SVANTEK

USER MANUAL

SV 34B

ACOUSTIC CALIBRATOR

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Contents

1. INTRODUCTION

1.1. Calibration

Calibration is the determination of the relationship between the value of the input signal and the reading on the instrument display (or measurement 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 instrument. The task of calibration is to determine these systematic deviations.

The simplest way to account for such systematic deviations is to correct the measurements by a calibration factor obtained by using an acoustic calibrator.

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

The "correct" value of the measurement signal is set before calibration and this value is compared with a value measured by the instrument.

Calibration therefore means establishing a relationship between the reference value and the measured value of the variable for the corresponding standard, so that this relationship can be used as a correction factor (calibration factor) in subsequent measurements.

1.2. Accuracy of calibration

Measuring instruments and measurement methods are subject to error. The measured variable is affected by environmental conditions (temperature and humidity) and operator actions. The displayed value of the measured variable will therefore usually differ from the true value of the measured variable.

It is recommended that the SV 34B is checked 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 consider carefully who should carry out such monitoring:

- internally by the inspection 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 of the series of measurements under repeated conditions, which is the result of repeated measurement of the reference level.

Classification of Sound Level Meters and Acoustic Calibrators

Acoustic calibrators (see IEC 60942. 2003) and the sound level meters (see IEC 61672: 2002) are classified into classes and types according to their accuracy.

Type LS has the most stringent requirements for the instrument. Equipment in this class is considered to be the most accurate.

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

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

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 significantly lower tolerances than the sound level meter of the same class. The calibrator should therefore be more accurate than a sound level meter as a reference for sound pressure.

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

2. ACOUSTIC CALIBRATOR SV 34B

2.1. General description

The SV 34B Acoustic Calibrator is a small, portable single range Class 2 device (sound source) instrument. The SV 34B is suitable for calibrating Class 2 sound level meters and dosimeters with ½" microphones. Powered by two LR03/AAA batteries, it contains a loudspeaker to generate sound pressure, a piezoresistive reference sensor to monitor generated level, pressure and temperature sensors to measure atmospheric conditions, and a microprocessor system to control the operation of the calibrator. A 1 kHz sinusoidal waveform is digitally generated and fed to the loudspeaker. The sampled signal from the reference piezoresistive sensor indicates the level of the currently generated signal in a feedback loop. Based on the information about the level of the signal and the actual values of pressure and temperature, the microprocessor adjusts the amplification of the loudspeaker signal to produce an appropriate sound pressure level in the calibrator chamber.

Note: *The SV 34B calibrator requires no user adjustment due to its feedback control loop and operates over a wide range of temperature and humidity (see technical specification).*

Figure 1. Acoustic calibrator SV 34B

The SV 34B is designed for calibrating of sound level meters with ½" microphones. Figure 2 shows how to insertion of a ½" microphone into the calibrator.

Figure 2. Calibration of the personal exposure meter with a ½" measurement microphone

Note: *To calibrate a sound level meter with a ¼" microphone, the SA 30 reduction adapter must be used.*

2.2. Using the calibrator

2.2.1. Button functions

The SV 34B is equipped with a button to control the operation of the calibrator. The button is used to switch the device ON and OFF. In this case, pressing the button has an immediate effect.

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

The operating time of the calibrator with the microphone in the chamber is limited to 3-5 minutes. This feature has been added to conserve battery life if, for example, the calibrator is accidentally left with the microphone inside.

Table 2. Functional description of the calibrator button

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

2.2.2. Indicators

There are two LEDs indicating the status of the calibrator. One is labelled "**114 dB**" and indicates the status of the generated level.

When the calibrator is placed on the microphone and switched on, the sound pressure inside the calibrator chamber is automatically adjusted to the desired level. During this process, the "**114 dB**" diode flashes at a frequency of approximately 2 Hz.

The calibrator is ready for use when this diode is lit with a steady light.

Figure 3. The top view of the SV 34B calibrator with the 114 dB LED lit

Note: *Calibration should only be performed when the* ***'114 d****B' LED is lit continuously.*

The LED 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 calibrator in this state as the generated level may differ from the declared values.

Note: *Replace both batteries when the "****LOW BAT.****" LED is flashing.*

2.3. Replacing the batteries

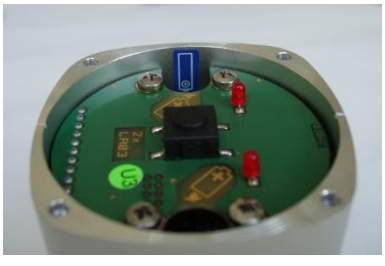
The batteries should be replaced as follows:

1. Remove the rubber cover on the button and diodes side.

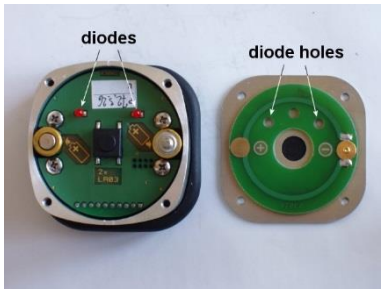
2. While holding the cover, use your fingers to unscrew the four fixing screws.

3. Remove the cover and remove the flat batteries.

4. Insert two new batteries in place of the discharged ones, with the polarisation as indicated on the printed circuit board and on the calibrator case.



5. Carefully place the cover so that the diodes fit into the corresponding holes in the cover.



6. Hold the cover with one hand and carefully tighten the fixing screws.

7. Fit the rubber cover.

3. SV 34B TECHNICAL SPECIFICATIONS

Output signal

Sound Pressure Level (SPL):	114 dB, with respect to 20 μPa in reference conditions
Output frequency	1000 Hz
Accuracy:	IEC 60942: 2003 standard, Class 2
SPL Accuracy:	±0.5 dB
Frequency accuracy:	±0.2 %
Total Harmonic Distortion (THD)	< 2.0 %

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/mm3
Level stabilization time:	typical 7 sec., max. 10 sec.
Microphone dimensions:	½" (13.2 mm) or ¼" 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.