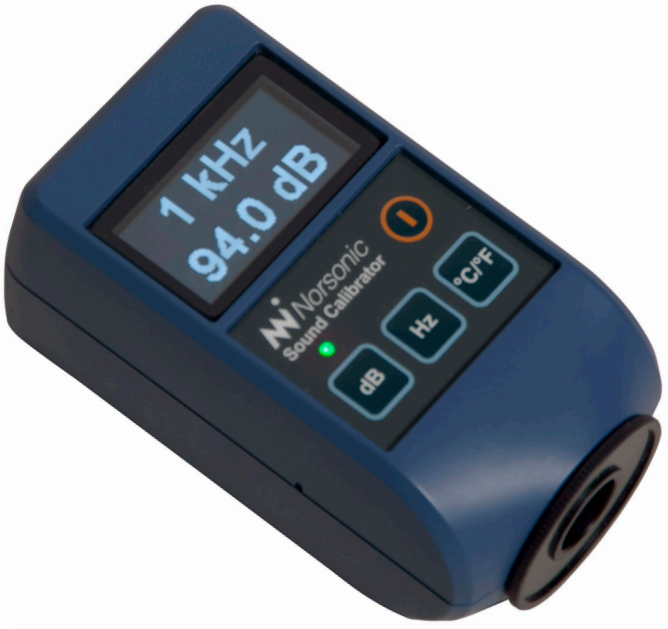
INSTRUCTION MANUAL



nor1256

Class 1 **sound calibrator**

Complies with IEC 60942 class 1

CE

Norsonic

Nor1256 - May 2017

IM1256_Ed2R3En

If you wish to communicate with us, please feel welcome.
Our address is:

Norsonic AS, P.O. Box 24, N-3421 Lierskogen, Norway
Find us on the web: www.norsonic.com
Tel: +47 3285 8900
Fax: +47 3285 2208
e-mail: info@norsonic.no

nor1256

Class 1 **Sound Calibrator**

Introduction

The Sound Calibrator Nor1256 is a small, battery operated sound source for the calibration and check of sound measuring instruments. The specifications conform to the requirements in IEC 60942 for a class 1 sound calibrator. The combination of two different levels and two different frequencies allows both level linearity and frequency linearity to be verified. In addition the Sound calibrator measures the environmental conditions: air pressure, temperature and humidity.

The sound calibrator may be used for calibration and check of most laboratory and working standard microphones with diameter not larger than 1" (LS1/WS1).

The microphone of the sound level meter shall be placed in the acoustic coupler of the calibrator before the calibrator is switched ON. After start up the calibrator will produces a regulated sinusoidal sound pressure signal at 1 kHz with a sound pressure level of 94,0 dB. The sound is generated by a small loudspeaker integrated in the acoustic coupler. The level is measured with an internal reference microphone and is automatically adjusted until the level is correct. This is indicated by the LED on the front turning from red to green. The feedback ensures that the sound level is nearly independent of the acoustic load volume of the microphone.

By pressing the **dB** button, the sound pressure level may be switched between 94 dB 114 dB.

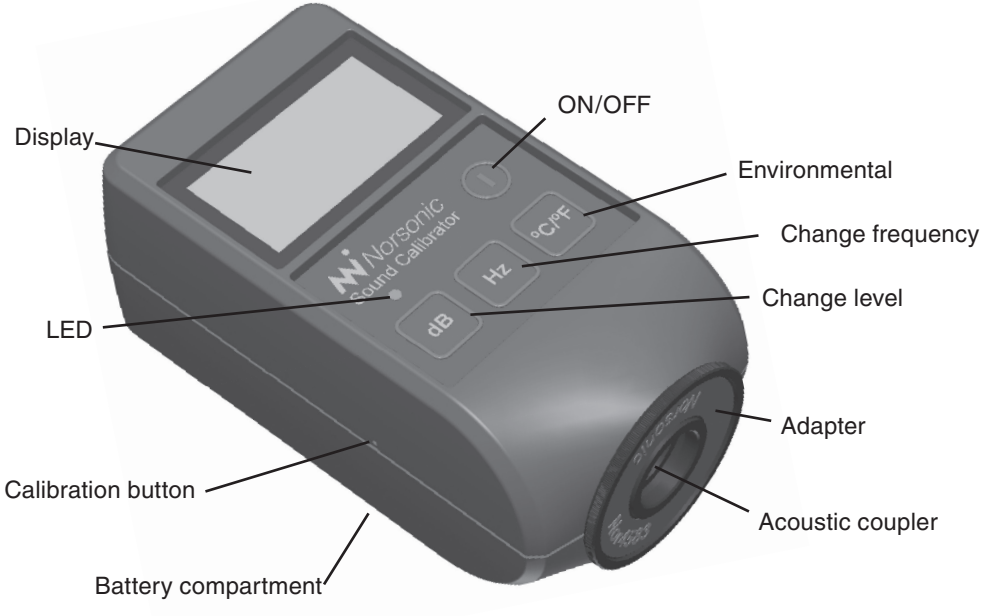
By pressing the **Hz** button, the frequency of the sound may be switched between 1 kHz and 250 Hz. Due to the principle of operation, the calibration level is virtually independent of ambient conditions like temperature, atmospheric pressure and humidity within the specified range of operation.

