Sutron Satellite Telemetry & Datalogging Systems

HOSKIN SCIENTIFIC

SUTRON

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SATLINK2 TRANSMITTER/LOGGER

SL2-G312-1B WITH 3-YEAR WARRANTY

HDR GOES Transmitter - SatLink2 in Enclosure

Model with Airtight Enclosure & Interactive Display

SL2's innovative design provides everything needed to collect high quality data, without costly options. Our standard unit includes a Built-in Logger, SDI-12 Interface, dedicated Tipping Bucket Input, 4 Analog Inputs, & a powerful Mathematical Equation Editor.

OVERVIEW

- Built to operate for a decade, SatLink2 has the lowest life-cycle cost & the highest ROI of any GOES Transmitter available.
- Manufactured in the USA by Sutron to exacting ISO 9001 QUALITY STANDARDS, our satellite transmitters provide long-term, reliable operation even in the harshest climates.
- Intuitive data view makes set up & data collection incredibly straightforward.
- You'll collect & transmit data more accurately, using one of the lowest power consumption DCPs available!
- 16 Independent Measurements: 4 Analog Inputs, SDI-12, Tipping Bucket & more (page 2....)
- Built-In Logger
- USB port for PCs without RS-232 ports. NOTE: RS232 port is not operational when the USB port is active.
- Multi-satellite certified :
  - *GOES High Data Rate 100/300/1200 bps*
  - *GOES Int'l*
  - *INSAT/METSAT*
  - *METEOSAT 2nd Gen. (MSG)*
  - *GMS /MTSAT*
  - *FY2C*
  - *ARGOS/SCD NEW*
- Battery backup for the Real Time Clock for proper 'time tagged' logging at powerup before GPS resynchronization.
- Front Panel Programming
- Min/Max Processing
- Process Non-Linear Sensors - simply copy & paste a formula without any programming!
- Two-Level Password Protection
- Multiple Models for multiple applications

SatLink2 Stand Alone Rainfall Station

DISPLAY & SD CARD

Front Panel Access to SatLink for

- SL2 Display includes SD Card slot for Log Downloads
- With Display/SD Card - Start & Stop SatLink
- View Current Status & Current Set-up
- Fully Set-up Transmissions & Sensor Measurements
- Initiate Transmissions
- Calibrate Sensors
- View Current & Previous Measurements
- Use Two Levels of Password Protection
- Multiple Choices for Downloading SatLink Log (or Any Part of It) : all data since the last download, the entire log, or a range of dates.
- Save SL2 Setup on the SD Card to Setup another SL2.
- Increased Logging Capacity & Data Redundancy (leave Card inserted & SL2 backs up Log to Card)

VOICE

- The SL2 Model that Provides Voice is the SATLINK2 in ENCLOSURE WITH MODEM (# SL2-ENC-DISP-2)
- This SL2 model has a special internal Sutron SL2 Voice Modem (installed in the equipment) that allows the user to dial into a Satlink station using a telephone.
- A properly equipped "speaking" SatLink delivers measurements & diagnostics via voice. User dials the station, the station answers & provides current sensor data.
- If any measurement triggers an alarm (user-selected limits), SL2 dials out to relay alarm data to pre-designated numbers.

USB Mini Type B requires USB Type A Transition Cable. Sutron will provide 6 ft USB Cable upon request. Cable Part # 6411-1613.

SATLINK2 TRANSMITTER/LOGGER
SL2-G312-1B WITH 3-YEAR WARRANTY

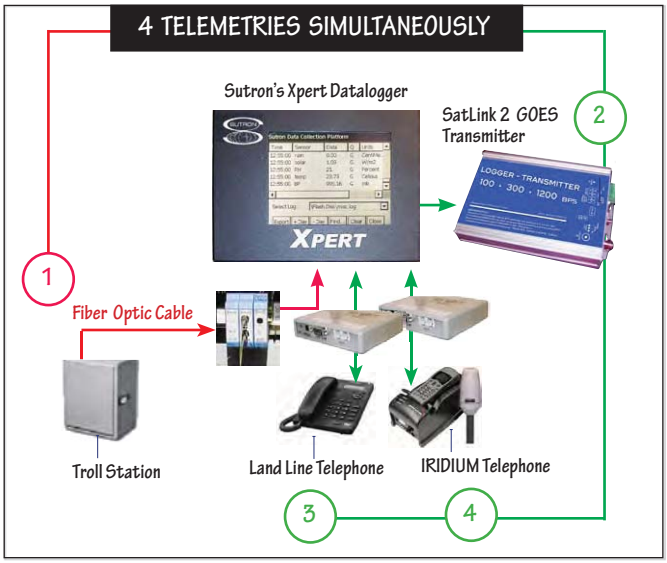
NOAA CHOSE SUTRON TO DEVELOP 2-WAY COMMUNICATIONS & COMMAND CAPABILITY FOR GOES TRANSMITTERS.

- Sutron Corporation won the SBIR to design 2-way communications capability for GOES Transmitters, currently (8/2009) in development.
- Design & manufacture of the communications capability for the next generation of GOES Transmitters has been pioneered by Sutron.
- When Sutron releases the new 2-way GOES Receiver (DCP Command), SL2 will support the upgrade via software, with no hardware change necessary.

SATLINK2 IS THE ONLY TRANSMITTER THAT HAS 30-DAY TURN AROUND ON REPAIRS. OTHERS AVERAGE 3 MONTHS.

- Most other GOES Transmitters are manufactured by 3rd parties & sold through providers who do not & cannot repair the equipment. Thus, the average turn around on repairs for other Transmitters is 3 months.
- One-Stop Accountability. SatLink GOES Transmitter/ Logger is designed by Sutron, manufactured by Sutron, supported by Sutron, & frequently installed & integrated into systems by Sutron.We have control over our own equipment & repair it all in-house within 30 days.

4 TELEMETRIES SIMULTANEOUSLY



SATLINK2 HDR TRANSMITTER HAS A BUILT-IN DATALOGGER & CAN OPERATE AS A STANDALONE DCP.

- In many applications, SatLink2 can function as a stand-alone DCP, thus **saving about $2000 per station** by eliminating the need for a separate datalogger.
- SL2 Logger: 16 Independent Measurements, Easy Data Merge (logs its own measurements & receives data from other loggers), an SDI-12 Interface, dedicated Tipping Bucket Input, 4 Analog Inputs, & a powerful Mathematical Equation Editor.
- When integrated into a station with another datalogger, SL2 provides critical data redundancy & expansion options.

SATLINK2 IS THE ONLY HDR TRANSMITTER WITH A "NO MORE HARDWARE SWAPS" CONTROL.

- All other providers rely on 3rd party manufacturers who may arbitrarily change size, functionality & design of their transmitters.
- Because we manufacture our own Transmitter, Sutron is the only GOES Transmitter Provider that controls its own equipment design.
- SatLink is stable. It was one of the first High Data Rate GOES Transmitter certified by NESDIS in 2001. The SL2-1B size & design are field-proven & very stable.
- All future upgrades including transition to higher data rates & 2-way command communications will be made via software downloads, without the annoying trip to the station to swap out transmitter, cables, etc.

SATLINK2 TRANSMITTER/LOGGER
HDR TRANSMITTER WITH BUILT-IN LOGGER

Sutron loggers & transmitters are frequently integrated into existing networks to upgrade & expand system capabilities. Therefore, we design & manufacture our equipment & systems with commonality of components & uniform interfaces for modular, open, distributed system architecture providing excellent performance regardless of the number of sensors, field stations or base stations added.

SUTRON RECEIVE SITES

- Sutron's Base Station Software *automatically* collects & processes data, generates alarms & messages, & makes it available on demand or on schedule.
- There are many ways to retrieve your GOES DCP data. Our LRGS Receivers support DOMSAT, LRIT, Internet, GOES-DRGS & NOAAPORT. We will help you choose the right system for your needs.
- Any data collected via sensors in the field must be quality-controlled. Sutron has automated tools to view hydromet data & correct if necessary.

SENSOR INTERFACING

- Supports 16 Sensors or Measurements
- SL2 is compatible with & integrates with the majority of existing & new sensors & data loggers, regardless of manufacturer.
- Processes Non-Linear Sensors - simply copy & paste a formula without any programming!
- Gain setting options on analog inputs
- SDI-12 Support for vast array of sensors
- Quick & easy firmware & field upgrades
- Surface Water Data - Catch Basins, Reservoirs, Lakes, River Basins, Streams, etc.
- Groundwater
- Water Quality
- WMO-Compliant Meteorological Stations
- COOP, GCOS Met Stations
- Sediment
- Precipitation
- Snow, Snow Melt & Ice
- Real-Time Stream Flow, Stage, Depth, Discharge, Head
- Evapotranspiration
- Agricultural-Meteorology
- Dams
- Flood & Floodway
- Coastal Ocean
- Currents, Tidal
- Storm Water
- Aviation Weather
- Water Rights, FERC Licensing
- Dam Performance

DATA HANDLING CAPABILITIES

- GOES Web Data Services
- Real-Time Data, Quality-Verified & Delivered Automatically at User-Set Intervals
- On-Demand, Random & User Scheduled Web Reports, Pager & Voice Reports, Tabular & Graphical, and Alarms
- Powerful mathematical equation editor - analog data conversion with polynomial & trigonometric support port
- Easy Data Merge - Logs its own measurements & receives data from other loggers.
- Text Messages, Manual Data Entry
- Voice Messages & Alarms
- In Situ Camera
- Internal Diagnostics including transmission quality & GPS
- User programmable from ALL PCs
- Internal flash log (downloaded @ 115200 Baud.)
- SD Card Interface Allows User to Download Entire SatLink Log (or Any Part of It)
- SD Card Increases Logging Capacity & Data Redundancy (when card is

EXPAND SYSTEM CAPABILITIES & SECURE DATA DELIVERY

- Use SL2 in concert with other telemetry, one or many *simultaneously*: Iridium, IP Modems, PSTN Dial-Up, GSM/GPRS, Hard-Wire, Ethernet, LOS Radio, Fiber Optic, All Cell Phone Types .
- Web-based Networks (with live video web-camera)
- 100%-Reliable Automated Dial-Out Notification, Call-Out & Alarm System with user-selected parameters
- Remote DCP SatLink2 Access via PC or PDA & the Internet
- Dynamic real-time web-reports (graphical & tabular) rainfall/water levels, alarm status, trending tables, diagnostics, etc.
- Complete System Remote Diagnostics & Configuration
- Multiple LOG files to distribute data with many users
- Hardened & tested for dependable performance in the most remote sites & harshest climates in the world.

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SATLINK2 TRANSMITTER/LOGGER SPECIFICATIONS

LOGGER

Applies to all SatLink2 versions unless otherwise noted.

MEASUREMENTS	
ANALOG INPUTS	4 single ended (0-5V, differential ratiometric selectable)
A/D RESOLUTION	24 bit A/D converter
A/D ACCURACY	+/- 0.02% FS @25C ; +/- 0.03% FS @ 25 during TX
TEMPERATURE COEFF	+/- 5 ppm/C typ.; +/- 10 ppm/C max
LINEARITY	+/- 0.005% FS
REFERENCE OUTPUT	2.5 Volt, 10 ma. max (for temp. sensors)
SWITCHED +12V OUT	500 ma. Nom
TIPPING BKT / PULSE COUNTER	Dedicated switch closure counter input, 16 bit resolution
INTERNAL MEASUREMENT	Battery Voltage & Temperature
SOLAR PAN. CHARGING STATUS	Optional
HUMIDITY % ENCLOSURE	Optional
SDI-12:	V1.0, V1.1, V1.2, V1.3 sensors
SENSOR SUPPORT	Supports 16 sensors or measurements
SCHEDULES	Independent for each sensor
SENSOR LABELS	User enterable
MATHEMATICAL EQUATION EDIT.	Analog sensor data conversion allows user entry of any equation
READINGS	Manually Entered

LOG	
READINGS	120,000
TIME STAMP	Individually w/1 sec. resolution
NUMBER RANGE	Can log numbers as small as 1E-38 or as large as 3E+38
QUALITY FLAG	One for Each Data Sample
MEMORY LOG	Non-volatile Flash
DATA MERGE MODE	Supports merging of SL2 Logger data & data from external logger
CIRCULAR BUFFER MODE	Enhanced transmission data mgt. Excess data is stored & sent on subsequent transmissions.

ALARMS	
TYPES	High , Low & Rate of Change Alarms
SENSOR DIFFERENTIATION	User configurable for each sensor

SATELLITE SUPPORT
GOES 100, 200, 1200

TRANSMISSION SUPPORT	
Random Reporting	Self-Timed
SHEF SHEFFIX	Pseudo Binary

MISCELLANEOUS	
CONFIGURATION STORAGE	Non-Volatile
DATA COLLECTION	Visual Indication
SET-UP UTILITY	Windows™-Based
TIME	GPS Support for Accurate Time
CLOCK ACCURACY	Max +/- 0.1 seconds with GPS (4 seconds/month without GPS)

TRANSMITTER

OPTIONAL INTERNAL MODEM (WITH DISPLAY ONLY)	
MAX DATA RATE	33.6 kbps
POWER OFF	Special power saver circuitry to power off while inactive
AUTO POWER	Auto power up on ring
ERROR CORRECTION	v.42, MNP2-4 & 10-EC
DATA COMPRESSION	V.42 bis & MNP-5 data compression
WEIGHT	2.2 lbs.
SIZE	5.55 in. x 7.70 in. x 1.75 in. (not including mounting ears)
ENVIRONMENTAL	-40°C to +65°C
OPERATING VOLTAGE	10.4 to 15 VDC, reverse voltage protected
LED INDICATORS	Status, Fault & Transmit

CONNECTIONS	
POWER	Built-in cable
GPS	SMA (Bulkhead Mounted)
RS232	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.; Frequency discipline to within 10Hz typ

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 ANTENNA	
5000-0080 OR 0081	Sutron YAGI, 10.5 dB gain (-0081 ss)
5000-0051-1 & 5000-0151-2	INSAT YAGI & INSAT YAGI Stainless Steel (formerly 5000-0010-1&2)

TRANSMISSION FORMAT	
SHEF & Pseudo Binary formats	METEOSAT
INSAT 422 bit format	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

SL2 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
2 Watt output for ARGOS,SCD	

PROTECTION AGAINST OPEN OR SHORT CIRCUIT LOADS ON TRANSMITTER OUTPUT

SATLINK2 TRANSMITTER/LOGGER OPTIONS

40 WATT SATLINK2 OPTION

- ✓ 4 ANALOG & 10 SDI-12 INTERFACES
- ✓ IDEAL FOR BUOY APPLICATIONS

The 40 Watt SatLink2 has been certified at 40 Watts on GOES 100/300/1200 bps and International DCS (GOES/METEOSAT/GMS)

The 40 Watt power level is highly suited for operation on a moving platform or station, such as a buoy, that requires a low gain omni-directional antenna.

SATLINK2 40 Watts may be used with an optional, non-mounted display that adds the following features:

- Adds dual communication capability to SatLink2
- Dimensions: 5 1/2" x 6 1/2" x 1"
- Optional internal modem
- Can force a transmission
- Communications: 3 RS232 ports (one to connect to Satlink 2, one to a PC or PDA, & one to an external modem)

⁂ The 40 Watt SL2 is not offered with USB Port or Battery Backed RTC.

