FTS

Extreme environments.
Extreme ruggedness.
Extremely simple.

DTS-12

Digital Turbidity Sensor

The World's Best Instream Tur

Stability and accuracy unlike anything else.

The DTS-12 is the first sensor to make turbidity monitoring practical. The value of continuo
accepted, but it's always been difficult, inaccurate, expensive, labor-intensive, and therefor
DTS-12 is different—we state with confidence that it's the "world's best" because its unique
(just clean and re-calibrate once a year) and **extremely high accuracy** over the full measur
the DTS-12 does one task, but does it exceptionally well (it's also less expensive and simple

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.

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

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.

rbidity Sensor™

usly monitoring turbidity has long been
e often dismissed as too impractical. The
e design delivers **extremely low maintenance**
able range of 0-1,600NTU. Unlike multisondes,
r to deploy).

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

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.

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.

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.

What makes the World's Best Instream Turbidity Sensor?

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.

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 double the calibration coefficients provide extreme accuracy 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.

Options

Deployment carousel 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.

Sensor type:	
Temperature:	Encapsulated thermistor
Turbidity:	Optical nephelometer (sidescatter)
Range:	0 to 1,600 NTU (nominal)
Accuracy (turbidity):	±2% of reading (0-399 NTU)
Accuracy (@ 25˚C):	±4% of reading (400-1,600 NTU)
Zero offset:	±0.2 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)

It simply works. In *any* environment.

Why Instream Turbidity Monitoring?

Turbidity is the cloudiness or murkiness of water caused by suspended organic or inorganic materials. Turbidity in natural waters is recognized as an important indicator of its environmental health.

- Turbidity can be a good indication of impairments such as **nutrients and e-coli**, and is an excellent **surrogate for suspended sediment concentration**.

- **Fish habitat** is impacted by turbidity. Suspended particles absorb sunlight, raising the temperature of water which causes oxygen concentration to fall. Poor visibility also impedes feeding.
- Monitoring turbidity in a watershed permits preemptive response to water quality events which could otherwise put the **public health** in jeopardy.
- Enables **regulatory and compliance** monitoring of NTU thresholds, TMDLs and BMPs.
- Permits monitoring impacts of **land development** and resource extraction, including adherence to the EPA's new standards controlling the discharge of pollutants from construction sites.
- Provides easy detection of contaminants due to **stormwater runoff.**
- **Turbidity is very useful for triggering strategic, event-based automated sampling**. Unlike stage or other measurements, an increase in turbidity is definitely indicative of an issue that should be sampled.
- Continuous monitoring of turbidity captures far more temporal data to provide a far better **characterization of turbidity changes** over time than manual grab sampling.

About FTS

FTS is in the business of **remote data collection**. We design and manufacture extremely rugged systems, dataloggers, DCPs and sensors for **hydrology and hydromet monitoring**. Our area of focus is **continuous instream turbidity and sediment monitoring**.

We've developed the world's first fully integrated turbidity event-triggered grab sampling system that can determine sediment and nutrient loads significantly more accurately than with traditional methods. It provides **the best method of characterizing impairments**, ensuring sound decisions affecting public safety are made and best management practices are implemented and effective.

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.

"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."

Kate Sullivan, PhD, Pacific Lumber Company

For more information, including FAQs and technical specs, visit **www.ftsenviro.com/dts-12**

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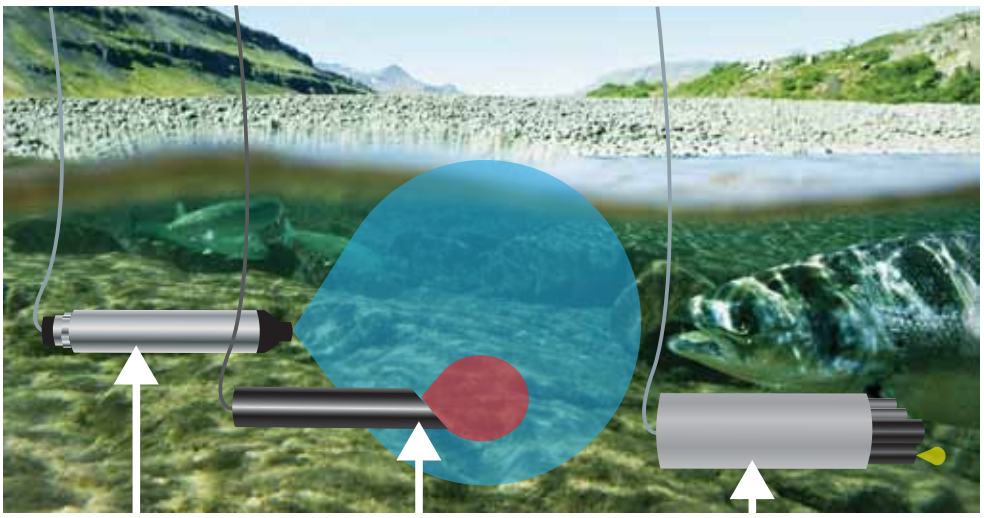
CE

Management System registered to ISO 9001 QMI-SAI Global

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.