

Turbidity and Free/ Total Chlorine Meter

EPA Compliant



- **EPA standards**
 - Meets USEPA requirements
- **CAL Check™**
 - Alerts users of calibration status
- **Five point calibration**
 - Up to 5 point turbidity calibration
- **Connectivity**
 - PC interface via USB
- **Logging**
 - Log and recall up to 200 measurements
- **GLP features**
 - Meets Good Laboratory Practices

Test the most important drinking water parameters

HI83414 is a highly accurate dual parameter instrument that reflects Hanna's years of experience. The HI83414 successfully combines turbidity and colorimetric measurements to test the most important parameters of drinking water: turbidity and free/total chlorine. This meter is specially designed for water quality measurements, providing reliable and accurate readings on low turbidity and chlorine values. The HI83414 meets and exceeds the requirements of USEPA and Standard Methods for turbidity and colorimetric measurements.

Calibration

A two, three, four or five-point calibration can be performed by using the supplied (<0.1, 15, 100, 750 and 2000 NTU) standards. If user-prepared standards are used, the calibration points can be modified. Free or total chlorine measurements can be made in the 0.00 to 5.00 mg/L (ppm) range.

CAL Check™

With the powerful CAL Check™ function, reliable performance can be validated at any moment by using the exclusive Hanna ready-made, NIST traceable standards. A one-point calibration can be performed using the same CAL Check™ standard.

Optical system

This instrument features an optical system to guarantee accurate results, assure long-term stability and minimize stray light and color interferences. They also compensate for variations in intensity of the lamp for less frequent calibration.

The 525 nm interference filter of the colorimeter assures accurate and repeatable results. Repeatability of the measurements are ensured with 25 mm round cuvettes made from special optical glass.

Measurements

Turbidity measurements can be made in the 0.00 to 4000 NTU (Nephelometric Turbidity Units) range when ratiometric measurements are used and in the 0.00 to 40.0 NTU range when non-ratio method is used. The HI83414 has an EPA compliance reading mode which rounds the reading to meet EPA reporting requirements. Alternative EBC and Nephelos measuring units are available. Depending on the measured sample and needed accuracy, normal measurement, continuous measurement or signal averaging measurement can be selected.

Good Laboratory Practice

The HI83414 features complete GLP (Good Laboratory Practice) functions that allow traceability of the calibration conditions. The last calibration points, time and date can be checked.

User-friendly interface with contextual help

This meter also incorporates a user-friendly interface with an easy-to-understand, graphic LCD. All messages are in plain text, making them easy to read. Comprehensive contextual help is available at the press of a button. All messages and help screens are available in several languages. Confirmation and error acoustic signals help the user during instrument operation. Furthermore, a tutorial mode of operation guides the user step by step through the analysis process.

Data logging

The logging function offers complete measurement information. Up to 200 measurements can be stored in the internal memory and consulted at any time. For further storage or analysis options, data can be downloaded to a PC using the USB port.

Standardization

The nephelometric turbidity meter is designed to be routinely standardized with a known light scattering standard. As with all analytical standards or reference materials, a turbidity standard should be able to perform the following: provide traceability, demonstrate the accuracy of results, calibrate the equipment and methodology, monitor user performance, validate tests and facilitate comparability; this ensures that when the correct procedures have been followed, the same analysis of the same materials will produce results that agree with each other whenever they are performed.

Standards and reference materials should be produced and characterized in a technically competent manner and should be homogenous, stable, certified and have available a known uncertainty of measurement. Presently, there are at least two standards recognized and approved by the USEPA, Standard Methods, ASTM and other regulatory agencies; these are formazin and AMCO AEPA-1.

Formazin is an aqueous suspension of an insoluble polymer formed by the condensation reaction between hydrazine sulphate and hexamethylenetetramine. Although formazin was suggested as a turbidity standard as early as 1926, it has many limitations, such as its high toxicity, low shelf life, quick rate of settling and easy agglomeration. Also, the diluent for formazin standards must be turbidity-free water. This is often difficult to obtain, particularly in a field situation.

AMCO AEPA-1 Standard

Fortunately, since 1982, there is a standard available which overcomes the shortcomings of formazin. This has been developed by the American company, Advanced Polymer Systems, and is a suspended mixture of styrene divinylbenzene polymer spheres. These standards have the following characteristics:

Stability: AMCO APEA-1 turbidity standards are a stabilized suspension of cross linked styrene divinylbenzene copolymer microbeads in ultrapure water. These beads are chemically inert and keep their chemical balance in a water medium regardless of concentration.

The size scatter of the beads only ranges from 0.06 to 0.2 microns. This small size accounts for random Brownian movement of these beads in suspension, keeping them in constant motion and totally dispersed within the ultra pure water matrix.

