FTS

Extreme environments. Extreme ruggedness. Extremely simple.

PRODUCT CATALOG
APRIL 2014

ABOUT FTS

FTS began in 1980 with a focus on the fire weather meteorological niche.

Since then we have expanded both our knowledge and product offerings to design and build many systems and networks for a variety of different meteorological applications. What all of our systems have in common is the need for rock-solid reliability... equipment that needs to operate continually often in extremely remote locations. No application exemplifies that need better than fire weather monitoring (monitoring the environment for purposes of predicting wildfire danger), which, given what's at stake (billions of dollars and people's lives), requires data accuracy and reliability far more than any other type of environmental monitoring.

FTS Core Competencies

Critical data delivery.
We understand applications that require data from your remote stations no matter what.

Remote deployment.
Partly by beginning in British Columbia, Canada, and partly from the nature of fire weather and the need for massive spatial coverage in forest regions, we have learned the challenges of continuously monitoring the weather in very remote locations. Lack of infrastructure and inaccessibility (or an extremely high cost of physically getting to stations) are obstacles that we have tremendous experience overcoming.

Extreme environments.
We also know all about the hazards faced by high tech equipment for scientific data collection in the wilderness. We understand how to design products and systems for locations where grizzly bears, lightning strikes, hurricanes, extreme heat or extreme cold are realities.

Scientific-grade accuracy.
Many decisions are made based on the quality of data that is measured. We understand the importance of accuracy as much as our fire weather customers, who make decisions daily that involve thousands or millions of dollars and affect public safety.

Operational simplicity.
Our experience in fire weather has also taught us the importance of keeping systems simple to install, simple to operate and simple to maintain. We've come to realize that anyone who works with environmental monitoring equipment, no matter how skilled, wants complexity eliminated. Not only does it make their job easier, it saves money from reduced training costs and increases reliability, by eliminating errors.

CONTENTS

A note about the product information shown in the document

This product catalog lists only a small sample of key specifications for most products and a brief description. For a more complete list of specifications and further details, visit our website:

www.ftsenviro.com

You can quickly and easily view the product's official product page with your smartphone by scanning the QR code next to each product in the catalog.

Fixed RAWS

The FTS fixed RAWS is the standard for remote automated weather stations used for fire weather monitoring in North America. It's a purpose-built system comprised of components and designed to inter-operate specifically with the interests of fire and fuels management agencies in mind. From the assembly of a new station at a remote location to yearly service and maintenance, the design of the FTS fixed RAWS shows our extensive 30-years of experience in the market.

Precipitation

The rugged, metal RG-T rain gauge is FTS' take on a simple, proven, mature technology. It has earned tremendous loyalty over several years for it's extreme accuracy, excellent calibration retention and super simple deployment that ensures success. The sensor measures precipitation in increments of .01 inch (0.254 mm), each hour. **See page 16.**

Ubicom

Ubicom provides 2-way communications via either 2-way satellite or cellular (or both) for additional reliability for your critical data. Not only can data be retrieved via Ubicom if it can't be retrieved through GOES, but Ubicom can be used to remotely manage your Axiom (or legacy FWS-12S) datalogger, including updating configuration files and even restarting the datalogger.
See page 9.

Solar radiation

The SDI-PYR solar radiation sensor is a pyranometer that measures the amount of sunlight exposed to fuels. It's a digital sensor with SDI-12 digital interface output, and stores all calibration coefficients within the sensor.
See page18.

Enclosure

Made from durable heavy-gauge aluminum, the KW1 lockable cabinet enclosure provides secure housing of the Axiom F6 datalogger (which optionally contains a GOES transmitter and/or AirTalk Radio Voice Transmitter), one or more heavy-duty batteries, any other electronics, manuals, etc. **See page 19.**

GOES antenna

The Eon CS2 GOES antenna does not need aiming in most locations. It's sealed, waterproof enclosure ensures reliable operation in harsh environments, including locations susceptible to ice and snow, and corrosive marine locations.
See page 7.

Heavy-duty battery

FTS uses a 100 amp-hour starved electrolyte heavy-duty battery. This 6-cell, 12-volt, valve regulated lead-acid battery powers all our fixed RAWS, and was chosen for its tolerance of extreme environmental conditions and its specific design for use with solar recharging applications. **See page 20.**

Axiom™ F6 Datalogger

The Axiom datalogger is the most rugged and durable, yet dead simple to use datalogger available. This clever design, borne out of our experience meeting the strict reliability demands of the North American fire weather market for over 33 years, provides an extremely low total cost of ownership. **See page 10.**

Fuel stick

The FTS FS-3 electronic fuel stick sensor is commonly deployed on-site near prescribed burn and wildfire operations. The sensor's output tracks closely with 10-hour fuel moisture, an invaluable indicator of fire behavior. It's an optional component, and not installed on every fixed RAWS. **See page 12.**
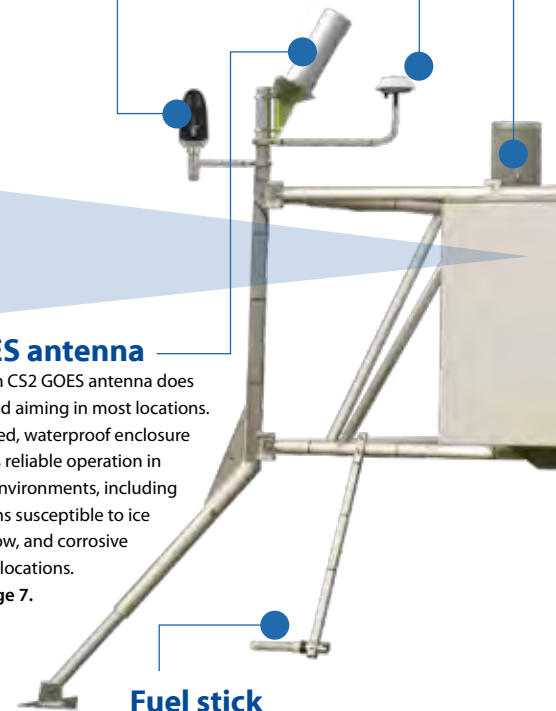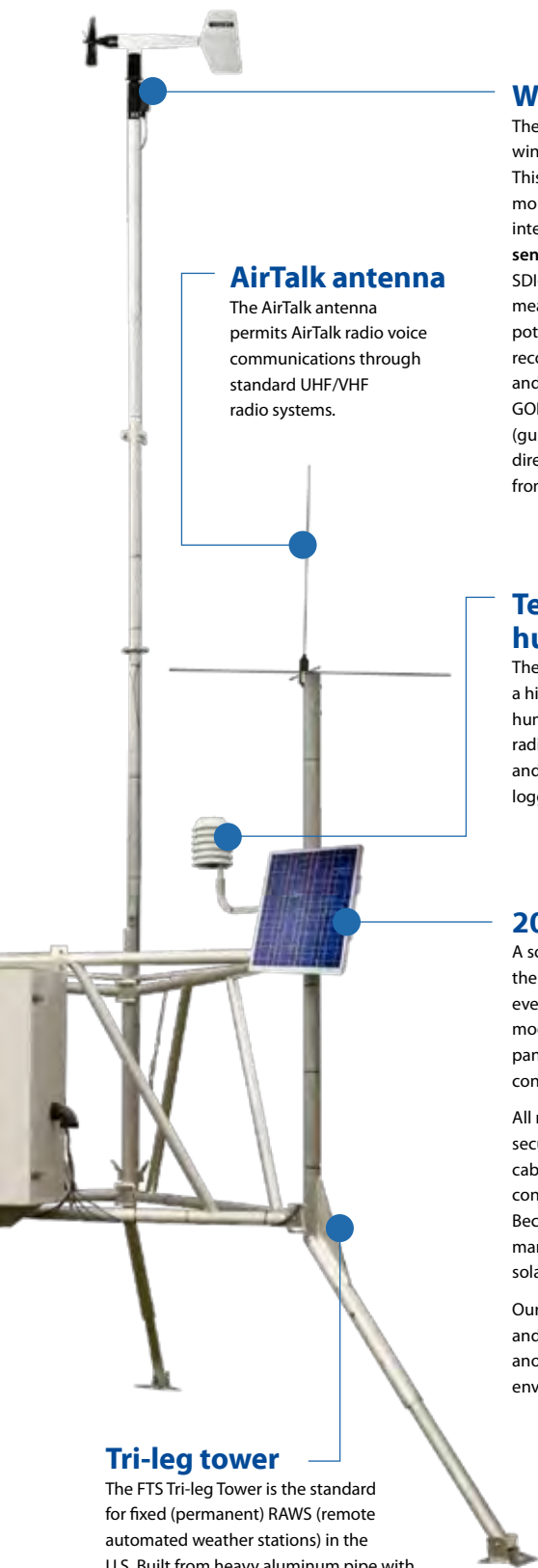
Wind speed and direction

