Axiom Datalogger Technical Specifications

Hardware

Display/touchscreen:	• Graphical color touch screen display, 3.65” (diagonal), QVGA (320x240 pixels). • Display is transflective (readable in low light and outdoors in bright daylight) • Displays system status, configuration, stored data (graphical and tabular) and provides system configuration and troubleshooting diagnostics. • Displays voltage and current separately for battery and solar panel and battery temperature. • Supports troubleshooting, configuration and programming.
CPU:	• Two (2) CPUs total, both low-power RISC. • Main CPU is 200MHz 32-bit ARM.
Memory/storage:	• 64MB RAM • 256MB fixed physical, non-volatile flash memory for data and program storage. • Data is stored in a circular 10MB buffer (oldest data overwritten by newest when buffer full). • Based on NFDRS logging criteria, 7,575 days (about 20 years) of data can be stored.
Device ports:	• 2 waterproof USB 2.0 host ports, 1.5Mbps and 12 Mbps, support for flash memory and other USB-compliant devices. • 1 waterproof USB 2.0 12 Mbps device port with automatic PC detect. • Supports USB keyboard and mouse. • GOES RF output (for models with an integrated GOES transmitter): N-type jack • GPS RF input (for models with an integrated GOES transmitter): SMA jack

Sensor ports:	• Waterproof, color-coded, military-style connectors.
	• Dedicated ports (F6):
	  ◦ wind speed (frequency input)
	  ◦ wind direction (potentiometer input)
	  ◦ rain gauge (counter)
	  ◦ temperature & humidity (thermistor, 0-1.0V)
	  ◦ fuel stick (thermistor, 0-1.0V)
	• Dedicated ports (H2):
	  ◦ rain gauge (counter)
	• 2 (F6 and H1) or 4 (H2) independent SDI-12 V1.3 ports, expandable using external expansion modules to support up to 62 digital sensors.
	• SDI ports each support up to 500mA and are electrically isolated.
	• Optional, configurable analog-to-SDI expansion module (SDI-AM) to connect legacy analog sensors (terminal strips).

Serial ports:	• Either:
	  ◦ 2 ports factory configured as internal GOES transmitter and one external, waterproof, military style bayonet connector
	  ◦ 2 external, waterproof, military-style bayonet connectors
	  ◦ One external, waterproof, military style bayonet connector
	• Signal levels: RS232C
	• Signals: TXD, RXD, RTS, CTS, DCD, DTR, RI

Environmental sealing, size, weight:	• Waterproof to IP67, O-ring sealed, cast aluminum & stainless steel hardware, engineered resin bezel • Dimensions: 10” W x 8” H x 6” D • Weight: approx. 8 lbs.

Power supply:	• Internal, temperature compensated charge regulator • Waterproof, military style bayonet connectors for solar panel and battery. • Sensing of battery voltage, battery current, battery temp, solar voltage and solar current. • 9.6VDC to 20VDC operating voltage.

Software

Station identification:	The station's name, NESID and GOES data can be easily identified on the touchscreen display.
Programming:	• All programming done through intuitive graphical user interface (GUI) without writing code. • No laptop required; GUI accessed through integrated touchscreen. • Unlimited setup configurations are stored directly on the datalogger; different configurations can be selected or a new one created with the GUI.

Electronic service reports:	• All of the data recorded by field techs during a service call can be captured electronically in the Axiom and saved to a USB memory stick.
	• Data includes:
	  ◦ a list of sensor serial numbers before and after the service trip.
	  ◦ Audit log.
	  ◦ datalogger program version.
	  ◦ latitude, longitude, elevation.

Datalogger performance verification:	• Graph sensor data and diagnostic parameters. • Battery load tests; view voltage before and after (requires dummy load on battery). • View current sensor readings. • View historical data. • View GPS performance stats. • View forward and reflected power stats to check GOES antenna performance.
Rain count:	• Custom NFDRS rain GUI allows users to quickly test tipping buckets each year by viewing manual tip measurement in real-time and quickly removing the test tips from memory (F6). • User can select a rain reset date if desired and set the action on power failure (rain total can be set to return to previous values or reset to zero).
One-touch current conditions:	• Users can customize the Current Conditions screen so that all sensors' real-time data are viewable with one button press, extremely handy when validating wind quadrants or simply validating each sensor as it is replaced. • The electronic service report automatically captures the current conditions at the start (pre-swap) and after (post-swap).
Data transfer via USB memory stick:	• Data, Programs and Firmware updates can be transferred to and from datalogger via a conventional USB memory stick. • Historical data download is fast: approximately 5 seconds for 1 year of data including logger and telemetry records. • Data downloaded in universal .CSV (comma-separated values) format; importable into Excel and many other software.

