



# World's Best Instream Turbidity Sensor

*Making it Simple*

## *DTS-12 Digital Turbidity and Temperature Sensor*

- Unprecedented stability
- Best self-cleaning wiper
- Superior accuracy
- SDI-12 digital output
- Shallow water capability

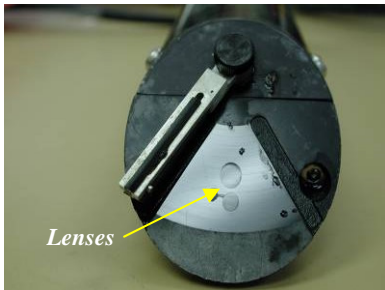


### **Unprecedented long-term stability – 12 Month Recalibration Interval**

The DTS-12 is the first turbidity sensor to use a laser diode light source. Its coherent, narrow, near-infrared spectral beam has a very well-defined threshold current and exhibits significant operational advantages. It has a very long life exhibiting high reliability and thermal stability with low-power requirements. It has a very stable output that can be modulated at high speeds. Field and lab experience has demonstrated that the DTS-12 typically exhibits less than 2% annual drift. These characteristics eliminate the typical requirement for frequent turbidity probe calibration.

### **Effective self-cleaning wiper**

The design of the DTS-12 wiper and optic face is the culmination of a comprehensive research and development program that evaluated over 40 different cleaning technologies including extensive lab and field tests. The humble wiper's combination of effectiveness, reliability, and low power requirements made it the best choice over more exotic solutions. Unlike competitor's wiper designs, several subtle but significant design elements combine to provide effective long-term cleaning performance. The very low abrasion neoprene wiper blade cannot be impregnated with sediment or bio-fouling. Its reversible wiping action cleans the optic surface in both directions and adjacent wiper cleaning grooves collect and flush wiped debris away. The relatively large optic lenses virtually eliminate scratch induced measurement bias. Infrequent wiper changes are simple and inexpensive.



### **Superior accuracy**

The DTS-12 is a nephelometer where the detection angle from the incident light source is at 90°. Capable of measuring both forward and backscatter this is the most sensitive geometry for a single light source providing a wide dynamic range that is ideal for variable grain size suspensions. By combining this geometry with a very stable laser diode, relatively large optical lenses, excellent thermal stability, an optimal viewing volume, and a high precision 10 point calibration, the DTS-12 provides superior accuracy. ( $\pm 2\%$  from 0-499 NTU and  $\pm 4\%$  from 500-1800 NTU)

### Turbidity output statistics

The DTS-12's built-in microprocessor handles statistical data processing, eliminating complex data logger programming. The plug-and-play "smart" sensor calculates and returns digital turbidity values for Mean, Variance, Median, Min, Max, and BES based on 100 readings taken over 5 seconds. Based on years of field monitoring experience this measurement scheme compensates for entrained debris spikes and enhances data quality. The sensor automatically reports data that distinguish between "real" bulk turbidity readings and in flow debris spikes. Water Temperature measurements are returned as a single value with each turbidity measurement cycle. Comparisons of Variance, Max, and Median values provide detailed turbidity information that can be correlated to field conditions. Collectively the DTS-12 output statistics increase your ability to obtain the most meaningful information from any turbidity study.

The SDI-12 digital protocol provides easy connection to any SDI-12 compatible data logger and eliminates the need to enter calibration coefficients, simplifying sensor installation, operation, and maintenance. SDI-12 also supports long cable runs of 500 ft (152 m) or more with FTS dataloggers.

### Shallow water capability

The DTS-12 was explicitly designed to address the viewing problems exhibited by other turbidity sensors. Some have large viewing volumes for a good water sampling average but are not capable of shallow-water deployment and see too much entrained debris (noisy), while others have shallow water capability but have very small sampling volumes that are also typically very noisy. The approximate tennis ball sized view of the DTS-12 provides an optimal sampling volume for minimizing entrained debris spikes while maintaining an excellent signal to noise ratio, and overall flexibility for use in shallow or deep-water environments.

### Laser Diode Optics

The DTS-12 turbidity sensor uses nephelometer technology with a 780-nm laser diode emitter with high stability automated power control. The spectral scattering effect from suspended solids are measured using a coupled infrared detector incorporating optical feedback and synchronous detection to reject ambient light. The DTS-12 features high accuracy, excellent thermal and long-term stability, and nearly linear response over three orders of magnitude.

The DTS-12 is the result of four years of research, engineering development and product testing following customer requests to build a durable, self-cleaning, digital turbidity sensor that can be deployed for long periods with no monthly cleaning and calibration requirements.

