

NOS-Approved Tide Stations

MAIN TIDE STATION

3001-0000-1

Although designed for the Coastal Monitoring Market, the Sutron Main Station is an ideal starting point for a wide variety of highly reliable & accurate weather stations.

Features

- ▶ Pocket PC Communications (IPAQ PDA)
- ▶ Advanced Graphical Setup
- ▶ Analog I/O Module
- ▶ Digital I/O Module
- ▶ Standard software with standard NOS GOES transmit format
- ▶ Standard NOS Dial-In Station Report (NWS Output)
- ▶ DQAP
- ▶ Standardized Panel Mounting with Mounting for Aquatrak Controller
- ▶ Mounting for CDPD
- ▶ Modem Enhanced I/O Surge Protection
- ▶ DIN Rail Mounting for I/O Modules
- ▶ Web Posting

The Main Tide Station includes this Sutron equipment:

- ▶ Satlink2 Logger/Transmitter
- ▶ Xpert Logger with Display & 4 Comms
- ▶ Xpert Analog & Digital I/O modules
- ▶ Xpert Voice Modem



SPECIFICATIONS

Height	28"	Weight	60 lbs
Width	15"	Depth	10"
XPRT DATALOGGER WITH DISPLAY			
Temperatures	-40°C to +60°C Operating -10°C to +60°C Display		
Processor	486 Class processor @66 MHz		
Memory	32 MB Flash Memory for log & configuration; Expandable. 16MB Flash Operating System; 32 MB RAM Expandable SD/MMC cards & USB		
Battery Backup	Not needed for log - memory is flash. Used for clock only. Lithium Battery: 2 years min.		
Watchdog Timer	System reset upon microprocessor failure		
Sample Intervals	Multiple sample intervals set in increments of 1 sec. to 24 hr., in 1 second increments		
Data Retrieval	Through RS-232 Ports & SD Cards, MMC Cards, USB thumb drives		
Visual Display	1/4 VGA		
Serial Sensor	Using one comm port (Qty 3 RS-232) for sensors SDI-12: Dedicated SDI-12 V1.3		
Communications - up to 4	Satellite Radio, LOS Radio, Voice & Data Modems (Speech Synthesis), Iridium, MODBUS, Direct Connect		

Specifications continued next page. Specifications subject to change without notice.



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Sutron's NOS-Approved Main Station & Redundant Station Configuration, Pacific Warning Center, Hawaii

SPECIFICATIONS (continued)

Power Supply	No internal battery or charger External 6.5 aH @ 12V, operates Xpert for 45 days at 15 minutes sampling.
Power Consumption	Quiescent: 2 mA Typical Avg: 5 mA @ 15 - minute intervals of shaft encoder sample
Digital I/O	Add as needed through I ² C expansion modules. Digital I/O module adds up to 8 additional digital I/O lines.
Analog I/O	I/O Add as needed through I ² C expansion modules. Analog I/O module adds 6 or 10 analog inputs.

DIGITAL I/O MODULE

Digital Inputs & Outputs	8 digital I/O lines supporting CMOS level inputs. Under software control, 6 of the 8 can be configured as outputs & all 8 can be configured as inputs. Inputs can be configured to support shaft encoders, tipping buckets, counters, & binary inputs.
Sensor Excitation	Software control of switched 12 VDC battery power. 250mA max load.
Shaft Encoders	Quadrature output encoder (4 max) uses 2 digital inputs each. 8 bit gray code encoder (1 max) uses 8 digital inputs.
Tipping Bucket Rain GAGEs	Input: 100 Kohm pullup for switch closure, software debounced. Uses 1 digital input each (6 max). Counter Inputs: Input frequency - 1 kHz max. 32 bit resolution. Uses 1 digital input each (8 max).
Switchable Thresholds	Software configurable 0.03 V threshold with hysteresis. (2 inputs max) For use with low level output devices such as the 5600-0200 wind sensor without amplifier.
Digital Outputs	Open drain with 100K pull-up to +5V. Switch on impedance 110 Ohms. 70 mA maximum sink current. Outputs can be externally pulled up to the switched battery voltage (12V nominal). When output is externally pulled above 5V, internal pull-up is automatically disabled.

ANALOG I/O MODULE

Analog Inputs	6 inputs configurable in various combinations of single ended and differential ranging from 6 single ended to 3 differential.
Resolution	22 bits
Input Range	-5V to +5

MAIN STATION - SATLINK2 TRANSMITTER SPECIFICATIONS

Operating Voltage	10.4 to 15 VDC, reverse voltage protected
LED Indicators	Status, Fault, Transmit

CONNECTIONS

Power	Built-in cable
GPS	SMA Bulkhead Mounted
RS 232	DB9
SDI-12	5 position removable terminal strip
Tipping Bucket	5 position removable terminal strip
Analog Input	7 position removable terminal strip

Timekeeping	Accurate within 10 ms
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POWER REQUIREMENTS @ 12.5 VDC

