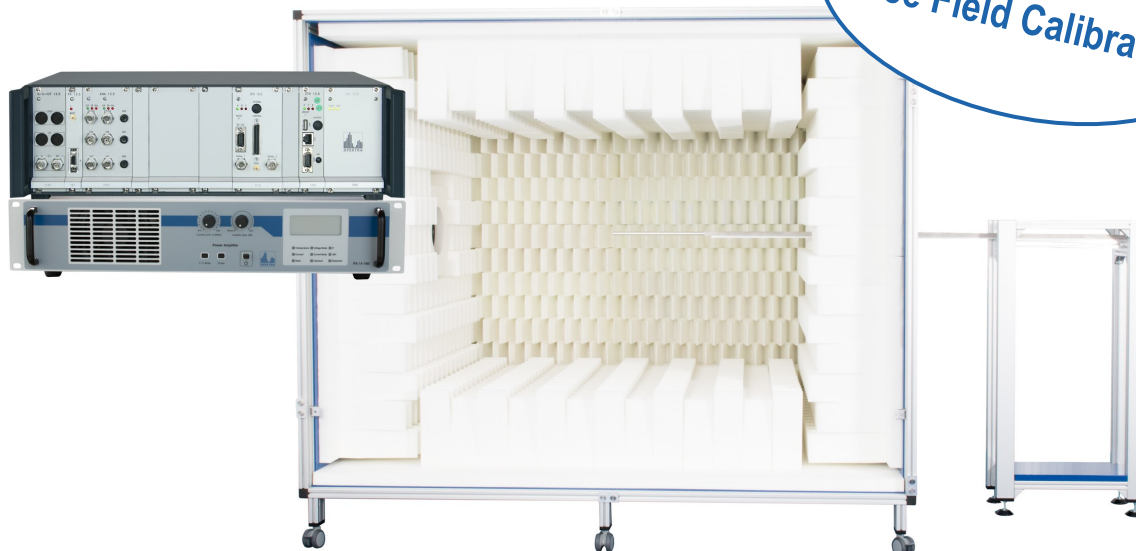


# CS18 FF

## Calibration System Free Field



True  
Free Field Calibration



### Application

- **Secondary calibration** of measuring microphones, sound level meters and other acoustic sensors according to **IEC 61094-8** and **IEC 61672**
- **Periodic single qualification** according to **IEC 61672-3**
- **Acoustical measurements** like:
  - Measurement of directivity characteristic
  - Determination of diffuse-field sensitivity
  - Measurement of acoustic emission of small objects
- **Calibration** of constructively mechanically **non-standard microphones**, e.g. external microphone units, optionally in axial and radial direction of measurement

### Range of Use

- **Certified calibration laboratories**
- **Measuring instrument verification** in research and industry, for example civil engineering, aviation and automotive engineering
- **Quality assurance** in manufacturing of microphones and sound level meters

### Features

- Reference standards **traceable** to **Physikalisch Technische Bundesanstalt (PTB)** Braunschweig by the SPEKTRA Calibration Laboratory D-K-15183-01-00 (DAkkS-calibration certificate)
- True **free-field calibration** in acoustically dead (anechoic) chamber
- **Calibration** of any measuring microphone (condenser, electrets, electro-dynamic etc.) with any construction with / without protection grid
- **Supply** of a defined free-field sound pressure level for the calibration of sound level meters
- **Calibration** of acoustic calibrators
- Can be combined with the following SPEKTRA calibration systems, e.g.:
  - CS18 SPL (calibration system pressure chamber)
  - CS18 SPL-E (calibration system pressure chamber for dosimeter)
  - CS18 SPL-VLF (calibration system sound pressure level very low frequency)

# CS18 FF

## Calibration System Free Field



### Components:

- Dedicated transportable **acoustically dead (anechoic) chamber** by SPEKTRA, completely lined with wedge-shaped absorbers, with loudspeaker, for alternately holding the reference standard and test object, with small window for reading off the indications of compact sound level meters without electrical output channel
- Vibration control system **SRS-35** by SPEKTRA
- Software CS18 FF with corresponding operation modes
- Power amplifier **PA 14-180** by SPEKTRA
- Boom (holder fixture for DUT's), accessories, cables and standard-PC
- Reference standards
  - ½" condenser microphone cartridge class **LS2P** with ½" VIC (Voltage Insert Calibration) preamplifier
  - Sound acoustic calibrator class **LS**, (94 dB / 1,000 Hz and 114 dB / 1,000 Hz)
- Working standards
  - ½" condenser microphone cartridge class **WS2F** with preamplifier

### Specification of CS18 FF with reference standard microphones listed above

for environmental conditions: temperature 23°C (± 2°C) and relative humidity 30 % ... 75 % and environmental noise of the laboratory: **LZeq < 60 dB**

Dimensions Anechoic Chamber (base body with casters)	Outside Inside	2.25 m x 2.00 m x 2.60 m (H x W x D) 1.25 m x 1.25 m x 1.65 m (H x W x D)	
Space required for operation		2.00 m x 2.00 m x 6.00 m (H x W x D) (depending on the placement of the measuring instruments)	
Type of the Sound Field		<b>Free field</b> of plane progressive waves	
Calibration Method		Comparison with reference standard, <b>substitution method</b>	
Recommended Sound Pressure Level for calibration of microphones <sup>2)</sup>		<b>84.0 dB</b> in the range of 125 Hz - 20 kHz at the calibration point (84 cm distance)	
Frequency Range and Expanded Uncertainty <sup>1)</sup>	<b>Measuring Microphones</b> with Different Diameter <b>Measuring Chains</b> with Separate Microphones	125 Hz ... < 250 Hz	0.35 dB
		250 Hz ... 8 000 Hz	0.30 dB
		> 8 000 Hz ... 10 000 Hz	0.40 dB
		> 10 000 Hz ... 20 000 Hz	0.45 dB
Recommended Sound Pressure Level for calibration of sound level meters <sup>2)</sup>		<b>84.0 dB</b> in the range of 125 Hz - 200 Hz <b>94.0 dB</b> in the range of 200 Hz - 10 kHz <b>84.0 dB</b> in the range of 10 kHz - 20 kHz at the calibration point (84 cm distance)	
Frequency Range and Expanded Uncertainty <sup>1)</sup>	<b>Sound Level Meters</b> with Microphone Mounted Directly to the Body of the Sound Level Meter	125 Hz ... < 250 Hz	0.50 dB
		250 Hz ... 8 000 Hz	0.40 dB
		> 8 000 Hz ... 10 000 Hz	0.50 dB
		> 10 000 Hz ... 20 000 Hz	0.60 dB

### Electrical calibration of sound level meter:

<b>Electrical Tests</b>		Supply of electrical input signal for the electrical tests according to IEC 61672-3, ED1	
Input Signal and Expanded Uncertainty <sup>1)</sup>	<b>Sound Level Meters,</b> Measuring Systems	4 kHz tone burst (0.25 ms ... 1 s)	0.20 dB
		C-weighted peak level	0.20 dB
		Level linearity, Frequency weighting, overload indication	0.20 dB

<sup>1)</sup> Determined according to GUM (ISO Guide to the expression of uncertainty in measurement) with k = 2 (coverage factor)

<sup>2)</sup> Recommended sound pressure level for best stability and lowest uncertainty. Higher sound pressure levels are possible (not included in table).