GOES Transmitter (Optional)

Manufacturer:	• FTS
Supported baud rates:	• 100 bps • 300 bps • 1,200 bps
Operating supply voltage:	• 10.8 VDC to 16 VDC
Supply current (at 12VDC):	• Idle: <3 mA • Transmitting: <2.6 A • GPS ON: <50 mA

Output power:	**GOES** • 300 bps: 14W max • 1,200 bps: 14W max **METEOSAT** • 100 bps: 14 W max
EIRP:	• 40-45 dBm
Compatible antennas:	• Power: 14W Max • Polarization: Right hand circular • Connector: N-Type Female • **Recommended antenna:** FTS EON 2 with GPS
Frequency range:	**GOES** • 401.701 MHz – 402.09850 MHz **METEOSAT** • 402.0355 – 402.4345 MHz
Frequency stability:	• Initial accuracy +/- 20Hz synchronized to GPS • GPS Schedule: 1 fix at power up, 1 fix per day thereafter
Channel bandwidth	• 100 bps: 3KHz • 300 bps: 750 Hz • 1,200 bps: 1.5 KHz
Time-keeping:	• < 100 µsec initial accuracy, automatically synchronized to GPS • < 10 ms per day drift without GPS • 28 day operation without GPS signal (after initial GPS synchronization)

Interface Serial Ports

Command port:	• N/A
SDI-12 port:	• N/A

User Interaction

User interface:	• Always-present status indicator of GPS time, data received by transmitter, success of transmission. • Number of satellites in view, average signal strength and other GPS status information available.
Forced transmissions:	• User can select any channel and time to force a test GOES transmission.

Resolution, Accuracy and Stability

I/O accuracy (with optional SDI-AM Analog interface module):

Input ranges	Accuracy
5 V	± 1.5 mV
2.5 V	± 0.75 mV
1 V	± 0.3 mV
100 mV	± 0.1 mV
55 mV	± 0.055 mV
25 mV	± 0.0375 mV

Analog-to-digital resolution:	• 24 bits
Sampling rates:	• Sampling rates are user-defined and can be as frequent as 1 second. • Sampling can be done on a timed basis or conditionally. • Sampling can be increased whenever a specific condition is met, for example if relative humidity drops below a certain percent, logging frequency can increase to every 15 minutes. • Multiple sampling routines can be set and stored. • Special "burn day" function allows logging data every 5 minutes during prescribed burning for higher resolution data.

GPS (Models with GOES transmitter only):	• Internal 12-channel GPS receiver. • SMA connector for 3V active patch GPS antenna. • Periodic time synchronization to UTC. • Latitude, longitude, elevation to full GPS accuracy.

Environmental Protection

Operational moisture range:	• 0-100% RH, condensing
Operational temperature range:	• Display operation: -20°C to +60°C • Datalogger operation: -40°C to +60°C • Storage: -55°C to +70°C

Lightning protection:	• Three-stage protection circuit offers superior protection:
	  ◦ Stage 1: transient earth clamp.
	  ◦ Stage 2: series impedance.
	  ◦ Stage 3: high speed shunt diode.

UV resistance:	• Excellent, as minimal plastics are used. Cable housing and omnidirectional GOES antenna are UV-stable.
Electronics protection:	• Core electronics sealed from moisture and dust in waterproof housings, completely isolated from environment and user. • All non-telemetry data exchange (firmware upgrades, report downloads) performed through waterproof USB port. • Battery overcharge protection.
IP code rating:	• IP67

Power Consumption

Datalogger current:	• Idle: 2-3mA (no integrated GOES transmitter), 7-8mA (with integrated GOES transmitter) • Active (collecting data): 7.5mA (no integrated GOES transmitter), 12mA (with integrated GOES transmitter) • Touchscreen backlight on: 60mA • GOES transmit: 2.6A. • GPS on: <50mA
Power status:	• Datalogger measures and logs solar panel voltage, solar panel current, battery voltage, battery current and battery temperature. • Status indicators (always visible) allow techs to identify if the system is charging correctly or not. • This data is also part of the Current Conditions screen call and are captured in the electronic service report.