Quiescent	6 mA typ
Transmitting 100/300 bps	3.2 amps typ
Transmitting 1200 bps	4.2 amps typ

RECOMMENDED ANTENNAS

5000-0080 or 0081	Sutron Yagi, 10.5 dB gain (-0081 is stainless steel)
5000-0010-1 & 2	INSAT Yagi, aluminum & stainless steel

TRANSMISSION FORMAT

	SHEF & Pseudo Binary formats
	INSAT 422 bit format
	METEOSAT
	CE Approved

TRANSMISSION MODES

	100 bps GOES random & self-timed
	300 bps GOES random & self-timed
	1200 bps GOES random & self-timed
	4800 bps INSAT selectable 10 min. window (3 randomized repeat sequence)
	METEOSAT Alert & Self Timed
	ARGOS/SCD Format

TRANSMITTER OUTPUT POWER

	Software selectable power levels
	7.0 Watt nominal, 100/300 bps
	14.0 watt nominal 1200 bps
	3.5 watt (adjustable to 18 watt) INSAT



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Telemetry Multi-Tasking

XPert , capable of true multi-tasking, will never tell a user it is "busy" when asked to make a GOES transmission while a user is receiving a PORTS Tag report over a dialup connection. Preemptive multitasking with time slicing allows the XPert to easily carry on both activities at one time. A fully configured XPert Logger can have up to 9 COM ports plus a family of input/output modules & all of the COM ports can be active at one time.

Data Exchange with Back-Up

Sutron XPert loggers support "phantom" sensors that do not reside locally. XPert supports special communications blocks called GETTag & SENDTag collect data from & log values collected on a totally separate XPert Logger. The 2nd logger can be connected to the first by ANY communications path including hard-wire serial, LOS radio, or telephone.

XPert Loggers support remote time synchronization. A primary tide station is normally equipped with a GOES transmitter, using GPS-derived time, accurate to milliseconds. The primary logger can pass extremely accurate time to the backup logger so that time tags match. NOS uses a phantom sensor capability, along with the time synchronization, to communicate with the tide station backup gage.

Interface to All NOS Water Level & Weather Instruments

XPert Loggers have built-in software to support ALL water level sensors used by NOS (or anyone else, for that matter). Among the sensors supported are:

- ▶ AQUATRAK acoustic level sensor (all types, including SDI)
- ▶ Quadrature output shaft angle encoders (all manufacturers including Sutron, DA, Handar, and others)
- ▶ BEI absolute shaft angle encoder
- ▶ Miros Air Gap radar sensor (serial output)
- ▶ All common millivolt-level output pressure transducers such as Druck

XPert software allows interface to all common weather instruments (wind speed /direction, barometric pressure, air temperature, water temperature, relative humidity).

Sutron's NOS Software

NOS identifies a station as a Tide Station only if it has the following capabilities:

- ▶ Real-time quality control of values used in water level averages
- ▶ Dial-in report capability
- ▶ NOS GOES self-timed report format
- ▶ Storm surge detection and reporting via the GOES random transmission facilities
- ▶ Telemetry multitasking – it MUST be able to communicate over *several paths simultaneously*

MAIN STATION XPERT/XLITE VOICE MODEM SPECIFICATIONS

RS 232 interface, Baud Rate Up to 115,200	V.90, 56 kbps Data Receiving
Voice Playback & Record	DTMF Decode
V.42, MNP 2-4 & 10-EC Error Correction	V.42 bis & MNP-5 Data Compression
Power Jumper Selectable	+5 +0.25V 0.5A minimum or +12 +3V 0.5A minimum
Power Jumper Selectable	+5 +0.25V 0.5A minimum or +12 +3V 0.5A minimum

NOTE: The Xpert can be configured to supply power out pin 9 of the DB-9 interface. The Xpert with the 6461-1197 DB-9 com port board can supply +12V, Xpert with 6461-1234 can supply +5(rec om mend ed) or +12.

RATINGS @ 25° C PARAMETER	Min	Max	Units
Tip / Ring Current Continuous	0	120	mA
Dielectric Withstanding Voltage	-	1650	VRMS
Operating Temperature	-40	+85	°C
Relative Humidity	10	95	%
Voltage Requirement	4.75	5.25	V
Power Consumption	720	880	mW
Transmit & Receive Level	-10 Tx	-43 Rx	dbm

AGENCY APPROVALS

FCC68 & CS-03 approved	CSA/UL1950 3rd Edition approved (E189947)
European CE	TUV approved (R2072525)

When **DTR** is low, modem enters **power-down mode** & the power to the modem is turned off to conserve the 120mA that would otherwise be used. When a ring is detected, full mode power is automatically turned on. Modem will then answer the phone on next ring to make connection.

Auto power up on ring with 60 second timer.

DLG - Digital Line Guard Protection (Modem has built-in Digital Line Guard Circuit that automatically detects an over current on the Tip and Ring pins thus protecting the modem in case it is accidentally connected to a Digital Telephone Line.