SL2-B40W-1 FEATURES

- NESDIS Certified for 40 watts (Fixed) output for 100, 300 &1200 bps
- Domestic Scheduled or Random Transmissions
- International Channel Operation
- Certified for use with 3 or 3.5 dB gain omni-directional antenna.
- Provides typical uplink EIRPs of 49dBm or 50dBm with typical cables.
- No additional operator setup fields required for operation
- User programmable from Pocket PC, desktop/laptop PC
- Built-in logger - 120,000 readings from any sensor to Flash Memory
- 4 Analog Inputs for single-ended & differential input sensors
- Gain setting options on Analog inputs
- SDI-12 facilitates a vast array of sensors
- Reference voltage output for direct thermistor support
- Internal flash log can be downloaded @ 115200 Baud.
- DC power cables provided
- Forward & reflected RF power measured.
- Powerful mathematical equation editor for analog sensor data conversion with polynomial & trigonometric support
- Dedicated Tipping Bucket Input
- Scheduled & random (event driven) reporting & alarm detection
- Easy Data Merge allows SatLink to make & log its own measurements AND receive data from another logger
- Trimble GPS module for fast satellite acquisition in all units
- Standard RS232 interface to data recorder
- Serial port for firmware & software upgrades
- Internal diagnostics to monitor transmission quality and GPS performance

OPTIONAL GPS JAM-RESISTANT BULLET ANTENNA

To maximize the unattended life cycle of your station, please consider the following:

The GPS Bullet Antenna is a viable option...

1. ...when the cable length of the magnet mount antenna is not sufficient, the Bullet Antenna should be used. The new standard cable lengths for this antenna are 5 or 10 meters. (There is sufficient gain to go further although not supported.)
2. ...when an application requires a more robust cable (i.e., direct exposure to the elements), this antenna option provides a UV-rated cable approximately 0.3 inches in diameter.
3. ...in heavy urban environments or when nearby transmitters may overload a standard mag antenna, the Bullet inside filtering helps with interference issues.
4. The Bullet Antenna should be used in any location where the antenna must be mechanically mounted. Application examples include buoys, towers, ocean exposure, or anywhere with high winds or other problems that might move a magnetic antenna.

Can I still use the standard magnetic antenna?

Yes, the standard magnetic antenna is still a good performer. When mounting the standard antenna, consider:

1. Conduit for the tiny cable if there is direct outdoor exposure. The small size of the cable can allow for rodent damage or damage from branches rubbing, etc if installed directly.
2. Mount the antenna so it may be protected from any weather events that may dislodge the antenna.
3. Different installation conditions may require other adjustments or options. Please contact Sutron Sales or Customer Service if you have any questions,

OPTION 1: JAM-RESISTANT GPS ANTENNA

The Bullet Antenna is recommended for applications where interference near the GPS frequency band might cause jamming or loss of GPS reception. The antenna is also suited for marine environments and any application where a more rugged antenna is required. This antenna has a TNC connector allowing the use of special length cables where required. (Mounting hardware not included.)

Order Sutron Part #5000-0170

OPTION 2: MOUNTING KIT FOR JAM-RESISTANT GPS ANTENNA

This kit is designed to mount to existing Uni-Strut type mounting arms used at many stations. Included are a 4 inch stainless steel threaded pipe with a pair of Uni-Strut mounting brackets with hardware for mounting to a Uni-Strut tower arm. (This kit does not include the Uni-Strut arm on the tower, see below.)

Order Sutron Part #6211-1209-1

OPTION 3: TOWER MOUNT ARM (UNI-STRUT SOLID WALL) FOR GPS ANTENNA

Length is 38 inches. Plating is Hot Dipped Galvanized. Remember to place the antenna in an open sky view location, i.e. away from the tower as much as possible.

Order Sutron Part #2271-1061-1

OPTION 4: ANTENNA CABLE FOR GPS ANTENNA

A low-loss RG-59 cable is provided with a TNC-male connector on one end and an SMA-male on the other end. Two lengths are available although the 5 meter is the preferred length if the extra length is not necessary:

5 Meter Length
Order Sutron Part #6411-1561-1
10 Meter Length
Order Sutron Part #6411-1561-2

Sutron's Multi-Sensor Input Logger plus Extremely Flexible & Economical Two-Way GPRS

GPRS-Link

Data Logger Features

1. GUI setup program.
2. Terminal strip with screw terminals for I/O and power connections
3. Operates 8-16VDC -- 12V required for SDI-12 sensors
4. TCXO real-time clock with battery backup (+/-4ppm)
5. Solar panel regulator for panels up to 30 watts.
6. Support for up to 16 measurements of the following inputs:
   - SDI-12/RS485 (shared as is done in the Bubbler)
   - 5 Analog inputs:
     - Two (2) single ended inputs (range 0-5V)
     - Two (2) differential inputs (range +/-39mv, +/-312mV, +/-2.5V)
     - One (1) 4-20mA input
   - 2 digital inputs. They can be used for tipping bucket, frequency, and on/off inputs
   - 2 internal SPI for future expansion
   - internal temperature
   - Battery voltage
   - Meta measurement
7. Options to average or accumulate any measurement.
8. Lightning protection (Gas Tube) on all external inputs.
9. User specified equation on any measurement .
10. User specified alarm detection on any measurement.
11. 2 LED for verification/diagnostics.
12. Log capacity of 240K of data accessible via GPRS and direct connect
13. SW Battery output and 1 digital output (open collector)
14. Also operates as a standalone recorder without telemetry
15. USB slave for serial connection to PC. THE USB PORT WILL NOT SUPPORT typical USB devices like memory sticks, modems, etc.
16. RealTime Clock operates with internal lifetime battery.

Sutron Logger with GPRS Communications

Telemetry via GPRS

1. Periodic transmissions at user set times with data in user selectable format (pseudobinary C, others)
2. Support for primary and secondary master stations via GPRS
3. Alarm transmissions as they are detected.
4. Diagnostics to help track of the amount of data being sent and the performance of the telemetry
5. **GPRS station is ALERT compatible direct to Novastar ALERT master station**
6. Support for remote commands for data collection, maintenance or control of two on/off devices
7. Optional authentication of incoming messages to insure they are from a trusted source & optional authentication of messages sent to TEMPEST/SUTRONWIN via GPRS
8. SMS transmissions if GPRS fails or in place of GPRS
9. Extremely affordable
10. GPRS modems use wireless cellular technology and provide data access in most areas where a typical cell phone works.

Complete Two-Way Communications with Remote Stations Anywhere in the World

IridiumLink

Sutron is an Authorized Iridium® Value Added Reseller (VAR).

Data Logger Features

1. GUI setup program.
2. Terminal strip with screw terminals for I/O and power connections
3. Operates 8-16VDC -- 12V required for SDI-12 sensors
4. TCXO real-time clock with battery backup (+/-4ppm)
5. Solar panel regulator for panels up to 30 watts.
6. Support for up to 16 measurements of the following inputs:
   - SDI-12/RS485 (shared as is done in the Bubbler)
   - 5 Analog inputs:
     - Two (2) single ended inputs (range 0-5V)
     - Two (2) differential inputs (range +/-39mv, +/-312mV, +/-2.5V)
     - One (1) 4-20mA input
   - 2 digital inputs. They can be used for tipping bucket, frequency, and on/off inputs
   - 2 internal SPI for future expansion
   - internal temperature
   - Battery voltage
   - Meta measurement
7. Options to average or accumulate any measurement.
8. Lightning protection (Gas Tube) on all external inputs.
9. User specified equation on any measurement .
10. User specified alarm detection on any measurement.
11. 2 LED for verification/diagnostics.
12. Log capacity of 240K of data accessible via Iridium® and direct connect
13. SW Battery output and 1 digital output (open collector)
14. Also operates as a standalone recorder without telemetry
15. USB slave for connection to PC. THE USB PORT WILL NOT WORK with typical USB devices like memory sticks, modems, etc.
16. RealTime Clock operates with internal lifetime battery.

PRELIMINARY

Sutron Logger with two-way Iridium® Short Burst Data Transceiver

Telemetry via Iridium®

1. Periodic transmissions at user set times with data in user selectable format (pseudobinary C, others)
2. Support for primary and secondary master stations via Iridium®
3. Alarm transmissions as they are detected.
4. Diagnostics to help track of the amount of data being sent and the performance of the telemetry
5. Iridium® station is Alert compatible via SutronWIN.
6. Support for remote commands for data collection, maintenance or control of two on/off devices
7. Optional authentication of incoming messages to insure they are from a trusted source

Hoskin Scientific Ltd
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As Easy to Use as the 8210 plus More Capabilities & a Lower Cost

7310 Data Logger

7310-0

- **Exceeds the capabilities of Sutron's powerful 8210 Logger**
- **Reliable Environmental Monitoring Using Real-Time Communications**
- **Built-In Solar Panel Regulator**

Compare to...

- *Compared to SatLink Logger:* **More measurements, more processing, supports more communications (more than GOES & PSTN), supports BASIC programming**
- *Compared to Competition:* **Packed with more features requested by users to support field station installation, operation & maintenance**

Features

- **Maximized Data Dependability** - Hardened design, multiple communications paths and field-proven logging power expand the 7310's reliability over other loggers.
- Built-In Solar Panel Regulator
- Simple front panel setup without PC or other devices
- Read & write set-ups to SD card
- Built-in support for GOES, Iridium®, GPRS, and telephone modems including speech
- Remote operation without custom PC programs
- Wide operating temperature range tolerates extreme conditions.
- Low power consumption
- SDI-12 support functions
- Single and dual point calibration
- Upgraded diagnostic logs
- Internal real-time clock w/battery backup. + 5 sec/month (typical), +10 sec/month (max) Optional GPS clock

*7310 (7310-0), with Rugged Enclosure **

Measurements & Logging

- Real-time data views
- Built-in measurement circuitry to handle commonly-used sensors
- Flexible measurement schedules and logging schemes
- Separate schedules for each measurement
- Built-in BASIC to support custom measurements, processing and communications
- Multiple level averaging
- Powerful BASIC processor
- Auto-dump data when SD card is inserted
- Command-line interface for operation without custom programs
- Flash memory log able to handle more than 1,000,000 readings, with additional logging to SD available

ORDERING	
7310-0	7310 Data Logger with rugged enclosure* & built-in solar panel regulator

**non-NEMA*

7310 Data Logger Specifications

7310-0 SPECIFICATIONS		
ENVIRONMENTAL		
Temperature	-40°C to +60°C (LCD operates to -20°C)	
Humidity	0-95% Non-condensing	
COMMUNICATIONS		
Interfaces	1 RS232 for user set-up	
	1 RS232 for serial sensor or communication. All serial ports use True UART with baud rates up to 115,200	
Devices supported	Satlink2 Sutron Telephone Speech/ Spread/Spectrum Radios Custom devices via BASIC	GPRS IRIDIUM SBD Modem LOS Radios
Protocols	SSP (Sutron Standard Protocol) Custom protocols via BASIC Y-MODEM	
SDI-12	**V1.3 compliant recorder**	
Two sets of SDI-12 wiring points on terminal strip		
Automatically combines requests to the same device		
ELECTRICAL		
Power Required	10-16VDC (20VDC max)	
Power Consumption	Typically 3mA standby, 40mA active	
MECHANICAL		
Enclosure & Dimensions (rugged, non-NEMA)	11" x 6" x 3" Aluminum, IP52 drip resistant installed vertically. ***Suitable for use inside gauge house, shelter &/or additional NEMA enclosure***	
Display	2x20 character backlit LCD	
Keypad	6 buttons	
SD Card Slot with Activity LED	For download data and read/write setups	
Red Warning LED	Indicates setup or operational error	
Green Heartbeat LED	Indicates unit is operating properly	
Sensor Connections	External terminal removable strips	
SWITCHED VOLTAGES		
Number Available	2	
Types	Switched battery, Switched +5	

7310-0 SPECIFICATIONS	
ANALOG INPUTS	
Number Available	8
Input Range	-0.1 to 5V with respect to ground, single ended or differential
Single Ended Range	0-5 V, ± 78 mV (with respect to ground)
Differential Range	±2.5V, ± 78 mV (+ input with respect to – input)
CMRR	120 dB typ
Input Impedance	> 10 Gohm typ
Accuracy	0.002% of 5V typ 0.003% of 78mV typ
Temperature Coefficient	5 ppm/C typ
Ratio Accuracy	Limited by A/D resolution
Noise Floor	RMS noise typically < 1bit on 78mV scale & above
Excitation	2.5V (up to 50 mA)
Protection	Multistage input protection including spark gaps.
4-20mA	Precision load available for 2 analog channels. Loop source voltage provided by switched battery voltage
DIGITAL INPUTS	
Number available	4
Types	Intended for tipping bucket, frequency or discrete inputs (quadrature takes 2 inputs)
Maximum Frequency	8KHz, minimum pulse width 100 micro-seconds
Input Range	0-5V (100KOhm pull-up to +5V provided)
Accuracy	+0.07% @200 ms sample interval +0.03% @500 ms sample interval +0.01% @1000 ms sample interval
Maximum Quadrature Frequency	4KHz
DIGITAL OUTPUTS	
Number Available	2
Output Type	Open collector with 100 ohm current limiting resistor, 100 mA, 15V max
SOLAR PANEL REGULATOR	
Float Charger for sealed 12V lead acid battery	Built-in temperature compensation
Charging Source	Accepts DC power supply as charging source (15VDC recommended)
Rated for solar panels up to 20W	Higher wattage will not damage, but built in protections may limit power delivered to battery.

As Easy to Use as the 8210 plus More Capabilities & a Lower Cost

8310 Data Logger

8310-N (Basic)

The 8310 exceeds capabilities of Sutron's 8210 & 9210 Loggers, among the most powerful dataloggers on the market today.

Designed for Environmental Monitoring Projects Using 1 or 2 Real-Time Communications Options

Capabilities

- Dependable data is what users want. The 8310 delivers dependable data through its hardened design, multiple communications paths and reliable logging.
- Simple Front panel setup without PC or other devices.
- Built-in measurement circuitry to handle sensors commonly used.
- Flexible measurement schedules and logging schemes.
- Built-in BASIC to support custom measurements, processing and communications.
- Built-in support for GOES, Iridium, GPRS, and telephone modems including speech.
- Dual communications support allowing combinations of supported communications devices.
- Remote operation without using custom PC programs.
- Weatherproof packaging to promote long product life in the field.
- Wide temperature operation for reliability in extreme conditions
- Battery operation with low power consumption.
- SDI-12 support functions
- Real-time data views
- Single and dual point calibration methods,
- Useful diagnostic logs.

ORDERING	
8310-N	8310 Data Logger in NEMA Enclosure
8310-N-G	8310 & GPRS in NEMA Enclosure
8310-N-G-I	8310 & GPRS & Iridium in NEMA Enclosure
8310-N-I	8310 & Iridium in NEMA Enclosure
8310-N-P	8310 & Phone/Speech Modem in NEMA Enclosure
8310-N-S	8310 & SatLink2-V2 in NEMA enclosure
8310-N-S-P	8310 & SatLink2-V2 enclosure & phone modem
8310-N-S-G	8310 & SatLink2-V2, enclosure & GSM/GPRS
8310-N-S-I	8310 & SatLink2-V2, enclosure, Iridium modem

Compare to...

