

PART 1 GENERAL

1.1 Section includes

- A. Laser nephelometer for monitoring low-range 0.0 to 5,000 mNTU (0.0 to 5.0 NTU) turbidity.

1.2 Measurement Procedures

- A. The method of measuring turbidity will be nephelometric.
 - 1. A 35 mW solid state, monochromatic, 660 nm laser light will be directed into the sample stream contained within the instrument body. The instrument body contains a light trap to minimize the internal incident light reflections.
 - 2. The light scattered at 90 degrees will be collected and carried through an optical fiber to a remote detection system.
- B. The method will comply with USEPA approved Hach Method 10133 for measuring turbidity for regulatory drinking water compliance reporting.
 - 1. Reference Federal Register, Vol. 67, No. 209, Section III, October 29, 2002.

1.3 Alternates

- A. Other methods of turbidity measurement, such as those that require a sample cell with glass window that can foul or fog or require air purge, desiccant, cleaning, or cause non-sample scatter of the incident light beam are not acceptable.

1.4 System Description

- A. Performance Requirements
 - 1. Measurement range: 0.000 to 5000 milli-Nephelometric Turbidity Units (mNTU)
 - 2. Accuracy
 - a. ± 3 percent of reading or ± 5 mNTU (whichever is greater) from 0 to 1000 mNTU
 - b. ± 2 percent of reading from 1000 to 5000 mNTU
 - 3. Limit of Detection (LOD): 0.4 mNTU using deionized, reverse osmosis water, based on statistical averages for three instruments and according to the procedure prescribed by ISO Method 15839.
 - 4. Resolution
 - a. For readings up to 9.999 mNTU: 0.001 mNTU
 - b. For readings from 10.00 to 99.99 mNTU: 0.01 mNTU
 - c. For readings from 100.0 to 999.9 mNTU: 0.1mNTU
 - d. For readings from 1000 to 5000 mNTU: 1 mNTU
 - 5. Repeatability
 - a. Better than ± 1.0 % at 24 mNTU as RSD (or as coefficient of variation)
 - b. Better than ± 1.0 % at 800 mNTU as RSD (or as coefficient of variation)
 - c. Better than ± 1.0 % at 5000 mNTU as RSD (or as coefficient of variation)

1.5 Certifications

- A. Light source: Class 1 laser product; with embedded 10 mW, 660 nm, Class 3B laser source complies with 21 CFR 1040.10 and 1040.11. FDA Laser Accession No. 9911570.

1.6 Environmental Requirements

A. Operational Criteria

1. Sample flow rate: 100 to 750 mL/minute (1.6 to 11.9 gallons/hour)
2. Sample temperature: 0 to 50 degrees C (32 to 122 degrees F)
3. Operating temperature: 0 to 40 degrees C (32 to 104 degrees F)
4. Operating humidity: 5 to 99 percent non-condensing

1.7 Warranty

- A. The product includes a one-year warranty on the FT660 sc sensor and a two-year warranty on the sc100 controller from the date of shipment.

1.8 Maintenance Service

A. Scheduled maintenance:

1. Calibration with formazin-based standards

B. Unscheduled maintenance

1. Clean instrument enclosure
2. Clean bubble trap
3. Clean or replace laser module
4. Clean or replace detection system

PART 2 PRODUCTS

2.1 Manufacturer

A. Hach Company, Loveland, CO

1. Model FilterTrak 660 sc Laser Nephelometer
2. Model sc100 Controller

2.2 Manufactured Unit

- A. The FilterTrak 660 sc Laser Nephelometer consists of a 660 nm laser diode with closed loop intensity control light source, detection system, bubble trap, and internal light trap.
- B. The sc100 controller is microprocessor-based with non-volatile memory backup (EEPROM).
- C. The sc100 controller contains the DC power supply.
- D. The sc100 controller is housed in a NEMA 4X enclosure made of polycarbonate face panel, epoxy-coated cast aluminum door and case, and stainless steel hardware.