### Long-term deployments

The optical system, lens face and wiper blades have been designed for extended field use, even in high suspended sediment concentrations. After accelerated wear testing simulating five years of operation in abrasive enriched waters, wiper function remained within factory specifications and sensor readings were offset by less than 2.9%. Routine annual recalibration and optic face resurfacing can easily compensate for any abrasion induced bias over the probe's life cycle.

### Angled head

The unique geometry of the sensor head was developed as a result of our detailed design analysis which demonstrated significant advantages for an angled sensor face. Lab tests demonstrated that an angled head performed best by shedding bubbles that can form on the face of a sensor and give false turbidity readings. Additionally, the angled head supported the nephelometer sensing geometry and self-cleaning wiper design.



### Built-in temperature sensor

The DTS-12 sensor includes an integrated temperature sensor accurate to  $\pm 0.2^\circ \text{C}$ .

### Quick disconnect option and connectors



Connectorized quick disconnect

Standard cable connections are fixed to the probe and are available in 60ft (18m) and 100ft (30m) lengths. Custom cable lengths are available on request. Optional connectorized quick-disconnect cables are available for convenient on-site handling.

Optional cable terminations include connectors for integration with FTS dataloggers and ISCO autosamplers.



ISCO connector

FTS SDI-12 connector

### Optional Equipment

Deployment of the DTS-12 is made easy with the turbidity probe carousel. This aluminum housing supports the DTS-12 when deployed down a 4" (100mm) PVC standpipe. The carousel has a bracket on the rear to support a rod for recovery of the probe from its monitoring position.



Deployment Carousel



FTS Datalogger with an ISCO autosampler using a DTS-12 for Turbidity Threshold Sampling

a complete suspended sediment monitoring system.

FTS manufactures a line of **Quick Touch** dataloggers with and without telemetry that make the DTS-12 a Plug-and-Play device.

**Quick Touch** dataloggers eliminate the need for a laptop or PDA providing a color touch screen GUI and memory stick upload/download through 2 front mounted USB ports. Configuring the logger and sensors is made easy using the intuitive touch screen to configure event triggered sampling as part of



H2 Datalogger with **Quick Touch** colour screen and easy access USB ports

FTS can also provide three different sized enclosures ideally suited for various applications. Small, secure enclosures allow room for the datalogger and battery power. Larger enclosures accommodate an autosampler with additional space for an extra battery, bottles and a complete Suspended Sediment Monitoring system.

To complete a user's requirement for a turn-key solution, FTS offers StreamTrac™, a powerful software for comprehensive water science data collection, management, editing, processing and analysis. StreamTrac™ will ease data correction, analysis and reporting requirements while significantly saving time and money.

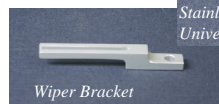


Send enquires for additional information on any of these products to [info@ftsinc.com](mailto:info@ftsinc.com)



### Designed for 24/7 operations

- Metal components are stainless steel and anodized aluminum
- "O" ring sealed for effective watertight security
- Extended duty cycle wiper motor for years of service
- Heavy duty stainless steel universal joint for wiper
- Thick walled aluminum shell
- Depth rated to 98 feet (30m)
- Noryl™ field proven durability, longevity, and thermal stability



### Technical Specifications

Range:	0 to 1600 NTU (nominal)
Resolution	0.01 NTU
Accuracy - Turbidity:	
Accuracy	±2% (0-499), ±4% (500-1600)
Zero Offset	±0.2 NTU
Temp Coefficient (0-40°C)	<-0.3%/°C
Accuracy - Temperature:	±0.2 °C
Supply Voltage Range:	9.6 to 16V
Current Consumption (typical):	
Standby	< 0.5 mA
Operating	< 75 mA
Motor Wiping	< 250 mA
Depth Rating:	98ft (30m)
Wipe Time:	5 sec Nominal
Operating Temp:	+32° to +104° F (0° to +40°C)
Communications Protocol:	SDI-12 version 1.1
Measurements Returned:	Instantaneous Turbidity
Raw data consists of 16-bit samples taken 20 times per second.	100 sample Mean and 100 sample Median 100 sample BES 100 sample Min 100 sample Max
Dimensions:	length 12in (30.48cm) diameter 2in (5.08cm) shell thickness 0.129in (0.38cm)
Weight	23.3 oz (604 g)

### Options

- Optional cable lengths with fixed connection
- Connectorized quick disconnect cables in 60 and 100ft lengths
- 4" Deployment carousel
- H2 **Quick Touch** Data loggers with and without telemetry
- Turbidity Threshold Stations c/w fully integrated autosamplers, pressure transducers, rain gauges, dataloggers, battery, solar power, and system manual, etc
- StreamTrac™ - Data collection, management, editing, processing and analysis software

Management system registered to:



ISO 9001  
QMI-SAI Global