The FTS SDI RMYoung Wind Monitor measures wind speed and direction with high accuracy. This sensor is the RM Young 05103 wind monitor with the addition of an SDI-12 interface. **It's the only mechanical dual wind sensor available that offers SDI output.** The SDI-12 interface avoids the complexity of measuring the AC wind speed signal or the potentiometer output. The Axiom datalogger records the ten-minute average wind speed and wind direction just prior to the hourly GOES transmission. The maximum wind speed (gust) over a 60 minute period as well as the direction from which the maximum gust came from is logged. **See page 15.**

AirTalk antenna

The AirTalk antenna permits AirTalk radio voice communications through standard UHF/VHF radio systems.

Temperature and humidity

The THS-3 temperature/humidity sensor is a high quality, precision temperature and humidity sensor housed in a durable solar radiation shield. Current air temperature and 10-minute average relative humidity are logged. **See page 17.**

20W solar panel

A solar panel recharges the battery and allows the fixed RAWS to run autonomously in virtually every environment and location. The 20W model is most commonly used, but a 50W panel is available when needed by site-specific conditions.

All models include a mounting bracket for securing to vertical 38mm diameter poles and a cable with a bayonet connector for easy, quick-connect compatibility with Axiom dataloggers. Because the Axiom contains a built-in power manager, there is no requirement for an external solar charge regulator.

Our solar panels were selected for our fixed and portable weather stations for their durable anodized aluminum construction and harsh environment rating. **See page 20.**

Tri-leg tower

The FTS Tri-leg Tower is the standard for fixed (permanent) RAWS (remote automated weather stations) in the U.S. Built from heavy aluminum pipe with welded gussets at all joints, it's an extremely strong, durable and sturdy platform for remote monitoring equipment that will last for decades.

A folding mast provides fast, easy access to wind sensors, which are positioned 6m above the ground. Anchored to the ground with spikes, it is able to withstand sustained 125 mph (200 km/h) winds without requiring setting a concrete base. The three legs are adjustable in length to permit the tower to be installed on uneven ground. The feet can be anchored with metal stakes, or rocks can be piled on top of the feet. **See page 19.**

The Best Part Weighs Nothing

FTS customers know that our equipment is exceptionally reliable and built like a tank. But the most significant reason that more fire management professionals rely on FTS than any other vendor is the service and support. We really take care of our customers, and they know it. So much goes into making things extremely simple—from extensive documentation written by people who work with the same equipment in the field as our customers do, to our lifetime, toll-free technical support.
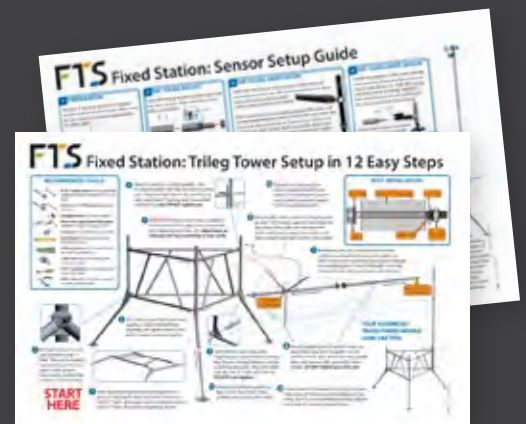
A fixed remote automated weather station can be custom configured with any digital or analog sensors required. Tell us what you need and we'll help you configure a system that will meet your exact needs.

LEARN MORE

Quick Deploy (QD) Portable RAWS

The FTS Quick Deploy portable weather station is the fire community's most widely used weather station for prescribed burns and temporary monitoring applications. It offers the same scientific-grade accuracy and reliability as our full fixed RAWS in a portable form, which can be set up completely in 15 minutes by one person, with no tools and no technical training.

Its portability means that several can be placed at the fireline and rapidly relocated as needed. It offers the same sensors and telemetry options as the fixed RAWS, and all components are interchangeable.

Data on Demand and Alerts

The QD can be configured with AirTalk radio voice communication which provides real-time data to the fire crew at the burn site via any DTMF-capable radio (compatible with P25 digital radios). With a simple 3- or 4-digit code, AirTalk broadcasts up-to-the-minute current weather conditions via a clearly audible digitized voice. In addition, instant alerts will be broadcast if any weather parameter threshold is exceeded. This provides real-time decision-making, maximizing fire crew safety and helping prevent escaped burns.

SedEvent

SedEvent is a turn-key system based around the effective Turbidity Threshold Sampling method, for intelligent, automated grab sampling that requires no programming to install and maintain.

Measuring suspended sediment concentrations used to be labor-intensive, costly, inaccurate and impractical. SedEvent not only makes it possible and practical, it makes it simple.

