



SV 34B

ACOUSTIC CALIBRATOR

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1. INTRODUCTION

1.1. Calibration

Calibration determines the ratio between the input signal value and the indication on the display of the measuring device (or measured result).

In principle, there are more or less large systematic deviations between the displayed measured value and the true value of the measured signal for every measuring device. The task of calibration is to determine these systematic deviations.

The simplest way to consider such systematic deviations is a correction of measurements by calibration factor obtained with the use of an acoustic calibrator.

However, in many cases it is sufficient to determine that the systematic deviations are within certain limits.

"Correct" value of the measured signal is set before calibration, and this value is compared with a value measured by the measuring device.

Thus, calibration means establishing a relationship between the reference and measured value of the variable for the corresponding standard to be able to take this ratio into account in subsequent measurements as a correction factor (calibration factor).

1.2. Accuracy of calibration

Measuring equipment and measurement methods have deviations. The measured variable is affected by environmental conditions (temperature and humidity), as well as the operator's actions. The displayed value of the measured variable will therefore usually deviate from the true value of the measured variable.

It is recommended to check the SV 34B every 2 years with periodic testing of the test equipment to ensure that the level values do not change, and the test results are reliable.

It is important to carefully check who should perform such monitoring:

- internally by the monitoring body,
- SVANTEK's own calibration laboratory according to ILAC,
- externally from PTB = Physikalisch-Technische Bundesanstalt or
- another local accredited laboratory.

Accuracy

There is a deviation between the true value and the average value of the series of measurements under repetitive conditions, which is the result of repeated measurement of the reference level.

Overview of the classification of sound level meters and calibrators

Classification of sound level meters and acoustic calibrators

The acoustic calibrators (see IEC 60942. 2003) and the sound level meters (see IEC 61672: 2002) are classified into their respective classes and types for accuracy.

Type LS is subject to the strictest requirements of the device. Devices of this class are classified as the most precise.

Each of the following types (LS, 1 and 2) allow a wider tolerance range (see Table 1).

Table 1. Tolerances for these types of acoustic devices, except for the maximum extended measurement uncertainty ($f = 1\text{kHz}$)

Class / Type	LS	1	2
Sound level meters (dB)	-	0.7	1.0
Acoustic calibrators (dB)	0.10	0.25	0.40

As shown in Table 1, the acoustic calibrator has unambiguously lower tolerances than the sound level meter of the same class. Thus, the calibrator, as a reference of acoustic pressure, should be more precise than a sound level meter.

With respect to acoustic measurements conducted in accordance with the standard, the requirements for calibrating the measuring channel before each measurement and very often also after measurement are mandatory.

2. ACOUSTIC CALIBRATOR SV 34B

2.1. General description

The SV 34B acoustic calibrator is a small, portable one-range Class 2 device (sound source), see Picture 1. The SV 34B is suitable for calibration of Class 2 sound level meters and dosimeters with 1/2" microphones. Powered by two LR03/AAA batteries, it contains a loudspeaker producing acoustic pressure, reference piezoresistive sensor for monitoring generated level, pressure and temperature sensors for measurements of atmospheric conditions and a microprocessor system controlling the operation of the calibrator. A sinusoidal waveform of 1 kHz frequency is digitally generated and feeds the loudspeaker. The sampled signal from the reference piezoresistive sensor indicates the level of currently generated signal in a feedback loop. Based on the information about the level of the signal, actual values of pressure and temperature, microprocessor adjusts amplification of the loudspeaker signal in order to produce appropriate sound pressure level in the calibrator's chamber.



Note: Due to the feedback regulation loop the SV 34B calibrator does not require user's adjusting and operates in a wide range of temperatures and humidity (see SV 34B Datasheet).



Picture 1. Acoustic calibrator SV 34B

The SV 34B is designed for calibration of sound level meters with 1/2" microphones. Picture 2 shows the way of insertion of a 1/2" microphone into the calibrator.



Picture 2. Calibration of the personal exposure meter with a 1/2" measurement microphone



Note: For calibration of a meter with a 1/4" microphone the SA 30 reduction adapter must be applied.

2.2. Using the calibrator

2.2.1. Button functions

The SV 34B calibrator is equipped with a button for controlling operation of the device. The button is used to turn the device ON and OFF. In this case the button pushing has immediate effect.

When the SV 34B is either ON or OFF pressing the button over 10 seconds and releasing it will cause full reset of the system. Normally this function is not necessary. It has been implemented in the case of inappropriate operation of the calibrator caused by external (EM radiation, subnormal atmospheric conditions, etc) or internal (inappropriate system reset as a result of battery replacement, etc) factors.

The operation time of the calibrator with a microphone put inside its chamber is limited to 3-5 minutes. This functionality was added in order to save the battery life, e.g. when the calibrator is accidentally left with the microphone inside.