The calibrator has been designed to serve one-inch and smaller microphones and sound level meters equipped with such microphones. One-inch microphones fit directly in the calibrator coupler, while half-inch and smaller microphones are served by application of a suitable adaptor. Adaptor for half-inch microphones is included, while adaptors for other microphone sizes must be ordered separately.

The calibrator is powered from two type LR03 alkaline batteries (AAA-size, also classified as 24A by ANSI/NEDA). If the voltage is too low to ensure proper operation, the calibrator will switch off or not switch on. Remove the batteries as soon as they are discharged or if the sound calibrator is stored for a prolonged period of time. Leakage from the battery may otherwise destroy the electronic components.

Using the sound calibrator

- Switch on the sound level meter to be calibrated and let the meter stabilize before calibration. A typical sound level meter needs at least 3 minutes to stabilise.
- Place the microphone of the sound level meter to be calibrated in the coupler of the calibrator. Use a suitable adaptor, if necessary. Use a slow movement, since a fast movement may create an excessive pressure which temporarily may change the sensitivity of the microphone.
- Press **ON/OFF** button. Wait for the LED above the "**dB**-button" to change from red to green. The level and frequency is indicated in the display of the calibrator. After powering the sound calibrator, the first combination of frequncy level is 94 dB re. 20µPa and 1 kHz. Select the appropriate level and frequency for your calibration by pressing the **dB** or **Hz** button, respectively.
- Normally the background level should be more than 20 dB lower than the level from the calibrator in order to not influence the reading. Therefore it is good practice to notice the indicated sound level before the sound calibrator is switched on.



- Press **Hz** to select a new frequency. Press **dB** to select a different levels.
- Press the **°C/°F** to display the environmental conditions: air pressure, temperature and humidity. The temperature and humidity is measured inside the calibrator. Note that due to the power consumption of the calibrator the temperature may rise above the ambient condition after longer time of operation affecting both the temperature and the humidity indication (Typically 3**°C after 30 minutes)**. It is therefore a good practice to measure the conditions shortly after powering the unit. The temperature may be displayed in centigrade (Celsius) or in degree Fahrenheit.
- Press the **°C/°F** again for returning to the sound calibrator mode.
- Press **ON/OFF** for switching the calibrator off.

The calibrator shuts off by itself after ten minutes. However, if a microphone has not been inserted or the level has not otherwise reached stability, the unit will switch off after 20 seconds. The automatic power off, may be deactivated by keeping the power on button depressed for more than 3 seconds when the unit is switched on (Keep the **ON** button depressed until the red LED turns on).

Power off!
The automatic power off, may be deactivated by keeping the power on button depressed for more than 3 seconds when the unit is switched on (until the LED lights).

Acclimatisation

Is always a good practice to let the calibrator and the sound measuring equipment reach the prevailing environmental conditions (mainly temperature) before using a sound calibrator. If the sound calibrator and the microphone to be calibrated have different temperatures, an unstable conditions exits and the calibration will not be reliable.

Unit for temperature

The temperature may be displayed in either degree Celcius (°C) or degree Fahrenheit (°F). In order to change the unit, keep the button **°C/°F** depressed during power on.

Sound pressure levels

The sound pressure in the coupler of the calibrator is produced by a small loudspeaker. The level is monitored by a reference microphone and adjusted to obtain the specified levels at the different frequencies.

All sound level meters should display at least the A-weighted sound pressure level. The A-weighting is a standardized, frequency dependent weighting which originally was developed to mimic our auditory organ and is specified in the standards for a sound level meter. The stated levels for calibrator Nor1256 are all un-weighted levels for both frequencies.

The nominal attenuation of the A-weighting is 0 dB at 1 kHz (reference frequency) and 8,6 dB at 250 Hz. The nominal A-weighted sound pressure levels for the calibrator will therefore at 250 Hz be 85,4 dB and 105,4 dB, respectively. The attenuations of the C-weighting are for both frequencies 0,0 dB and C-weighted levels correspond therefore with the un-weighted levels.