- *Compared to SatLink Logger: more measurements, more processing, supports more communications (other than GOES and PSTN), supports BASIC programming*
- *Compared to the competition: the 8310 is packed with more features requested by users to support field station installation, operation & maintenance.*

SPECIFICATIONS	
ELECTRICAL	
Power Required	10-16VDC (20VDC max)
Power Consumption	<3mA standby <40mA active typical
MECHANICAL	
Enclosure	NEMA-4 Fiberglass
Dimensions	12" x 10 " x 6 " enclosure, molded fiberglass polyester construction. With quick release latches.
Display	2x20 character backlit LCD
Keypad	6 buttons
SD Card Slot with Activity LED	For download data and read/write setups
Red Warning LED	Indicates setup or operational error
Green Heartbeat LED	Indicates unit is operating properly
Sensor Connections	External terminal removable strips

8310 Data Logger

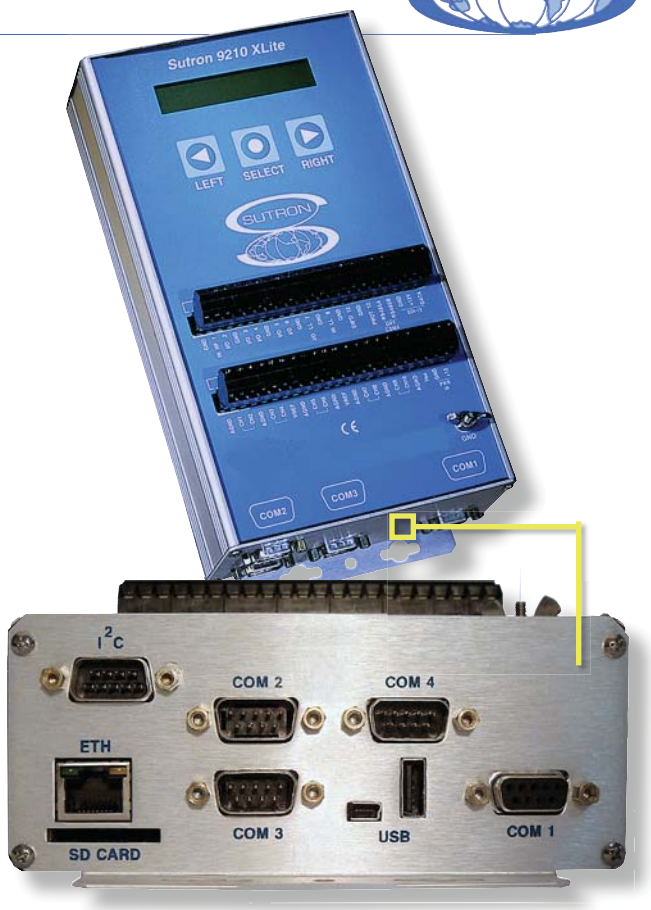
SPECIFICATIONS		
ENVIRONMENTAL		
Temperature	-40°C to +60°C (LCD operates to -20°C)	
Humidity	0-95% Non-condensing	
COMMUNICATIONS		
Interfaces	1 RS232 USB Slave for user setup	
	2 RS232 for communications	
	1 RS232 for serial sensor or other. All serial ports use True UART with baud rates up to 115,200	
	Ethernet	
Devices supported (up to 2 Total)	Satlink2 Sutron Telephone Speech/ Spread/Spectrum Radios Custom devices via BASIC	GPRS IRIDIUM SBD Modem LOS Radios
Protocols	SSP (Sutron Standard Protocol) MODBUS Master/Slave Custom protocols via BASIC	Y-MODEM MODBUS TCP
FEATURES		
Simple Front panel setup		
Separate schedules for each measurement		
Multiple level averaging		
Powerful BASIC processor		
Autodump data when SD card is inserted		
SD card can also read/write setups		
Command-line interface for operation without custom programs		
Internal real-time clock w/battery backup. + 5 sec/month (typical), +10 sec/month (max) Optional GPS clock		
Flash memory log able to handle more than 1,000,000 readings, with additional logging to SD available		
SDI-12	V1.3 compliant recorder	
Two sets of SDI-12 wiring points on terminal strip		
Automatically combines requests to the same device		
ANALOG INPUTS		
Number Available	8	

SPECIFICATIONS	
Input Range	-0.1 to 5V with respect to ground, single ended or differential
Single Ended Range	0-5 V, + 78 mV, +19.5 mV (with respect to ground)
Differential Range	+2.5V, + 78 mV, +19.5 mV (+ input with respect to – input)
CMRR	120 dB typ
Input Impedance	> 10 Gohm typ
Accuracy	0.002% of 5V typ 0.003% of 78mV typ HiGain 0.03% of 19.5mV typ x128Gain
Temperature Coefficient	5 ppm/C typ
Ratio Accuracy	Limited by A/D resolution
Noise Floor	RMS noise typically < 1bit on 78mV scale & above
Excitation	2.5V (up to 50 mA)
Protection	Multistage input protection including spark gaps.
DIGITAL INPUTS	
Digital Input 1, 2 – count, frequency, discrete	Intended for tipping bucket, frequency or discrete inputs
Maximum Frequency	TBD
Input Range	0-5V (100KOhm pull-up to +5V provided)
Digital Input 3,4 - count, discrete, quadrature	Frequency, quadrature encoder or discrete ihputs
DIGITAL OUTPUTS	
Number Available	2
Output Type	Open Collector
SWITCHED VOLTAGES	
Number Available	2
Types	Switched battery, Switched +5
INPUT/OUTPUT EXPANSION	**Additional analog & digital inputs & outputs can be added via external i/o expansion modules.**
Module Types	Analog, 10 channels, 16 bit Analog, 6 channels, 24 bit Digital, 8 channels, input or output

XLITE 9210 DATALOGGER
9210-0000

SUTRON'S MOST POWERFUL DATALOGGER ENGINEERED FOR MAXIMUM VALUE! HIGHLY MODULAR WITH REMOVABLE MEDIA SUPPORT:

- SD CARDS
- MMC CARDS
- USB THUMB DRIVES



DESCRIPTION

The XLite 9210 Datalogger, a high performance data recorder & communications device for UNATTENDED, REMOTE DATA ACQUISITION, CONTROL & COMMUNICATIONS, is a multi-tasking logger capable of making measurements & communicating SIMULTANEOUSLY.

- CONNECT A WIDE VARIETY OF SENSORS to the system using built-in high-precision analog & digital interfaces as well as via RS232, RS485, & SDI-12.
- EXPAND SENSOR CAPACITY via I/O modules plugged into the the XLite's I^2C port.
- With 32 MB OF FLASH DISK for data storage, the 9210 also has 4 COMMUNICATIONS SERIAL PORTS for SATELLITE TRANSMITTERS, MODEMS, RADIOS & OTHER SERIAL COMMUNICATION DEVICES.
- Retrieve data using any communication interface, USB or SD MEMORY CARDS.
- VIEW DATA, CALIBRATE & ADJUST the XLite using its built-in LCD and buttons. Locally or remotely, ALL 9210 FUNCTIONALITY IS ACCESSED THROUGH COMMUNICATIONS PORTS using easy to-understand set-up, data display & system maintenance GUIs.
- EASILY CUSTOMIZE the 9210 with BASIC or C++ routines to become the core of virtually any hydrological, meteorological &/or control application including

Automatic Weather	Synoptic Weather
Climatic Weather	Airport Weather
Agricultural/AgMet	Oceanic, Tidal & Coastal
Rainfall Stations	Water Distribution
Flood Warning	Irrigation/Gate Control
Stream Gaging	Flow Monitoring

MORE FEATURES

- Built-in I/O!
  - 8 digital I/Os & 10 Analog inputs
  - Expandable I/O capacity using modules
- BROAD SENSOR SUPPORT:
  - Analog & Digital Sensors (expandable w/add-on modules)
  - SDI-12 Sensors
  - Serial Sensors (RS-232 and RS-485)
- 32 MB EXPANDABLE FLASH MEMORY Standard for Log & Config Files
- Built-in ETHERNET
- Multiple Telemetry - 4 SIMULTANEOUSLY!
  - GOES, INMARSAT, METEOSAT, INSAT, more!
  - VOICE/DATA MODEM
  - LOS RADIO
  - MODBUS
  - IRIDIUM
- Wide Operating Temperature (-40 to +60°C)
- Remote Access & Control (XTerm Software)
- Flexible Scheduling
- Custom Programming (BASIC, C++)
- Battery Operated, Low Power (<2.5mA quiescent)
- Secure Access (user names & passwords)

XLITE 9210 DATALOGGER
9210-0000

FEATURES DETAIL

- UNPARALLELED SENSOR SUPPORT
  The XLite provides unparalleled sensor support through its expansive I/O capabilities & built-in program libraries. The Xlite SUPPORTS A WIDE VARIETY OF MEASUREMENT TYPES: single voltage, differential voltage, resistance, 4-20mA, frequency, counter, binary, binary alarm, grey-code binary, smart serial (RS-232 and RS-485), SDI-12,etc.

  Most Sensors are SUPPORTED SPECIFICALLY BY NAME using an XLite Sensor "Block" from the extensive built-in library. Support for new sensors not already in the Sensor Library can be easily added by writing a simple program in Xpert Basic. More complex custom processing tasks also can be added by writing a program in C++ (required development tools are available for free from Microsoft).

- ROBUST LOGGING
  XLite boasts 32 MB built-in memory expandable via removeable media. Logged data is compressed and not affected by changes to the Setup. System events are logged independently of measurement data.

- FLEXIBLE SCHEDULING
  EACH MEASUREMENT CAN BE INDEPENDENTLY SCHEDULED. Sample intervals can be set from 1 sec. to 24 hr., in 1-second increments. Built-in functions to support min, max, average, and accumulation calculations are provided.

- EVENT DRIVEN PROCESSING
  Digital inputs can be configured to trigger measurement processing, including logging and telemetry transactions.

- EASY TO USE DISPLAY
  The Xlite provides a 2-line LCD character display with 3 front panel control buttons, making it very simple to view data and make minor Setup changes in the field.

- INTUITIVE SETUP
  System Setup and configuration are performed using the XTerm program, providing the same intuitive graphical user interface (GUI) as Sutron's mighty Xpert (both based on the familiar Microsoft Windows CE, intuitive and easy to use).

ORDERING

9210-0000-2B	XLite, basic
9210-SL2-2B	XLite with SatLink
9210-ENC-B	XLite within rugged enclosure
9210-SL2-ENC-B	XLite wSatLink within enclosure

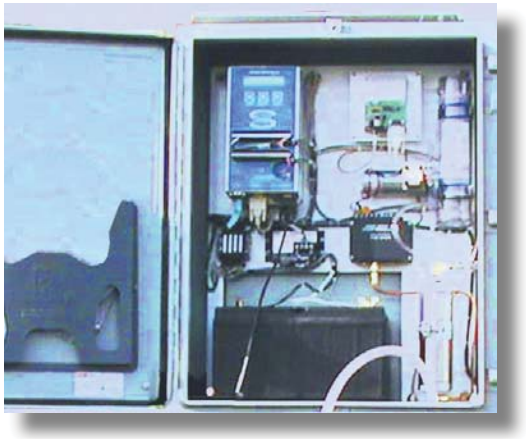
EXPANSION ACCESSORIES

8080-0002-1	Xpert Digital I/O Module
8080-0003-1	Xpert Analog I/O Module
8080-0005-1	Voice Modem Module
6661-1275-1	Enclosure for XLite (empty)
6661-1276-1	Enclosure for XLite w/SL2 (empty)

SATLINK2 & XLITE: OPTIONS

XLite can be ordered with or without an enclosure and packaged with or without SatLink2 GOES Transmitter/Logger.

ENCLOSURE FEATURE	9210-ENC-B	9210-SL2-ENC-B
Enclosure for 9210 only (6661-1275-1)	✓	
Enclosure for 9210 & SatLink2 (6661-1276-1)		✓
Size: 14.13" x 12/26" x 6.13"	✓	✓
3 DIN rails to mount optional equipment inside (ie, I/O modules, modems, etc.)	✓	✓
Protection Board Mounting Holes	✓	✓
3 digital, 4 analog, VREF, SW'D 12, 4 SDI-12, Input Power & a phone line (RJ to Terminal block) supplied	✓	✓
3 PG-9 and 2 PG-11 plugs	✓	✓
Cable strain relief fittings for additional wires	✓	✓
Single point grounding connector	✓	✓
GPS and RF-out connections		✓
RF-out configured for panel-mounted Polyphaser Lightning Protection (in RF-out & ground connections)		✓



XLITE 9210 DATALOGGER
9210-0000

SUTRON

SPECIFICATIONS

DIMENSIONS	11"x6"x3": Aluminum, IP52 drip resistant when installed vertically. Suitable for gauge house, shelter, NEMA enclosure
WEIGHT	3.6 lbs.
TEMPERATURES	Operating: -40°C to +60° (-60°C to +60°C optional)
DISPLAY (VIEWING) TEMP.	-25 ≤ T ≤ +60 °C
SUPPLY VOLTAGE	8-16 VDC recommended, 20 V max
VOLTAGE MEASUREMENT	5 V single ended ± 2.5 V differential
REFERENCE VOLTAGE	2.5 Volts
POWER CONSUMPTION	Quiescent: <2.5 mA
TYPICAL AVERAGE	3 mA @ 15 min sample intervals of shaft encoder
BATTERY BACKUP	Internal lithium backup battery (for clock, not required for logged data) 2 years min
TCXO REAL-TIME CLOCK	Real-time clock accuracy better than 10 seconds per month (-40°C to +60°)
WATCHDOG TIMER	System resets upon microprocessor failure
AMBIENT RH	0 to 95%
MEMORY	32 MB Flash Memory for log & configuration files. Expandable! 16MB Flash Operating System 32 MB RAM
SAMPLE INTERVALS	Multiple Sample Intervals set from 1 sec. to 24 hr. in 1-second Increments
DATA RETRIEVAL	RS-232 Ports, Memory Cards
ETHERNET	802.3 10BaseT
REMOVABLE MEDIA	SD Cards, MMC Cards, USB Thumbdrives
DISPLAY	2 line by 20 character alphanumeric LCD
EXTERNAL DISPLAY	Full feature Windows display
SERIAL PORTS	4 RS-232 ports, 1 RS-485 port
SDI-12	Dedicated SDI-12 V1.3
COMMUNICATIONS	4 RS-232 ports Up to 4 of the following types: SIMULTANEOUSLY: Satellite Radio, LOS Radio, Data & Voice Modem, Direct Connect MODBUS

DIGITAL INPUTS & OUTPUTS	8 digital I/O lines 2 input only 6 bi-directional 1 high frequency 8kHz) ■ Supports shaft encoders, tipping buckets, counters & binary inputs. Software Control of switched 12VDC power. ■ Expandable I/O using external I²C modules ■ 2 low level for tipping bucket or wind speed/wind direction without amplifier. Includes CMOS.
ANALOG INPUTS	10 Inputs single ended, or up to 5 differential, expandable using external I²C modules
OUTPUT	+12VDC SW power available
DC EXCITATION OUTPUT	+2.5, +12V Expandable using external I²C modules
I/O INTERNAL PROTECTION	Outputs internally protected against short circuits.
OPERATION MODE	Operation mode is software selectable w/ frequency, analog & counter inputs.
SHAFT ENCODERS	Quadrature output encoder (3 max.) uses 2 digital inputs each.
	7 bit gray code encoder (1 max) uses 7 digital inputs
	Expandable using external I²C modules
TIPPING BUCKET	Input: 100 Kohm pullup for switch closure software debounced uses 1 digital input each
COUNTER INPUTS	Input Frequency: 1 channel @ 8kHz max, 7 channels @1 kHz max.
COUNTER ACCURACY	± 0.1% with 32 bit resolution. Expandable by external I²C modules
ACCURACY RATIOMETRIC	± 0.01% of full scale
ABSOLUTE ACCURACY	0.1% -40 to +60°C
INPUT RANGE	0-5 V full scale
PRESSURE TRANSDUCER	■ Bridge sensors require 2 channels ■ Voltage output sensors require 1 channel. ■ Current output sensors require external bridge completion resistor 1 channel.
DATA RESOLUTION	32 bit resolution displaying up to 6 decimal places, user selectable
A/D RESOLUTION	16 bits

XPERT DATALOGGER & CONTROLLER 8080-0000

SUTRON'S MOST POWERFUL DATALOGGER YET!

- REMOVABLE MEDIA SUPPORT
  - SD Cards
  - MMC Cards
  - USB Thumb Drives
- 32MB FLASH MEMORY
  Standard for Log and Config Files Expandable via SD Cards

The Xpert Datalogger/Controller, a high performance data recorder and communications device for UNATTENDED, REMOTE, REAL-TIME DATA ACQUISITION, CONTROL AND COMMUNICATIONS, is a multi-tasking logger capable of making measurements & communicating SIMULTANEOUSLY.