Physical properties: Particle size, uniform shape and refractive index make these spheres ideal to characterize light absorption and scatter for 90° behavior in the UV-VIS range. In addition, the bead's spherical shape and size impedes the agglomeration or precipitation of the standard. For these reasons, the AMCO AEPA-1 standards are very stable.

Reliability: These standards are prepared and bottled in a clean room facility. They are tested for accuracy and stability, fully validated before bottling, and free from any toxic or carcinogenic chemicals or compounds.

Hanna turbidity calibration standards are prepared from NIST traceable primary standard reference materials. All prepared standards are compared to formazin turbidity standard solutions. The values reported on Hanna Certificate of Analysis are the results obtained on the date of analysis. The evaluation of these data is based on Standard Methods.



Typical sources of turbidity in drinking water include the following:

- Waste discharge
- Run-off from watersheds, especially those that are disturbed or eroding
- Algae or aquatic weeds and products of their breakdown in water reservoirs, rivers, or lakes
- Humic acids and other organic compounds resulting from decay of plants, leaves, etc. in water sources
- High iron concentrations which give water a rust-red coloration (mainly in ground water and ground water under the direct influence of surface water)
- Air bubbles and particles from the treatment process

Simply stated, turbidity is the measure of relative clarity of a liquid. Clarity is important when producing drinking water for human consumption, and in many manufacturing uses.

Once considered as a mostly aesthetic characteristic of drinking water, significant evidence exists that controlling turbidity is a competent safeguard against pathogens in drinking water.

Turbidity measurement is a quick and inexpensive test that can help operators diagnose and treat water problems. Proper calibration technique and the use of high quality turbidity standards, such as the AMCO AEPA standards, ensure that measurements can be fully validated, are in compliance with regulatory requirements, are traceable to Primary Reference Materials and, most importantly, are comparable. The user can be certain that their measurements, irrespective of instrument, are all traceable in an unbroken chain to the same NIST Primary Standard.

HI83414 Turbidity Specifications

Non-Ratio Mode	Range	0.00 to 9.99; 10.0 to 40.0 NTU; 0.0 to 99.9; 100 to 268 Nephelos; 0.00 to 9.80 EBC
	Resolution	0.01; 0.1 NTU; 0.1; 1 Nephelos; 0.01 EBC
Ratio Mode	Range	0.00 to 9.99; 10.0 to 99.9; 100 to 4000 NTU; 0.0 to 99.9; 100 to 26800 Nephelos; 0.00 to 9.99; 10.0 to 99.9; 100 to 980 EBC
	Resolution	0.01; 0.1; 1 NTU; 0.1; 1 Nephelos; 0.01; 0.1, 1 EBC
Range Selection		automatic
Accuracy		±2% of reading plus 0.02 NTU (0.15 Nephelos; 0.01 EBC); ±5% of reading above 1000 NTU (6700 Nephelos; 245 EBC)
Repeatability		±1% of reading or 0.02 NTU (0.15 Nephelos; 0.01 EBC) whichever is greater
Stray Light		< 0.02 NTU (0.15 Nephelos; 0.01 EBC)
Light Detector		silicon photocell
Method		nephelometric method (90°) or ratio nephelometric method (90° & 180°), adaptation of the USEPA method 108.1 and standard method 2130 B
Measuring Mode		normal, average, continuous
Turbidity Standards		<0.1, 15, 100, 750 and 2000 NTU
Calibration		two, three, four or five-point calibration

HI83414 Free and Total Chlorine Specifications

Range	0.00 to 5.00 mg/L (ppm)
Resolution	0.01 mg/L (ppm) from 0.00 to 3.50 mg/L (ppm); 0.10 above 3.50 mg/L (ppm)
Accuracy @25°C/77°F	±0.02 mg/L @ 1.00 mg/L
Detector	silicon photocell with 525 nm narrow band interference filters
Method	adaptation of the USEPA Method 330.5 and Standard Method 4500-Cl _G .
Standards	1.00 mg/L (ppm) free chlorine; 1.00 mg/L (ppm) total chlorine
Calibration	one-point calibration

HI83414 General Specifications

Light Source/ Life	tungsten filament lamp / greater than 100,000 readings
Display	40 x 70 mm graphic LCD (64 x 128 pixels) with backlight
Log Memory	200 records
PC Interface	USB
Environment	0 to 50°C (32 to 122°F); max 95% RH non-condensing
Power Supply	115/130 Vac; 50/60 Hz, auto-off after 15 minutes of non-use
Dimensions	230 x 200 x 145 mm (9.0 x 7.9 x 5.7")
Weight	2.5 kg (88 oz.)
Ordering Information	HI83414-01 (115V) and HI83414-02 (230V) are supplied with sample cuvettes and caps (5), calibration cuvettes for turbidity (HI88703-11) and colorimeter (HI93414-11), silicone oil (HI98703-58), cuvette wiping cloth, scissors, power cord and instruction manual.

See page 12.18 for reagents and accessories