Most sound level meters are designed to show the correct free-field sound pressure level. This means that the indication shall correspond to the level in a free, progressive field before the sound level meter was placed in the field. The size of the microphone – and eventually the sound level meter body – will modify the pressure just in front of the microphone – especially at higher frequencies. For a ½"microphone (type WS2F) the pressure increase will typically be 0,1 dB at 1 kHz. It is therefore a common recommendation to adjust the sound level meters applying such microphones to display 93,9 dB and 113,9 dB, respectively at 1 kHz.
If microphones other than WS2P are used, the reading from the sound level meter should be corrected accordingly. See the list below for some microphones in common use

Recalibration

At regular intervals – at least once per year – proper operation of the sound calibrator should be verified, preferably by an accredited acoustic calibration laboratory or the Norsonic factory. The calibration should be performed as specified for periodic verification in the International standard for sound calibrators IEC 60942 (2003), Annex B.
The level should preferably be measured with a laboratory standard microphone type LS2, according to IEC 61094-1, where the pressure sensitivities at the different frequencies are known with a sufficiently high accuracy.

Various types and makes of microphones may have different effective load volume. Due to its working principle, the Nor1256 has a large effective coupler volume. The variations in sound pressure level due to variations in effective load volume among microphones are therefore for most applications insignificant. An equivalent microphone volume of 250 mm^3 is used as reference load volume for ½" microphones. This corresponds to most ½" measuring microphones with protecting grid mounted like the Norsonic types 1220, 1225, 1226, 1227 and 1230. If no adaptor ring is used, the nominal reference front volume is 1333 mm^3. This corresponds to most 1" measuring microphones with the protection grid mounted.

The sound pressure levels generated by the calibrator may be adjusted by the following procedure (NOTE: it will not be possible to switch the calibrator OFF during calibration mode):

Correction for different Microphones

Supplier	Type of microphone	Adjustment level/dB 250 Hz	Adjustment level/dB 1000 Hz
Brüel & Kjaer	4144, 4134, 4166, 4192	94,0 bzw. 114,0	94,0 bzw. 114,0
Brüel & Kjaer	4145	94,0 bzw. 114,0	93,7 bzw. 113,7
Brüel & Kjaer	4149, 4165,	94,0 bzw. 114,0	93,9 bzw. 113,9
Brüel & Kjaer	4176, 4188, 4189, 4190, 4191	94,0 bzw. 114,0	93,9 bzw. 113,9
Brüel & Kjaer	4180	94,0 bzw. 114,0	94,0 bzw. 114,0
CEL	186/3F, 192/2, 192/2F	94,0 bzw. 114,0	93,9 bzw. 113,9
GRAS	40 AE, 40 AF	94,0 bzw. 114,0	93,9 bzw. 113,9
GRAS	Low Noise 40 HL	94,0	93,9
GRAS	40 AU, 40 AIR, 40 AQ	94,0 bzw. 114,0	94,0 bzw. 114,0
GRAS	40 AG, 40 AK, 40 GK	94,0 bzw. 114,0	94,0 bzw. 114,0
Larson Davis	2540, 2541	94,0 bzw. 114,0	93,9 bzw. 113,9
Mikrotech Gefell	MK 102.1	94,0 bzw. 114,0	93,7 bzw. 113,7
Mikrotech Gefell	MK 221, MK222, MK223	94,0 bzw. 114,0	93,9 bzw. 113,9
Norsonic	1220, 1222, 1225, 1227, 1228	94,0 bzw. 114,0	93,9 bzw. 113,9
Norsonic	1230	94,0 bzw. 114,0	94,0 bzw. 114,0
NTI	M2010	94,0 bzw. 114,0	93,9 bzw. 113,9
RION	UC-52, UC-53, UC-53N	94,0 bzw. 114,0	93,9 bzw. 113,9

- Place the reference microphone in the coupler and select the appropriate frequency.
- Press the calibrator button for about one second until the display starts blinking and the LED turns red. The calibrator button is accessible through a small hole in the left-hand side of the enclosure. Use a small rod with a diameter of about 1 mm.
- While the display is blinking, press **Hz** to increase the level or **dB** to reduce the sound pressure level. The level is changed in step of about 0,02 dB.

Warning!
Never enter the calibration mode without access to reliable references.

- When the correct level is obtained, press the calibrator button once more for returning to normal operation.

