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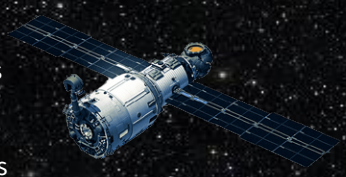
IGU-16HR 3C 2Hz ETH

The IGU-16HR 3C 2Hz ETH is a next-generation node-based seismometer equipped with the high-sensitivity DT-SOLO 2Hz low-frequency geophone. With outstanding self-noise performance, it captures deep, low-frequency seismic signals with remarkable precision. The device supports real-time communication and can be rapidly deployed in the field, enabling the formation of distributed seismic networks for real-time monitoring and data analysis.
With **high performance, portability**, **and intelligent design**, the instrument is well-suited for a wide range of applications, from scientific reséarch to commercial exploration.

Applications:



- Natural Seismology Research – Capture full seismic waveforms to support geodynamic studies
- Crust and Mantle Structure Imaging – Build high-resolution geophysical profiles
- Tectonic Structure Detection – Map faults, folds, and active geological zones
- Ambient Noise Tomography – Improve underground imaging through passive seismic methods
- Volcanic Monitoring – Detect volcanic activity and contribute to early warning systems
- Lithospheric Velocity Imaging – Support seismic hazard assessments with detailed velocity models
- Aftershock Monitoring – Deploy rapidly post-event to track seismic sequences
- Microseismic Monitoring – Detect and analyze small-scale events in mining, energy, and reservoir applications
- Engineering Geophysical Surveys – Aid infrastructure development and site evaluations
- Structural Health Monitoring – Monitor dams, bridges, and major civil infrastructure in real time
- Geohazard Monitoring – Provide early detection for landslides, collapses, and other geological risks

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IGU-16HR 3C 2Hz ETH

Three-Component Smart Seismic Sensor (Ethernet Version)

Key Advantages

Fully Integrated Design: Sensor, digitizer, communication, and control modules are integrated for efficient and stable field deployment
High-Precision Data: Built-in DT-SOLO 2Hz low-frequency geophone accurately captures deep low-frequency signals, ideal for deep structure and ambient noise studies
Consistent Performance: Precision manufacturing ensures accurate and consistent instrument transfer function across devices
High Reliability: IP68-rated, low power consumption, long battery life, and ultra-wide operating temperature range make it suitable for harsh field conditions
Low Self-Noise: Improves signal-to-noise ratio, enabling detection of ultra-weak seismic signals
Real-Time Communication: Supports Ethernet communication for remote control and real-time data transmission
Multi-System Compatibility: Open data transmission protocol allows seamless integration with mainstream processing platforms (Linux/Windows)
Electrical Protection: Enhanced circuit protection significantly extends instrument lifespan

Overview

The IGU-16HR 3C 2Hz ETH is a next-generation node-based seismometer equipped with the high-sensitivity DT-SOLO 2Hz low-frequency geophone. With outstanding self-noise performance, it captures deep, low-frequency seismic signals with remarkable precision. The device supports real-time communication and can be rapidly deployed in the field, enabling the formation of distributed seismic networks for real-time monitoring and data analysis.Combining high performance, portability, and smart networking, this instrument is ideal for both academic research and industrial geophysical exploration.

New Generation Node-based Seismometer

Fully Integrated Design: No complex cabling required — supports rapid deployment and large-scale networking, with enhanced system stability and electromagnetic interference resistance
Built-in GNSS : Ensures accurate timing synchronization for array-based applications
Onboard Storage: Equipped with a 64 GB internal memory card, expandable up to 128 GB
Long Battery Life: Internal battery supports up to 40 days of continuous data acquisition
Flexible Power Supply: Compatible with external power sources and solar energy systems
Ethernet Data Transmission: Enables remote control and real-time data streaming via Ethernet connection

Peripheral Equipment

- Data download cable with parallel USB 2.0 high-speed data transfer
- 4-port USB Hub supporting simultaneous data download from 4 devices
- Power adapter supports 4A current charging
- Combined power and Ethernet cable supports 7–15V DC input; RJ45 connector compatible with various data transmission modules

Applications

Crust and Mantle Structure Imaging – Build high-resolution geophysical profiles
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Microseismic Monitoring – Detect and analyze small-scale events in mining, energy, and reservoir applications
Engineering Geophysical Surveys – Aid infrastructure development and site evaluations
Structural Health Monitoring – Monitor dams, bridges, and major civil infrastructure in real time
Geohazard Monitoring – Provide early detection for landslides, collapses, and other geological risks

Combined Power and Ethernet cable

Data download cable

4-port USB Hub

Power Adapter

Specifications

General Specifications

Channels	3
Dimensions	ϕ158 x160 mm(without leveling nuts)
Weight	4.8 kg(including battery and leveling nuts)
Protection Rating	IP 68
Operating Temperature	-40° C to +70° C
Charging Temperature	+3° C to +45° C
Charging Time	<7.5 hours
Battery Life @25°C	40 days @ 2 ms, 24 hours of operation per day, offline mode 80 days @ 2 ms, 12 hours of operation per day, offline mode 7 days @ 2 ms, 24 hours of operation per day, Ethernet transmission mode
Memory	64 GB(expandable to 128 GB)
Data Transmission	Supports Ethernet data transmission
Data Download	USB2.0
External Power	7-15 VDC
GNSS Mode	Supports GPS, Beidou, GLONASS, with single- mode and dual-mode operation

