 FNU or 1000 NTU using the single 90º detector. The instrument does not utilize ratio measurements.

Ordering Information

Hach 2100 Series Laboratory Turbidimeters

All turbidimeters are supplied with six sample cells, a complete set of StablCal Primary Calibration Standards in sealed vials, silicone oil and oiling cloth, dust cover, manuals, and a power cord. Model 2100AN also includes a 455 nm filter for Pt-Co color measurement. Models 2100AN and 2100AN IS also include printer paper.

USEPA-COMPLIANT—Models 2100N and 2100AN

4700000 2100N Laboratory Turbidimeter, with North American power cord and fuse
4700002 2100N Laboratory Turbidimeter, with continental European power cord and fuse
4700100 2100AN Laboratory Turbidimeter, with North American power cord and fuse
4700102 2100AN Laboratory Turbidimeter, with continental European power cord and fuse

ISO-COMPLIANT—Models 2100N IS and 2100AN IS

4790000 2100N IS Laboratory Turbidimeter, with North American power cord and fuse
4790002 2100N IS Laboratory Turbidimeter, with continental European power cord and fuse
4790100 2100AN IS Laboratory Turbidimeter, with North American power cord and fuse
4790102 2100AN IS Laboratory Turbidimeter, with continental European Power Cord and fuse

Accessories

4744900 Manual Flow Cell Kit
4745000 Automated Flow Cell Kit, 115 Vac
4745002 Automated Flow Cell Kit, 230 Vac
4397500 Sample Degassing Kit
4397510 Sample Filtration & Degassing Kit
2489500 Branson Ultrasonic Bath, for cleaning cells
3036300 Color Filter Module, for 410 nm wavelength
1999800 Color Filter Module, for 455 nm wavelength (incl with 2100AN)
3031200 Color Filter Module, for EPA compliance (incl with 2100N and 2100AN)
3036700 Color Filter Module, for 500 nm wavelength
3037100 Color Filter Module, for 560 nm wavelength
3037300 Color Filter Module, for 610 nm wavelength
3037600 Color Filter Module, for 810 nm wavelength
1999900 Color Filter Module, for 860 nm wavelength

Turbidity Standards

2662105 StablCal Turbidity Standards Calibration Kit, for 2100N / N IS Turbidimeter, sealed vials (<0.1, 20, 200, 1000, 4000 NTU)

2659505 StablCal Turbidity Standards Calibration Kit, for 2100AN / AN IS Turbidimeter, sealed vials (<0.1, 20, 200, 1000, 4000, 7500 NTU)

246149 Formazin Turbidity Standard, 4000 NTU, 500 mL

(Contact Hach Company for individual standards in various sizes.)

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At Hach, it's about learning from our customers and providing the right answers. It's more than ensuring the quality of water—it's about ensuring the quality of life. When it comes to the things that touch our lives...

Keep it pure.

Make it simple.

Be right.

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