

# Wallace & Tiernan® Analytical Measurement TMS 561 Turbidimeter On-Line Process Turbidity Measurement

## General Description

The TMS 561 turbidimeter is specifically designed for continuous on-line measurement of turbidity in filtered or raw water in municipal and industrial water treatment plants, final effluent in wastewater, and filter performance in the commercial aquatic applications. Utilizing an EPA-approved, reusable, primary standard, routine calibration is fast and inexpensive. For poor quality water, an ultrasonic, self-cleaning system is available to reduce maintenance. An optional data acquisition system and software package allows networking of up to 255 turbidimeters into a single computer. The software provides graphical trending, alarms, and filter analysis.

## Features

The TMS 561 turbidimeter provides an economical, compact system for turbidity measurement in most water treatment applications. Available with either a white light or IR light source, it is ideally suited for reporting results under EPA and other international standards. Each TMS 561 turbidimeter offers these standard and optional features:

- Two automatic measurement ranges of 0-10 NTU and 10-1000 NTU (Nephelometric Turbidity Units).
- Three basic models to choose from to provide the correct instrument for a specific application.
- Compact design eliminates the need to mount multiple components for each turbidimeter. All of the electronics and operator controls are built into the measurement unit.

## Key Benefits:

- User-friendly, menu-driven electronics are housed in a NEMA 4X / IP 56 enclosure.
- Interfacing with any control system via standard 4-20mA output, two configurable alarms or optional RS-485 digital system.
- Meets USEPA method 180.1 or ISO 7027 design and performance criteria.
- Optics are not in contact with the sample, reducing the chance of false low readings and eliminating the possibility of fouling the measurement detector.
- Removable sample cuvettes provide for cleaning and calibration without the need to disconnect piping or tubing.
- Convenient, EPA-approved, sealed calibration standards eliminate errors and simplify calibrating
- Networking of 255 turbidimeters with the optional data acquisition package.



## Design

### Vapor Purge

To eliminate condensation on the flow-through cuvette, a replaceable desiccant pack dries the air in the area of the cuvette. A circulation fan and heat from the system's electronics further maintain a dry environment around the cuvette to eliminate any interference from transient moisture. An alarm on the control display indicates when the desiccant pack requires replacement.

### Bubble Rejection System

The optical chamber of the TMS 561 turbidimeter has been designed to eliminate air in the sample and at the same time create a vortex cleaning action throughout the optical chamber.

### Light Source

White light is recommended for use in turbidimeters reporting results under USEPA (US standard) jurisdiction. The TMS utilizes an advanced krypton-filled white light technology with a lamp life expectancy up to seven years. Infrared light is recommended for use in turbidimeters reporting results under ISO 7027 (European standard) jurisdiction. Lamp life expectancy is up to 11 years. Infrared light is also recommended for wastewater final effluent and industrial applications where color is present in the sample stream.

### Automatic Self-Cleaning

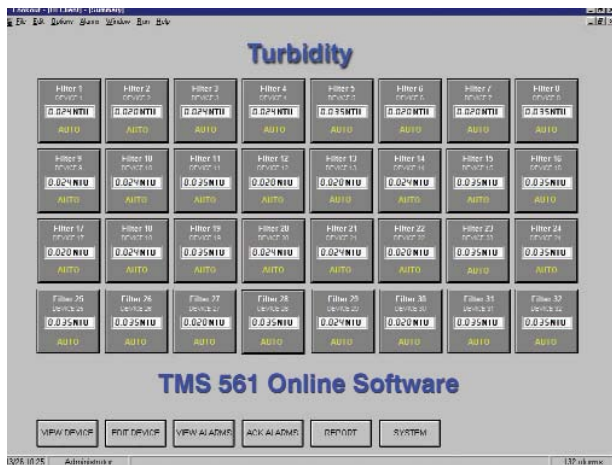
For applications with poorer water quality, automatic self-cleaning is available as an option. This unique system works by sending ultrasonic frequency into a piezo transducer bonded to the bottom of the flow-through cuvette. This dramatically increases the time between manual cleaning to enable turbidity measurements in difficult applications. This extends flow-through measurement technology into the area once only capable with surface scatter instrumentation, but at a lower cost and improved reliability.

### Menu-Driven Electronics

An integral LCD display provides the operator with the turbidity levels and messages for guidance in setup, calibration, and troubleshooting. There are three operational modes of the instrument accessible through the three-button touchpad: AUTO (measurement), CAL, and CONFIG. Through these three menu selections, the instrument can be calibrated, customized (displays, alarm functions, outputs, etc.), and setup for limited sample calibration. A security access option can be selected to prevent unauthorized tampering with the instrument operating parameters.

### Simple, Economical Calibration

Calibration can be completed using EPA-approved primary standards available as an accessory from Siemens' range of Wallace & Tiernan® Products. Unlike competitive units, these calibration standards are sealed cuvettes and require no mixing or dilution of expensive bulk standards. This dry method of calibration is fast, clean, and reusable. One set of standards can be used on multiple turbidimeters. On-screen menu prompts guide you through the calibration procedure quickly and easily. It is not necessary to disconnect any piping or turn off the sample flow when performing the calibration.



