What makes the World's Best Instream Turbidity Sensor?

Extreme accuracy: better, safer decisions

- **Statistical analysis** performed by the integrated microprocessor on 100 readings over 5 seconds outputs clean data and ignores the effect of entrained debris.
- **Nephelometric geometry** and multi-point calibration provide excellent linearity over the entire 0-1,600NTU range.
- **Optimized viewing volume** strikes a balance between minimal noise and maintaining accuracy even in shallow water.
- **SDI-12 protocol** prevents noisy data from long analog cable runs and provides compatibility with any SDI-12 capable datalogger.

Low maintenance: reduced costs

- **12-month recalibration interval** made possible by use of a non-degrading laser diode light source, which provides less than 2% optical drift annually. **Extreme stability, extremely low number of site visits required.**
- **Unique, self-cleaning wiper** eliminates site visits to manually remove bio-fouling. Non-abrasive blade keeps optic face clean and free from abrasion for up to 12 months.

TECHNICAL SPECIFICATIONS

SENSOR TYPE	
Temperature	Encapsulated thermistor
Turbidity	Optical nephelometer (sidescatter)
RANGE	0 to 1,600 NTU (nominal)
ACCURACY (TURBIDITY)	
Accuracy (@ 25°C)*	±2% of reading + 0.2 NTU (0-399 NTU)
	±4% of reading (400-1,600 NTU)
Resolution	0.01 NTU
Temp. coefficient (0-40°C)	< -0.3% / °C
ACCURACY (TEMPERATURE)	±0.2 °C
SUPPLY VOLTAGE RANGE	9.6V to 16V
CURRENT CONSUMPTION (TYPICAL)	
Standby	0.35 mA
Operating	50 mA
Motor wiping	200 mA
DEPTH RATING	98 ft. (30m)
WIPE TIME	5 seconds (nominal)
OPERATING TEMPERATURE	+32°F to 104°F (0°C to +40°C)
COMMUNICATIONS PROTOCOL	SDI-12, version 1.3
MEASUREMENTS RETURNED	The following are computed from 100 instantaneous samples taken: Mean, Variance, Median, BES, Min, Max, Temperature
SAMPLE RATE	20 Hz
DIMENSIONS	12 in. (30.48cm) x 2 in. (5.08cm)
WEIGHT	23.3 oz (604g)
CABLE OPTIONS	
Fixed cables	Custom lengths
Connectorized cables	60 ft (18.3m) / 100 ft (30.5m)

*excluding formazin batch accuracy of ±5%

Options

Deployment guide supports the DTS-12 when deployed in a 4" PVC standpipe. Bracket at the rear supports a rod for recovery from monitoring position.

Connect the DTS-12 directly to an ISCO automatic water sampler with an ISCO interface cable.

"We have been using DTS-12's for several years now and in general have had great experience with them. We have deployed them in everything from Coastal Redwood streams with heavy debris loads to large mainstem rivers. They have been very reliable for us and can take a beating."

Cort Pryor, Hydrologist
Graham Matthews and Associates

"We have no drift, no expensive instrument calibration and no changing of instruments with the DTS-12. We estimate that this step alone saves us about $2,000 per instrument, per year in maintenance costs relative to YSI's."

Rich Rossen
Pacific Lumber Company

"I find the DTS-12 to be superior for measuring turbidity. We have been able to reduce the number of technicians needed significantly."

Chuck Schager
Pacific Lumber Company

"For years of monitoring construction site stormwater run off, the equipment has been highly reliable."

Scott Stoneman
OTAK

About FTS

FTS—Forest Technology Systems, Ltd.— is a leading manufacturer of remote environmental monitoring systems, instrumentation and communications technology. Our equipment forms the backbone of some of the world's most sophisticated and demanding environment monitoring networks.

For over 33 years, FTS weather and water monitoring stations have proven themselves under the most demanding conditions...from the most remote northern regions of arctic Canada to the sun-beaten, wind-blown salt and sand of the Mexican coast, FTS technology is engineered rugged and is unparalleled in ease-of-use.

Our technology is engineered specifically for harsh environments in remote locations, so it has to operate continually, reliably, for long periods of time, with minimal maintenance requirements.