Geophone Specifications

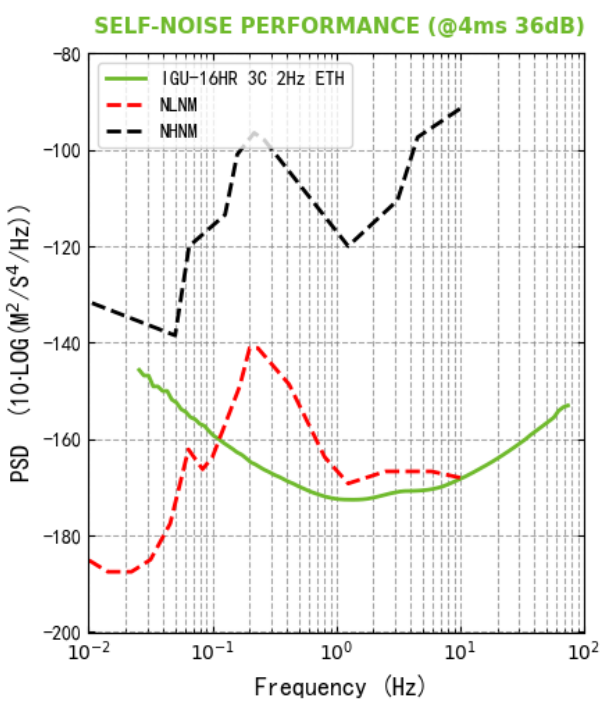
(Unless otherwise specified, all parameters are tested at +20° C with the vertical core in vertical conditions and the horizontal core in horizontal conditions.)

Natural Frequency	2 Hz
Distortion	⩽ 0.30% @ 12 Hz, (0° - 7.5°) vertical tilt, (0° - 0.5°) horizontal tilt
Damping	0.70
Sensitivity	260 V/m/s(6.60 V/in/s)

Channel Specifications

(Unless otherwise specified, all values are at a sampling rate of 2 ms, 31.25 Hz, and +25° C.)

ADC Resolution	32 bits (The ADC has a resolution of 32 bits, with noise resolution not exceeding 24 bits)
Sampling Rate	0.25，0.5，1，2，4，8，10，20 ms
Pre-Amplifier Gain	0 dB to 36 dB，6 dB increments
Anti-Aliasing Filter	206.5 Hz @ 2 ms (82.6% Nyquist frequency), selectable – linear phase or minimum phase
DC Blocking Filter	1 Hz to 10 Hz, in 1 Hz increments or DC Remove
Maximum Input Signal	±2.5 V peak @ 0 dB gain
Instantaneous Dynamic Range	125 dB @ 2 ms, 0 dB gain
Equivalent Input Noise	0.18 μV @ 2 ms, 18 dB gain
Total Harmonic Distortion	<0.0002% @ 0 dB gain
Common Mode Rejection	>100 dB
Gain Accuracy	<1%
GPS Time Standard	1 ppm
Timing Accuracy	±10 μs，GPS Synchronization
Channel Crosstalk	<-110 dB
Inter-Channel Phase Difference	<0.1 ms
Lateral Vibration Suppression	Better than 0.1%
Inter-Channel Amplitude Consistency	5%
System Dynamic Range	145 dB
Frequency Response	0-1652 Hz@0.25 ms



Note: SmartSolo Scientific reserves the right to make changes to this manual, and no prior notice will be given for any amendments.

SmartSolo Solar Gateway

The SmartSolo Solar Gateway includes a 25 W solar panel, a 122 Wh low-temperature battery, and an Ethernet-to-4G communication module. By connecting the IGU-16HR 3C 2Hz ETH to the SmartSolo Solar Gateway, data can be transmitted wirelessly via 4G to a local computer, enabling long-term monitoring and wireless data transmission.

Performance Specifications

Maximum Solar Power	24±5% W
Peak Solar Voltage	18.0 V
Peak Solar Current	1.39 A
Battery Voltage	12.8 V
Battery Capacity	9.6 Ah
Charging Temperature	-30° C to +60° C
Discharging Temperature	-40° C to +60° C
Storage Conditions	Store in a dry place, free from corrosive gases, at temperatures between -20 ° C to +60 ° C and humidity of 65% ± 20% RH. Optimal Storage Temperature: +10° C to +25° C Optimal Storage Humidity: 65% ± 20%
Wind Resistance	60 m/s
Hail Resistance	20 m/s （25mm）
Dimensions	450 mm×380 mm×100 mm
Weight	6.6 kg

4G IoT Frequency Bands

Compatible with 4G cellular networks and can be used in China and surrounding areas.

Performance	LTE CAT4 3GPP R9 (Category 4: 150 Mbps Peak Downlink / 50 Mbps Peak Uplink)
Frequency band	Frequency band LTE-FDD: B1/3/5/8 LTE-TDD: B34/38/39/40/41 WCDMA: B1/8

Note: 4G is a high-frequency electromagnetic wave, and the 4G signal is easily affected by geographical environment, spatial magnetic fields, and 4G base stations, which can lead to instability and unreliability. Based on this, it is hereby stated that SmartSolo's products are robust and durable, and there are no issues with data collection and local storage. However, we do not guarantee any data transmission issues arising from 4G signal failures outside of this product.

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New generation of seismic instruments | New generation of electrical instruments |
New generation of data acquisition systems