Menu-Driven Electronics

## Optional Data Network Interface

### Acquisition System

An optional data acquisition system is designed to sequentially collect data from a series of interfaced TMS 561 turbidimeters. The software can monitor up to 255 turbidimeters on one computer. The software system stores data and prints reports, graphs, and alarms on each individual turbidimeter. In addition, it can compare filters and monitor individual or multiple filter efficiency.

### Minimum Hardware Requirements for Software

- Pentium Class PC running at 90 MHz
- 32 MB RAM (recommended 64 MB), 200 MB free hard disk space
- Windows NT/2000/XP recommended
- Network card and TCP/IP networking installed on PC's to be connected (this is required only if the SCADA system is to operate on a multi-node network of PC's).

## Operation

Turbidity of a fluid is caused by undissolved substances, such as inorganic or organic particles, colloids, or gas bubbles. If light strikes such suspended particles, the light beam is reflected or refracted and a small amount of light is scattered throughout the fluid. The intensity of the light scattered is determined by the amount and the properties (size, shape, color) of these particles. Measurement of the turbidity is based on the evaluation of the intensity of the scattered light. The measurement value depends on the wave length of the light used and the geometry of the measuring instruments or the angle of measurement. In order to establish an international standard of turbidity, these parameters have been defined by the EPA (for U.S. applications) and ISO (for international applications).

In the TMS 561 turbidimeter, a continuous sample of the process to be measured flows through the meter. The measuring chamber consists of a rotational flow-through assembly with a replaceable glass cuvette. A specially designed flow head eliminates the need for a bubble trap and ensures an immediate response time. Either a white light or IR light lamp generates a beam of light, which is passed through the sample. This light is measured by two sensors arranged at an angle of 90°. The resulting signal is conditioned by the integral electronics to provide a turbidity measurement reading in NTU. When calibrated against a known turbidity standard, the TMS 561 turbidimeter provides an accurate indication of turbidity on a continuous basis.



TMS 561 turbidimeter with Calibration Cuvettes

## Technical Data

**Model Selection:** All models provided fully calibrated and include 4-20 mA output, desiccant, spare measuring cuvette with light shield, power supply, and instruction manual. Also, an optional flow alarm is available to provide indication of a loss of sample flow.

Model No.	RS-485	Backlight Display	Ultrasonic Cleaning	Range NTU
TMS 561 BW (white light)	Standard	Standard	N/A	0-1000
TMS 561 BR (infrared light)	Standard	Standard	N/A	0-1000
TMS 561 CW (white light)	Standard	Standard	Standard	0-100
TMS 561 CR (infrared light)	Standard	Standard	Standard	0-100
TMS 561 DW (white light)	Standard	Standard	Standard	0-1000
TMS 561 DR (infrared light)	Standard	Standard	Standard	0-1000

**Measurement Range:** 0-1000 NTU (Models BW, BR, DW & DR) 0-100 NTU (Models CW & CR)

**Accuracy:**  $\pm 2\%$  of reading or  $\pm 0.02$  NTU below 40 NTU, whichever is greater  $\pm 5\%$  of reading above 40 NTU

**Resolution:** 0.0001 NTU (below 10 NTU)

**Response Time:** Adjustable from 5 to 500 seconds

**Display:** Multi-line LCD back-lit display

**Alarms:** Two programmable high/low alarms, 120-240 VAC 2A Form C Relay

**Analog Output:** Powered 4-20 mA, 600  $\Omega$  drive, galvanically isolated

**Communications Port:** Bi-directional RS-485 with Modbus or W&T communication protocol

**Light Source:** White Light or Infrared (850nm)

**Sample Flow Rate:** 100 ml/min to 1 liter/min (0.026 to .26 gal/min)

**Sample Pressure:** 60 psi (4.1 bar) Maximum

**Sample Connections:** Intake and Drain tubing connections - 3/16"ID x 5/16"OD

**Sample Flow Alarm:** Optional, factory installed. Provides alarm indication in the event of a loss of sample flow.

**Operating Temperature:** 32°F to 122°F (0°C to 50°C)

**Sample Temperature:** 34°F to 122°F (1°C to 50°C)

**Wetted Materials:** Nylon, Borosilicate Glass, Silicon, Polypropylene, Stainless Steel

**Power Requirements:** 90-250 VAC, 47-63 Hz, 80VA

**Enclosure Rating:** NEMA 4X / IP 56

**Environmental Conditions:** Not recommended for outdoor use. Altitude up to 6560 ft. (2000 meters). Up to 95% RH (non-condensing)

**Regulatory Compliance:** White Light version compliant to U.S. EPA 180.1 Infrared version compliant to ISO 7027 Certifications: CE Approved, ETL listed to UL 3111-1. ETL Certified to CSA 22.2 No. 1010-1-92

**Dimensions:** 14" x 12" x 12" (35cm x 30cm x 30cm) See WT.050.610.101.UA.CN.

**Typical Installation:** See WT.050.610.200.UA,CN

**Shipping Weight:** 5.5 lbs (2.5 kg)

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