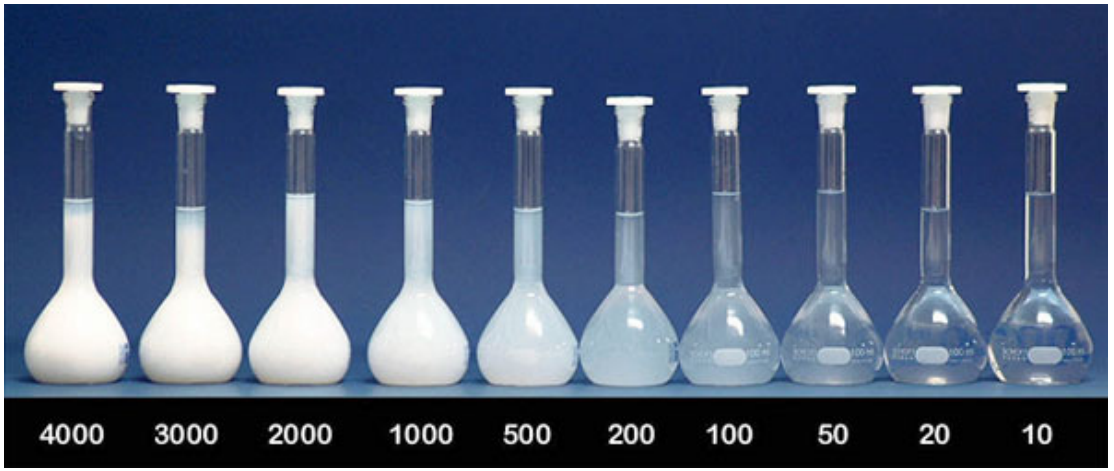
Triton™ TR8 Turbidity Analyzer

The Clear Choice
Water to Sludge

ELECTRO-CHEMICAL DEVICES

What is Turbidity?

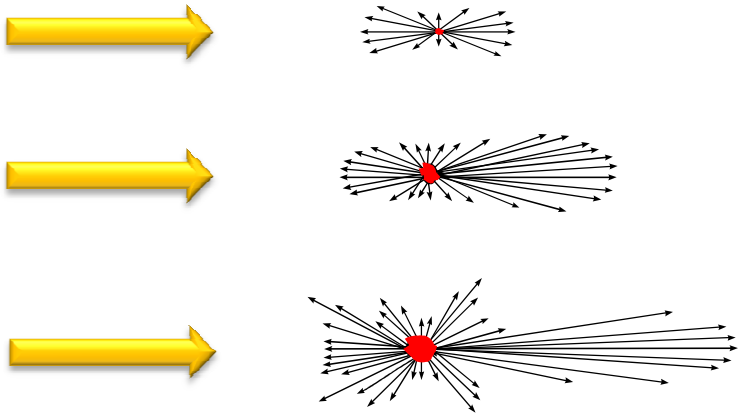
- *Standard Methods for the Examination of Water and Wastewater* describes Turbidity as “an expression of the optical property that causes light to be scattered and absorbed rather than transmitted in a straight line through the sample”.
- In simple terms, turbidity is the degree of cloudiness or haziness of a water sample caused by un-dissolved particles like silt, clay, emulsions or gas bubbles.



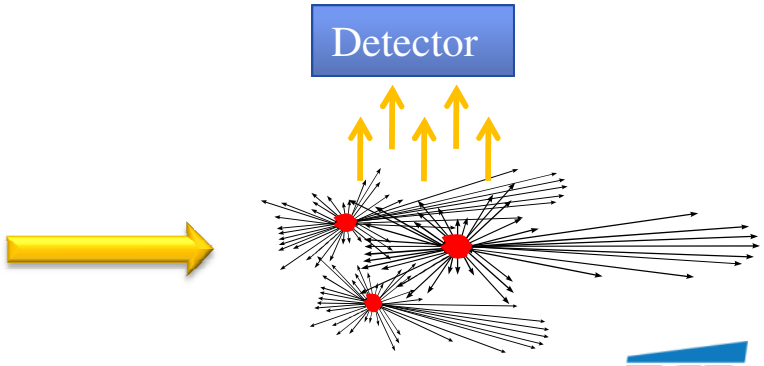
How is Turbidity Measured?