Xpert Model 8080-0000-2B

Standard Xpert End Plate

UNPARALLELED SENSOR SUPPORT

- Sensors connect to the system via analog and digital I/O modules that plug into the I^2C port as well as via RS232, RS485, SDI-12.
- With 32 MB OF FLASH DISK for data storage, the Xpert also has 4 COMMUNICATIONS SERIAL PORTS for SATELLITE TRANSMITTERS, MODEMS, RADIOS & OTHER SERIAL COMMUNICATION DEVICES.
- Retrieve data using any communication interface, USB or SD MEMORY CARDS.
- VIEW DATA, CALIBRATE & ADJUST the Xpert using its LARGE TOUCH SCREEN. Locally or remotely, all Xpert FUNCTIONALITY IS ACCESSED THROUGH COMMUNICATIONS PORTS using easy to-understand set-up, data display & system maintenance GUIs.
- Wide Operating Temperature (-40 to +60°C)
- Built-In ETHERNET
- ROBUST LOGGING & FLEXIBLE SCHEDULING
  Logged data storage expandable with SD Cards. Changes to setup do not affect logged data. Logged data is compressed. System events logged independently of measurement data.

CUSTOMIZED APPLICATIONS

EASILY CUSTOMIZE the Xpert with BASIC or C++ routines to operate as the core of virtually any hydrological, meteorological &/or control application including

- Automatic Weather
- Agricultural/AgMet
- Synoptic Weather
- AWOS Stations
- Tidal, Oceanic & Coastal Stations
- Water Quality
- Gate Control Station & Water Distribution
- Flood Forecasting, Warning & Control
- Hydromet Stations
- Water Level Stations
- Rainfall Stations
- Stream Gaging
- Dam Safety
- Irrigation Control
- Your Application!

XPERT DATALOGGER & CONTROLLER - FEATURES

EXPANDABLE I/Os

Inputs and Outputs can easily be added as needed using Sutron's I/O modules. These modules use an industry-standard "I^2C" bus, that runs a total of 10 ft between devices. The analog and digital modules have the following features:

ANALOG MODULES

8080-0003-1 HIGH RESOLUTION ANALOG I/O

- 6 channels configurable as 6 single-ended channels or 3 differential inputs, or a combination of both. All channels feature self-excitation & built-in voltage, current & resistance sensing.
- Up to 6 (six) 4-20mA sensor interfaces & ability to make resistance measurements without any external resistors.
- 22 bit resolution
- Accepts inputs from -5V to +5V.
- Per measurement input gain settings allow selection of ±5V or ±300mV input range.
- Programmable excitation from -5V to +5V can be applied to any of the 6 channels.
- 1 (one) switched battery power output.
- 1 (one) protected battery power output.

8080-0003-3 I/O WITH TERMINATION BOARD

- All features of the 8080-0003-1 above plus all connections are brought out via ribbon cable to a termination board.
- Multi-stage surge protection circuitry including spark gaps on termination board.
- Termination board grounds directly to metal mounting panel via standoffs.

8080-0007-1 10-CHANNEL ANALOG I/O

- 10 channels configurable as 10 single-ended channels or 5 differential inputs, or a combination of both
- 16 bit resolution
- Accepts inputs from -0.1V to +5V
- Measurement ranges: 0-5V, ±2.5V, ±78mV
- 1 (one) switched battery power output.
- 1 (one) reference output.
- Built-in multi-stage surge protection circuitry with spark gaps.

DIGITAL MODULES

8080-0002-1 DIGITAL I/O

- 1 (one) switched battery power output
- 8 digital I/O total, 6 are bi-directional, 2 are input only. Configurable for use as follows:
  - Up to 8 general purpose sampled inputs, level sense with alarm or 32 bit event or frequency counters
  - Up to 4 quadrature output sensors (quadrature requires 2 inputs per sensor)
  - Built-in 100K pull-up on 6 inputs accommodates switch closure sensors such as a tipping bucket.
  - 2 switchable threshold RM Young wind-sensor-compatible inputs (low level AC signal).
  - 6 inputs accept switch battery voltage signals as well as 5V logic signals.
  - 6 open collector type outputs that can work with devices tied to 12V.

FLEXIBLE SCHEDULING

Each measurement can be independently sceduled. Sample intervals can be 1 sec. to 24 hours, in 1 sec. increments. Built-in functions to support min, max, average, & accumulation calculations are provided. Changes to setup do not affect logged data.

EVENT DRIVEN PROCESSING

Digital inputs can be configured to trigger measurement processing, including logging & telemetry transactions.

INTUITIVE INTERFACE

System setup & configuration is performed using the graphical user interface (GUI), either on the LCD touchscreen or remotely using XTerm. The interface, based on Microsoft Windows CE, is familiar & easy to use.

ROBUST DISPLAY

The Xpert provides a backlit 1/4 VGA LCD touchscreen display. The display operates from -20 to +60°C. The transflective design of the display enables complete readability in full sunlight.

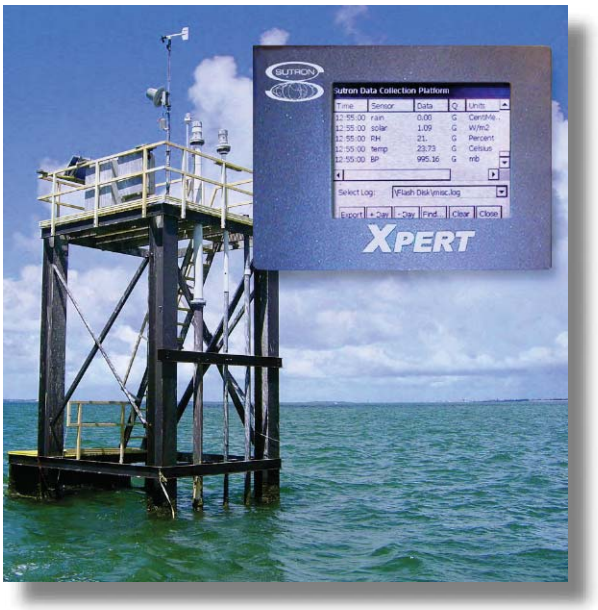
DIGITAL MODULES cont'd

8080-0002-4 DIGITAL I/O WITH TERMINATION BOARD

- All the same features as the 8080-0002-1 plus all the connections are brought out via ribbon cable to a termination board.
- Multi-stage surge protection circuitry including spark gaps on a termination board.
- Termination board grounds directly to metal mounting panel via standoffs.

XPERT DATALOGGER & CONTROLLER 8080-0000

XPERT SPECIFICATIONS	
DIMENSIONS	8 1/2" x 6 1/2" x 2 1/2"
WEIGHT	2 lbs.
OPERATING TEMP	-40°C to +60°C Operating (Display -20°C to +60°C)
POWER SUPPLY	10-16 VDC recommended
POWER CONSUMPTION	Quiescent: 2.5 mA Typical Avg: 5 mA @ 15 min sample intervals
FLASH MEMORY	32 MB Flash Memory for log & configuration files, expandable using optional SD Cards
BATTERY BACKUP	Internal lithium backup battery (for clock, not required for logged data) 2 years min
TCXO REAL-TIME CLOCK	Real-time clock accuracy better than 10 seconds per month (-40°C to +60°)
SERIAL PORTS	4 RS-232 ports standard, up to 8 total RS-485 options available Dedicated SDI-12 bus
COMMUNICATION TYPES	Satellite Radio, LOS Radio, Voice Modem (Speech Synthesis), Data Modem, Iridium, MODBUS, Direct Connect
ANALOG INPUTS	Every 8080-0003 Analog Module adds up to 6 additional analog inputs, so use as many modules as needed.
	Every 8080-0007 Analog Module adds up to 10 additional analog inputs as needed.
DIGITAL I/O	Every 8080-0002 Digital Module adds up to 8 additional digital I/O lines. Use as many modules as needed.
REMOVABLE MEDIA	SD Cards, MMC Cards, USB thumb drives
ETHERNET	802.3 10BaseT



ORDERING XPERT DATALOGGER/CONTROLLER	
8080-0000-1B	Xpert with Display
8080-0000-2B	Xpert with Display & 4 additional Com Ports (total of 8 Com Ports - see page 1 photo)
8080-0001-1B	Xpert **without** Display
8080-0001-2B	Xpert **without** Display Includes 4 additional com ports (total of 8 com ports)
ORDERING XPERT I/O MODULES	
8080-0002-1	Xpert Digital I/O Module
8080-0002-4	Xpert Digital I/O Module with Termination Board
8080-0003-1	Xpert Analog I/O Module 6 Channels
8080-0003-3	Xpert Analog I/O Module 6 Channels with Termination Board
8080-0007-1	Xpert Analog I/O Module 10 Channels
8080-0005-1	Voice Modem Module

ACCUBAR® CONSTANT FLOW (CF) BUBBLE GAUGE/RECORDER

SUTRON

AN ALL-IN-ONE, PRECISION DEVICE FOR MEASURING WATER LEVELS

DESCRIPTION

The Accubar® Constant Flow (CF) Bubble Gauge is a self-contained, precision device for measuring water levels. The gauge features a front panel, simplified setup, RS232 & SDI-12 ports, data communication & maintenance. The gauge also has a built-in datalogger for stand-alone operation or backup recording of data.

The CONSTANT FLOW BUBBLER consists of a pump, tank, manifold, control board, display/keypad & enclosure for the purpose of measuring water levels using long-established bubble gauge principles, all packaged within a single, NEMA-4 enclosure.

SPECIFICATIONS

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

ELECTRICAL	
Power Required	8-16VDC
Interface	SDI-12 V1.3, RS232
Quiescent Current	<1 mA
Average Power	<8.3 mA @ 12 V for 3 sec. measurement every 15 min.
PNEUMATIC	
Pressure Range	0-25 psi (57.5 ft. or 17.5 m water*)
Accuracy	0-20 ft. 0.01% FSO 20-57.5 ft. 0.05% of reading
Resolution	0.0001 psi
Purge Pressure	>= 50 psi max.
Bubble Rate	User Settable
Compressor Type	Piston
MECHANICAL	
Enclosure	NEMA-4 fiberglass
Dimensions	12 in. x 15 in. x 7.5 in.
Connections	8 position terminal block
Pressure Outlet	3/8 in. O.D. tubing
ENVIRONMENTAL	
Temperature	-25°C to +60°C optional: -40°C to +60°C
Humidity	0-95% non-condensing

KEY FEATURES

- Self-contained system needing only external power & outlet tubing
- Extended-life desiccant (up to 1 year)
- Adjustable bubble rate
- Configurable averaging
- User-variable auto purge
- Flexible auto blockage detection
- Modifiable auto measurement & logging
- Built-in FLASH LOG for **over 300,000 readings**
- Stand-alone or operation with other loggers/ communication devices
- Precision Accubar® Pressure Sensor!
- Front panel setup & maintenance.
- SDI-12/RS232 interfaces compatible with loggers, cell modems, SatLink2 Transmitter/ Logger
- Swing-out front panel for easy maintenance.
- Auto-zero function
- Easier re-calibration
- 3 Levels of filtration
- User-forced purge option
- SD Card slot!

ORDERING

56-0133-25-1	Accubar® Constant Flow Bubble Gauge 25 psi range
ACCESSORIES	
2911-1183	Tubing, Orifice Line Black Polyurethane up to 2000 feet (609.6 meters)
2911-1279-1	Replacement Desiccant, full canister

*Reference to ft. based on USGS conversion factor of 2.3073 ft. water per psi

STAGE DISCHARGE RECORDER
SDR-0001-1

Sutron's ULTRA-RELIABLE SDI-12 OPTICAL ENCODER fused with Sutron's STATE-OF-THE-ART SATLINK2 LOGGER technology to create AN ENCODER THAT NEVER FORGETS.

- ☐ Dual Sensor: Setup SDR to measure a second stage using an analog* or SDI-12 sensor
- ☐ Rating Table: Compute discharge using a rating table with up to 50 points
- ☐ Averaging: Stage can be computed by averaging multiple samples over a user-set period
- ☐ 4-20mA output:* Output stage or discharge using the 4-20mA circuit

*requires SDR w/analog: SDR-0001-3 or -4

MORE FEATURES

- Using proven float-tape-counterweight technology, the STAGE-DISCHARGE RECORDER is a "plug compatible" replacement for a Stevens strip chart or punched-tape recorder.
- Saves your data in ultra-reliable Flash memory.
- NO BACKUP BATTERIES and you NEVER lose your data.
- Incorporates standard flume and weir equations
- Computes and logs discharge totals
- Displays discharge as well as flume/weir stage.
- Built-in event log tracks any time that someone views, downloads data, or makes changes to the setup.
- Runs up to 1 year on an industrial alkaline battery.
- Data delivered in easy-to-read & easy-to-open CSV (comma-separated variable) files
- All setup can be done from front panel
- Download utilities available for Pocket PC-compatible PDAs & Windows laptops.

SUTRON RECOMMENDS

1. Stilling well with minimum 8" diameter
2. 5/16" shaft float wheel/pulley with circumference of 12", 18", & 375mm. If the float wheel does not have an insulating hub, a PVC float must be used. (See Ordering Options)
3. Beaded wire/tape compatible with the float wheel.
4. Float/counterweights.
5. 12-volt alkaline battery with capacity of at least 20 amp-hrs. (See Ordering Options).

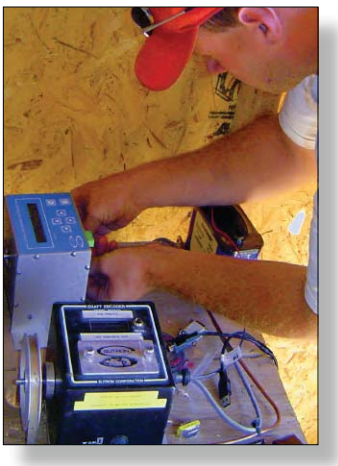
WOULD YOU LIKE TO ...

- Immediately see STAGE/DISCHARGE at flume/weir sites?
- Download up to 6 MONTHS OF DATA to Pocket PC or Laptop?
- Have DATA IN SPREADSHEET-FORM for easy processing?
- Have a RECORD SHOWING WHEN A SITE WAS VISITED & WHAT CHANGED?

- Buy REPLACEMENT BATTERIES at a HARDWARE STORE?
- Have NO FEAR OF LOSING DATA if the battery does go dead?

TIRED OF...

- Processing data off of strip charts?
- Driving hundreds of miles several times a month to get strip charts?
- Recording devices that stop or record errors after the first freeze or close lightning strike?



STAGE DISCHARGE RECORDER
SDR-0001-3 WITH ANALOG OPTION

EXTREMELY ACCURATE, LOW-NOISE ANALOG MEASUREMENT SYSTEM for

- 0-5 V Sensors
- Low-Level Bridge Output Sensors
- 4 to 20 mA Sensors*

A switched 24-volt power supply provides everything needed to operate 4 to 20mA loop sensors.

FEATURES

Supports the following (one at a time only)

- 0-5 V SINGLE ENDED ANALOG INPUT (General Purpose Analog Sensors)
- 0 to (+/-)39 mV Differential Analog Input (for BRIDGE TYPE PRESSURE SENSORS)
- 4-20 mA INPUT SENSORS

Also supports the following outputs:

- 2.5 V EXTERNAL VREF to support accurate references for sensors.
- SWITCHED BATTERY OUTPUT to power sensors and conserve battery power when not performing measurements
- 24 V OUTPUT to power 4-20 mA CURRENT LOOP SENSORS

Use Sutron's Analog Stage Discharge Recorder when a shaft encoder cannot be used &/or when there is no stilling well. This SDR comes *without* a shaft encoder & *can*.....

- READ A DIFFERENTIAL BRIDGE PRESSURE SENSOR (resistive bridge output sensors like Druck). The sensor, installed on the bottom of water being measured, is connected by terminal strip (provided) to the side of the SDR enclosure.
- READ virtually ANY 4-20 mA SENSOR either PRESSURE or ULTRASONIC LEVEL (for example) as the source of data for calculating stage discharge**.
- READ 0 to 5V LEVEL SENSORS
- ☑ The system functions with input voltages as low as 5.5 V. *However*, if the SDR battery is supplying power to external sensors, the low battery operating point of the external sensors applies. 12 VOLT BATTERIES ARE RECOMMENDED FOR TYPICAL APPLICATIONS.
- ☑ Software provides additional slope & offset fields to convert output information to appropriate units.