The ability to collect useful data about sediment transport and other pollutants closely coupled to SSC is dependent on the timing and frequency of manual grab samples during run-off events. Most sediment and pollutant is transported during a small number of storm events which are infrequent and unpredictable. When they do occur, trained personnel or the proper equipment may not be available to collect grab samples. Manual grab sampling schemes are also labor-intensive, inefficient, dangerous and costly (and aren't done 24/7/365).

An automated pump sampler can eliminate the need to sample manually, but factoring in the expense of a rechargeable power system, a datalogger and a typical turbidity probe (most are "noisy" and can trigger many unnecessary samples), you're no better off than doing it manually. The primary limiting factor is the number of sample bottles. By the time the autosampler is full, the probability that any sample will have been taken during the critical point of a storm event is low. Expensive lab analysis costs are incurred, money is likely wasted.

10:07am, May 19.
Site visit, stage gauge observation and manual grab sample taken at non-SedEvent station.
Virtually all event data is missed.
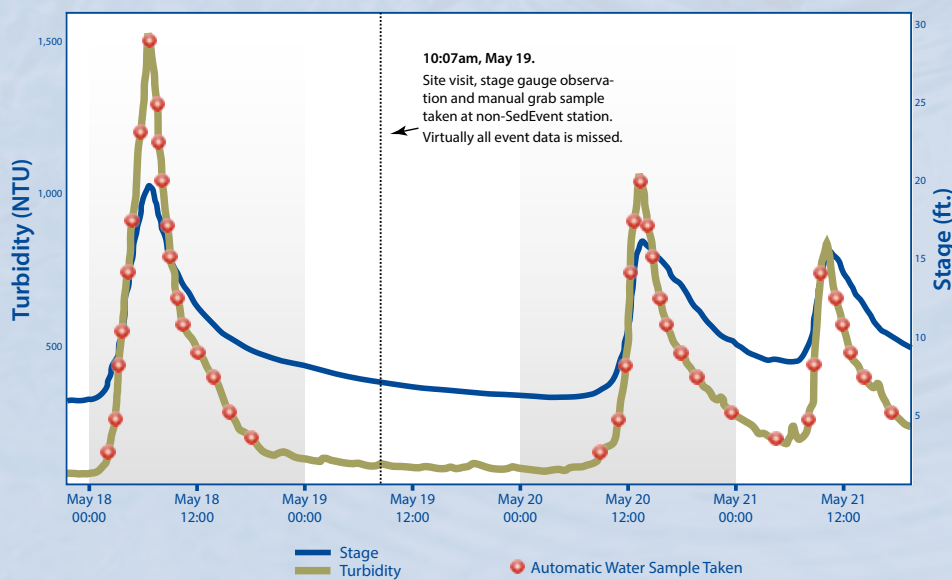
Telemetry and Remote Communications

Robust and innovative remote communication technology is a significant part of our 33+ year history. Given our focus on systems designed for extremely remote deployment, it's no wonder that we've matured into a leader in GOES satellite communication technology.

FTS communication technology forms the backbone of the US National Climate Reference Station system.

GOES Transmitter (G5)

FTS is a worldwide leader in GOES communication. The CS2 G5 is the standard GOES transmitter that's in all new weather stations for the U.S. National Interagency Fire Center (NIFC). FTS was the first company to introduce GPS into GOES communication, and the first to offer HDR GOES data. Our fifth-generation G5 GOES transmitter is extensively field proven a the most reliable of any manufacturer. In fact, FTS GOES technology forms the backbone of the National Climate Reference Station System.

The G5 is certified by NOAA and by EUMETSAT for use on the Meteosat system.

- Extremely accurate timekeeping reliably transmits hourly data for up to 28 days without a GPS fix.
- Extremely low power requirements extend operation in situations of low power or interrupted solar panel charging.
- Automatically calculates GOES antenna azimuth and inclination, speeding installation and eliminating errors.
- Supports test transmissions on an alternate test channel with fixed text messages to ensure future data transmission reliability.
- NESDIS ID testing is performed at the factory before each unit is shipped to further ensure that GOES transmissions will work perfectly.

The G5 is available as an integrated option in the Axiom datalogger, or as a separate unit for use with older FTS dataloggers.

SUPPORTED BAUD RATES	300 bps 1,200 bps
SUPPLY CURRENT (AT 12VDC)	**Idle:** 5 mA **Transmitting:** 2.6 A
OUTPUT POWER	**300 bps:** 5.6 W **1,200 bps:** 11.2 W
EIRP	40-45 dBm
DATA VALIDITY	Integrated GPS time synchronization on start-up and once every 24 hours. Maximum 28-day transmit timing accuracy without a GPS fix. **Setting accuracy:** +/- 100 μsec synchronized to GPS **Drift:** +/- 10 μsec/day over operating temperature range
FREQUENCY RANGE	401.701 MHz - 402.09850 MHz
FREQUENCY STABILITY	**Initial accuracy:** +/- 20Hz synchronized to GPS **GPS Schedule:** 1 fix at power up, 1 fix per day there after **Short term drift:** +/-0.04 Hz/sec **Ageing:** +/- 0.1 PPM/year **Vcc + Temperature:** +/- 0.1 PPM
TIME-KEEPING	< 100 μsec initial accuracy, automatically synchronized to GPS < 10 ms per day drift without GPS 28 day operation without GPS signal (after initial GPS synchronization)
SDI-12 PORT	**Signal Levels:** TTL **Connector:** 3 terminal internal Panduit plug **Protocol:** SDI-12 version 1.3 **Applications:** Connection to SDI-12 sensors

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GOES Antenna (Eon)

Designed for CS2 GOES and Meteosat systems, the Eon antenna is the last GOES antenna you'll ever need. It's extremely rugged—sealed and completely watertight, so it will last for year without requiring repairs. It's ideal for any location—from marine environments to the frozen north, to the equator. It also requires no aiming within 53 degrees latitude (Southern Canada to Southern Chile) for quick installation and exceptional reliability, and reduces training needs.

Comes with fully adjustable, U-bolt mast-mounting hardware for aiming when needed, and all cables.

CABLE LENGTH	6 m (20')
CABLE CONNECTOR	Type-N (female)
GAIN	5.7 dBic minimum
MAXIMUM DIAMETER OF MOUNTING STRUCTURE	6.35 cm (2.4")
HALF POWER BEAMWIDTH	99°
DIMENSIONS	24.74 cm x 8.76 cm diameter (9.7" x 3.4" diameter)
WEIGHT	0.453 g (1 lb.)
WIND LOADING	322 km/h (200 mph)

GOES Antenna (Yagi)

For CS1 transmitters, this antenna a Yagi RHCP antenna with a gain of 11.0 dBic. The antenna comes with a 'U'-bolt mast mount, and a cable to connect the antenna to the transmitter.

