SVANTEK

USER MANUAL

SV 36

ACOUSTIC CALIBRATOR

Warsaw, 2024-10-07
Rev. 1.07

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 36 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 the 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 36

2.1. General description

The SV 36 Acoustic Calibrator is a small portable dual range (94dB and 114dB reference) Class 1 (sound source) instrument. The SV 36 is suitable for calibrating Class 1 and 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 the 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 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.

The SV 36 automatically corrects the sensitivity of the reference microphone in the static pressure range from 65 kPa to 108 kPa, ensuring accuracy in accordance with IEC 60942: 2017 for Class 1 devices. The SV 36 has a built-in static pressure sensor or this purpose.

Note: *Due to the feedback control loop, the SV 36 calibrator requires no user adjustment and operates over a wide range of temperature and humidity (see technical specification).*

Figure 1. SV 36 Acoustic Calibrator

The SV 36 is designed for calibrating sound level meters with ½" and ¼" microphones. Figure 2 shows the calibration of the Class 1 sound level meter SVAN 971 with a ½" microphone.

Figure 2. Calibration of the SVAN 971 sound level meter with a ½" measurement microphone

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

2.2. Using the calibrator

2.2.1. Automatic calibration

The SV 36 calibrator is equipped with an optical system that detects the presence of a microphone in the calibrator chamber. This allows the calibrator to switch on automatically when it is placed on the microphone and to switch off when it is removed. Using the SV 36 calibrator is therefore as simple as placing it on the microphone, performing the calibration and removing it from the microphone.

Note: *The SV 36 calibrator always switches on in the range set at the moment it is switched off.*

Note: ***A****utomatic switch-on will not work if the SA30 calibration adapter is inserted into the calibrator chamber.*

Note: *The default range after changing the battery is 114 dB.*

2.2.2. Button functions

The SV 36 calibrator is equipped with a multi-functional button for controlling the operation of the calibrator. The functions of the button depend on the state of the calibrator (ON/OFF) and on the time it is pressed (see Table 2).

When the calibrator is OFF, pressing the button will switch it ON immediately. The range is automatically set to the range in which the calibrator was switched off. If the calibrator is not placed on the microphone within 3-5 seconds of switching on, it will automatically switch off.

When the calibrator is ON, pressing the button briefly (less than 3-5 sec.) will change the range from 94 dB to 114 dB or vice versa.

When the SV 36 is either ON or OFF, pressing and releasing the button for 10 seconds and releasing it will cause a complete reset of the system. Normally this function is not required. It has been implemented in the case of improper operation of the calibrator caused by external (EM radiation, subnormal atmospheric conditions, etc) or internal factors (improper system reset as a result of battery replacement).

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

Note: *Leaving the SA 30 reduction adapter in the calibrator chamber is equivalent to leaving the microphone inside. Therefore, the calibrator will automatically switch off after 3 minutes from the moment the adapter is placed inside the calibrator.*

Table 2. Functional description of the calibrator button.

Calibrator switched OFF	
Button press	Function description
Short, less than 3 sec.	Turn the device on
Long, over 10 sec.	Full reset of the system

Calibrator switched ON	
Button press	Function description
Short, less than 3 sec.	Change the range of the device
Long, over 10 sec.	Full reset of the system

2.2.3. Range LEDs

In normal mode the calibrator's LEDs act as range indicators. In this mode, the LED for the selected range will illuminate continuously, indicating that the calibrator is ready to start the calibration procedure (see Figure 3).

When the calibrator is placed on the microphone, switched on or the range is changed, the sound pressure in the calibrator chamber is adjusted to the desired level. During this process, the corresponding range LED flashes at a frequency of 2 Hz.

Note: *Calibration should only be performed when the range LED is lit continuously.*

Figure 3. The top view of the SV 36 calibrator with the 114 dB LED lit

The alternate flashing of the LEDs indicates low battery voltage. It is recommended not to use the SV 36 calibrator in this condition as the generated level may differ from the declared values.

