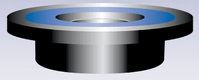
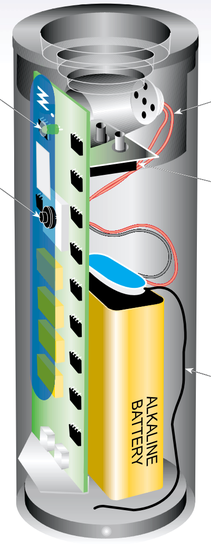
An insider's view of a Norsonic calibrator

There are adaptors available to also facilitate the calibration of ½-inch and ¼-inch cartridges in addition to full-inch. Note that the Nor-1252 accepts ½-inch and ¼-inch cartridges only.





A green LED illuminates when the sound pressure level inside the coupler cavity is correct.

The power button. Depress to start generating the sound pressure level. The sound calibrator switches itself off automatically if the required sound pressure level cannot be established, for example if the microphone to be checked has not been inserted.

At any rate, the unit switches itself off after approximately five minutes.

Miniature loudspeaker generating the sound pressure level inside the coupler.

Silicon microphone monitoring the sound pressure level inside the coupler. One side of the the microphone diaphragm is exposed to the sound pressure inside the coupler while the rear side of the diaphragm is located in a separate vented cavity to prevent pick-up of extraneous noise signals.

The cord is attached to the battery connector and the bottom lid. Remove the lid and pull the cord to get the battery out.

Remove (by pulling) the bottom lid to gain access to the battery compartment.

Specifications

	Nor-1253	Nor-1251	Nor-1252
IEC60942 Classification	Class 0	Class 1	Class 2
Complies with ANSI S1.40	Yes	Yes	Yes
Sound pressure level (re: 20µPa)	124.0 ± 0.2 dB	114.0 ± 0.2 dB	114.0 ± 0.4 dB
Frequency	250 Hz ± 0.2% [1]	1000 Hz ± 0.2%	1000 Hz ± 0.2%
Distortion	<1%	<1%	<1%
Sensitivity to change in the load volume	– 0.00002 dB/mm³ (250 Hz) +0.0003 dB/mm³ (1000 Hz)	+0.0003 dB/mm³	+0.0003 dB/mm³
Typical change in SPL per year	< 0.01 dB	< 0.02 dB	< 0.02 dB
Time for level to stabilise	<2 sec.	<2 sec.	<2 sec.
Microphone cartridge size	1", ½", ¼"	1", ½", ¼"	½", ¼"
Controls	Power-on push button with green LED indication. Automatic shut-off when the microphone is removed (except for ¼")		
Temperature range	–10 °C to +50 °C	–10 °C to +50 °C	–10 °C to +50 °C
Ambient pressure range	65–108 kPa	65–108 kPa	65–108 kPa
Humidity range	10–90 %RH	10–90 %RH	10–90 %RH
Battery type	9V 6LR61	9V 6LR61	9V 6LR61
Battery life-time	>20 hours	>30 hours	>30 hours
External supply voltage (via battery connector)	7.5–15 Vdc. Automatic shout-off when V_{BATT} < 7.5 Vdc		
CE classification, EMC	EN50081-1, EN 50082-1		
Safety	EN 61010-1, 1993 portable equipment pollution category 2		
Size	L: 109.5 mm; Ø: 40 mm		
Weight	185 g with battery		

[1] Other frequency on request. Note that this may alter the load volume

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Sound Calibrators

Introducing the world's first "electronic pistonphone"

Norsonic

Sound calibrators. No sound measurement is correct without them.

The use of sound calibrators dates back to the days when it was easier to design a stable sound calibrator than a stable sound level meter.

Today, sound measuring instruments, in general, are as stable as the sound calibrators.

However, measuring microphones are very delicate devices designed to fulfill very rigid specifications. This makes them vulnerable and subject to damage unless care is taken.

One may therefore say that a calibrator is just as much a verification of proper operation as it is a device for re-adjustment of sensitivity of sound measuring instruments.

The Norsonic selection of sound calibrators comprises three types, viz. the Nor-1251, the Nor-1252 and the Nor-1253. The difference between them lies in their accuracy; while the Nor-1251 is a class 1 calibrator and the Nor-1252 is a class 2 calibrator, the Nor-1253 is no less than a class 0 calibrator!

The “Electronic Pistonphone”

Being a class 0 calibrator the Nor-1253 is often referred to as the “electronic pistonphone” since it maintains an accuracy normally associated with a pistonphone without the need for a barometer to make corrections for variations in the ambient pressure.

Standard class 0 version of the Nor-1253 comes in two versions, producing 124 dB SPL re. 20 µPa at 250 Hz or at 1000 Hz.

However, special versions are available. These will be of Class 1 accuracy. The output signal level is then factory preset to any level within the range 114–134 dB and the frequency may be factory preset to any frequency within the range 80–4000 Hz. None of these settings are user-adjustable.

