framatome

Seismic Instrumentation

Seismic Monitoring and Seismic Trip Actuation

Customizable and field-proven Seismic Instrumentation Systems responding to customer specific layout and qualification requirements to support reliable and timely response to earthquakes, thus increasing plant safety and availability.

Challenge

NPP operators must act quickly during earthquakes, but many plants lack modern seismic monitoring. Reliance on outdated equipment like mechanical seismographs or generic public data from public seismic networks can cause delays and inaccurate assessments. Further, this increases the risk of equipment damage or unnecessary plant shutdowns. These limitations may result in slow or inaccurate decision-making, making it difficult to assess the earthquake's impact on different parts of the plant. Consequently, operators risk equipment damage from underestimated impacts or economic losses from unnecessary shutdowns. Upgrading to modern, plant-specific seismic monitoring systems is essential for timely and focused interventions.

In areas of high seismic activity, seismic trip systems are usually required by national nuclear regulations to ensure timely and possibly automatic response, thus contributing to plant safety.

Solution

Framatome provides customizable and field-proven seismic instrumentation systems responding to customer specific plant layout, I&C architecture and qualification requirements.

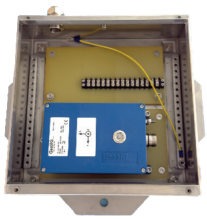
Our state-of-the-art Seismic Monitoring System continuously monitors and assesses seismic activity to meet your needs. It offers configurable options for data acquisition and processing, incorporates voting mechanisms, and provides a wide range of software-based functions for post-processing seismic data.

If you want to ensure your nuclear power plant can be shut down quickly after an earthquake, Framatome offers a reliable Seismic Trip System. This solution uses a straightforward analog design to generate a trip signal promptly, supporting both manual and automatic shutdowns in a timely manner.

The design process based on customer inputs and plant specific requirements ensures proper integration of the equipment into an existing NPP at the expected level of qualification.



Seismic Monitoring System Cabinet



Sensor in Stainless Steel Housing



Accelerometer Sensor



Seismic Trip Main Rack

Customer benefits

- Enhanced plant safety thanks to high measurement accuracy and short response time
- Rapid and automated online evaluation of seismic parameters for prompt decision-making
- Increased plant availability since unnecessary shutdowns following seismic events are reduced
- Cost savings due to reduced local equipment inspections and thanks to automated self-tests
- Qualifiable systems for safety-related applications

Technical information

Seismic Monitoring System:

- High performance signal processing with up to 2000 SPS at a bandwidth from DC up to 1000 Hz
- Adjustable signal recorder settings
- Flexible alarm relay configuration
- Comprehensive voting logic
- User-friendly and versatile software interface for visualization and Post-Event assessment

Seismic Trip System:

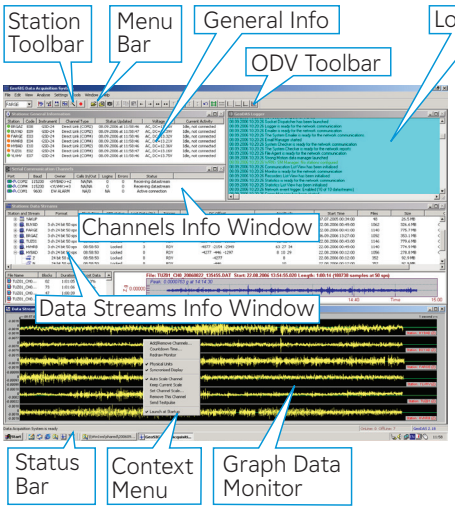
- Tripping function fully software-free based on discrete electronics
- Axis-based or Vector-based tripping logic
- Relay outputs for 2x Trip levels, Fault and Test Mode
- Integrated Self-Monitoring and Test functionalities
- Digital recording modules isolated from the trip function modules

Accelerometer Sensor:

- User selectable full-scale-range ± 0.5, 1, 2, 3 or 4 g
- Dynamic range up to 165 dB at a bandwidth from DC to 200 Hz
- Temperature range -20 to +70 °C , Humidity 95% non-condensing
- Available with voltage or current-loop output signal
- Protective IP 65 stainless steel housing

Compliance of the seismic system design to:

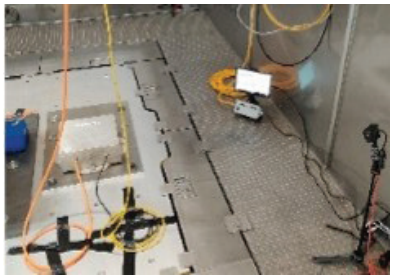
- Regulatory guide US NRC REG 1.12 Rev. C for seismic instrumentation
- Project-specific design process for safety-related applications
- Project-specific environmental qualification requirement



Seismic Monitoring Software User Interface including instrument tree view, channel recordings, enhanced context menus, online and offline signal visualization features and detailed status information



Project-specific EMC qualification tests



Project-specific seismic qualification tests



Key figures

30 years of operational experience

Installation in **17 countries worldwide**

1 sensor type which fits into all applications

Features

State-of-the-art equipment from GeoSIG:

- Design and manufacturing according to ISO 19443
- Equipment installation & commissioning support
- Customer training
- Long-term spare-part availability

Proven solutions and reliable services from Framatome:

- Integration into existing I&C architectures
- Project-specific qualification
- Supplier qualification and manufacturing inspections
- Licensing support for safety-related application
- Entry point for after-sales and product support

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