

# CS18 Seismic

## Calibration System for Seismic Sensors



### Applications

- **Secondary calibration of**
  - ⇒ Seismometer und geophones,
  - ⇒ Sensors for measuring vibration immission (DIN 45669),
  - ⇒ Heavy vibration transducers with sinusoidal excitation and very high quality according to **ISO 16063-21** (comparison method)
- **Secondary calibration of reference standards**
- **Resonance frequency search** from 10 Hz to 400 Hz
- Calibration of **vibration sensors**
- Calibration of **vibration meters**
- Calibration of **vibration calibrators**

### Range of Use

- **Certified calibration laboratories**
- Departments for the **supervision of measuring instruments** in research and industries (Geophysics, Seismology, Aerospace and Military Research)
- **Quality assurance** in sensor production
- **National metrology laboratories**

### Features

- **Traceable** to Physikalisch Technische Bundesanstalt (**PTB**) Braunschweig by the accredited SPEKTRA Calibration Laboratory D-K-15183-01-00 (**DAkkS Calibration Certificate**),
- **Calibration of sensors** with / without amplifiers, of measurement instruments with indication of their own by applying determinate acceleration signals
- **Reference Standard for very low frequencies**
- **Frequency range 0.2 Hz ... 400 Hz** (Optional: 0.1 Hz)
- **Sensor mass up to 50 kg**
- Air-bearing **vertical Vibration Exciter** with **frictionless load compensation**
- Air-bearing **horizontal Vibration Exciter** with electronic zero position control unit
- **Upgradeable** to calibration systems, e.g. CS18 Seismic / HF or primary calibration system CS18P Seismic

# CS18 Seismic

## Calibration System for Seismic Sensors



### Components

- Vibration control system **SRS-35**
- Software CS18 Seismic: Sensor Calibration, Measurement, Vibration Generation, Sweep
- Vertical Excitation
  - ⇒ Air bearing vibration exciter **SE-13**
  - ⇒ Power amplifier **APS 125**
- Horizontal Excitation
  - ⇒ Air bearing vibration exciter **APS 129**
  - ⇒ Power amplifier **APS 125**
  - ⇒ Electronic zero position controller **APS 0109**
- Reference standard accelerometer **BN-07** or **BN-13**

Specification of CS18 Seismic with **vertical** air bearing vibration exciter **SE-13** in the frequency range **0.2 Hz ... 400 Hz** for sensor mass up to 50 kg (DUT) for environmental conditions: temperature 23°C (± 2°C) and relative humidity 30 % ... 75 %:

Frequency Range		Sensor Mass DUT Vertical	Expanded Measurement Uncertainty <sup>2)</sup> Amount <sup>3)</sup> / Phase <sup>1)</sup>	Working Range (peak values)		
From	To			Minimum	Maximum <sup>4)</sup> (Displacement, Velocity, Acceleration)	Maximum <sup>5)</sup> (Displacement, Velocity, Acceleration)
0.2 Hz	< 1 Hz	50 kg	1.5 % / 1.5°	0.2 Hz .. 400 Hz: <b>0.01 m/s<sup>2</sup></b>	0.2 Hz .. 4 Hz: <b>10 mm</b>	0.2 Hz .. 4 Hz: <b>10 mm</b>
1 Hz	10 Hz		1.0 % / 1.0°		4 Hz .. 6.5 Hz: <b>250 mm/s</b>	4 Hz .. 25 Hz: <b>250 mm/s</b>
> 10 Hz	160 Hz	20 kg	2.0 % / 2.0°		6.5 Hz .. 400 Hz: <b>10 m/s<sup>2</sup></b>	25 Hz .. 120 Hz: <b>40 m/s<sup>2</sup></b>
> 160 Hz	400 Hz	10 kg	3.0 % / 3.0°			120 Hz .. 400 Hz: <b>40 m/s<sup>2</sup>.. 25 m/s<sup>2</sup></b>
Ref. Freq.: 8 Hz,			1.0 % / 1.0°			

Specification of CS18 Seismic with **horizontal** air bearing vibration exciter **APS 129** in the frequency range **0.2 Hz ... 160 Hz** for sensor mass up to 30 kg (DUT) for environmental conditions: temperature 23°C (± 2°C) and relative humidity 30 % ... 75 %:

0.2 Hz	< 1 Hz	30 kg	1.5 % / 1.5°	0.2 Hz .. 160 Hz: <b>0.01 m/s<sup>2</sup></b>	0.2 Hz .. 1.25 Hz: <b>50 mm</b>	0.2 Hz .. 1.25 Hz: <b>50 mm</b>
1 Hz	10 Hz		1.0 % / 1.0°		1.25 Hz .. 6 Hz: <b>0.4 m/s</b>	1.25 Hz .. 6 Hz: <b>0.4 m/s</b>
> 10 Hz	160 Hz	20 kg	2.0 % / 2.0°		1.25 Hz .. 25 Hz: <b>3 m/s<sup>2</sup></b>	6 Hz .. 25 Hz: <b>15 m/s<sup>2</sup></b>
Ref. Freq.: 8 Hz,			1.0 % / 1.0°		25 Hz .. 160 Hz: <b>3 m/s<sup>2</sup> .. 0.4 m/s<sup>2</sup></b>	25 Hz .. 160 Hz: <b>15 m/s<sup>2</sup> .. 2 m/s<sup>2</sup></b>

<sup>1)</sup> Only in combination with optional extra PHASE

<sup>2)</sup> Determined according to GUM (ISO Guide to the expression of uncertainty in measurement, 1995) with k = 2 (coverage factor) for the best possible DUT (other devices that are not as ideal have to be evaluated with individual additions)

<sup>3)</sup> Values only valid for electrical sensor signals ≥ (1 mV or 1 pC)

<sup>4)</sup> Maximum acceleration for maximum payload (DUT)

<sup>5)</sup> Maximum acceleration without any payload (DUT)

### Options for calibration system CS18 Seismic:

- **EF:** Extended frequency range from 0.05 Hz
- **TABLE:** granite plate on block of sandstone or concrete to mount and use the system properly