CABLE LENGTH	6 m (20')
CABLE CONNECTOR	Type-N
GAIN	11 dBi, RHCP (right-hand circular polarized) antenna
MAXIMUM DIAMETER OF MOUNTING STRUCTURE	6.35 cm (2.4")

Meteosat Transmitter (G5-M)

FTS is a worldwide leader in GOES/Meteosat communication technology. Our G5 GOES transmitter has been certified by EUMETSAT for use on the Meteosat network.

G5-OEM GOES/Meteosat Transmitter (G5-OEM)

This special OEM version of the G5 transmitter can be integrated into your own datalogger or environmental monitoring system.

- Operates on both North and South American GOES networks. Certified for use in Brazil.
- Operates on European/African Meteosat network. Certified for use with EUMETSAT.
- Extremely accurate timekeeping reliably transmits hourly data for up to 28 days without a GPS fix.
- Extremely low power requirements extend operation in situations of low power or interrupted solar panel charging.
- Automatically calculates antenna azimuth and inclination, speeding installation and eliminating errors.
- Supports test transmissions on an alternate test channel with fixed text messages to ensure future data transmission reliability.

GOES hopper
by FTS

GOES.hopper is a fully turnkey GOES satellite-based communication solution for new or existing monitoring stations with SDI sensors and no datalogger.

- Pre-configured and tested—ready to go out of the box. Just connect existing sensors.
- Extremely simple to deploy—install in 15 minutes with no training.
- Transmits data once per hour, 24/7/365.
- Extremely low power consumption.
- No IT infrastructure required.

20W Solar Panel (optional)

Rugged Eon GOES Antenna

Enclosure (optional)

SDI Sensor (not included)

G5 GOES Transmitter in ruggedized enclosure

Keyway plate

Terminal strip connector

44 aH or 100 aH heavy-duty battery
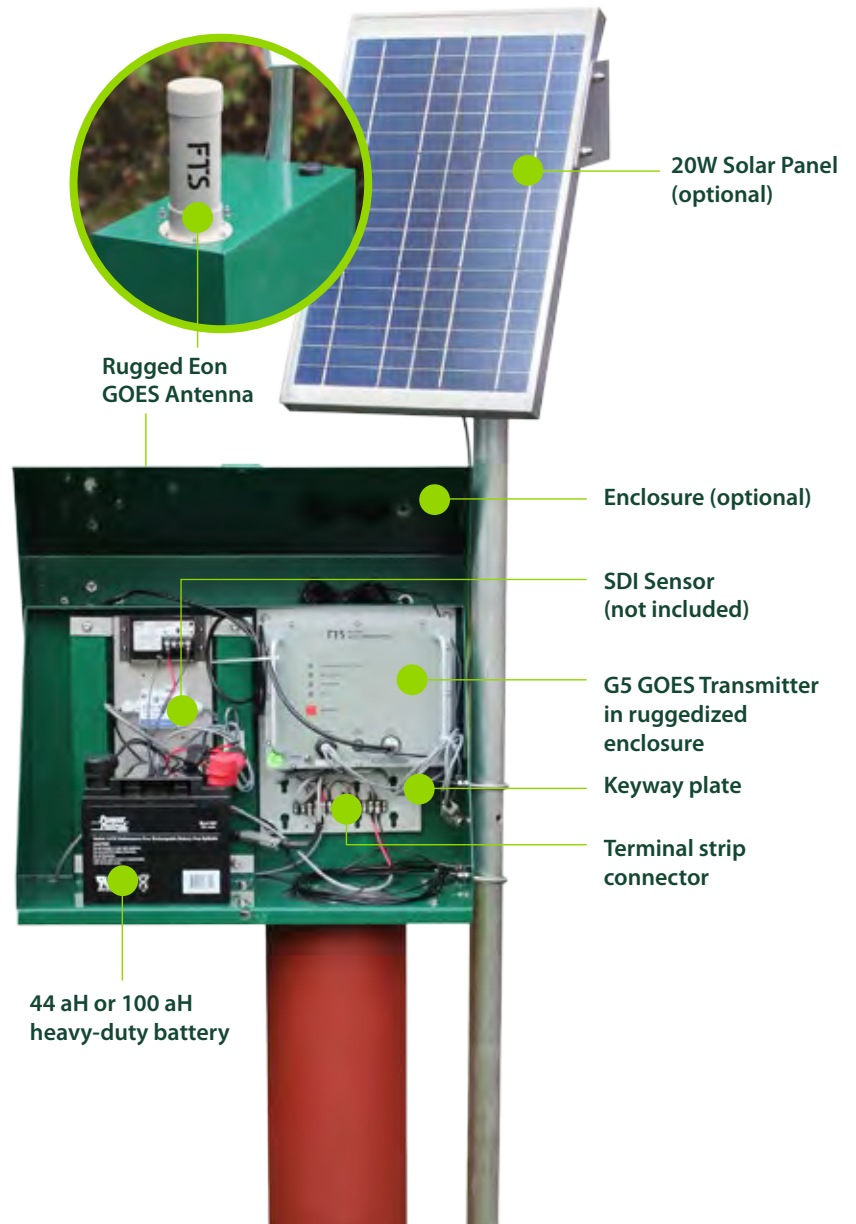
Groundwater, surface water or water quality data to your desktop. Low upfront cost, no monthly fees, no datalogger.

REDUCED COSTS

Now data comes to you

- Reduce manpower and site visits
- Increase service intervals

BETTER, MORE RELIABLE DATA

Near-real time monitoring of station performance

- Know if data is not being collected (higher quality data)
- Better correlation to water quality events
- Publish the timely data (only an hour old) expected by the public

Ub com

Ubicom is 2-way communications that helps you control the cost of managing your network of remote monitoring stations.

- 2-way satellite and/or cellular in a single device
- Low power and customizable duty cycle
- Remote station management
- Completely provisioned, ready-to-go out of the box
- Data pooling across your network
- **No monthly bill**

Reliability with dual telemetry in a single device

No monthly fees and shared data pool across your network

Remote station management including power cycling of up to 4 devices

Unique all-in-one design. Simple installation. Reliable operation.
The transceiver integrates all electronics, antennas and antenna cables into a single device.

Choice of integrated communications.
2-way satellite OR Cellular (HSPA) OR both. Remotely switch between communication methods, or set to automatically switch.

Pre-provisioned and fully turnkey
Just select communication services when ordering—all administration, configuration and contract negotiation is handled for you. The transceiver automatically establishes connection, data and remote access is immediately available.

Integrated power relays
Allows remote switching and power-cycling of up to 4 devices such as data loggers, bubblers, etc.