- The Degree Light is Scattered is Dependent on the Particle's Size, Shape, Color and Refractive Index.
- Forward Scattering is **very dependent** on Particle size.
- Scattering at 90° is **less dependent** on Particle size.
- Measurement of the light at 90° is referred to as Nephelometric.

Light Scattering

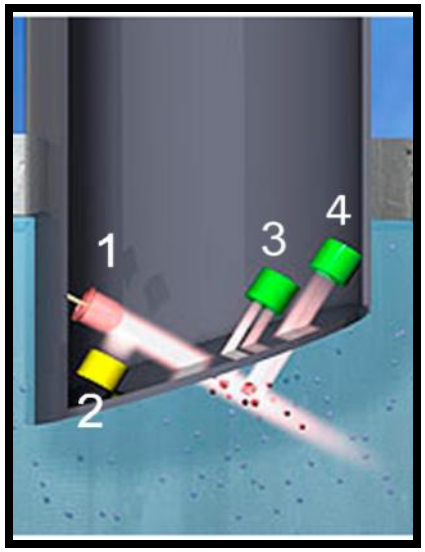


Nephelometric Measurement

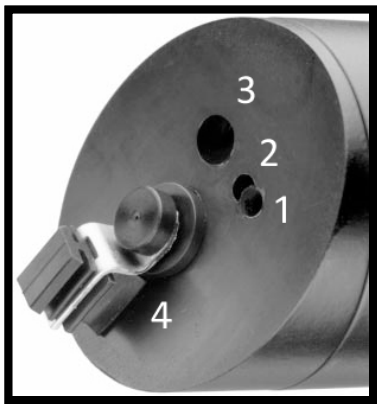


How is Turbidity Measured?

- The TRITON™ TR8 Turbidity sensor uses the Nephelometric method according to ISO 7027 / EN27027.
- The TRITON™ TR8 has three Detectors.
  - A **Reference** detector to compensate for variations caused by aging or power fluctuations of the LED.
  - A **Short Path** length detector that is best for higher ranges.
  - A **Long Path** length detector that is best for lower ranges.



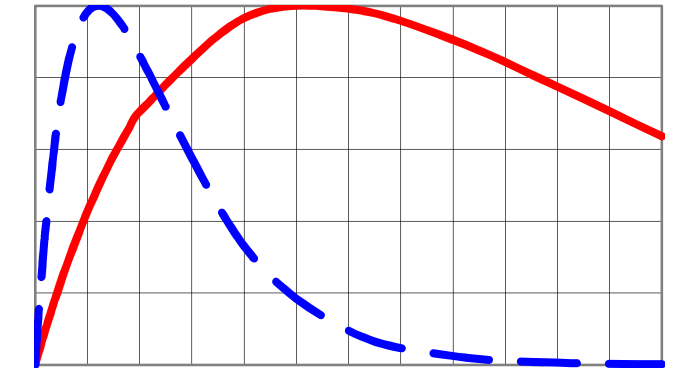
1. LED (880 nm)
2. Reference Detector
3. Short Path Detector
4. Long Path Detector



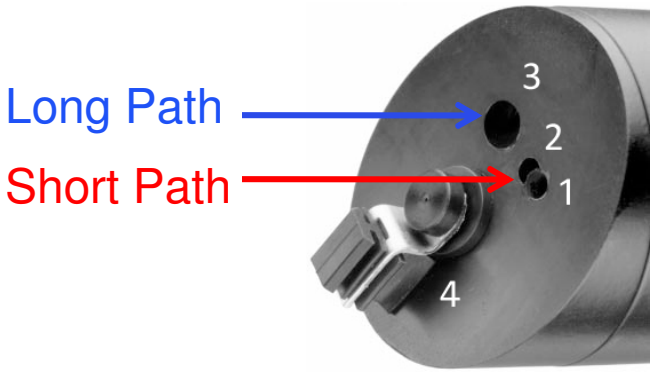
1. LED Emitter
2. Short Path
3. Long Path
4. Wiper

How is Turbidity Measured?