*Countries Supported: Argentina, Australia, Austria, Belgium, Brazil, Canada, China, Denmark, Finland, France, Germany, Greece, Hong Kong, Iceland, India, Ireland, Italy, Japan, Korea, Malaysia, Mexico, Netherlands, Norway, Phillipine, Poland, Portugal, Russia, Saudi Arabia, Singapore, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, UK, US and TBR21 Generic

- ▶ Data exchange with a physically separate backup data logger & level gage
- ▶ Interface to all water level & weather instruments commonly used by NOS

Sutron tide stations are based on our XPert Datalogger series. XPerts run the powerful Windows CE multi-tasking operating system. Equipping each Tide Station with Windows CE ensures that the software not only meets but exceeds all of NOS requirements.



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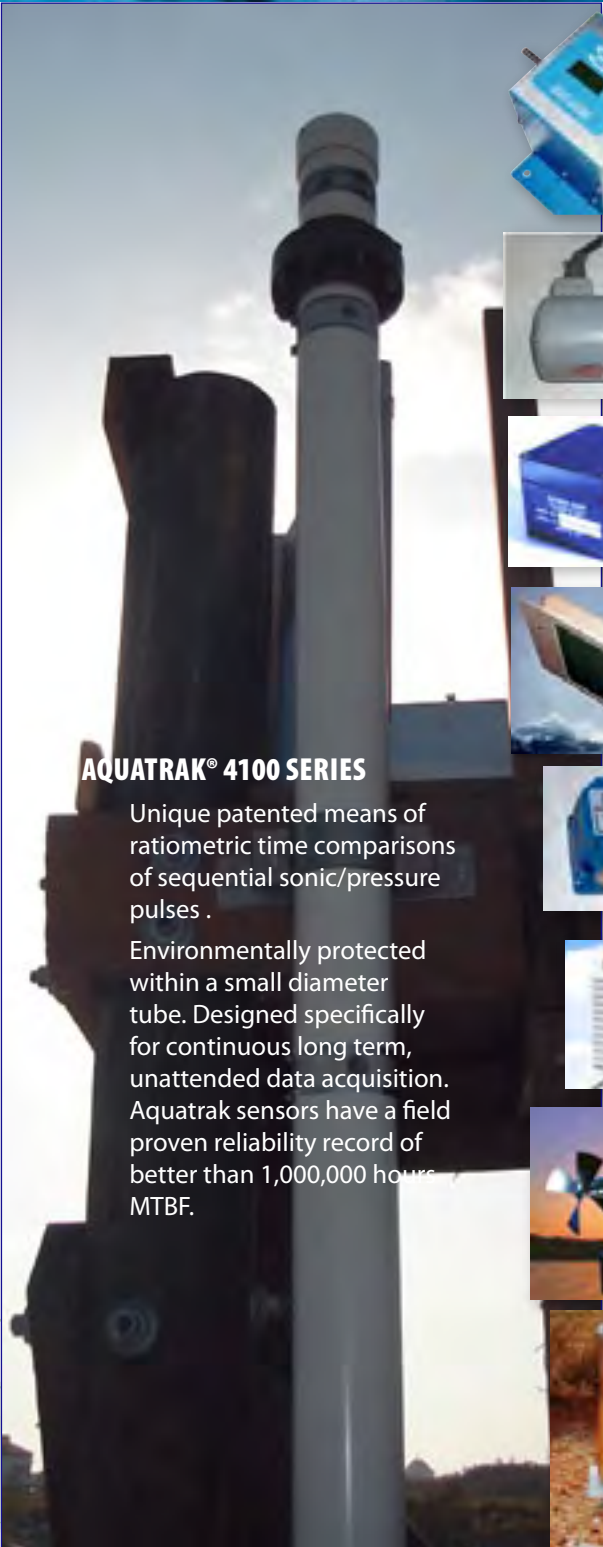
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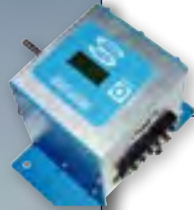
Typical NOS-Approved Tide Station Sensors



AQUATRAK® 4100 SERIES

Unique patented means of radiometric time comparisons of sequential sonic/pressure pulses .

Environmentally protected within a small diameter tube. Designed specifically for continuous long term, unattended data acquisition. Aquatrak sensors have a field proven reliability record of better than 1,000,000 hours MTBF.



SDI (Serial Data Interface) Incremental Shaft Encoder

Scaleable pulses & frame of reference



Shaft Angle Encoder

An "absolute" encoder - produces a fixed range of counts over a fixed # of revolutions.



Pressure Transducer

High-accuracy pressure sensor used in bubbler-based water level measurement

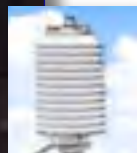


Air Gap Sensor

Radar-based water level sensor



General Purpose Analog Device SDI Barometer



Air Temperature/Relative Humidity Sensor

Installed externally inside a shield



Wind Speed & Direction

Referred to as "wind birds", pulsed output for speed & internal potentiometer for direction



Tipping Bucket Rain Gauge

Sensors are ordered separately.



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