The displayed temperature, air pressure and humidity may be adjusted in a similar way:

- Place a microphone in the coupler and select any frequency.
- Press the calibrator button for about one second until the display starts blinking and the LED turns red. The calibrator button is accessible through a small hole in the left-hand side of the cabinet. Use a small rod with a diameter of about 1 mm.
- Press **°C/°F** and the temperature value starts blinking.
- While the display is blinking, press **Hz** to increase the reading or **dB** to reduce the reading.
- When the correct value is displayed, press **°C/°F** and the value for air pressure start to blink.
- While the display is blinking, press **Hz** to increase the reading or **dB** to reduce the reading.
- When the correct value is displayed, press **°C/°F** and the value for humidity start to blink.
- While the display is blinking, press **Hz** to increase the reading or **dB** to reduce the reading.
- When the correct value for humidity is displayed, press **°C/°F** and the calibration mode is terminated and the instrument returns to normal mode of operation.

Main specification:

Sound calibrator class 1 according to IEC 60942 Ed. 3 (2003) and ANSI/ASA S1.40-2006 (R2011).

In addition, the calibrator displays: Temperature, Air pressure and Humidity. The temperature and humidity is measured in the enclosure where the temperature will be higher and humidity lower after some time of operation.
Temperature range: -10°C to +50°C; Resolution 0,1°C; Accuracy ±2°C,
Atmospheric pressure: 65 kPa to 108 kPa; Resolution 0,1 kPa; Accuracy ±0,4 kPa, (for temperature above 0°C)
Relative humidity: 0% to 100%; Resolution 1%; Accuracy ±4%, (for temperature above 0°C and humidity in the range 25% to 85%)

Level and frequencies at reference conditions (23,0°C/101,325 kPa/50% RH) – levels in decibel relative to 20µPa:
250 Hz (251,19±0,30)Hz : (114,0±0,2)dB; 94,0±0,2)dB
1 kHz (1000,00±1,00)Hz : (114,0±0,2)dB; (94,0±0,2)dB

Distortion: Max 2,0%

Stabilizing time: 20 seconds.

Sensitivity to environmental conditions: As specified for IEC 60942 class 1.

Microphone size: 1/1" and below. Adapter for 1/2" microphone Nor4583 (included)

Power supply:
Battery operated: two LR03 alkaline batteries (AAA-size, also classified as 24A by ANSI/NEDA).
Voltage for specified operation: 2 V – 3.4 V. Automatic switch off if the voltage is too low for operation according to the specifications.
Battery life:> 10 hours

Display: Mono-colour OLED graphical display with resolution 128 x 64 (W x H) and a dual colour LED.
Principal sound pressure level (IEC 60942 point 6.3): 114,0 dB,
Principal frequency (IEC 60942 point 6.3): 250 Hz.

Environmental range for specified operation:
Temperature: -10 °C to +50 °C (14 °F to 122 °F)
Relative humidity: 25% to 90%**.**
Air pressure: 65 kPa to 108 kPa.

Reference orientation for testing the effects of exposure to/radiation of radiofrequency fields: Display in direction of antenna.

Weight: 125 g (0,28 lb)
Size: 97x51,5x41 mm (3,8x2,0x1,6")

Declaration of Conformity

We, Norsonic AS, Gunnersbråtan 2, Tranby, Norway, declare under our sole responsibility that the product:

Sound Calibrator Nor1256

to which this declaration relates, is in conformity with the following standards or other normative documents:

Product Standard	IEC 60942 ed. 3.0 – 2003 Class 1 ANSI/ASA S1.40-2006 (R2011) Class 1
Safety:	EN61010–1 ed. 3.0 – 2010 for portable equipment and pollution category 2.
EMC:	IEC 60942 ed. 3.0 – 2003

following the provisions of the LVD- and EMC-Directive. The direction of maximum sensitivity/emission is with the display facing the antenna.

This product has been manufactured in compliance with the provisions of the relevant internal Norsonic production standards. All our products are tested individually before they leave the factory. Calibrated equipment—traceable to national and international standards—has been used to carry out these tests.

This Declaration of Conformity does not affect our warranty obligations.

Tranby, September 2015

Dagfinn Jahr
Quality Manager

The declaration of conformity is given according to EN 45014 and ISO/IEC Guide 22.

Norsonic AS, P.O. Box 24, N-3421 Lierskogen, Norway

Norsonic
P.O. Box 24
N-3421 Lierskogen
Norway
Tel: +47 3285 8900
Fax: +47 3285 2208
info@norsonic.com
www.norsonic.com

Norsonic AS supplies a complete range of instrumentation for acoustics – from sound calibrators, microphones & preamplifers; via small handheld sound level meters to advanced, yet portable, real time analysers, but also building acoustics analysers and complete community, industry and airport noise monitoring systems. Contact your local representative or the factory for information on our complete range of instrumentation.