TECH SPECS

MOUNTING	Surface mount, or 1" NPT with supplied flange	**POWER CONSUMPTION**	Avg. current consumption - send: 250 mA Avg. current consumption - receive: 28 mA Sleep mode (cannot send/receive): < 5 mA
CONNECTOR INTERFACE	Waterproof, military-style bayonet connector or spring-clip terminal strip connectors		
POWER RELAYS	4 in total for power cycling up to 4 12V devices.	**COVERAGE**	Global
OPERATIONAL TEMPERATURE RANGE	-40°C to +60°C (2-way satellite version) -30°C to +60°C (Cellular and hybrid versions)	**SATELLITE SERVICE PROVIDER**	Iridium
		CELLULAR TECHNOLOGY	HSPA penta-band
MESSAGE SIZE	6-250 bytes typically, no maximum	**BANDS**	GSM quad-band: 850/900/1800/1900 MHz UMTS/HSPA penta-band: 850/900/1700/2100 MHz
SERIAL PROTOCOLS	AT commands, PPP, SLIP, UDP/IP, TCP/IP		

Dataloggers / DCPs and Accessories

Leave the laptop at the office.
- No more wind and rain damage, low battery or "where do I put the laptop?" hassles.
- No complex software to install, configure, maintain or learn.
- No interface cables to mess with.

Built like a tank.
- Fully watertight.
- 3 levels of lightning protection.
- Waterproof military bayonet connectors.
- IP67 aluminum case.

Real simple.
Clever graphical interface built right in makes configuration and troubleshooting easy. Reduces the chances for things to go wrong.

Axiom F6

Designed to be simple to use and to maintain, the F6 eliminates the need to take a laptop and cables into the field and it incorporates an easy to operate, touchscreen user interface. With no laptop malfunctions, dead batteries or forgotten cables to worry about, our customers make fewer onsite maintenance visits, saving significant time and money, and they spend less time getting trained on use of complex software, which saves additional money.

The Axiom F6 can be configured with GOES and/or AirTalk radio voice communication to provide on-demand weather conditions and alerts via a digitized voice directly to a handheld short-range radio.

MODELS

F6-TLM-2	Axiom F6 (use with external telemetry)
F6-G5-TLM	Axiom F6 with integrated GOES G5 transmitter
F6-TLM-RVT2	Axiom F6 with integrated AirTalk
F6-G5-RVT2	Axiom F6 with integrated GOES G5 transmitter and AirTalk

Axiom H2

The Axiom H2 is a rugged datalogger (DCP) designed for remote data collection and complex SDI-12 sensor applications. It features four independent, electrically isolated SDI-12 ports that can each handle up to 500mA, and an integrated solar regulator.

MODELS

H2-TLM-2	Axiom H2 (use with external telemetry)
H2-G5-TLM	Axiom H2 with integrated GOES G5 transmitter

Axiom H1

The Axiom H1 is the little brother of our flagship H2, with the same touchscreen interface and extremely rugged design but only 2 SDI-12 ports and no solar regulator.

MODELS

H1-TLM-2	Axiom H1 (use with external telemetry)
H1-G5-TLM	Axiom H1 with integrated GOES G5 transmitter

Axiom Analog Interface Module

SDI-AM

The Axiom F6 was designed for applications requiring uncompromising reliability. FTS dataloggers are used by 100% of the top 50 forest management agencies in North America.

The Axiom F6 can be configured with GOES and/or AirTalk radio voice communication to provide on- demand weather conditions and alerts via a digitized voice directly to a handheld short-range radio.

STANDBY POWER CONSUMPTION	< 1 mA
OPERATING TEMPERATURE	-40°C to +60°C
ANALOG INPUTS	Single-ended or 4 differential inputs Configurable for 4-20 mA sensor inputs 24-bit converter resolution Current sense: 100 ohms to ground, 0.1% accuracy
EXCITATION OUTPUTS	2 individually programmable outputs, 0-5 VDC @ up to 20mA maximum; accuracy: ±5 mV (0.1% of full scale), resolution: 0.35 mV Programmable to 1 mV

SDI Expansion Cable

CBL-SDI-EXP-3

3-port expansion cable for connecting 3 SDI sensors to a single SDI port.

CONNECTOR TYPE	Military-style bayonet
CABLE LENGTH	1 m (3ft.)

SDI Adapter Cable

CBL-SDI-TERM

Adapter cable for connecting sensors with flying lead to Axiom dataloggers. Converts all sensors to waterproof military-style bayonet connectors.

CONNECTOR TYPE	Military-style bayonet
CABLE LENGTH	45 cm (18")

Sensors

SDI-12: The Digital Advantage

We like SDI-12 sensors because they're smart

SDI-12 sensors have their own microprocessor and data storage, and store serial numbers and configuration information, so an SDI-12 sensor is both smart and the closest you can get to "plug-and-play".

There are a number of advantages of SDI-12 over analog, including:

- **Smarter** Unique and complex self calibration algorithms can be done in microprocessorbased sensors.

- **Quicker and easier** Because the calibration is stored in the sensor, sensors can be swapped without the need to re-program the datalogger.

- **More flexible** Permits longer cable runs (up to 300m). SDI-12 digital signal is low power and yet far more resistant to data errors than a low-power analogue signal, greatly reducing the likelihood of corrupt data due to interference.

- **More efficient** Power is supplied to the sensor through the SDI-12 interface. This eliminates the need for a separate power supply for each sensor.

- **Less costly** Reduces training required for field staff. Personnel trained in SDI-12 have skills to work with a variety of SDI-12-based dataloggers and sensors.

- **More expandable** Provides the ability to use a single available data channel for multiple sensors. With analog sensors, a technician may want to set up more sensors but is limited by the number of analogue channels that may be available on a particular datalogger. SDI-12 allows more sensors to be used on a limited number of channels—up to 62 sensors can be connected to a single SDI-12 port.

- **Standard** SDI-12 is an international standard, so it guarantees interoperability between sensors, dataloggers and other devices, regardless of who the manufacturer is.

Fire Weather

Fuel Temperature and Moisture
FS-3

The FTS FS-3 electronic fuel stick sensor is commonly deployed on-site near prescribed burn and wildfire operations. The sensor's output tracks closely with 10-hour fuel moisture, an invaluable indicator of fire behavior. The sensor uses digital compensation and linearization to provide a greater degree of precision and better temperature performance than analog sensors.

The FS-3 includes an armored stainless steel cable and bayonet connector, providing fast and simple mating to the "fuel stick" port on the Axiom F6 datalogger.

TEMPERATURE	**Accuracy:** ±0.1°C **Resolution:** 0.1°C **Range:** -40°C to +60°C (-40°F to 140°F)
OPERATING CURRENT	<1mA
HUMIDITY	**Type:** Capacitive sensor **Output:** 0 to 1 VDC **Accuracy (0 to 60°C):** ±2% (0 - 100% RH) **Resolution:** 1% **Range:** 0 to 100%

Solar Radiation Sensor
SDI-PYR

The SDI-PYR is a pyranometer that measures total light available (global sun plus sky radiation). The sensor converts light through a photodiode to an electrical signal which is interpreted by the internal microprocessor.