Table 2. Functional description of the calibrator's button.

Button press	Function description
Short, less than 10 sec.	Turn the device on/off
Long, over 10 sec.	Full reset of the system

2.2.2. Indicators

There are two LEDs to indicate the state of the SV 34B calibrator. One of them is titled “**114 dB**” and shows the condition of the generated level.

After the calibrator is put on the microphone and switched on, acoustic pressure inside the calibrator’s chamber is automatically adjusted to the desired level. During that process “**114 dB**” diode blinks with a frequency of approx. 2 Hz.

The device is ready when this diode is on with a continuous light.



Note: Calibration should not be performed until the “**114 dB**” diode light is continuous.

The diode called “**LOW BAT.**” presents the batteries status. When the combined battery voltage is less than 2.1 V the “**LOW BAT.**” diode will blink with a frequency of approximately 2 Hz. It is recommended to not use the SV 34B calibrator in this state as the generated level may differ from the declared values.



Note: Replace both batteries, when when the diode “**LOW BAT.**” blinks.



Picture 4. The top view of the SV 34B calibrator with one diode on

2.3. Replacing the batteries

The batteries should be replaced as follows:

- a) remove the rubber cover on the button and diodes’ side



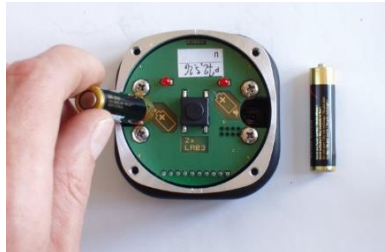
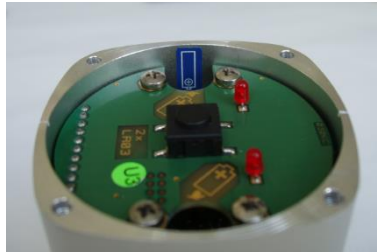
b) holding the cover unscrew four fixing screws with your fingers



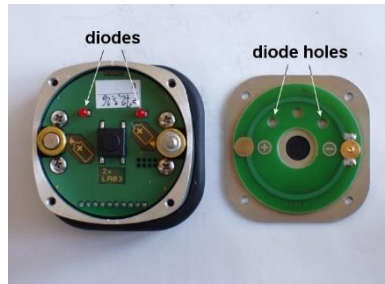
c) take off the cover and remove discharged batteries



d) put two new batteries in place of the discharged ones with polarization as indicated on the printed board and calibrator's case



e) carefully put on the cover so that the diodes fit the corresponding holes in it



f) holding the cover with one gently hand fasten the fixing screws



g) put on the rubber cover.



3. SV 34B TECHNICAL SPECIFICATIONS

Output signal

Sound Pressure Level (SPL):	114 dB, with respect to 20 μ Pa in reference conditions
Output frequency	1000 Hz
Accuracy:	IEC 60942: 2003 standard, Class 1
SPL Accuracy:	± 0.5 dB
Frequency accuracy:	± 0.02 %
Total Harmonic Distortion (THD)	< 0.75 %

Reference conditions

Temperature:	23 °C
Atmospheric pressure:	101.3 kPa
Humidity:	30-80% RH
Effective microphone load volume:	250 mm ³ , microphone type: Brüel&Kjaer 4134, SN:1591010

General data

Effective load volume sensitivity:	0.00027 dB/mm ³
Level stabilization time:	typical 7 sec., max. 10 sec.
Microphone dimensions:	1/2" (13.2 mm) or 1/4" with reduction adapter SA 30
Storage temperature range:	-25 °C to +70 °C (-13 °F to +158 °F)
CE classification:	EN 61010-1: 2010, EN 61326-1:2013, EN 60942:2003

Working conditions

Temperature range:	from 0°C to +40°C (32 °F to 104 °F)
Atmospheric pressure range:	from 65 kPa to 108 kPa (19.2 inHg to 31.9 inHg)
Humidity range:	from 25% to 90% RH

Environmental conditions influence (typical)

Temperature coefficient:	$\pm 5 \cdot 10^{-3}$ dB/°C
Pressure coefficient:	$\pm 1 \cdot 10^{-4}$ dB/hPa
Humidity coefficient:	$\pm 1.25 \cdot 10^{-3}$ dB/%

Power supply

Battery type:	two LR03 (IEC)/AAA (ANSI) alkaline batteries
Continuous operation time:	30 hours
Standby mode:	approx. 2 years
Minimal operating voltage:	2.1 V DC

Dimensions and weight

Weight:	305 g (10.9 oz) with batteries
Dimensions:	65 x 65 x 70 mm

EMC properties

- The configuration with the highest RF emission in the direction parallel to the axis of the calibrated microphone in the acoustic chamber
- The lowest level of noise immunity is parallel to the axis of the calibrated microphone in the acoustic chamber.

Other connections with the calibrator are not available.