We don't just manufacture equipment, we constantly innovate advanced environmental monitoring technology. And because we understand our customers and their goals, we produce solutions that have a direct impact on ease-of-use. Our customers have told us that tremendous power and flexibility should not come at the expense of simplicity.

FTS

EXTREME ENVIRONMENTS EXTREMELY RELIABLE

DTS 12 Digital Turbidity Sensor

Low maintenance, high stability sensor for freshwater and saltwater applications.

The marine-capable DTS-12 is the World's Best Instream Turbidity Sensor.

Using true Nephelometric geometry, along with a durable optical face and angled head that sheds bubbles, it provides extremely clean, highly precise data with repeatable, long-term accuracy.

The DTS-12 exhibits less than 2% annual optical drift, providing an incredible 12-month recalibration interval. The unique self-cleaning wiper minimizes bio-fouling. These features can typically save 11 site visits per year.

Set it and forget it. For up to 12 months.

The World's Best Instream Turbidity Sensor

Stability and accuracy unlike anything else.

The DTS-12 is the first sensor to make turbidity monitoring practical. The value of continuously monitoring turbidity has long been accepted, but it's always been difficult, inaccurate, expensive, labor-intensive, and therefore often dismissed as too impractical. The DTS-12 is different—we state with confidence that it's the "world's best" because its unique design delivers **extremely low maintenance** (just clean and re-calibrate once a year) and **extremely high accuracy** over the full measurable range of 0-1,600NTU. Unlike multisondes, the DTS-12 does one task, but does it exceptionally well and it is also less expensive and simpler to deploy.

Unique self-cleaning wiper.

The culmination of a comprehensive research and development program that evaluated over 40 different cleaning technologies in extensive lab and field tests. The result: **a wiper that really works,** enabling accurate readings for up to 12 months, long after other turbidity sensors would become fouled.

- Self-cleaning, bi-directional design utilizes a back-and-forth motion and two cavities in the face of the sensor that scrape away any fouling twice each time the wiper is activated.
- Silicone wiper blade cannot be impregnated with sediment or bio-fouling.

Despite significant bio-fouling after a 12 month deployment, the optical face of the DTS-12 is clean and perfectly operational.

Set it and forget it. For up to 12 months.

The DTS-12 exhibits less than 2% annual optical drift, providing an incredible 12-month recalibration interval. The unique self-cleaning wiper minimizes bio-fouling. These features can typically **save 11 site visits per year.**

- The DTS-12 is the first turbidity sensor to use a laser diode light source, a coherent, narrow, near-infrared spectral beam that provides a constant intensity with virtually no degradation over time.
- Unique, self-cleaning, bi-directional wiper provides effective long-term cleaning performance. Non-abrasive silicone wiper blade prevents optical face abrasion.
- Integrated thermal compensation provides very high thermal stability of light source and electronics.

Non-abrasive silicone wiper blade is designed for long-term deployment and eliminates optical face abrasion even in highly abrasive sediment-rich waters. Infrequent wiper blade changes are simple and inexpensive.

Casing and all metal hardware is stainless steel, so it won't corrode in salt water.

Optional quick disconnect cable connectors allow rapid on-site servicing and instrument swap (and without reconfiguring the datalogger).

Optical face made from Noryl and Delrin, selected for their field-proven durability and thermal stability. Large optic lenses virtually eliminate scratch-induced measurement bias.

Two cavities on either side of optic face allow debris to be flushed away from the wiper between wipes, and the top edge scrapes away any stubborn fouling from the wiper blade. The wiper also "parks" in one, which extends the flexibility of the wiper blade.

Angled head sheds bubbles that can form on the optic face and give false turbidity readings. It provides the ideal Nephelometric geometry for excellent accuracy across the full range. It also simplifies mounting and siting in shallow locations.

The digital advantage.

- Long cable runs are possible without signal degradation and noise common with analog sensors.
- Calibration coefficients stored in sensor eliminating reprogramming of datalogger when changing sensors.
- Compatible with all dataloggers supporting the SDI-12 standard.

Extreme accuracy.