The sensor mounts to a corrosion-resistant anodized aluminum mounting arm, clamped directly to a weather station mast, providing a lightweight yet rugged sensor support. The connecting cable from the sensor is fitted with a waterproof military-style bayonet connector for ease of setup and reliable, long-term operation.

INTERFACE	SDI-12
POWER CONSUMPTION	<1 mA when idle
RANGE	0 to 1,800 W m^{-2}
LINEARITY	Maximum deviation of 1% up to 3000 W m^{-2}
ACCURACY	±5%
STABILITY	< ±2% change over a 1 year period

Hydrology

Turbidity
DTS-12

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.

The DTS-12 features all stainless steel casing and hardware, so it won't corrode in salt water. It is available with fixed or connectorized 18.3 m (60') or 30.5 m (100') cables.

INTERFACE	SDI-12
RANGE	0 to 1,600 NTU (nominal)
ACCURACY (@ 25°C):	±2% of reading + 0.2 NTU (0-399 NTU), ±4% of reading (400-1,600 NTU)
RESOLUTION	0.01 NTU
CURRENT CONSUMPTION (TYPICAL)	**Standby:** 0.35 mA **Operating:** 50 mA **Motor wiping:** 200 mA

Water temperature
DigiTemp

The FTS DigiTemp submersible temperature sensor is a rugged SDI-12 sensor for measuring the temperature of water, soil or other liquids with scientific-grade accuracy and long-term reliability. It makes adding automatic temperature monitoring to existing stations incredibly easy and cost-effective.

DigiTemp is small enough to easily deploy through standard 1" (2.5 cm) PVC conduit with 8" (20.3 cm) factory bend corners.

INTERFACE	SDI-12
TEMPERATURE RANGE	-40°C to +60°C (readings returned in °C & °F)
ACCURACY	±2°C (-5°C to +45°C)
RESOLUTION	0.01°C
RESPONSIVENESS	Reaches 95% of final value in 1.7 min., 99% in 2.9 min.
CURRENT CONSUMPTION	5 mA active, 0.6mA quiescent
CABLE LENGTH	18.3 m (60')

Stage - Submersible Pressure Transducer

SDI-PT

FTS' submersible pressure transducer provides reliable, accurate pressure and temperature measurements. The digital (SDI-12) transducer consists of a piezoresistive sensor and a temperature sensor housed in a 316L stainless-steel case that can be submerged in most canals, wells, ponds, harbors, lakes, streams and tanks. An NTP fitting allows the SDI-PT to be used in closed-pipe applications.

INTERFACE	SDI-12
MEASUREMENT TIME	<1.5 seconds
POWER CONSUMPTION	**Standby:** < 80 µA **Operating:** 8 mA (1-second measurement) (40mA max.)
ACCURACY	±0.1% FS TEB
RESOLUTION	0.0035% FS

Stage - Radar Level Sensor

RLS-1

The FTS SDI Radar Level Sensor is a radar sensor for non-contact water level measure-ments at surface waters. The sensor uses impulse-radar technology to determine the water level. The RLS-1 is mounted above the water surface, for example at bridges or auxiliary constructions. Its solid, relatively light and water-proof housing is easy to install, with extremely low energy consumption. It covers a measurement range of up to 35m.

INTERFACE	SDI-12
RESOLUTION	0.001 m (0.01')
RANGE	0.8 m - 35 m (2.6' - 115')
ACCURACY	0.8 m - 2.0 m: ±10 mm 2.0 m - 30 m: ±3 mm 30 m - 35 m: ±10 mm

Stage - Bubble Sensor

OTT-CBS

The OTT Compact Bubble Sensor is a compact and accurate SDI-12 bubble sensor for water level monitoring. It exceeds USGS guidelines and will not drift over time. Contained within ABS plastic housing, the durable sensor is easily programmed via the built-in DIP switches.

INTERFACE	SDI-12
ACCURACY	±6 mm (±0.24")
RANGE	0-15 m (0-50')
RESOLUTION	0.9 mm (0.036") / 0.014 psi

Stage - Bubbler

H-3553

The H-3553 is a combined bubbler with built in, calibrated, NIST traceable pressure sensor. The sensor directly measures dry gas with accuracy better than 0.02% FSO. The H-3553 produces a precision constant mass flow of gas and is used to measure fluid levels in applications such as surface and ground water.

INTERFACE	SDI-12
RESOLUTION	**Pressure:** 1 part in 1,000,000 (0.0001%) **Temperature:** 1 part in 1,000,000 (0.0001%)
ACCURACY	**Pressure:** Less than or equal to 0.02% of full scale output over temperature range referenced to a straight line stretched from zero PSI to maximum pressure **Temperature:** Internal temperature ±1°C over temperature range
LINEARITY	Less than 0.02% deviation from a straight line referenced to end points

Meteorology

Wind Speed and Direction - SDI-12

SDI RMYoung Wind Monitor (SDI-WS-RMY)

The FTS SDI RMYoung Wind Monitor is the RM Young 05103 wind monitor with the addition of an SDI-12 interface. It's the only mechanical dual wind sensor available that offers SDI output. The SDI-12 interface avoids the complexity of measuring the AC wind speed signal or the potentiometer output. Wind speed and wind direction are returned in engineering units when requested by SDI command.

Available in three standard cable configurations:

- 10.67 m (35') armored cable with waterproof, positive-locking Bayonet connector
- 15.24 m (50') standard cable with waterproof, positive-locking Bayonet connector
- 15.24 m (50') standard cable with bare leads

INTERFACE	SDI-12
WIND SPEED	**Range:** 0-100 m/s (224 mph) **Accuracy:** ±0.3 m/s (0.6 mph) or 1% of reading **Threshold:** 1.0 m/s (2.2 mph)
WIND DIRECTION	**Range:** 0-359 degrees **Accuracy:** ±3 degrees **Threshold:** 1.1 m/s (2.4 mph)

Wind Speed and Direction - Alpine

SDI RMYoung Alpine Wind Monitor (SDI-WS-RMY-A)

The FTS SDI RMYoung Alpine Wind Monitor is the RM Young 05103-45 wind monitor with the addition of an SDI-12 interface. Additional measurements are provided by the SDI-12 interface including peaks, averages, and wind direction capture at peak.