- The Long Path length detector measures Low level turbidity.
- Increasing the turbidity increases the number of particles and the intensity of the scattered light.
- Further increases start to block some of the scattered light and the intensity drops.
- Now there are two turbidity values for the same intensity value, oops!

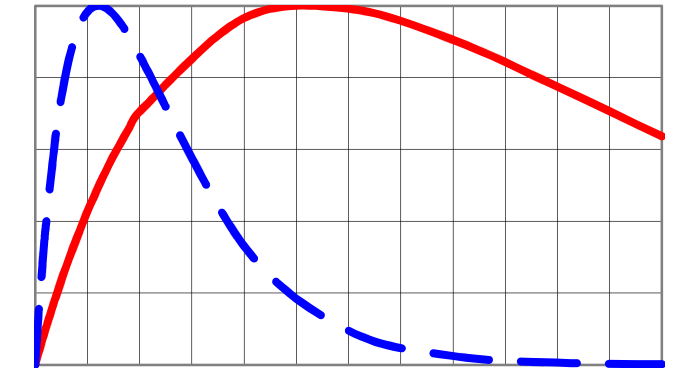


Intensity vs. Turbidity

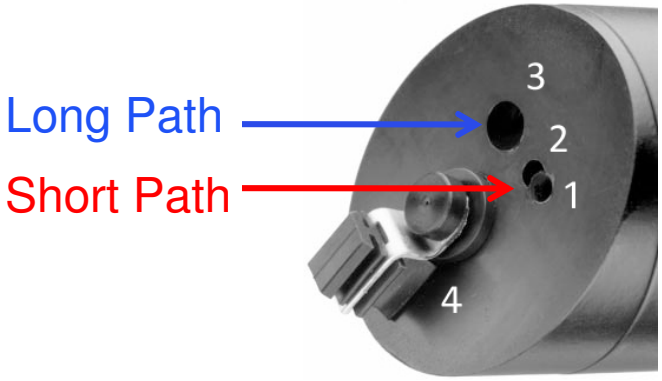


How is Turbidity Measured?

- The Short Path length detector measures High level turbidity and has a different Intensity Profile.
- Comparing the two Path Length intensities allows the TRITON TR8 to determine the true turbidity value.
- This also provides a larger Measuring Range than most competitive analyzers.



Intensity vs. Turbidity



How is Turbidity Measured?

- Measurement units
  - **FNU**: Formazine Nephelometric Unit
  - **NTU**: Nephelometric Turbidity Unit
  - **FTU**: Formazine Turbidity Unit
  - **FNU=NTU=FTU**
- The Standard Calibration for all three is with Formazine, 400 FNU
- Other Measurements
  - Grams per Liter, g/l
  - Parts Per Million, ppm
  - % Concentration, %

0.05 - 1 FNU

20-50 FNU

500-1000 FNU

6-10 g/l

What is the TRITON™ TR8

- Complete Turbidity Analyzer System
  - Transmitter
  - Sensor
  - Installation Assemblies
- Two Separate Ranges
  - One Analyzer, Two Sensors
  - Clean Water (< 500 FNU)
  - Waste Water

Units of Measure	TR8	TR8- High
FNU, FTU, NTU	0.000 – 9999	0.00 – 9999
ppm	0.00 – 3000	0.00 – 9999
grams/liter	0.0 – 3.0	0.0 – 300.0
% Concentration	0.0 – 200.0	0.0 – 200.0

TRITON™ TR8 Analyzer

- User Configurable Units of Measure:
  - FNU, FTU, NTU
  - ppm, g/l, % concentration
  - Temperature
- NEMA 4X Enclosure
- Choice of Power Supply
  - 115 VAC, 230 VAC or 24 VDC
- Single 0/4 -20 mA output, (optional 2nd output)
- Single Alarm Relay (optional 2 or 4 additional 250 VAC, 30 VDC 2 amp relays)