INSIDE SDR ENCLOSURE	SPECIFICATIONS
GENERAL	
Input Voltage	8-16 Volts*
Temp Range	-40° to +60° C
Temp Coefficient	10 ppm/C max
2.5 Volt Ref	+/- 10 mv
Switched Batt	Short Protected
Lightning Protection	Sufficient for most installations
Miswiring tolerant	Protection on all inputs
SINGLE ENDED	
Number of Bits	24
Full Scale	0 to 5 Volts
Resolution	0.298 uV
Noise (p/p) @25C	6.5 uV (p/p)
Noise (rms) @25 C	3.4 uV RMS
Accuracy @25C	0.02%
Input Impedance	>2M Ohm
DIFFERENTIAL	
Number of Bits	24
Full Scale	+/- 0.0390625 V
Resolution	4.657 nV
Noise (p/p) @25C	1.6 uV (p/p)
Noise (rms) @25C	0.38 uV
Accuracy @25C	<.01%
Input Impedance	>3M Ohm
4-20mA INPUT	
Number of Bits	24
Full Scale	20ma
Resolution	<1nA
Accuracy @25C	.02%
24 Volt Current Loop Pwr	24 Volt +/- 5%
24 Volt	Short Protected

STAGE DISCHARGE RECORDER
BASIC SPECIFICATIONS

STAGE RANGE	+/- 80 ft of the set value, 400 count per revolution
ENCODER	400 count optical encoder
CLOCK	Internal real-time clock with battery backup (coin cell with 5+ year life). ±2 minutes a month (0 to +50C).
RECORDING INTERVALS	15-minute default, 1, 5, & 10 minutes user selectable. 30 & 60 minute intervals also available.
DISCHARGE CALCULATION	Parshall Flume & Broad Crested Weir Equations plus general purpose equation with user-selectable constants
VOLUME TOTAL	Daily volume calculation and logging
DAILY AVERAGE STAGE & VOLUME	Computes and logs the average daily stage and volume every day at midnight
LOG CAPACITY	Over one (1) year of 15-minute stage data with accompanying daily average of discharge and midnight battery voltage
LOG WRAPPING	The log is PERMANENT, and wraps when full (oldest data replaced by newest data). There is NO mechanism to erase the log.
OPERATOR INTERFACE	6-button front panel with two-line display and status lights. Buttons select menu options.
DATA DOWNLOADS	Pocket PC compatible PDA or laptop/ desktop Windows PC
AVAILABLE DATA	Station name, date/time, current stage, current discharge, current total, battery voltage & logged values of the stage & discharge, daily average stage, average discharge & total discharge.
CALIBRATION	The user can use the front panel/PC/ PDA to adjust the current stage to match a staff reading (optional password protection)
EVENT LOG	Any stage or setup changes are written to the event log
PASSWORD	Can be configured to require a password for setup changes and stage adjustments
SETUP DATA	All setup stored in non-volatile flash memory
DOWNLOAD TIME	Less than 6 minutes, even for a 6-month log
DOWNLOAD	Comma-separated variable (CSV)
GRAPHING DATA	PDA and laptop utilities provide data graphing
STATUS LIGHTS	Two on front panel – provide "heartbeat" and run/error status
DRIVE SHAFT	5/16" diameter with 1: threaded and milled flat for set screw, shaft is 2.5" above base.
SEALING	NEMA rated enclosure – resists dripping water and spray

MODBUS	Supports MODBUS slave protocol with user-set address & baud rate
FLOAT WHEELS	Can operate with the following diameters: 18 inch, 375 mm, 1 foot.
OPERATING TEMPERATURE	–40 to +60C. The LCD operates to –10C.
DATA CONNECTION	DB9 (female) for direct connection to PC/PDA The DB9 provides +5V on pin 9 with a capacity of 71ma. Provides a means to power external devices, such as BlueTooth.
GROUNDING	#8 ground stud with wing nut
SDI OUTPUT	One set of connections for SDI-12 on a terminal strip (available Fall 2005)
BATTERY CONNECTION	Dual battery connections on a terminal strip and appropriate circuitry to allow a new battery to be installed before the old battery is removed
BATTERY LIFE	Operates on 5.5 to 16 vdc 3 to 9 months on standard gel cells (7 ah to 24 ah) 9 to 15 months on various series configurations of alkaline cells
POWER CONSUMPTION	< 0.25 mA @ 12 VDC
BATTERY VOLTAGE LOG	Battery voltage logged ech day at midnight, battery life indicator available in display

ORDERING

SDR-0001-1	Stage Discharge Recorder, Standard Unit, with shaft encoder only, battery cable included
SDR-0001-3	SDR w/Analog Input & 4-20mA outputs The Analog Stage Discharge Recorder does not include a shaft encoder, which is ordered separately.
SDR-0001-4	SDR w/Analog Input, 4-20mA outputs, & shaft encoder Includes a shaft encoder
	OPTIONAL ACCESSORIES
5100-0040	Battery, 12VDC, 24 AH, sealed, rechargeable lead-acid
5100-0530-2	Float, 6" PVC
5100-0118-1	Float Wheel, 375mm/revolution for beaded cable and 5/16" shaft
5100-0581	Chain, Beaded, 12.5cm, 1 Meter Length Increments
5100-0550	Counterweight, 8 oz.

BATTERIES NOT INCLUDED.

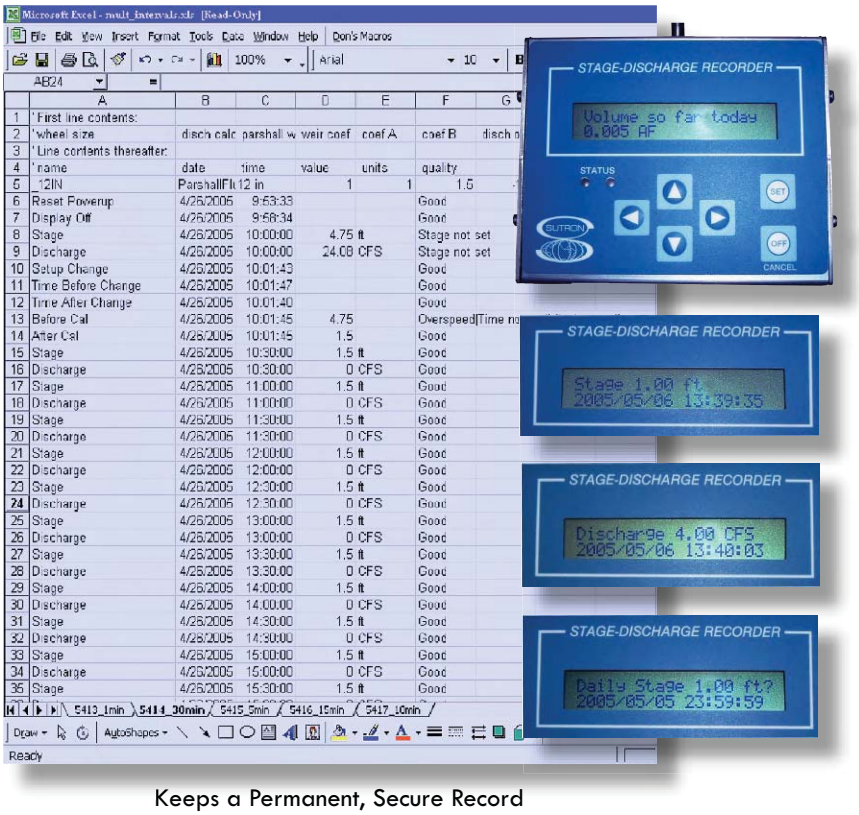
Use lead acid or alkaline batteries providing 12 volts.

OR

Use two 6 volt lantern batteries (Eveready 528 or 529) connected in series. In most applications this will provide 12 months of operation.

STAGE DISCHARGE RECORDER

SDR-0001-1



Keeps a Permanent, Secure Record

- SITES with or without STILLING WELLS
- GROUND WATER MONITORING
- Records DISCHARGE ON CANALS, DITCHES, TURNOUTS, etc.
- Runs all year on 2 LANTERN BATTERIES
- LOG FILE DOES NOT ERASE.
- SIMPLY ENTER FLUME/ WEIR FORMULA
- 2 YEARS OF DATA STORAGE

DISPLAYS

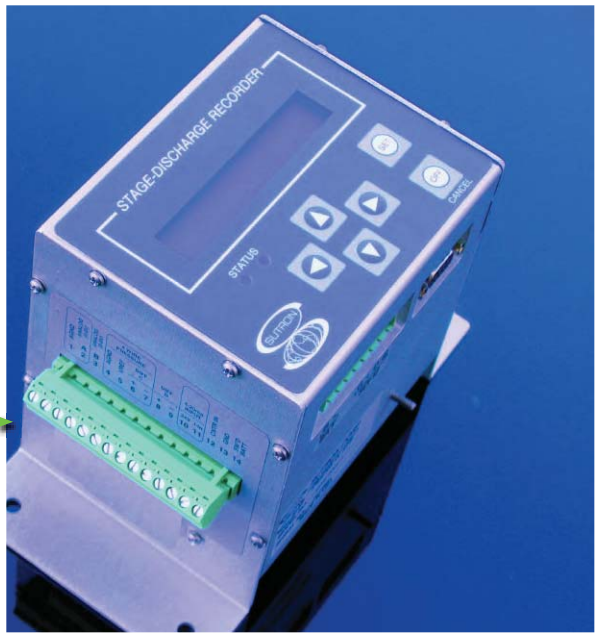
- Stage - Daily & Log
- Volume So Far Today
- Flow
- Discharge
- Review Discharge by Day

Sutron's Stage Discharge Recorder and its companion, the Water Monitor, are logging shaft encoders for use in surface (SDR) and groundwater (Water Monitor) applications. Both are front panel programmable, hold two years worth of data, and operate for over one year on alkaline batteries.

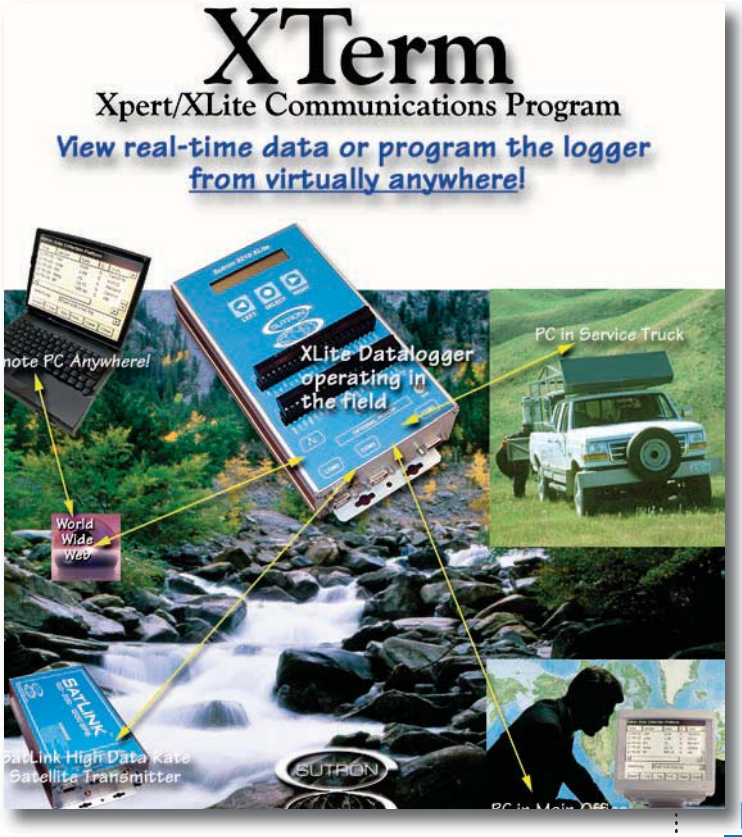
Both units also work with low-cost CDMA cellular data modems and Sutron's SDR Comm desktop software to create an AUTOMATICALLY-POLLED, IP-BASED DATA COLLECTION SYSTEM.

Moreover, they are also SDI-12 SENSORS.

Both units are available with AN ANALOG SENSOR INPUT for use with ultrasonics, submersibles and other sensors.



XTerm Communications Program

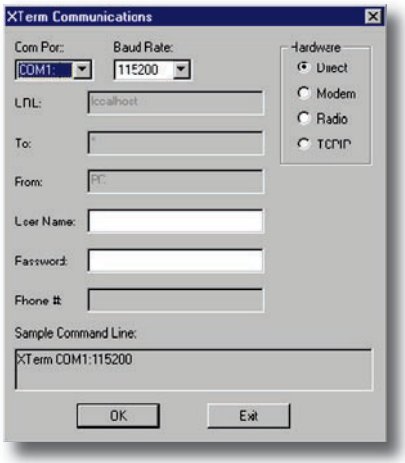


Applications

- √ Automatic Weather Station
- √ Agricultural/AgMet Station
- √ Synoptic Weather Stations
- √ AWOS Stations
- √ Tidal Stations
- √ Hydromet Stations
- √ Fire Weather Station
- √ Water Level Station
- √ Water Level/Rainfall Station
- √ Gate Control Station
- √ Water Distribution Control Station
- √ Stream Gauging
- √ Irrigation Control Station
- √ Your Application!

Sutron's XTerm communications program allows *any* PC to *remotely* setup and operate an Xpert or XLite - without using a front panel.

No special installation is needed for XTerm. Simply copy it to any folder on your PC. When you run XTerm, you will see this screen:



Use the controls on the screen to select the com port, baud rate, type of hardware (direct, modem, radio, TCP/IP) and related values. Then select OK and Xterm will begin operation with the type of communications you have selected.

Features

- √ Remote operation of XPert or XLite
- √ Automatically displays the graphic display of the XPert or XLite
- √ Sends mouse clicks to the XPert or XLite as if you were pressing the touch screen
- √ Easy file transfer to allow uploading and downloading of setups, programs, and data files
- √ Set the clock of the XPert or XLite with a single button
- √ Export logged recordings to your PC
- √ Communicate to an XPert or XLite via RS232 com ports 1-9 at up to 115200 baud.
- √ Supports Direct Connect, Hayes (TM) style Modems, and Keyed Half Duplex Radio Systems
- √ Communicate to an XPert or XLite via a TCP/IP network.
- √ Communicate over the internet by using XTerm as a proxy
- √ Automatically prompts for login account and password when needed.
- √ Display system information regarding running processes, threads, and memory usage

Anywhere to Everywhere Xonnect

SUTRON

XCONNECT SOFTWARE 9300-0000

REAL-TIME DATA FROM THE FIELD TO YOUR DESKTOP

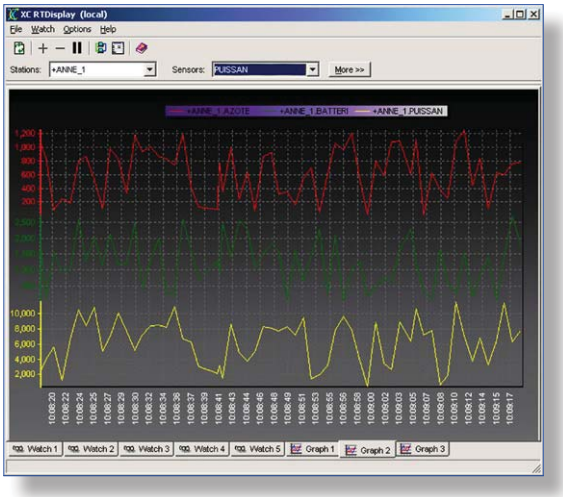
SUTRON

TURN-KEY SOLUTIONS FOR TODAY'S & TOMORROW'S APPLICATIONS

- Data collection, data processing, data validation & data storage with multiple options
- Running Windows®, it handles any & all RTU communications - simple to satellite - with instant desktop supervisory control (SCADA) & data access.
- Unlimited Reporting Products & Alarms including data view, graphs, trending, diagnostics, etc.
- Easy implementation & integration of future applications & existing system upgrades without the need for consulting dependency.

