



# Instruction Manual

## Sound Level Calibrator 05000

### Application

- Handy sound source for rapid and easy calibration of sound level meters and acoustical measuring systems
- Sensitivity calibration of microphones
- Conforms to IEC 942, class 2
- Suited for laboratory and field use

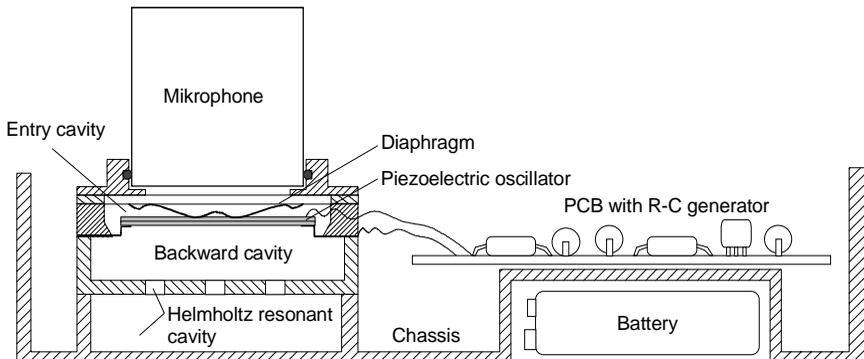


### Function

The Sound Level Calibrator 05000 operates at a frequency of **1000 Hz**. This is the reference frequency for the internationally standardized weighting networks, so the same calibration value is obtained for all weighting networks (A, B, C, D and Linear).

Model 05000 provides a sound pressure of **94 dB** (corresponding to 1 Pa or 1 N/m<sup>2</sup>). The sound pressure is nearly independent of static atmospheric pressure.

The figure shows a sectional view of the instrument and explains its construction.



The acoustic transducer is situated at the left side of the instrument. It consists of a double bender element of piezoelectric ceramics with a stuck on diaphragm of aluminum. The piezoelectric system is operated in its resonant frequency. Below the transducer system there is a Helmholtz resonant cavity. The upper side of the system is sealed by a ring seal to pick-up a 1" microphone. The diaphragm is protected by a hole disc with a gauze filter. In the right part of the instrument there is the battery compartment and the R-C oscillator. The printed circuit board includes in addition a circuit for battery control, which switches off the oscillator in case the battery voltage drops down below the operating voltage.

## Operation

The Sound Level Calibrator 05000 is operated by a 9 V battery type 6F22, which has to be inserted into the battery compartment at the bottom of the instrument. The battery voltage is controlled by an electronic circuit. If the voltage drops down below 7.5 V the R-C oscillator is switched off and the transducer stops oscillating. This way it is guaranteed, that the calibrator is working well within its technical parameters.

For calibration the microphone has to be slipped into the mouth of the sound source up to the stop. For ½" microphones at first the included ½" adapter has to be inserted. As an optional accessory an adapter for ¼" microphones is available.

**Caution:** Please insert the adapter and the microphone slowly. When inserting the adapter, do not close the hole with your finger. Otherwise the diaphragm may get damaged by excess pressure.

The big equivalent cavity volume of 200 cm<sup>3</sup> minimizes the error caused by different coupling conditions and equivalent air volume of the microphones. So, for instance, a microphone slipped loose into the calibrator has hardly an influence to the accuracy of the calibration. During the calibration process the calibrator and the microphone must not be moved against each other.

**Sound pressure sensitivity measurement of microphones:** For the measurement of sound pressure sensitivity a millivoltmeter has to be connected to the output of the microphone. The calibrator is switched on and the rms output voltage can be measured. The result of the indicated voltage divided by the sound pressure of the calibrator (94 dB is equivalent to a sound pressure of 1 Pa) is the sound pressure sensitivity of the microphone at 1000 Hz.

**Determination of the free field sensitivity of microphones:** A free sound field will be disturbed by the microphone itself. At an incidence perpendicular to the diaphragm of the microphone the sound wave causes a ram pressure in front of the diaphragm. Because of this higher pressure the free field sensitivity, related to the undisturbed wave propagation, rises at increasing frequencies in relation to the sound pressure sensitivity. The free field sensitivity of 1" microphones at a frequency of 1000 Hz is 0.4 dB higher than the sound pressure sensitivity measured with the calibrator. For ½" microphones the difference amounts to 0.2 dB. To determine the free field sensitivity by means of sound pressure calibration, refer to a sound pressure level of 93.6 dB = 0.957 Pa for 1" microphones and 93.8 dB = 0.980 Pa for ½" microphones.

**Calibration of sound level meters and acoustical measuring systems:** Sound level meters and acoustical measuring systems are calibrated by adjusting the indicator of the measuring instrument to the sound pressure level of the calibrator which is 94 dB. If the instrument is intended for use under free field conditions, please adjust the indication to the values mentioned above for determination of the free field sensitivity. The calibration frequency of 1000 Hz also allows the calibration with switched-on frequency weighting filters (A, B, C or D), because the attenuation of these filters is 0 dB at 1000 Hz.

## Technical Data

<b>Sound pressure level</b>	94 dB / 1 Pa
<b>Frequency</b>	1000 Hz $\pm$ 1.5 %
<b>THD</b>	$\leq$ 1 %
<b>Accuracy</b>	$\pm$ 0.3 dB, class 2 to IEC 942
<b>Reference conditions for specifications mentioned above</b>	23 °C (73 °F) 40 .. 60 % rel. humidity 1.013 · 10 <sup>5</sup> Pa atmospheric pressure
<b>Operating temperature range</b>	-10 °C .. 50 °C (14 .. 122 °F)
<b>Humidity</b>	$\leq$ 90 % rel. humidity
<b>Accuracy within the range of operating temperature and humidity of sound level of frequency</b>	$\pm$ 0.5 dB $\pm$ 2.5 %
<b>Suited microphones</b>	1" directly, adapters for ½" and ¼ "
<b>Equivalent cavity volume at 23 °C within the operating temperature range</b>	$\geq$ 200 cm <sup>3</sup> $\geq$ 100 cm <sup>3</sup>
<b>Battery</b>	IEC 6F22, 9 V battery
<b>Battery life</b>	approximately 100 hours
<b>Dimensions</b>	165 x 52 x 51 mm <sup>3</sup>
<b>Weight without battery</b>	360 g
<b>Accessories (included)</b>	05000, ½" adapter, instruction manual
<b>Accessories (optional)</b>	leather case, ¼" adapter

## **Limited Warranty**

Metra warrants for a period of  
**24 months**

that its products will be free from defects in material or workmanship and shall conform to the specifications current at the time of shipment.

The warranty period starts with the date of invoice.

The customer must provide the dated bill of sale as evidence.

The warranty period ends after 24 months. Repairs do not extend the warranty period.

This limited warranty covers only defects which arise as a result of normal use according to the instruction manual.

Metra's responsibility under this warranty does not apply to any improper or inadequate maintenance or modification and operation outside the product's specifications.

Shipment to Metra will be paid by the customer.

The repaired or replaced product will be sent back at Metra's expense.



## **Declaration of Conformity**

Product: Sound Level Calibrator

Type: 05000

It is hereby certified that the above mentioned product  
complies with the demands  
pursuant to the following standards:

- EN 50081-1
- EN 50082-1

Responsible for this declaration is the producer:

Metra Mess- und Frequenztechnik

Meissner Str. 58

D-01445 Radebeul

declared by

Manfred Weber

Radebeul, 5<sup>th</sup> of March, 1995