Available in three standard cable configurations:

- 10.67 m (35') armored cable with waterproof, positive-locking Bayonet connector
- 15.24 m (50') standard cable with waterproof, positive-locking Bayonet connector
- 15.24 m (50') standard cable with bare leads

INTERFACE	SDI-12
WIND DIRECTION	**Range:** 0-359 degrees **Accuracy:** ±3 degrees **Threshold:** 1.1 m/s (2.4 mph)
WIND SPEED	**Range:** 0-100 m/s (224 mph) **Accuracy:** ±0.3 m/s (0.6 mph) or 1% of reading **Threshold:** 1.0 m/s (2.2 mph)

Wind Speed and Direction - Ultrasonic
Gill Windsonic (SDI-UWS-GILL)

Ultrasonic wind speed and direction sensors offer an alternative to conventional cup and vane or propeller type wind sensors. They are robust and lightweight with no moving parts, and use an SDI-12 interface, therefore offering several advantages over analog sensors. This sensor is suitable for land or marine applications.

INTERFACE	SDI-12
WIND SPEED	**Range:** 0-134 mph (0-216 km/h) **Accuracy:** ±2% @ 12 m/s **Resolution:** 0.01 m/s (0.022 mph) **Threshold:** 0.01 m/s (0.022 mph)
WIND DIRECTION	**Range:** 0-359° **Accuracy:** ±3° @ 12 m/s **Threshold:** 1 degree

Wind Speed and Direction - Analog
Dual Analog Wind Sensor (WSD-QD)

The WSD-QD is an analog, precision anemometer designed for long term unattended operation in most environments. The potentiometer meets stringent military specifications for sand, dust, salt spray and fungus resistance. Constructed from anodized aluminum and stainless steel.

OPERATING TEMPERATURE	-50°C to +70°C
ACCURACY	**Wind speed (<10 m/s):** ±0.1 m/s (±0.25 mph) **Wind speed (>10 m/s):** ±1.1% of true Wind direction: ±4°
STARTING THRESHOLD	0.4 m/s (0.9 mph)
RANGE	**Wind speed:** 0-75 m/s (167 mph) **Wind direction:** 0-359°
CABLE LENGTH	10.67 m (35')

Precipitation - Tipping Bucket
RG-T

The rugged, allmetal RG-T rain gauge is FTS' take on a simple, proven, mature technology. It has earned tremendous loyalty over several years for its extreme accuracy, excellent calibration retention and super simple deployment that ensures success.

The RG-T tipping mechanism is injection moulded engineered resin, resulting in extreme accuracy on every unit.

RESOLUTION	0.254 mm (0.01") per tip (optional calibration to 0.2 mm)
ACCURACY	±2% at 2" per hour (50 mm)
CABLE	6 m (20') metal-clad armoured

Precipitation - Heated Rain Gauge
RG-E12-30

The RG-E12-30 heated rain gauge is a high precision tipping bucket. Approved to CSA (Canadian Standards Association) special inspection standards and meeting U.S. Field evaluation requirements, the RG-E12-30 offers exceptional calibration retention.

Powered by 120VAC and dual thermostat controlled, the RG-E12-30 uses a 125W Heater to enable sustained operation in temperatures as low as -30°C.

RESOLUTION	± 0.2 mm (0.01 in)
ACCURACY	±2%
OPERATING TEMPERATURE	-30°C to +60°C (-22°F to +140°F)
SUPPLY VOLTAGE	120VAC @ 60Hz
CURRENT DRAW WITH HEATER ON	Approx. 1.1A

Precipitation - All-Season Rain Gauge
Pluvio²

The OTT Pluvio² is an all-weather precipitation gauge that uses superior weight-based technology to measure rainfall, snow or hail.

The OTT Pluvio² determines the collection bucket weight every 6 seconds. The difference between this measurement and the known weight of an empty collection bucket equals the precipitation accumulation. The difference between the current bucket content and the previous measurement equals precipitation intensity.

INTERFACE	SDI-12
RANGE	0-50 mm/min or 0- 3000,00 mm/h
RESOLUTION	± 0.1 mm/min, o.o1 mm/min or mm/h
ACCURACY @ -25°C TO +45°C	**Amount:** ± 0.1 mm or ±1% of measured value **Intensity threshold:** ± 0.1 mm/min or ± 6mm/h

Air Temperature/ Humidity
THS-3

The THS-3 is a high quality, precision temperature and humidity sensor housed in a durable solar radiation shield. The solar radiation shield is comprised of six UV resistant louvers, providing effective protection from direct or reflected sunlight and rainfall, while ensuring good ambient air flow to the sensor.

The sensor assembly mounts to an aluminum mounting arm that clamps directly to the weather station mast, providing a lightweight yet rugged support.

OPERATING TEMPERATURE	-40°C to +60°C
TEMPERATURE	**Accuracy:** (0 to 60°C): ±0.1°C **Accuracy:** (-40°C to 0°C): ±0.2°C **Resolution:** 0.1°C
HUMIDITY	**Accuracy:** (0 - 60°C): ± 2% (0 - 100% RH) **Resolution:** 1%

Air Temperature
TS-2-1

The TS-2-1 is a high quality, precision temperature sensor housed in a durable anodized aluminum solar radiation shield. The sensor is also mounted inside a stainless steel tube for maximum protection.

OPERATING TEMPERATURE	-60°C to +60°C
PRECISION (0 - 60°C)	± 0.05°C
RESOLUTION	0.1°C

Soil Moisture/ Temperature

S-HPII

The FTS SDI soil sensor is the Stevens Hydra Probe II, which offers a unique advantage over other soil probes by providing an all-in-one, in-situ system that can measure many different parameters simultaneously.

INTERFACE	SDI-12
SOIL MOISTURE FOR INORGANIC & MINERAL SOIL	**Range:** From completely dry to fully saturated **Accuracy:** ± 0.01 WFV for most soils ± 0.03 max for fine textured soils
DIELECTRIC CONSTANT	**Range:** 1 to 80 where 1 = air, 80 = distilled water **Accuracy:** ± 1.5% or 0.2 whichever is typically greater
CONDUCTIVITY	**Range:** 0.01 to 1.5 S/m **Accuracy:** ± 2.0% or 0.005 S/m whichever is typically greater
TEMPERATURE	**Range:** -10°C to +55°C (14°F to 131°F) **Accuracy:** ± 0.1°C

Barometric Pressure

DigiBP

The DigiBP SDI-12 barometric pressure sensor is a highly accurate, solid state pressure transducer with a normal operating range between the elevations of -1,200 and +13,000 feet. It offers SDI-12 output.

INTERFACE	SDI-12
RANGE	500 to 1,100 hPa
RESOLUTION	0.01 hPa
ACCURACY	±0.3 hPa over full temperature range (-40°C to +60°C)

Solar Radiation - Extreme Accuracy

SDI-SR-CM11B-M

The SDI-SR-CM11B-M sensor with an FTSdesigned SDI-12 interface incorporates a 100 thermocouple sensor, imprinted on a thick-film substrate housed under K5 glass domes. The sensor is rotationally symmetrical. A white screen prevents the body of the pyranometer from heating up. A drying cartridge keeps the interior free from humidity. All pyranometers are supplied with a calibration certificate which also shows the level of directional error. This sensor has ISO 9060 secondary standard classification.