Solidly built on cutting edge relational database architecture, XConnect puts data at your fingertips & provides the most powerful open system available for data collection, data processing & data storage.

For 30 years Sutron has specialized in collecting & delivering remote data in your specified format because it's not real-time if you have to wait to use it.



XConnect Real-Time Trend Display

FEATURES

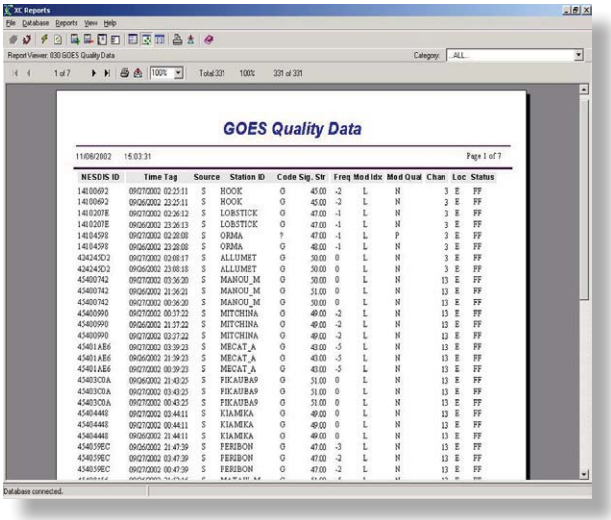
- Customer-designed hydro-met data collection at a fraction of the cost of in-house or alternative solutions. You save critical capital upfront & reduce support & expansion costs.
- Automated communications from PC server to all RTUs, no matter how remote
- Flexible & scalable relational database with multiple storage formats: PCBase2 Binary files, ODBC (Oracle®, Microsoft® Access), ASCII day files, and Microsoft® Excel, XML
- Unlimited Reporting Products & Alarms including graphs, trending, diagnostics, etc.
- Real-time error detection flags - supports multiple alarm detection thresholds plus "no change" checks (e-mail & paging notification available)
- Real-time data processing (including table lookups) prior to data storage

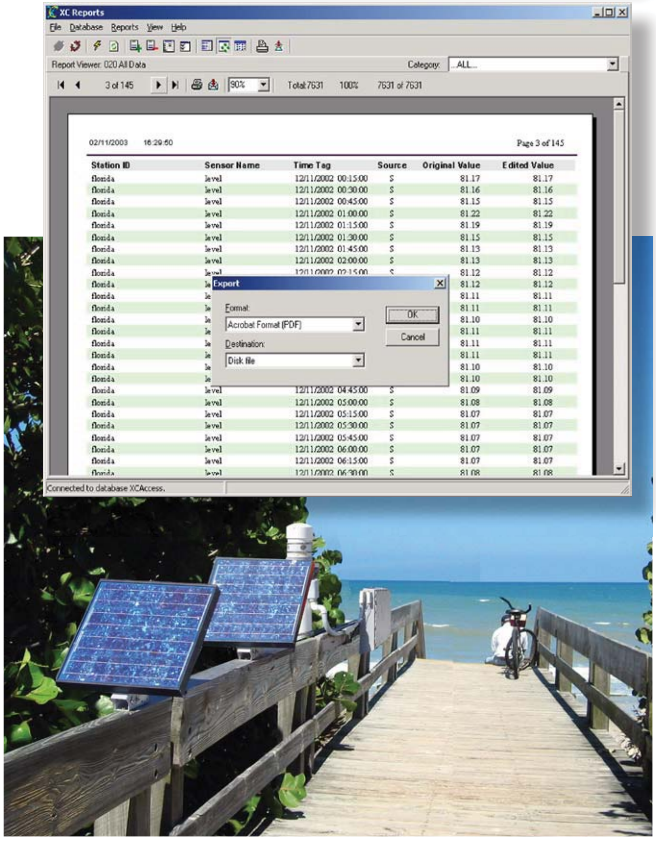
Anywhere to Everywhere Xonnect

SUTRON

USE XCONNECT TO ACHIEVE GREATER EFFICIENCY, ENHANCED ACCURACY, REDUCED COST & TECHNOLOGICAL ADVANTAGE

For 30 years Sutron has specialized in collecting & delivering remote data in <u>your specified format</u> because it's not real-time if you have to wait to use it.





FEATURES CONT'D

- Communications diagnostics tools.
- Instant Implementation reduces connection time & expense & immediate improvement of data flow process
- Runs on any Windows® device with no additional configuration
- Unlimited Expandability
- Demonstrated project success
- Quality Flags - Supports 2 alarm detection thresholds plus "no change" checks.
- Flexible Time Tags - can be set to the second.
- Communicates with entire family of Sutron RTUs using Sutron Standard Protocol. Optional historical data tables for post-processing, automated calculation & statistics storage - MIN, MAX, SUM, MEAN...
- Communications diagnostics tools
- Optional satellite message decoder module & utilities.
- Runs under Windows® - key modules implemented as automation servers w/future transition to Windows® services
- COM servers allow 3rd party software link to data in real-time. XConnect modules implemented as automation servers for exchange of methods & data among popular programs & development environments. DDE protocol maintained.
- All modules have intuitive GUIs & help files.
- XC Reports comes with a library of pre-defined time series & maintenance reports.
- Easily add reports of user's own design to XConnect Reports Library.
- Continued field & software support, maintenance, & technology advances long after the solution is launched with basic maintenance contract.

Anywhere to Everywhere Xonnect

SUTRON

KEEP AHEAD OF THE ELEMENTS & APACE WITH TODAY'S RAPIDLY CHANGING TECHNOLOGY - XCONNECT MAINTENANCE PLAN

SYSTEM FUNCTIONS

- Setup of stations, sensors, data groups
- Polling schedule (radio, phone systems)
- Real-time processing setup (tables, equations)
- Communications parameters
- Real-time status of data collection
- Interactive tools to aid in sensor configuration
- Interactive Graphics
- Access to database station and sensor characteristics
- Standard Reports (hour, day, week, month, year)
- Post processing setup (optional)
- GOES decoding (optional)
- Data export (optional)

XCONNECT PRODUCT PACKAGES

XCONNECT STANDARD

XConnect Standard represents the baseline XConnect package for a conventional hydro-met system. A conventional system is one that uses telephones, radios, or direct connect cable communications. Conventional systems are two-way systems wherein XConnect sends a data request to the datalogger and the datalogger replies.

Programs Included	Data Storage Options
XC Desktop	PCBase2
XC Setup	Binary Files
XC Rtu	ASCII Log Files
XC RTDisplay	Excel Files
XC Dataview	XML Fi

XConnect Standard **#9300-0000-1**

XCONNECT STANDARD WITH DATABASE

XConnect Standard with Database includes all of XConnect Standard and expands the data storage options to include databases (Oracle® and MS Access®). Additional modules are included to assist the user in viewing and manipulating the data.

Programs Included	Data Storage Options
XC Desktop	PCBase2
XC Setup	Binary Files
XC Rtu	ASCII Log Files
XC RTDisplay	Excel Files
XC DataView	XML Files
XC Reports	Oracle®
XC PostProc	MS Access®
XC Calc	

XConnect Standard with Database **#9300-0000-2**

Anywhere to Everywhere Xonnect

SUTRON

XCONNECT SATELLITE

XConnect Satellite is designed for systems that use satellite communications (SatLink Transmitter or other GOES Satellite transmitter). Currently satellite systems are only one-way systems in which XConnect communicates with a digital direct readout ground station (DDRGS)/receive site multiplexor to receive satellite messages.

Programs Included	Data Storage Options
XC Desktop	PCBase2
XC Setup	Binary Files
XC Mux	ASCII Log Files
XC Decode	Excel Files
XC Daps	XML Files
XC RTDisplay	
XC DataView	

XConnect Satellite **#9300-0001-1**

XCONNECT SATELLITE WITH DATABASE

XConnect Satellite with Database includes all programs and data storage options included in XConnect Satellite and expands the data storage options to include databases (Oracle® and MS Access®). Additional modules are included to assist the user in viewing and manipulating the data.

Programs Included	Data Storage Options
XC Desktop	PCBase2
XC Setup	Binary Files
XC Mux	ASCII Log Files
XC Decode	Excel Files
XC Daps	XML Files
XC RTDisplay	Oracle®
XC DataView	MS Access®
XC Reports	
XC PostProc	
XC Calc	

XConnect Satellite with Database **#9300-0001-2**

XCONNECT TOOLKIT

XConnect Toolkit includes add-on utilities.

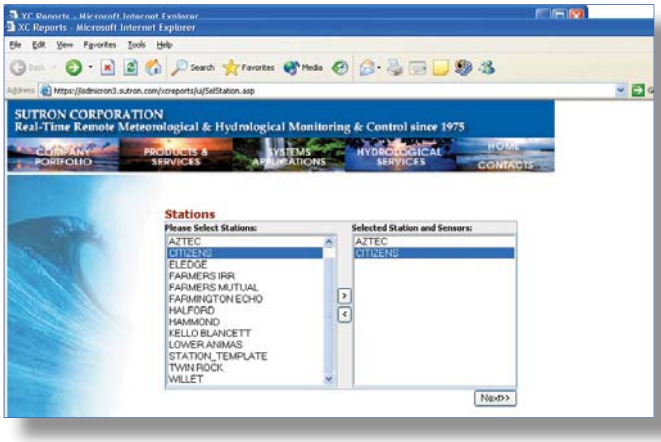
Utilities Included
- XC Export
- XC Alarm

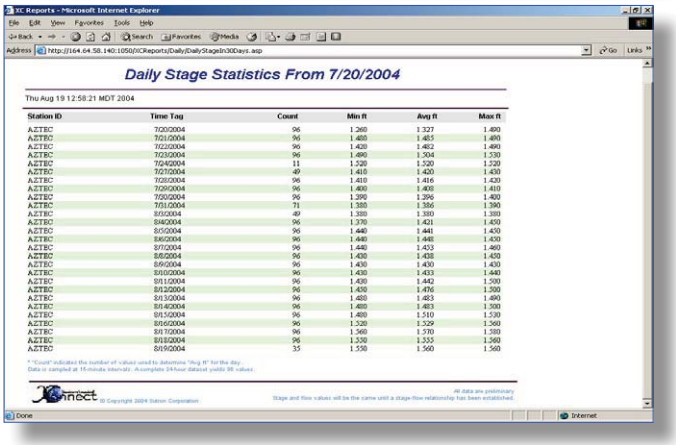
XConnect Toolkit **#9300-0002-1**

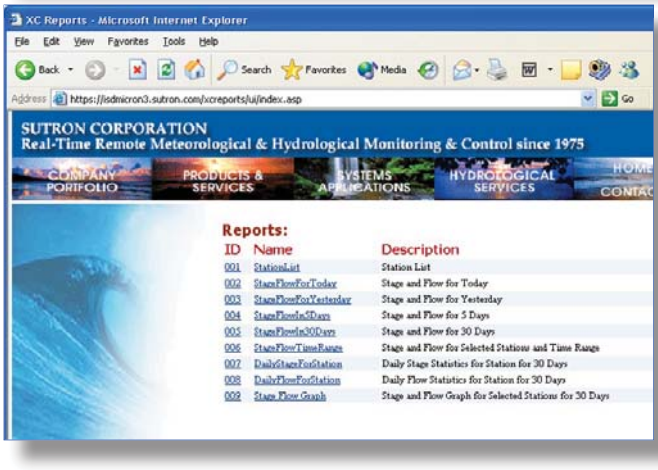
XCONNECT DATA HOSTING

Not ready to implement a data collection network on your own?

Sutron can collect, decode, archive and deliver your data to you or post to the web; or install and operate your data collection network.



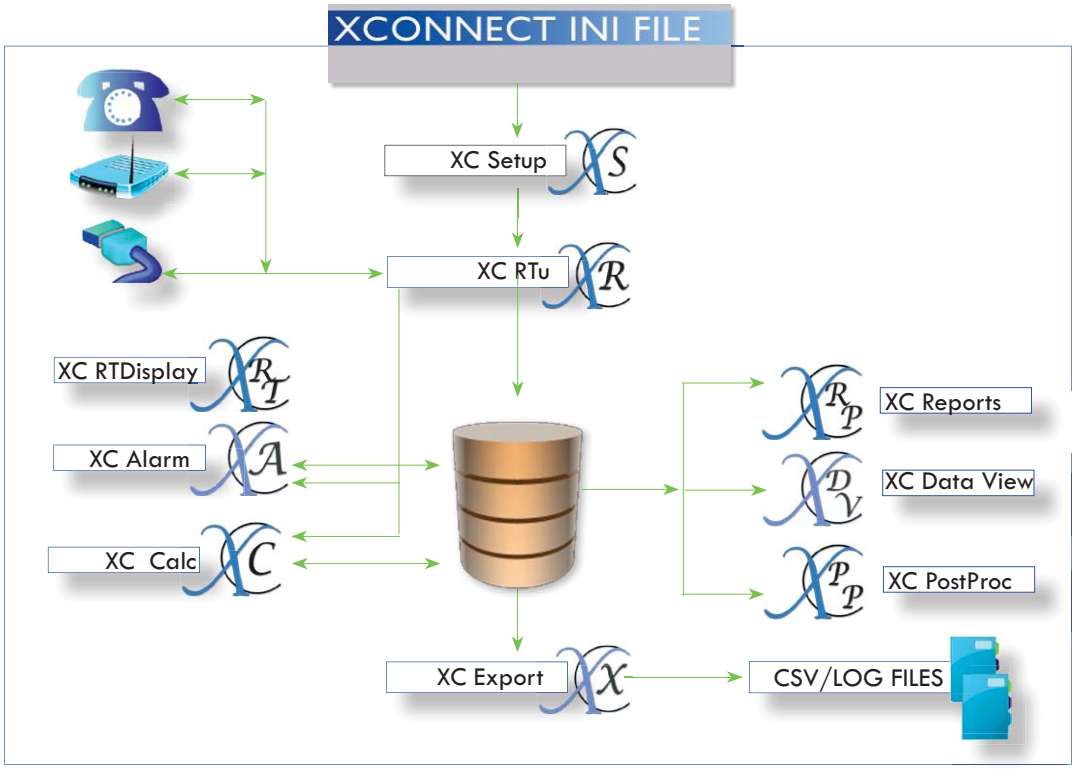




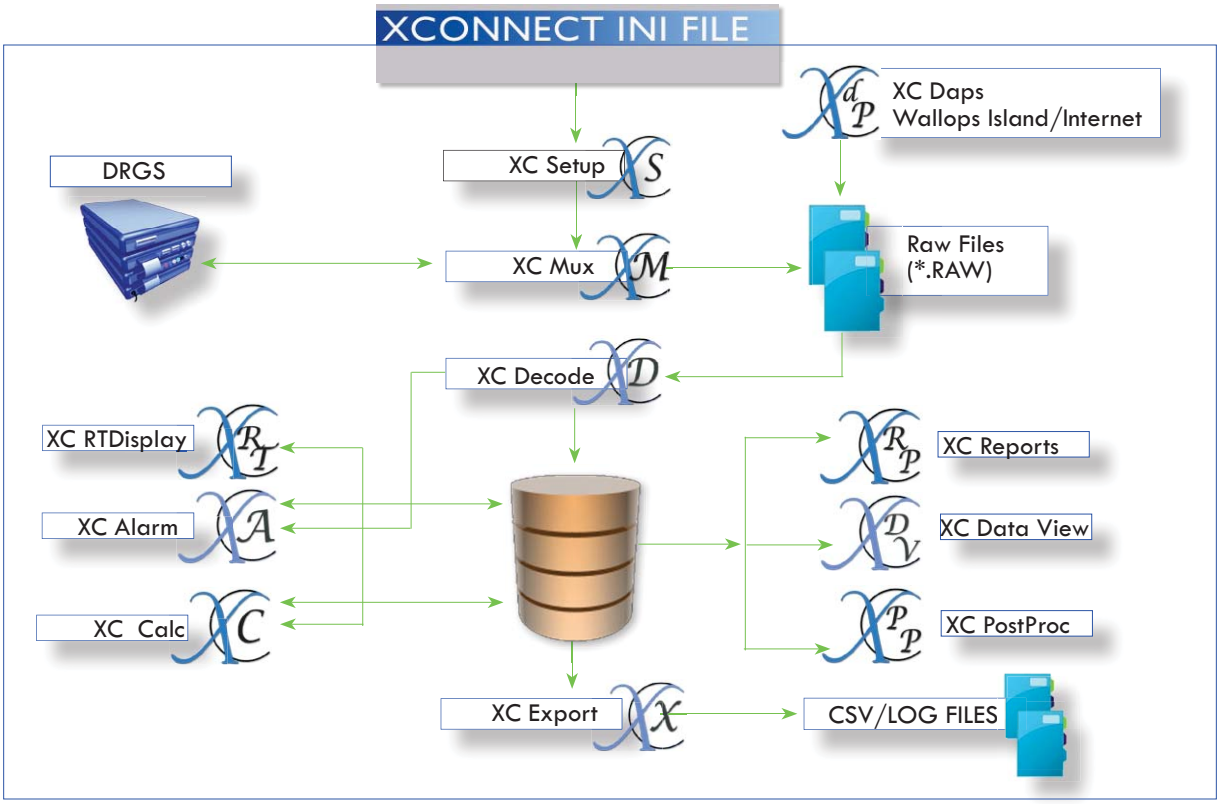
XCONNECT SOFTWARE
9300-0000 DCP to Desktop

