

## SMS / SAS Seismic Monitoring / Alarm System

### Features\*

- Recording, advanced analysis and annunciation according to project specific or international regulations
- Automatic exceedance evaluation
- Reporting and alerting via relays, visual and audible tools as well as printed matter
- Project specific Automatic Event Processing (AEP), Nuclear (NPP) or other features
- Up to 36 triaxial analog sensors and unlimited number of seismic field recorder stations
- 24 or 32 bit event-based and/or continuous recording
- Common timing and triggering within the system
- Completely over-voltage protected
- Continuous system-wide SOH monitoring
- Seismically and EMC proven design
- Comprehensive configuration of the whole system via the enhanced computer interface



\*The information provided is a typical overview. For each project a specific description is provided outlining the relevant system.

### Outline

The core of the SMS / SAS is a Central Processing Unit (CPU) with a multi-channel digital recorder system rack mounted in an industrial cabinet together with an industrial computer and relevant peripherals.

Accelerometers, seismometers, complete seismic stations or sensor packages, which are referred to as Detection / Recording Units (DRUs), are placed at remote locations and can be connected to the CPU.

The system has been designed in a way that it is not bound to a single topology. There could be only the sensors or both sensors and data acquisition out in the field. Advantages of these topologies are briefly explained in the specifications section.

The system has great modularity and flexibility to simplify an instrumentation upgrade and enable existing elements to be reused as much as possible. Built-in redundancy of the recorders and power supply are key features.

The CPU monitors all DRUs in parallel, as a result of the dedicated communication links that are provided by the system hardware.

By monitoring continuously the DRUs, the CPU detects seismic events, generates associated alarms and automatically processes the recorded data. Also it performs periodical tests on the system and monitors the system-wide state of the health as well as analyses the detailed cause of any malfunction. The result of the data processing is provided in a report a few minutes after the occurrence of an event.

State-of-the-art GeoDAS software is utilised in the CPU. For each measuring channel the recording threshold and the alarm limit values can be set individually. Detailed project limits can be fully defined along with other parameters as required by relevant regulations or customised user requirements.

# Specifications SMS / SAS Seismic Monitoring / Alarm System

## Centralised Recording



**Advantages:**  
Simple devices in controlled area (analog sensors).  
Simplified diagnostics and maintenance.  
Higher compatibility with existing systems for upgrade.

## De-centralised Recording



**Advantages:**  
Independent recording units increase redundancy and reliability.  
Link from remote to central can use Fiber Optics.  
Digital transmission between remote and central locations.

## Cascaded / Hybrid Recording

Combination of the decentralised and centralised systems to provide a more flexible deployment.

## Typical System Specifications

The below specifications provide a typical overview. For each project a specific description is provided outlining the relevant system.

### Sensor

SMS/SAS system offers the most flexible sensor connectivity options to cater for the needs of any measuring requirement. Any matching type of sensor can be connected to the system.

### Digitiser

A/D Converter: 24 to 32 bit ADC  
Dynamic Range: 137 dB to 150 dB @ 50 SPS  
Sampling rates: up to 2000 SPS  
Bandwidth: DC to 1000 Hz

### Data Recording

Pre-event-Time: Adjustable \*  
Post-event-Time: Adjustable \*

### Triggering

Type: Level (threshold) or STA/LTA trigger, project specific triggers also available  
Filtering: User configurable

### Data Storage

Type: 2 -128 GByte per 3 channels and/or HDD, SSD in the computer

### Data Analysis

GeoDAS software provides various analysis functions like filtering, FFT, response spectra, etc. Other commercially available evaluation software packages may alternatively be used.

### Timing

Standard clock accuracy: Free running, based on TCXO  
NTP accuracy <4ms (<1ms in a close network): GPS System accuracy < 1 µsec.

### Indicators

LED, Push button and/or Flat-screen indicators, may vary with each project, based on requirements

### Self Test / State of Health

Permanently active, self monitoring and user selectable, periodical system test including comprehensive sensor, memory, filter, real time clock, battery level and hardware tests.

### Seismic Switch / Warning / Alarm Options

The warning option provides independent warning / error outputs (relay contacts) based on user selectable criteria.

As separate acquisition module in the CPU with its own power supply, remote sensor and cable; or independent DRUs with integral relays and CPU connection.

### Communication Channel Options

Ethernet TCP/IP, landline, GSM/ GPRS/UMTS/3G, Serial

### Power Supply

AC/DC Power supply: 230 VAC / 50 Hz or 115 VAC / 60 Hz  
External battery option: Rechargeable, 4 x 24 VDC, 24 or 40 Ah

### Housing

19" cabinet in different sizes, floor standing or wall mounted.

\*: Any value is useable, as long as it does not lead to data loss because of incorrectly configured or conflicting parameters.

SMS-SAS is compliant with the latest NRC RG 1.12 Rev. 3 of 2017.