INTERFACE	SDI-12
POWER CONSUMPTION	0.75mA when idle
SENSITIVITY	7 to 14 µV/W/m^2
RESOLUTION	1 W/m^2

Snow Depth

SDI-SR50A

The SDI-SR50A is a rugged acoustic sensor for measuring the distance from the sensor to a target. It is typically used to measure snow depth. It uses a multiple echo processing algorithm to help ensure measurement reliability.

INTERFACE	SDI-12
MEASUREMENT TIME	< 1.0s
MEASUREMENT RANGE	0.5 m to 10 m (1.6' to 32.8')
RESOLUTION	0.25 mm (0.01")
ACCURACY	±1 cm (±0.4") or 0.4% of distance to target (whichever is greatest); requires external temperature compensation

Structures and Enclosures

Trileg Tower

The FTS Trileg tower is the standard for fixed (permanent) RAWS in the U.S. It's an extremely strong, durable and sturdy platform for remote monitoring equipment that will last for decades. Built from heavy aluminum pipe with welded gussets at all joints, the Trileg tower is extremely robust.

The folding mast provides fast, easy access to wind sensors, which are positioned 20ft above the ground.

RAWS Enclosure
KW1

The KW1 enclosure provides secure and simple housing of equipment at fixed RAWS (remote automated weather station) sites.

The enclosure is supplied with two adjustable galvanized steel horizontal mounting rails with stainless steel hardware. These rails are 3ft long and can be cut and drilled to match non-FTS towers, or the enclosure can be mounted to two vertical metal or wooden fence posts. The keyway system allows mounting of major components without tools—equipment just clicks into place.

DIMENSIONS	85.1 cm x 47 cm x 44.5 cm (33.5" x 18.5" x 17.5")
CONSTRUCTION	1/8th inch, heavy gauge, marine-grade aluminum
WEIGHT	19.1 kg (42 lb.)

Small Equipment Enclosure
SM1

FTS' SM enclosure is the smallest in our series of rugged, purpose built, equipment enclosures. It is ideal for stream gauging, water-quality and meteorology monitoring applications, and will stand up to decades of use against the elements. Fabricated from powder-coated, highgrade aluminum, it features a cold-pressed door flange and anti-drip rail, along with solid stainless steel hardware.

Internally, FTS' standard keyway mounting plate allows simple and secure mounting of FTS components without tools—equipment just clicks into place.

DIMENSIONS	52.8 cm x 61 cm x 32.4.5 cm (20.8" x 24" x 12.8")
CONSTRUCTION	1/8th inch, heavy gauge, marine-grade aluminum
WEIGHT	13.6 kg (30 lb.)

Water Quality Enclosure

The FTS water quality enclosure is designed specifically for water quality stations utilizing an ISCO water autosampler, like our SedEvent event-driven, automatic grab sampling system. The enclosure simplifies changing auto-sampler bottles in the field, provides a roomy, ready-to-go, weather-proof system for mounting equipment, and offers a practical security solution where vandalism poses a problem.

DIMENSIONS	120 cm x 90 cm x 60 cm (48" x 36" x 24")
CONSTRUCTION	1/8th inch, heavy gauge, marine-grade aluminum
WEIGHT	36 kg (80 lb.)

Power

Heavy Duty Battery and Cable

S-HPII

FTS uses the Sunlyte 12-500X starved electrolyte heavy-duty battery. This 6 Cell, 12 Volt valve-regulated lead-acid battery powers all our fixed RAWS, and was chosen for it's tolerance of extreme environmental conditions. It's environmentally-friendly, as it's 100% recyclable.

Our smart battery cable connects the battery to the Axiom datalogger, and offers nickel-plated battery terminals, a 15A ATO integrated blade fuse and a built-in temperature sensor for charge regulation. The 2.4 m (8ft) cable includes current sensing and recharge connections.

Solar Panels

SPS-20W-F6H2

SPS-50W-F6H2

FTS solar panels are available in two sizes, all suitable for use with environmental monitoring stations. The 20W panel is a standard component of all our systems, a 50W panel is also available.

The solar panels include a mounting bracket for securing to vertical 1 1⁄2" diameter poles and a cable with a bayonet connector for easy, quick-connect compatibility with Axiom dataloggers. Because the Axiom contains a built-in power manager, there is no requirement for an external solar charge regulator.

CABLE LENGTH	9.14 m (30')
VOLTAGE AT MAXIMUM POWER	17.3V (20W), 17.5V (50W)
CURRENT AT MAXIMUM POWER	1.2A (20W), 2.9A (50W)
DIMENSIONS	55.4cm x 39.0cm x 3.4cm (21.8" x 15.35" x 1.33") (20W), 83.8cm x 53.3cm x 5cm (33" x 21" x 2") (50W)

Miscellaneous

Autosampler Interface Controller

The unique FTS autosampler interface controller is a custom-designed interface used to communicate between the Axiom datalogger / DCP and ISCO automatic water samplers. The interface converts SDI-12 commands sent from the datalogger to an appropriate signal format to control the water sampler.

The controller allows the datalogger to trigger a water sample from the attached ISCO sampler and correlate the sample request to a specific sampler slot number. The interface also allows the datalogger to retrieve the slot number of the last water sample taken as well as the current SDI-12 bus voltage level.

DTS-12 Deployment Guide

The FTS DTS-12 deployment guide is comprised of two engineered resin mounting brackets designed to fit inside a standard 4 inch diameter PVC standpipe. It provides a convenient deployment and retrieval method that is suitable for many DTS-12 turbidity sensor installation applications. The brackets slide easily inside the standpipe and is positioned using a 3/4" PVC rod that is attached to a rear bracket on the deployment guide of similar length to the standpipe. Using a keyed notch position on the sidewall of the guide, the probe can be positioned in a specific orientation following probe removal for cleaning. As a result, probe deployment and servicing is made extremely easy.

We are Experts in Remote Data Collection

We put a tremendous amount of effort into every product's design, paying attention to the smallest details, and customers are heavily involved. This translates into **operational simplicity**—systems that provide ease-of-use where it counts most: in the field.

We know the value of reliability when it comes to remote monitoring in extreme environments. Our products deliver extreme ruggedness and ultra low power consumption. We strive for dead-simple installation and maintenance without requiring training, so deployment can't be messed up. Because that's what over 33 years of experience has taught us.

Our customers, which include 100% of the top 50 forest management agencies, count on FTS. We supply the equipment for the single largest fire weather network in the world.

Our equipment is used by customers at every level of government, in multiple countries around the world.

GSA Certified

Management System registered to ISO 9001 QMI-SAI Global