SUTRON

DATAFLOW FOR CONVENTIONAL SYSTEMS



DATAFLOW FOR SATELLITE SYSTEMS



SUTRON/ILEX SATELLITE DATA ACQUISITION PRODUCTS

SUTRON

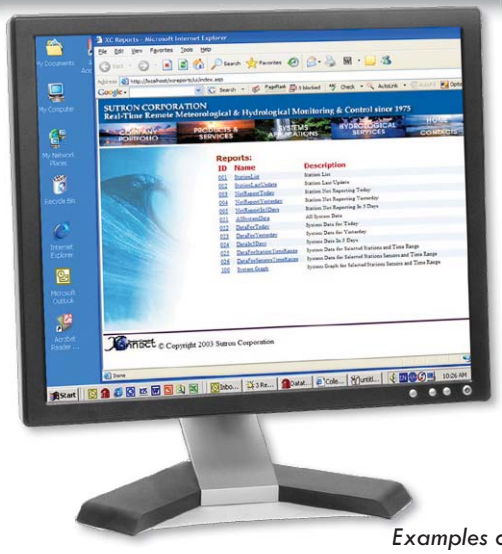
No Matter What Your Format or Platform, Sutron Provides Every Component for Advanced Real-Time Solutions from the Field through Data Processing & Storage.

NO ONE OFFERS MORE WAYS TO COLLECT, STORE & PROCESS YOUR GOES SATELLITE DATA.

In 2008 Sutron acquired ILEX Engineering, bringing our customers true next-generation solutions to data handling problems & expanding our GOES Satellite data capabilities exponentially.

The ILEX Product Family includes Data Collection System (DCS) Products for DOMSAT, DRGS, NOAAPORT & LRIT Systems. ILEX Data Collection Software is also a perfect complement to Sutron's XConnect Software.

SATLINK	XCONNECT
TEMPEST	GOES WEB
GOES DRGS	LRGS
NOAAPORT	DOMSAT
LRIT	DCS TOOLKIT
SOLARIS	LINUX
WINDOWS	IRIDIUM



Examples of Web Screens

Hoskin Scientific Ltd
Vancouver: 604-872-7894 Burlington: 905-333-5510 Montreal: 514-735-5267

ILEX GOES WEB DATA SERVICES

DESIGNED FOR GOES DCS USERS WHO DO NOT WANT TO MANAGE THEIR OWN GROUND SYSTEMS

Through the GOES Web Service, ILEX will collect your DCP data and deliver it to you via the web. We can deliver raw data (as it is transmitted by the platform), or we can decode it for you into engineering units.

DECODER

- Our decoder can present the data in a wide variety of commonly used formats such as SHEF, Kisters ZRXP, Comma-Separated Value (CSV), Excel, USGS STDMSG, HTML, XML, Pi Historian, and several others.
- Our decoder can handle any DCP currently using the GOES DCS. It extracts time series data and converts it to engineering units using conversion coefficients that you provide.

We will provide a web URL for you to retrieve your data and to view it graphically in plots, tables, or Excel spreadsheets. Your data will be available immediately after it is received over the satellite link.

You simply need to download the data from a preset URL. No special software is required on your computers.

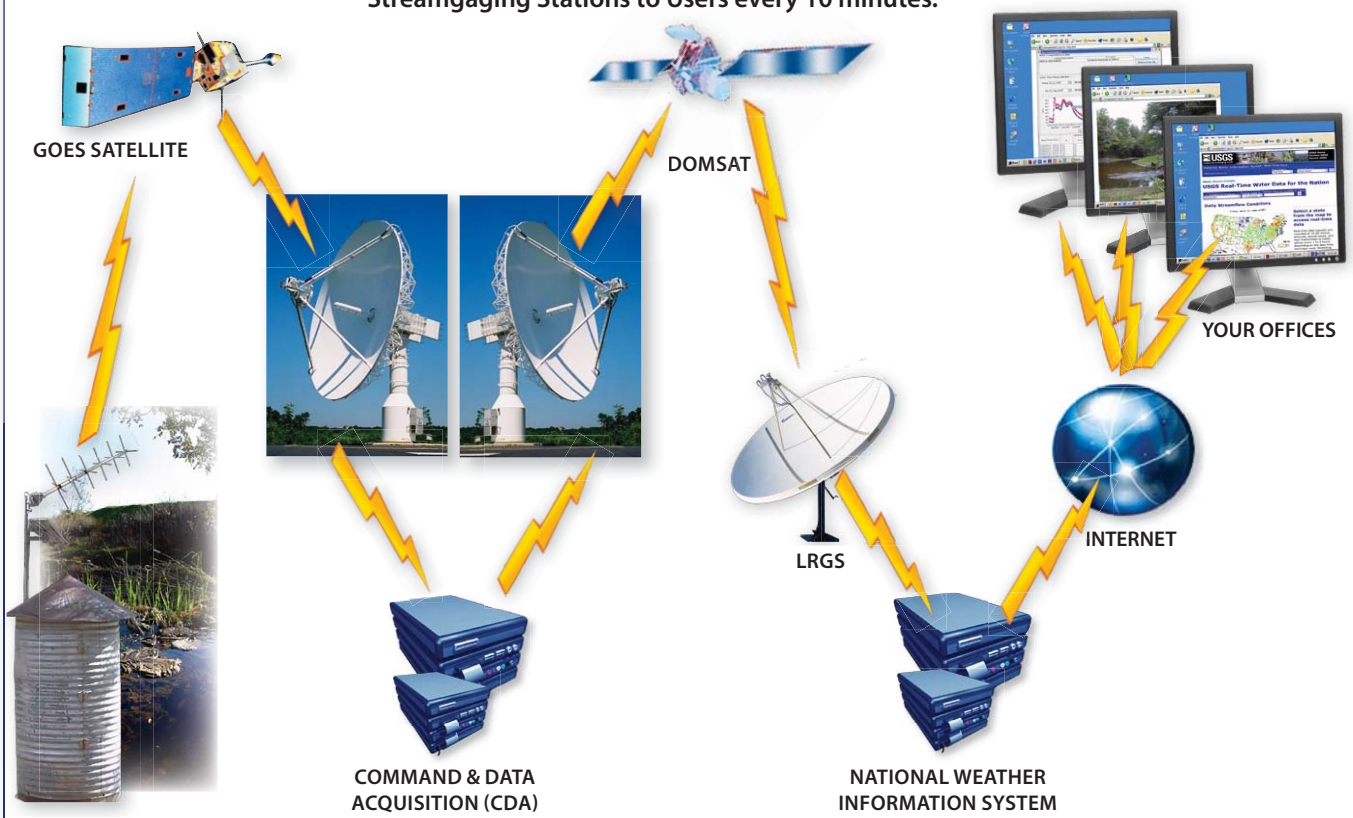
We can also provide derived parameters such as periodic averages, stage-to-flow ratings, etc. We can limit check each parameter and provide notification to you via email when a parameter goes out of limits.

We charge a low annual or monthly fee per-platform.

You provide us with the Platform address and a description of the sensors.

Coming Soon: Web Control Panel - We will provide you with your own web-page where you can log in and customize all of the delivery parameters for the service

USGS's* National Water Information System (NWIS) uses the Sutron ILEX GOES/ DOMSAT System illustrated in this diagram to pass real-time river data from Streamgaging Stations to Users every 10 minutes.



*Sutron's ILEX Division Designed & Implemented DECODES for NOAA, USGS, & USACE DCPs.

ILEX GOES RECEIVERS

Advanced Data Solutions on Linux™, Windows™® or Solaris™

LRGS-DOMSAT LRIT DRGS LRGS-INTERNET NOAAPORT DAPS

TEMPEST™ LOCAL READOUT GROUND STATION (LRGS) RECEIVERS

provide six separate ways to access GOES information:

6 OPTIONS FOR ACCESSING GOES DATA ILEX'S TEMPEST™ LOCAL READOUT GROUND STATION (LRGS) RECEIVERS					
	DOMSAT Receiver	**LRIT Receiver**	**GOES Receiver**	**Internet Receiver**	**NOAAPORT Receiver**
Transmission Delay	A few seconds	Less than a minute	Immediate	A few seconds	A few minutes
Geographic Coverage	Continental U.S.	Western Hemisphere	Western Hemisphere	The World	Continental U.S.
GOES Channel Coverage	All Channels	All Channels	Purchase demodulators / each channel	All Channels	Limited to DCPs Observed by NWS
Relies on NOAA Wallops CDA?	Yes	Yes	No	Depends on Source Server	Yes
DDS Support	Client/Server	Client/Server	Client/Server	Client/Server	Client/Server
Decoder Support	Yes	Yes	Yes	Yes	Yes
Computer Platform	Linux	Vendor's LRIT Platform	Runs Anywhere	Runs Anywhere	Vendor's NOAAPORT Platform

TEMPEST DATA COLLECTION SYSTEM (DCS) TOOLKIT

The DCS Toolkit is a suite of software that allows you to retrieve, decode, process & store DCP data from any of the following:

- Any LRGS Satellite Receiver (DOMSAT, GOES, NOAAPORT, LRIT)
- Data logger files collected manually, via modem or automated download.
- Iridium Short Burst Data Interface
- Data available via web (data mining via web)
- Custom interfaces

The Toolkit is 100% Java and will run on any modern OS. It provides a low-cost, reliable means of acquiring DCS data in near real-time.

The **DECODES MODULE** included with the DCS Toolkit is a universal converter for DCP data.

- It can extract time-tagged engineering-unit samples from any DCP.
- It also handles fixed format or delimited data equally well.
- It presents data in SHEF, SHEFIT, Human-Readable, EMIT-ASCII and other formats.
- It is written in 100% pure Java so it will run on any modern computing platform.

No one offers more ways to collect, store, & process your GOES Satellite Data. True next-generation solutions to data handling problems & expanding our GOES Satellite data capabilities exponentially.

ILEX DCS TOOLKIT

TEMPEST DATA COLLECTION SYSTEM

The DCS Toolkit is a suite of software that allows you to retrieve, decode, process & store DCP data from any of the following:

- Any LRGS Satellite Receiver (DOMSAT, GOES, NOAAPORT, LRIT)
- Data logger files collected manually, via modem or automated download.
- Iridium Short Burst Data Interface
- Data available via web (data mining via web)
- Custom interfaces

The Toolkit is 100% Java and will run on any modern OS (Solaris, Linux, Windows, AIX.). It provides a low-cost, reliable means of acquiring DCS data in near real-time. Moreover, it can work in real-time or in periodic batches on a schedule you set.

DataSource	DOMSAT, GOES, LRIT, NOAAPORT, Internet, File, Etc.
Decode	Extract Samples, Time Tag, Convert to EU
Compute	Computation Model, Stage - Flow, Elev - Volume, etc.
Presentation	Rounding, Unit Conversions, Etc.
Formatting	SHEF, CSV, Human Readable, XML, USGS-STD,et al
Output	File, Directory, Socket, Pipe, GUI, Etc.
Time Series Database	Oracle, DSS, MySQL, RiverWare, Custom

The figure at the right shows a typical application of the toolkit. The toolkit is implemented as a set of pluggable modules for maximum flexibility. It is designed to conform to the way you work rather than the other way around.

The Toolkit can pull data from your own satellite receiver, or from the public servers operated by NOAA in Wallops, VA.

The Toolkit can save raw or decoded data into local files on your machine, or you can pipe the data into your own programs in real-time. You can run the toolkit interactively, or in the background using the built-in scheduler module.

See our separate specification sheets on the LRGS and the Tempest DCS Analysis Module.

FEATURES

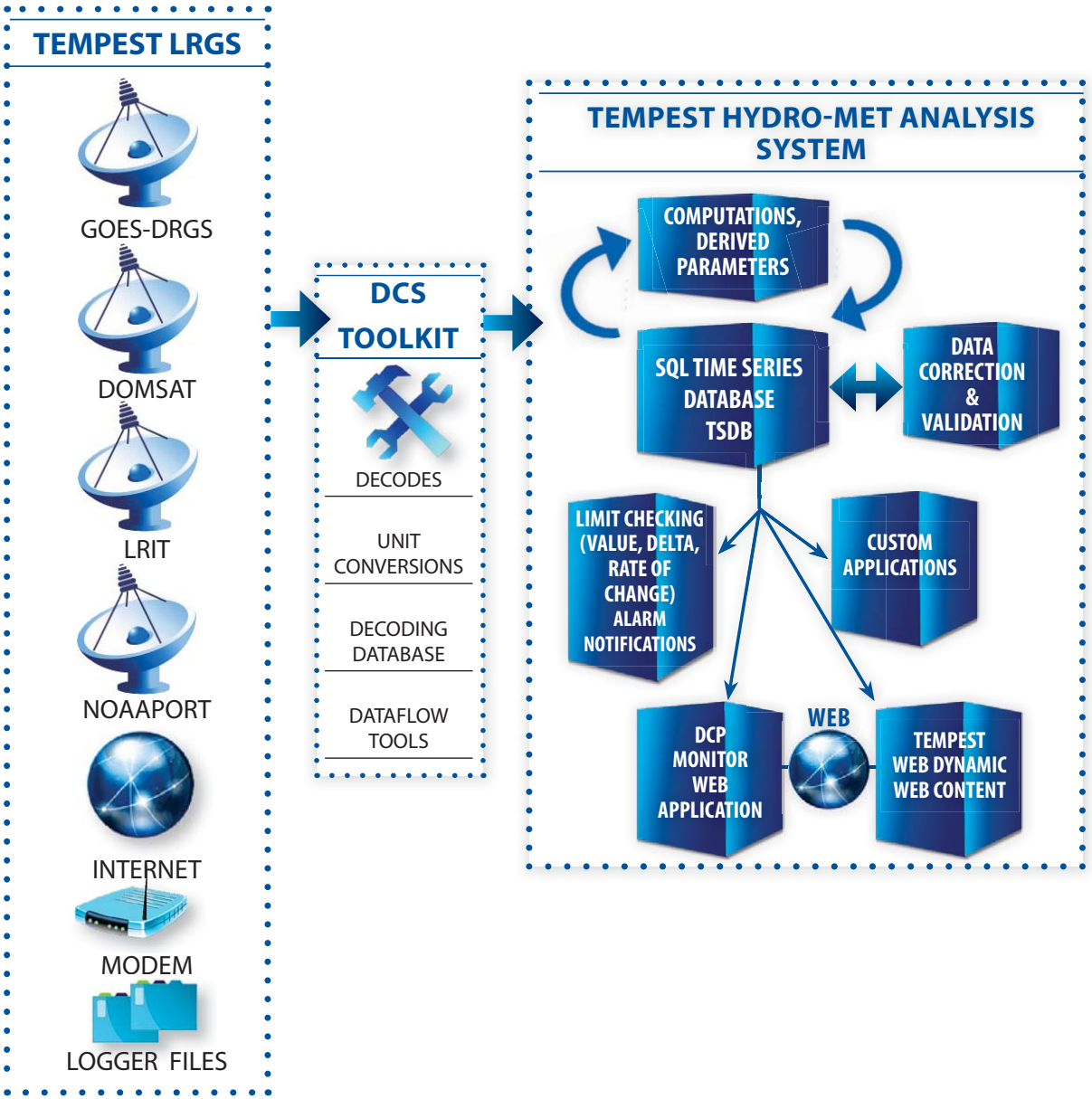
- Retrieve DCP data from wide variety of sources.
- Run in real-time, interactively, or in periodic batches.
- Easy-to-use scheduler will automatically run your retrieval processes at set times of the day.
- Receive data from a list of servers, automatically switching to a backup server in case of failures.
- Select DCP messages by combination of time range, network list, DCP name, DCP address, GOES channel, or data source.
- Command-line interface to run toolkit components from within your own scripts.
- GUI to monitor real-time status of LRGS servers, and to select most reliable data source.
- Data can be retrieved in real-time from any Tempest Receive system (DOMSAT, LRIT, GOES, Internet) or from pre-stored files.
- Supports a variety of output formats including SHEF, Human-Readable, EMIT-ASCII, XML, STDFMT, Transmit-Monitor, and CSV table.
- Network browser for interactively retrieving and decoding DCP message data.
- Converts data into standard engineering units. Standard English-Metric conversions built-in.
- Uses a database of DCP specifications stored either in a SQL database or XML files.
- Software designed to be easily expandable by adding custom classes, algorithms, etc.
- Direct Support for USGS 'RDB' Rating Tables.