Effective Volume Corrections

Different microphone cartridges tend to have different effective front volumes. The working principle of our calibrators produces a large effective coupler volume. The variations in the sound pressure level inside the coupler due to variations in the effective front volume will therefore be insignificant for most applications.

The Nor-1253 is adjusted with the ½-inch adaptor for an equivalent microphone volume of 250 mm³, which corresponds to most ½-inch microphones with protection grid mounted like the Nor-1220 and 1225. If the cartridge under test has a different volume, the accuracy may be improved by applying a volume correction.

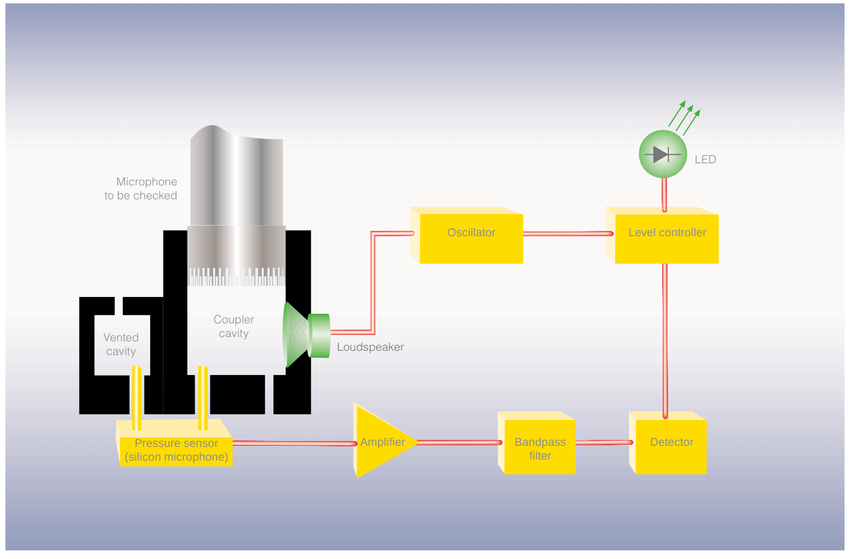
The typical sensitivity for the level change is –0.00002 dB/mm³ (depends on calibrator frequency). Hence, if a ½-inch cartridge with an effective front volume of 150 mm³ is used, the level inside the coupler will typically reduce by 0.002 dB because of the volume reduction of 100 mm³.

If no adaptor is used, the nominal effective front volume for no correction is 1333 mm³. This corresponds to most full-inch cartridges with protection grid mounted.

The Class 1 and 2 Calibrators

The Nor-1251 is a class 1 calibrator with an output level of 114 dB @ 1 kHz. The calibrator accepts full-inch cartridges right away and ½-inch cartridges by means of the included adaptor. An optional adaptor (the Nor-1444) – available separately, permits the use of the calibrator with ¼-inch cartridges.

The Nor-1252 is our class 2 alternative aimed at less critical applications. The Nor-1252 cannot accept full-inch cartridges, but an optional Nor-1445 adaptor is available, so that the ¼-inch calibration possibility is maintained.



The sound calibrator operating principles

Our selection of sound calibrators share a common working principle. The difference between them lies solely in their accuracy.

The microphone to be calibrated is placed in the coupler of the sound calibrator where the sound pressure level is generated by a miniature loudspeaker. The electrical signal – driving the loudspeaker – is generated by an electronic oscillator.

The sound pressure generated is measured with a pressure sensitive silicon sensor (patent pending). This signal is used to adjust the level of the oscillator signal.

The rear side of the silicon sensor is located in a separate, vented cavity to prevent pick-up of extraneous noise signals. Noise pick-up is further reduced by the use of a bandpass filter in the feedback path.

Because of the high stability of the silicon sensor and the electronic controller, the acoustic signal generated becomes virtually independent of the battery voltage and ambient conditions such as temperature, humidity and the atmospheric pressure.

The feedback principle automatically compensates for variation in the equivalent volume of the microphones. Hence, it creates an effective coupler volume many times the volume given by the mechanical dimensions of the coupler. The system even compensates for drift in the loudspeaker.

The acoustic coupler is vented to the inside of the sound calibrator, which in turn is vented to the outside for equalisation to the atmospheric pressure. A separate channel vents the rear side of the reference transducer to the outside of the sound calibrator.

A light emitting diode (LED) illuminates whenever the level control is in balance. When there is no microphone placed in the coupler, the loudspeaker will in general fail to generate and maintain the correct sound pressure in the coupler. This situation is indicated by a non-iluminated LED.

An electronic circuit inside the calibrator will switch off the power at approximately five minutes after the ON button was pressed. Should you need that the sound calibrator stays on for a longer time, just keep pressing the button or use adhesive tape.

Nor-1253 – the influence of ambient conditions

All the sound calibrators have a very low sensitivity to the ambient pressure, humidity, temperature and the load volume. The Nor-1253 and the Nor-1251 are calibrated at three temperatures (–10 °C, +23 °C and 45 °C) to ensure that the output sound pressure level is well within the requirements set by the IEC 61942 and ANSI S 1.40–1997 over the specified temperature range.