

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 sound pressure level)
 - CS18 SPL-E (calibration system pressure chamber for dosimeter)
 - CS18 SPL-VLF (calibration system sound pressure level very low frequency)

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Components:

- Vibration control system **SRS-35** by SPEKTRA
- Power amplifier **PA 14-180** by SPEKTRA
- **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
- Holder fixture, accessories, cables
- Standard-PC
- 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

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**

Anechoic Chamber (base body)	Outside (H x W x D)	2.00 m x 2.00 m x 2.40 m	
	Inside (H x W x D)	1.25 m x 1.25 m x 1.65 m	
Type of the Sound Field		Free field of plane progressive waves	
Calibration Method		Comparison with reference standard, substitution method	
Recommended Sound Pressure Level for calibration of microphones ²⁾		84.0 dB in the range of 125 Hz - 20 kHz at the calibration point (84 cm distance)	
Frequency Range and Expanded Uncertainty ¹⁾	Measuring Microphones with Different Diameter Measuring Chains 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 ²⁾		84,0 dB in the range of 125 Hz - 200 Hz 94,0 dB in the range of 200 Hz - 10 kHz 84,0 dB in the range of 10 kHz - 20 kHz at the calibration point (84 cm distance)	
Frequency Range and Expanded Uncertainty ¹⁾	Sound Level Meters 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:

Electrical Tests		Supply of electrical input signal for the electrical tests according to IEC 61672-3, ED1	
Input Signal and Expanded Uncertainty ¹⁾	Sound Level Meters, 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

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

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