The DTS-12 is a digital sensor with a microprocessor dedicated to handling some powerful statistical processing, eliminating complex datalogger programming. Combined with its Nephelometric geometry, it provides extremely **clean, highly precise data with repeatable accuracy.**

- The built-in microprocessor takes 100 readings over 5 seconds, then computes and outputs the mean, variance, median, min, max and BES values. This statistical analysis compensates for entrained debris spikes and "cleans" the data, providing a precise measurement of bulk turbidity.
- The DTS-12 uses true Nephelometric geometry, which improves the signal-to-noise ratio by measuring the scattered light at a 90° angle to the light beam. Because of Nephelometry's sensitivity, precision and applicability over a wide particle size and turbidity range, it's the preferred method for measuring turbidity by the EPA.
- Utilizes 4 calibration coefficients (twice as many as other sensors) which are calculated from 10 calibration points. This results in significantly more precise linearization of the inherent non-linear response of optics.
- Eliminates the frustrating trade-off between low end accuracy and wide dynamic range with superior accuracy over the entire dynamic range (±2% from 0-499NTU and ±4% from 500-1,600 NTU). This is a near-linear response over 3 orders of magnitude.
- The sample viewing area has been optimized for watershed, river and stream applications, where low water levels sometimes occur. The approximate tennis-ball sized viewing volume maintains the right viewing volume balance: large enough for reduced noise, but small enough for shallow water deployment.
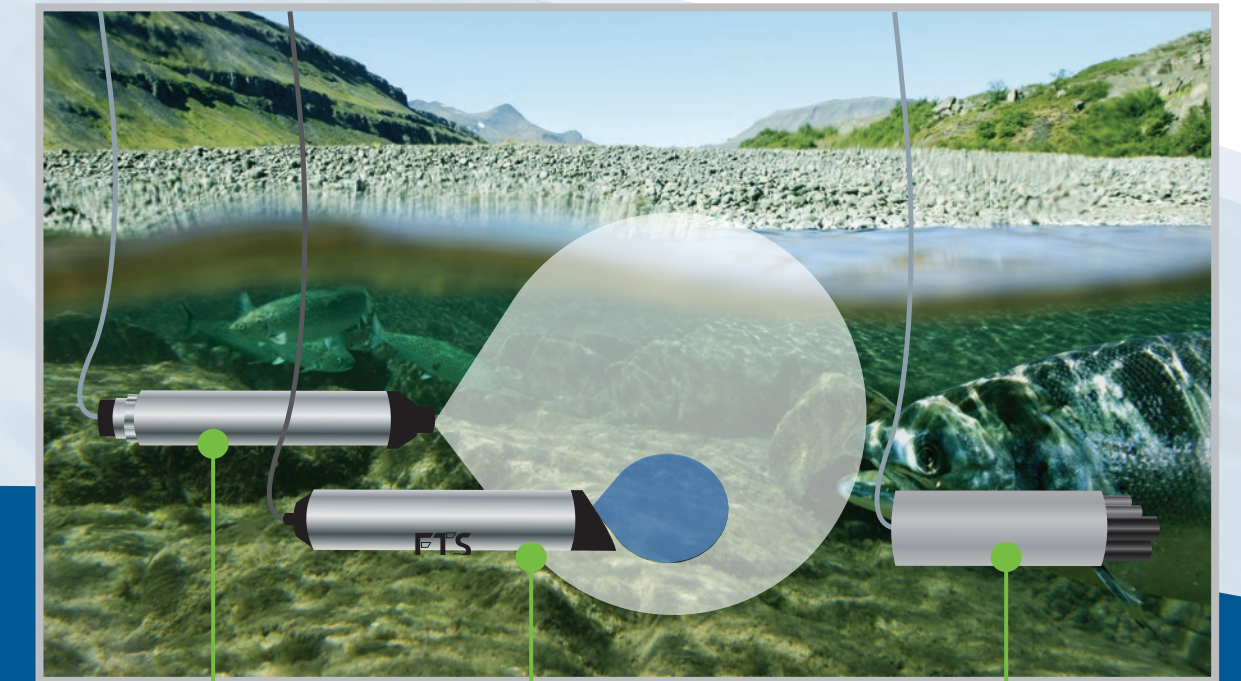
Typical single-parameter sensor has a large viewing volume that often intersects the surface and riverbed, generating false turbidities.

DTS-12 viewing volume strikes the optimal balance, for accuracy even in shallow water.

Typical multisonde and similar probes have tiny viewing volume which produces significant noise.