TRITON™ TR8 Sensors

- Two Ranges (p/n 1398XXX-1 or -2)
  - The Standard is (-1) designed for Clean Water < 500 NTU
  - High Range (-2) water to sludge
- Choice of Cable Lengths
  - 7 meter
  - 15 meter
- With or Without Wiper
- Factory Calibrated (FNU, NTU)
  - Separately or with Flow Cell
  - Easy Calibration in 100%, 33% 10% dilution of the measured solution.
- Durable Sapphire windows
  - Easily cleaned with wet cloth
- G1 and ¾" MNPT threads

TR8 Sensor Specifications

- Measurement Principle
  - Nephelometric 90° NIR (880 nm)
  - ISO 7027/EN27027
- Measurement Range
  - Standard: 0.000-500 FNU
  - High Range: to 9999 FNU
- Temperature Range
  - -5° - 50° C
- Pressure Range
  - 85 psig at 25° C
  - 15 psig at 50° C
- Accuracy
  - Maximum error < 5% of reading
- Repeatability
  - < 1% of reading

Installation Assemblies

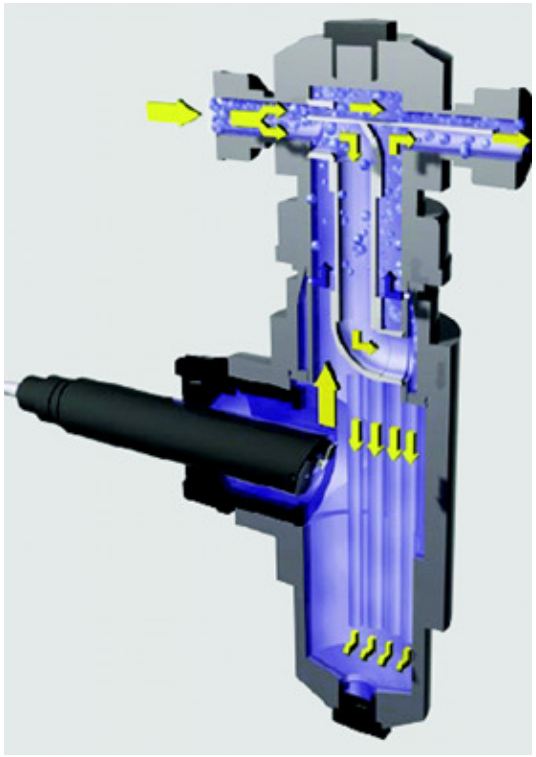
- Immersion Assembly
  - 1 meter (P/N 1000223)
  - Optional 2” rail mounting brackets (P/N 2000278)
- Flow Thru Tee with Spray Cleaner
  - Only available as a set with the Sensor. Factory calibrated in Flow Cell.
- De-bubbler Flow Cell
  - Only available as a set with sensor. Factory Calibrated in Flow Cell.

De-bubbler Flow Cell

Flow Thru With Spray Cleaner

De-Bubbler Flow Assembly

- Gas Bubbles cause high readings, beware of:
  - Cold water warming up
  - Pressurized water going to atmospheric pressure
  - Water depressurized by Siphoning action out of the flow cell
- De-bubbler Assembly is a flow cell that provides a split stream bubble trap, eliminating bubbles from the measurement chamber



Where is Turbidity Used ?

- Waste Water Treatment
  - Primary Clarifier, Aeration, Secondary Clarifier, Sand Filter Break through and Backwash, Outfall
  - Activated Sludge, Sludge Thickening, Digesters
- Water Treatment
  - Incoming water, Filter Monitoring/Break through, Clear Well/Distribution.
- Rinsing Applications Dilution Applications








TRITON™ TR8 Features

- Factory Calibrated for Easy Start Up
- Dual Optical Pathways for Extended Range
- Internally Referenced LED for Stability
- Sapphire Windows Resist Scratching
- Optional wiper assembly with easily replaced rubber wipers
- Digital Signal for noise free Transmission up to 200 meters.

ELECTRO-CHEMICAL DEVICES

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