

M1000

The M1000 node instrument can conveniently and quickly form various networked seismic arrays, combined with active and passive source methods, to obtain massive data for high-density array spatiotemporal measurement (DAM).

Suitable for scientific research and enterprise survey needs in different scale regions.

Applications:

- Various long-term observation and research in the field (e.g. earthquakes, volcanoes, tsunamis, tides, glaciers, hydrology, Lakes, ecology, forests, meteorology, grasslands, deserts, drylands, ports, etc.)
- Observation and research on geological hazards (e.g. debris flow, landslide, rockfall, seabed geology)
- Structural health monitoring (e.g. bridges, tunnels, buildings)
- Environmental monitoring



SmartSolo M1000

New Generation Nodal Data Logger



Features

- New Generation Data Logger
- High resolution data with up to 1 ms sampling and 32-bit delta-sigma ADC
- Externally connected with various sensors
- Built-in GNSS module and disciplined clock
- Connect with other nodal instruments to realize intelligent monitoring of physical quantities in many fields
- Connect intelligent monitoring gateway or wireless transmission module, real-time data return
- The extreme cost-effective system on the market
- Light weight, small size
- Green indicates 'good', red light indicates 'bad'

Descriptions

The M1000 is the latest generation of intelligent networked node scientific instruments launched by SmartSolo Scientific, which can be used for comprehensive scientific data measurement. It has high-precision differential analog voltage measurement and single-ended analog voltage and current measurement interfaces, which can measure high-precision analog voltage and current signals at high sample rates, and RS485 and SDI-12 digital interfaces and can be connected to a variety of digital output sensors. It has a built-in GPS module that supports GPS, Beidou, and Glonass single-mode or dual-mode operations, and can realize positioning and time synchronization of multiple measurement systems. Its powerful measurement and sensor access capabilities, spatiotemporal synchronization, and extensive external communication access capabilities help scientists and technology innovators easily build scientific research-grade high-density field spatiotemporal monitoring systems.

Applications

- Geological survey
- Geothermal and water resources exploration
- Real-time earthquake warning
- Real-time environmental monitoring
- Structural health monitoring
- Landslide monitoring

Power Supply Capacity:

M1000 has no internal battery and requires an external power supply, which is suitable for short-term or long-term monitoring. SmartSolo has the ability to provide a variety of battery pack solar systems, and can also provide customized power solutions.

Positioning and Time Synchronization:

M1000 has a built-in GPS module, which support GPS, Beidou, Glonass single-mode or dual-mode operations to achieve positioning and time synchronization. It suit for spatiotemporal monitoring in various field environments.

Data Storage:

M1000 has an 8 GB storage by using the high-speed USB3.0 interface downloading.

Data Transfer:

M1000 has a special RS485 interface, which is used to connect the external communication module such as 4G/WIFI/Bluetooth/Ethernet/satellite communication, to obtain measurement data easily and quickly.

Typical Node Specifications

Acquisition Specifications

Sensor Interface	1x ± 2.5 V differential voltage channel (can be configured as 1x ± 5 V differential analog voltage channel, or configured as 2x 0~5 V single-ended analog voltage interfaces and 2x 0~20 mA current interfaces) 1x RS485 digital interface 1x SDI-12 digital interface
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Differential Analog Voltage Measurement Channel

Channel	1
Maximum Input Signal	± 2.5 V peak @ 0 dB ± 5 V peak @ 0 dB (configurable)
ADC Resolution	32 bits
Sample Interval	1, 2, 4, 8, 16 ms
Preamplifier Gain	0 dB to 24 dB, 6 dB Steps
Antialias Filter	206.5 Hz @ 2 ms (82.6% Nyquist) linear phase or minimum phase selectable
DC Blocking Filter	1 Hz to 10 Hz, 1 Hz increments or DC removed
Equivalent Input Noise	0.71 μ V @ 2 ms, 12 dB
Instantaneous Dynamic Range	116 dB @ 4 ms, 0 dB
Total Harmonic Distortion	-115 dB @ 0 dB
Common Mode Suppression	>115 dB
Gain Accuracy	<0.3%
System Dynamic Range	140 dB

Single-ended Voltage Measurement Interface (Configurable)

Number of Interfaces	2
Input Voltage Range	0-5 V
ADC Resolution	32 bits
Accuracy	± 10 μ V
Sample Interval	Single channel acquisition (-5 V~+5 V): 1 second to 1 hour Dual channel acquisition (-5 V~0, 0~5 V): 2 seconds to 1 hour (Note: In dual-channel mode, the sampling rates for both channels cannot be set separately)

Analog Current Interface (Configurable)

Number of Interfaces	2
Input Current Range	0-20 mA
Accuracy	>0.1%
Sample Interval	Dual channel acquisition: 2 seconds to 1 hour (Note: In dual-channel mode, the sampling rates for both channels cannot be set separately)

Digital Ports

Ports	1x RS-485 half duplex output/ input port 1x SDI-12 communication port
Supports Digital Protocols	RS-485: MODBUS, ASCII polled SDI-12
Sample Interval	1 second to 1 hour

Communication

Communication Interface	Two IN&OUT interfaces have one common RS-485 half-duplex port and one common power interface for connecting with other devices to form a multi-sensor system
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Communication Extension	M1000 can be connected to 4G modules/ WiFi modules/Ethernet modules/ Bluetooth modules/satellite communication modules to achieve real-time or timed communication. Utilizing one communication module, it can be connected in series with up to 15 pieces M1000 to achieve data collection of up to 90 sensors
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Physical Specification

External Input Voltage	7-15 V DC The power input has protection functions for surge, overvoltage, overcurrent, reverse power supply, and lightning protection
Output Voltage	12 V DC typical (consistent with the voltage of the input power supply) Can supply power to external sensors
Maximum Output Current	1 A @ 12 V DC
Data Storage Format	CSV format, containing sensor data and time information DLD format, containing high sampling analog signal data, time and location information
GNSS Mode	Supports GPS, Beidou, Glonass, and single or dual-mode operations. Intermittent work (optional 90 seconds to 1 day) or long-term work (Always On)
Timing Accuracy	± 10 μ s @ GPS discipline 8 minutes/circle ± 250 μ s @ GPS discipline 24 hours/circle
Data Storage	8 GB (expandable to 16 GB)
Working Temperature	-40 °C ~ +70 °C
Protective Performance	IP 67
Physical Dimensions	147.7 mm (L) × 111 mm (W) × 60.9 mm (H)
Weight	0.8 kg

Note: Follow SEG polarity rules (When shocked by seismic motion, sensor upward motion as the channel record is Negative signal, sensor downward motion as the channel record is Positive signal)

Specifications are subject to change without prior notice.