

# Perancangan sistem kalibrasi seismometer secara relatif maupun absolut = design for seismometer calibration with relativ and absolute methode

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## Abstrak

### [<b>ABSTRAK</b><br>

Seismometer mempunyai karakteristik seperti frekuensi natural, konstanta damping, bandwidth frekuensi dan sensitivitas. Nilai dari besaran-besaran tersebut berpengaruh dalam pengolahan data seismik, terutama parameter gempa bumi seperti magnitudo, olah karena itu diperlukan kalibrasi sehingga dihasilkan pengukuran yang valid. Kalibrasi seismometer adalah kalibrasi untuk mendapatkan nilai sensitivitasnya. Penelitian ini bertujuan untuk mendapatkan nilai paramater seismometer yaitu sensitivitas yang tertelusur ke satuan international, dengan merancang sistem kalibrasi seismometer secara relatif maupun absolut. Perancangan sistem kalibrasi dilakukan baik secara hardware maupun software. Pada hardware dirancang sistem low noise digitizer dengan ADC beresolusi 16 bit, sedangkan untuk pengolahan dan analisa data kalibrasi digunakan software builder LabVIEW.

Dari data hasil kalibrasi tiga lokasi yang berbeda, kalibrasi relatif menggunakan signal sinus 1 Hz di dapat bahwa sensitivitas seismometer TDV-23S mempunyai nilai sebesar  $1217,28 \pm 3,42$  V/m/s atau 0,25 % untuk nilai ketidakpastiannya pada setiap komponen dan nilai konstanta damping 0,49.

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Seismometers have characteristics, such as natural frequencies, damping constants, frequencies bandwidth, and sensitivities. The values of the characteristics have very influential in determine of earthquake magnitude. Therefore, calibration of seismometers is needed to obtain validated measurement. This research is aimed to design calibration system either relative or absolute, in order to obtain the sensitivity value that traceable to international units. The calibration system design is done in hardware and software. On the hardware, is designed low noise digitizer system with 16 bit resolution, for the processing and calibration data analysis is used LabVIEW Software Builder.

The calibration test data from this research are seismic signals which are recorded from three different locations. Results from testing on the entire seismic signals show that relative calibration which is used sine signal of 1 Hz, gives  $1217,28 \pm 3,42$  V/m/s sensitivity of TDV-23S seismometer is obtained, or uncertainty of each component of 0,25% and the damping constant of 0.49.;Seismometers have characteristics, such as natural frequencies, damping

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