ILEX HYDRO-MET ANALYSIS SYSTEM

The ILEX Tempest ™ Hydro-Met Analysis System provides a suite of tools for retrieving, storing, validating, analyzing, and displaying hydro-meteorological data.

The figure below shows how the members of the Tempest family fit together: Use an LRGS System to retrieve raw DCP Data. Data is collected from several possible satellite, radio, internet or file links. Then use the DCS Toolkit decoder to convert raw data to time-tagged engineering units. Finally use the Tempest™ Hydro-Met Analysis System to perform all of the tasks shown at the right of the figure:

- Efficiently store your decoded data in a standards-based SQL database,
- View & correct the data graphically using several automated tools,
- Perform automated computations, limit-checking, and alarm notification,
- Generate web-content for your analysts and for public release,
- Export data to your custom applications.



AUTOPOLL 8204-1096

AutoPoll is Sutron software used to schedule periodic downloads of data and/or to collect data-on-demand from multiple Sutron hydro-met station loggers and logging sensors, including the following:

- Xpert
- XLite
- Monitor
- DitchMaster
- Stage Discharge Recorder
- Stage Discharge Recorder for Ground Water
- Radar Level Recorder
- Constant Flow Bubbler

FEATURES

- Schedule periodic downloads of data from multiple DCPs.
- Collect data-on-demand from multiple DCPs
- Download to CSV files
- View data with any text editor (i.e., Notepad)
- Import data to MS Excel spreadsheet
- Works with Xpert, XLite, Monitor, Stage Discharge Recorder, DitchMaster, Radar Level Recorder, & the Constant Flow Bubbler.
- Transfer setups to & from DCPs
- Synchronize time between device and PC
- Communications: Direct Connect, Modem, Cell Modem, TCP/IP Virtual Com Port
- Protocols: SCP, Modbus, Command Line
- Runs on your PC

AutoPoll runs for 30 days unlicensed. Please contact Sutron Sales Administration (703)406-2800 or your regional Sales Manager to make arrangements for a license.

Real-Time Web Hosting, Data Processing, Delivery, Storage & Alarms!

SutronWIN Web Hosting
Water/Weather Information Network

- *Real-Time Web Service for Hydro-Meteorological Data Collection & Dissemination*
- *Direct Data, Warnings & Control via the Web, in Any Format You Want, Ready to Use*
- *Reliable Data On-Demand, Event-Triggered & Scheduled via SMS, EMAIL or ON-LINE*

Telemetry Types

Satellite Stations

- IRIDIUM® SATELLITE STATIONS
- Sutron is the only IRIDIUM Value Added Reseller (VAR) in the remote environmental data collection industry.
- Sutron designed, developed & manufactures its own IRIDIUM® Modem for SBD Data Communications.

All Geostationary Satellite Stations

- Stations communicating with satellites all over the world including GOES, METEOSAT, INSAT, ARGOS, etc.
- Real-Time Communications Expertise is Sutron's #1 Strength.

GSM/GPRS Stations, PSTN/Modem Stations, All LOS Radio Modem Stations

All Hydro-Met Applications & Stations Existing, Upgraded or New Systems

- Any application where **data from multiple sources** needs to be **seamlessly distributed to many users** without interruption.
- Monitoring, Warning & Control Systems
- **All Satellite Transmitter Data Decoded** from **Any Manufacturer** including Campbell Scientific, Design Analysis & Associates, YSI, Forest Technology Service, OTT, Stevens.

SutronWIN Is Designed For...

- Users who need a back-up server (not located in their geographical area), back-up data & back-up alarms
- Large System Users
- Small Monitoring Systems Users who don't want the hassle odata-collection, storage, decoding, analysis, etc.
- Any Users who want Sutron to simplify their data collection (which is complicated, expensive & time consuming)
- Users who want a complete, turn-key, end-to-end solution.

Advantages

- Hosted by Sutron
- No capital investments for the Central Station
- Minimal monthly recurring costs
- No maintenance costs or upgrades costs
- No resources required for customers
- No special resources (DBA, software engineers., etc)

SutronWIN: *Water/Weather Information Network*

SutronWIN - How It Works

We collect data from your Hydro-Met Station(s), *from Existing, Upgraded & New Systems,* by Satellite, GSM/GPRS, Radio, Modem, Cellular, etc.

1.

We process the data according to your specifications & decode it into time-tagged engineering units.

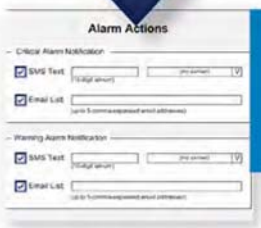
2.

We store the data for 6 months * in our SQL database. And, we perform automatic computing of derived parameters & automatic limit checking.

3.

SutronWIN Servers

*up to 10 yrs. for an additional cost



Then we deliver. We provide a secure web-page to view your data graphically, on a map or in tabular form.

4.

And, links to download data in any format: SHEF, A/E, Kisters ZRXP, CSV/TSV, Excel, Hydstra, USGS STDMSG, HTML, XML, Pi Historian, & many others.

5.

Limit Checking, Alarm Notifications, Voice & Data Messages, E-Mail, SMS, Web Cam Images, Tabular Data, Graphs, Station Maps, Derived Parameters, History, Diagnostics

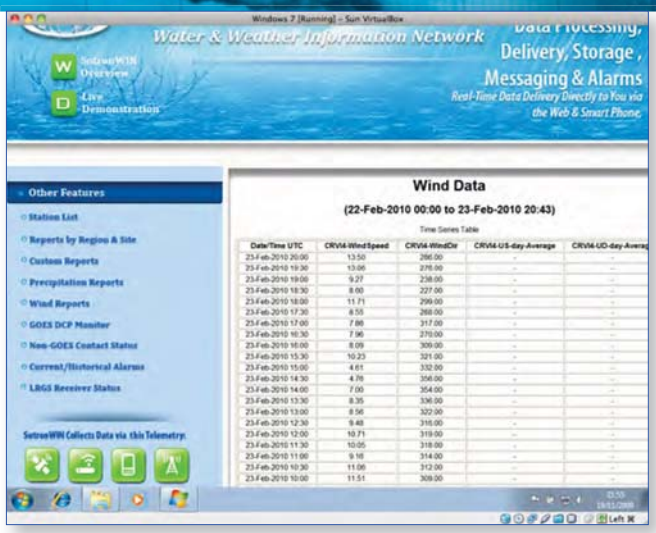
Your messages, data, reports & alarms are delivered to your Desktop, Laptop, Smart Phone, Cell Phone, etc. Data is also available on demand by anyone you authorize, anywhere at all.

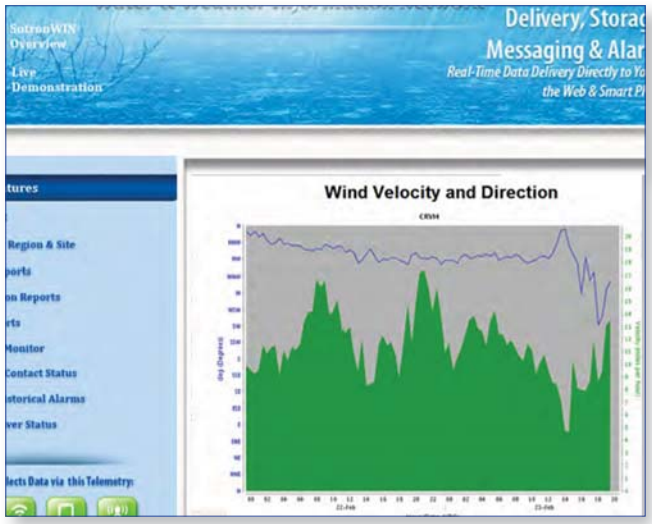
6.

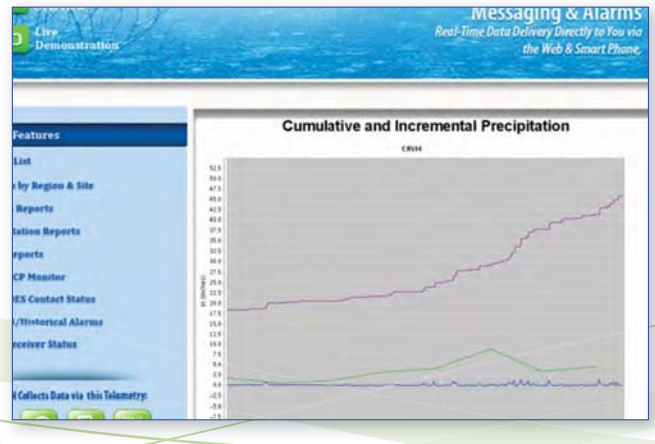
* *We will also deliver raw data as it is transmitted by the station if you prefer to process your own data. We will provide a secure download page which is updated immediately as your data arrives.*

Real-Time Web Hosting, Data Processing, Delivery, Storage & Alarms!

SutronWIN Web Hosting
Water/Weather Information Network







WHAT'S INCLUDED

- We provide all Receive Site & Server Hardware.
- We activate the modems & satellite equipment. Activation of communications can be a big problem for most users.
- We distribute real-time data seamlessly to PCs, iPhones, Blackberries, etc.
- We will develop a custom web page just for your data on SutronWIN or match your current web page styles, banner, etc. to fit into your own site.
- We provide a Google map or static map showing all your station sites.
- We automatically perform limit checking for all your monitored parameters & derived parameters to determine if any alarms or warnings need to be issued based on your designated limits.
- SutronWIN will automatically generate alarms when your limits are triggered. Additionally, your authorized staff can generate alarms to be sent to designated personnel on demand.
- Automatic alarms can be sent via voice messages, email messages & SMS.
- In maintenance mode, raw data messages can be sent to your cell phone, etc.

9400-0400	SutornWIN Client Set Up (one-time fee for new Web User Account)TBA		
9400-0401	Custom Starter Page (optional)		
9400-0402	SutronWIN Station Set Up (one-time fee per new station)		
9400-0403	SutrinWIN Per Station Annual Fee for first 10 Stations		
9400-0404	SutronWIN Service Discounted Recurring Fee for Stations 11-20		
9400-0405	SutronWIN Service Discounted Recurring Fee for Stations 21-30		
9400-0406	SutronWIN Service Discounted Recurring Fee for Stations 31-50		

Prices & Specifications Subject to Change without Notice.

Real-Time Web Hosting, Data Processing, Delivery, Storage & Alarms!

SutronWIN Web Hosting
Water/Weather Information Network

FEATURES

- DERIVED PARAMETERS: Combine parameters (e.g. add with coefficients), USGS Stage/Flow Rating Calculation, Periodic Averages, Incremental Precip, Sum, Min/Max, etc.
- LIMIT CHECKING: Value and rate-of-change limits. Separate limits can be set for warning/critical levels.
- ALARM NOTIFICATION: via web
- ALARM NOTIFICIATION IS ALSO AVAILABLE VIA EMAIL AND SMS Text message for an additional cost.
- VOICE: Standard & User-Customized (additional cost)
- PRICING: AFFORDABLE. Whether you receive data from a single station or hundred, we charge a one-time setup fee and then a low recurring fee per station. Some services such as GPRS or Iridium may also incur nominal costs from the service provider. Please ask for a customized quotation.
- Sutron also provides BACKUP ON-LINE DATA COLLECTION, STORAGE AND ANALYSIS at NO ADDITIONAL COST.
- Sutron can provide ON-LINE WEB-HOSTING through the new SutronWIN web site., WWW.SUTRONWIN.COM. Data is available via a web interface as shown here or your own customized web pages using your own logo, etc.
- STORAGE: GOES data is stored on the NESDIS server for 72 hours. However, using Sutron's ILEX Tempest LRGS and Sutron's own local ground station, we receive ALL GOES DATA TRANSMITTED. Therefore, we can store all GOES data, in addition to your station data, and keep it available as long as specified.
- Secure password protected log-in
- Real-time data access from anywhere in the world
- GOOGLE map that shows the location of each Hydro-Met Station
- Dynamic bubble that shows current data, date and time when clicked & changes from GREEN to RED or YELLOW based on RECEIVED ALERTS.
- Data downloads & reports in tabular or graphical format
- Demo Site: **http://www.sutronwin.com/htm**
- Great back-up for Critical Gage Alarm Notification for Federal/State Govt.
- We store data for up to a year (minimum 90 days.) NESDIS stores raw messages for only 72 hours.

We've solved the dilemma of retrieving data from many different station interfaces. And, we've mastered data & control directly to you via SMS, the web , email, etc. - any format you want, ready to use.

SUTRON-HOSTED SYSTEM ON SUTRONWIN.COM	
One Time User Account Fee	
Set-Up Fee for 10 Stations	
Annual Hosting Fee ($3650 only after the first year which includes One Time User Fee & Set-Up Fees)	
1st YEAR APPROX. START-UP TOTAL	
2nd Year Onward Annual Fee (Communications service costs are extra, i.e., monthly cell phone provider expense.)	
CUSTOMER-HOSTED SYSTEM	
Hardware & Software Acquisition Costs PC, Server, Database, Sutron's Data Collection Software	
Training	
Custom Development, Reports, Labor	
Partial Yearly AMC Costs for Labor	
Annual Agreements (AMCs) with Harware & Software Vendors	
APPROX. START UP COSTS for CUSTOMER-HOSTED SYSTEM	

Hoskin Scientific Limited has been supplying testing and monitoring instruments since 1946. Although our range is broad, we focus on three major markets including:

Geotechnical & Materials Testing
Environmental Monitoring
Test & Measurement Instrumentation

Hoskin Scientific operates out of three offices within Canada:

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Burnaby, BC V5C 4E7
Phone (604) 872-7894
Fax (604) 872-0281
email salesv@Hoskin.ca

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Burlington, ON L7L 5L6
Phone (905) 333-5510
Fax (905) 333-4976
email salesb@Hoskin.ca

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Montreal, PQ H4N 2E7
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Fax (514) 735-3454
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