Note: *Replace the batteries, when the LEDs flash alternately.*

2.3. Changing the batteries

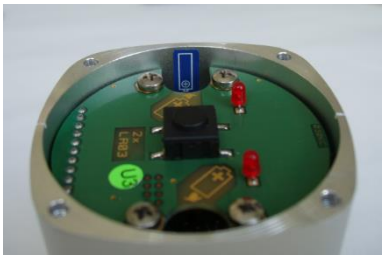
The batteries should be replaced as follows:

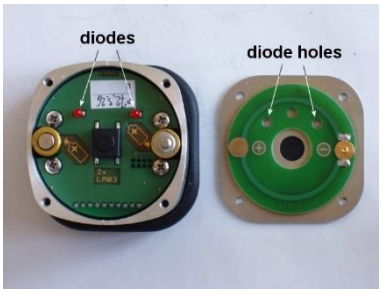
a) Remove the rubber cover from the button and diodes side.

b) Holding the cover, unscrew the four fixing screws with your fingers.

c) Remove the cover and remove the flat batteries.

d) Replace the discharged batteries with new ones, polarised as indicated on the printed circuit board and on the calibrator case.





e) Fit the cover so that the LEDs fit into the corresponding holes in the cover.

f) Holding the cover with one hand, tighten the fixing screws.

g) Fit on the rubber cover.

3. SV 36 TECHNICAL SPECIFICATIONS

Output signal

Sound Pressure Level (SPL):	94 dB and 114 dB (principal), with respect to 20 μPa in reference conditions
Output frequency	1000 Hz
Accuracy:	IEC 60942:2017 standard, Class 1
SPL Accuracy:	±0.25 dB
Frequency accuracy:	±0.2 %
Total Harmonic Distortion	< 0.75 % for 94 dB range and < 1.00 % for 114 dB range

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 10 sec., max. 25 sec.
Microphone dimensions:	½" and ¼" with reduction adapter SA 30
Storage temperature range:	-25 °C do + 70 °C
CE classification:	EN 61010-1: 2010 EN 61326-1:2013 EN 60942:2017

Working conditions

Temperature range:	from –10°C to +50°C
Atmospheric pressure range:	from 65 kPa to 108 kPa
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:	40 hours in 94 dB range and 30 hours in 114 dB range
Standby mode: approx.	2 years
Minimal operating voltage:	2.1 V DC
Maximum operating voltage:	4 V DC - absolute maximum supply voltage at the battery terminals.

Dimensions and weight

Weight:	305 g with batteries
Dimensions:	65 x 65 x 70 mm

EMC characteristics

- 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 to the calibrator are not available.

4. DECLARATION OF CONFORMITY

SVANTEK

INSTRUMENTATION FOR SOUND & VIBRATION
MEASUREMENTS AND ANALYSIS

EU Declaration of Conformity

No. SV 36-CE-EN/11/2019

Manufacturer:	**SVANTEK Sp. z o. o**
Address:	Strzyglowska 81 04-872 Warszawa Poland
Kind of product:	*CLASS 1 ACOUSTIC CALIBRATOR*
Type:	**SV 36**

Directive:	**Low Voltage Directive (LVD) 2014/35/EU**
Standard:	EN 61010-1: 2010 *Safety requirements for electrical measurement equipment*

Directive:	**Electromagnetic Compatibility Directive (EMC) 2014/30/EU**
Standards:	EN 61326-1:2013 *Measurement equipment: EMC emission and immunity*

Auxiliary industry standards:

IEC 60942:2017 *Electroacoustics - Sound calibrators*

I, the undersigned, representing the manufacturer, declare in sole responsibility, that the product specified above, to which this declaration relates, conforms to the above mentioned Directives and Standards:

Place of issue: **Warsaw, Poland**

Date of issue: 18 11 2018

Wiesław Barwicz, General Manager .....
(signature)