2.3 Equipment

- A. The FilterTrak 660 sc nephelometer operates using 10.8 to 13.5 Vdc, 1.5 VA power.
- B. The FilterTrak 660 sc nephelometer operates continuously.
- C. The sample stream into the FilterTrak 660 sc nephelometer flows through an internal bubble trap.
- D. The FilterTrak 660 sc nephelometer provides user selectable signal averaging, bubble rejection, alarm and recorder output hold, and self-test diagnostics.
- E. The FilterTrak 660 sc nephelometer provides a secondary measurement parameter denoted "RSD". RSD provides a quantitative assessment of measurement baseline fluctuation. Measurement baseline

- fluctuation is often a precursor to an ensuing turbidity spike and is a complementary response to a turbidity spike.
- F. The sc100 controller is capable of functioning with one or two FilterTrak 660 sc nephelometers.
 - G. The graphical display of the sc100 controller has the following characteristics.
 - 1. Liquid crystal display (LCD), 128 x 64 pixel dot matrix with backlighting
 - 2. Character height:
 - a. Main display: 1/2-inch (13 mm)
 - b. Auxiliary display: 1/8-inch (3 mm)
 - 3. Menu screens contain up to six lines of conversational text.
 - 4. The screen is readable in full sunlight.
 - H. The sc100 controller displays a single reading or dual reading simultaneously.
 - I. The sc100 controller displays auxiliary information.
 - 1. Analog output values
 - 2. Date and time
 - 3. Relay status
 - 4. Diagnostic warnings
 - 5. Error messages
 - J. The sc100 controller provides user-selectable signal averaging, bubble removal, alarm and recorder output hold, and self-test diagnostics.
 - K. The sc100 controller will let operators control sensor and interface functions with menu-driven software
 - L. The sc100 controller will be able to transfer data to a computer or printer via direct Modbus[®] or LonWorks[®] communications.
 - 1. Support of other networking protocols can be added without modification to the hardware.
 - M. The sc100 controller will be able to transfer information directly into a laptop computer or Personal Digital Assistant (PDA) via a wireless IR Port using Integrated Infrared Data Access (IrDA).
 - N. The sc100 controller will have a built-in data logger to store data on 15-minute intervals for up to 6 months with two sensors per controller.
 - O. The sc100 controller will include two isolated 0 to 20 mA or 4-20 mA analog outputs.
 - 1. Resolution: 0.005 mA (12-bit).
 - 2. Able to drive up to 600 ohm loads.
 - 3. Values can be entered to define the endpoints for minimum and maximum output mA.
 - 4. A selected output can hold a preset value or remain active to respond to measurements during calibration events.
 - P. The sc100 controller will include three set-point alarms, each equipped with SPDT relay with unpowered contacts rated at 5A.

2.4 Components

- A. Standard equipment:
 - 1. Nephelometer sensor head
 - 2. Nephelometer body
 - 3. Digital controller
 - 4. Manual
 - 5. Quick reference card
- B. Dimensions
 - 1. Nephelometer
 - a. 12 inches (30.5 cm) wide
 - b. 16 inches (40.6 cm) high
 - c. 10 inches (25.4 cm) deep

- 2. Controller
 - a. 5.7 inches wide
 - b. 5.7 inches high
 - c. 5.9 inches deep
- C. Shipping weight: 16.9 pounds (7.7 kg)
- D. Connectors
 - 1. Nephelometer
 - a. Sample inlet fitting: 0.25-inch NPT female, 0.25-inch compression fitting
 - b. Drain fitting: 0.5-inch NPT female, 0.5-inch hose barb
 - 2. Controller
 - a. Three 0.5-inch conduit holes
 - b. Nylon mounting bracket

2.5 Accessories

- A. StablCal[®] calibration standards
- B. FT660 Nephelometer calibration kit
- C. StablCal verification standards.
- D. Floor stand

PART 3 EXECUTION

3.1 Preparation

- A. Wall mount
- B. Clearances: sufficient space to remove head assembly for calibration/cleaning.
- C. Storage temperature: -20 to 60 degrees C (-4 to 140 degrees F)

3.2 Installation

- A. Contractor will install the turbidimeter in strict accordance with the manufacturer's instructions and recommendation.
- B. Manufacturer's representative will include a half-day of start-up service by a factory-trained technician.
 - 1. Contractor will schedule a date and time for start-up.
 - 2. Contractor will require the following people to be present during the start-up procedure.
 - a. General contractor
 - b. Hach Company factory trained representative
 - c. Owner's personnel

3.3 Manufacturer's Service and Start-Up

- A. Contractor will include the manufacturer's services to perform start-up on instrument to include basic operational training and certification of performance of the instrument.
- B. Contractor will include a manufacturer's Service Agreement that covers all the manufacturer's recommended preventative maintenance, regularly scheduled calibration and any necessary repairs beginning from the time of equipment startup through to end user acceptance / plant turnover and the first 12 months of end-user operation post turnover.

- C. Items A and B are to be performed by manufacturer's factory-trained service personnel. Field service and factory repair by personnel not employed by the manufacturer is not allowed.
- D. Use of manufacturer's service parts and reagents is required. Third-party parts and reagents are not approved for use.

END OF SECTION