INSTRUCTION MANUAL

Sound Calibrator

NC-75

RION CO., LTD.

3-20-41 Higashimotomachi, Kokubunji, Tokyo 185-8533, Japan

http://www.rion.co.jp/english/

Organization of this manual

This manual describes the features and operation principles of the sound calibrator NC-75.

The contents of this instruction manual is based on IEC 60942:2003.

The following pages contain important information on safety. Be sure to read this part.

This manual contains the following sections.

Outline

Gives basic information on the unit.

JCSS

Describes about JCSS calibration.

Controls and Features

Briefly identifies and explains all parts of the unit.

Preparations

Describes how to insert batteries and use the adapter.

Calibration

Describes the basic steps and procedures for calibration.

Reference

Describes the calibration values for sound level meter and analyzer. Also describes effects of exposure to radiofrequency fields.

Specifications

Lists the technical specifications of the unit

* All company names and product names mentioned in this manual are trademarks or registered trademarks of their respective owners.

This product can be used in any areas including residential areas.

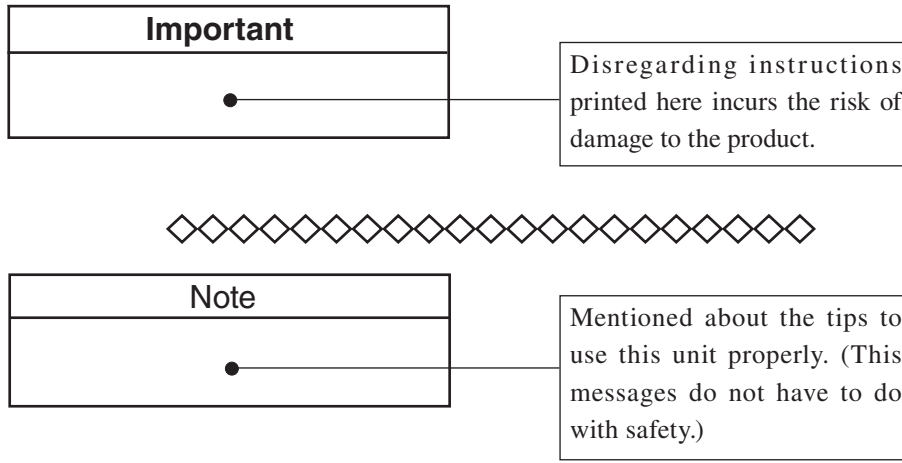
To conform to the EU requirement of the Directive on Waste Electrical and Electronic Equipment, the symbol mark on the right is shown on the instrument.

The product described in this manual is in conformity with the following European standards;

EN60942:2003 EN61326-1:2013

FOR SAFETY

In this manual, important safety instructions are specially marked as shown below. To prevent the risk of death or injury to persons and severe damage to the unit or peripheral equipment, make sure that all instructions are fully understood and observed.



Precautions

- Operate the unit only as described in this manual.
- Do not use or store the unit in locations which may be
  - subject to splashes of water
  - subject to high levels of dust
  - subject to direct sunlight
  - subject to vibrations or shock
  - subject to adverse effects from salinity, sulfur content, oils, chemicals, gases etc.
  - outside of the specified temperature and humidity range
  - subject to drastic temperature changes and to condensation
- To reduce the risk of inadvertent damage from water, dust, vibrations, shocks etc., it is recommended to perform calibration with the unit placed in its soft case NC-75-011.

- When not using the unit, it is recommended to leave the unit in the soft case NC-75-011 and just close the lid.
- Store the unit in the desiccator in locations subject to high temperatures and high humidity.
- Do not use the unit for any purpose other than calibrating sound level meters or microphones.
- Do not hold the active coupler to the ear for a long time.
- Be sure to use only the specified batteries.
- Remove the batteries from the unit if it is not to be used.
- Do not try to disassemble or alter the unit.
- Never insert any foreign object into the coupler.
- If the unit will be carried around and there is a risk that it may be dropped, it is recommended to attach the supplied hand strap VM-63-017 using the strap hole. You can then wrap the strap VM-63-017 around your wrist when carrying the unit.

- When using the unit near rotating machinery, take care the strap VM-63-017 cannot be caught in the machinery.
- In case of malfunction, do not attempt any repairs. Note the condition of the unit clearly and contact the supplier.
- Dispose of the unit and of used batteries in accordance with local laws and regulations. The unit does not contain any substances harmful to the environment. Treat the unit as non-combustible waste.
- In order to maintain continued precision, have the unit checked and serviced once per year. Contact the supplier.
- To clean the unit, use only a dry cloth or a cloth lightly moistened with lukewarm water. Do not use solvents or alcohol-based cleaners.
- When mounting and dismounting the microphone and sound calibrator, do not rotate the sound level meter or sound calibrator. Otherwise the protective grid of the microphone may become loose or detached, causing damage to the microphone diaphragm.

- Be sure to use only the 1/2-inch microphone adapter NC-75-022 and 1/4-inch microphone adapter NC-75-S11 designed specifically for the NC-75. Using another adapter may prevent correct calibration.

Contents

Outline

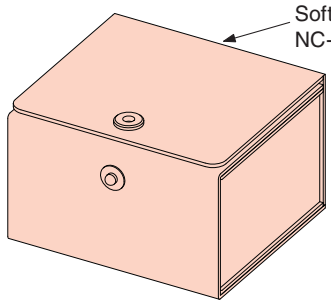
The NC-75 is a 1 kHz, 94 dB sound calibrator conforming with JIS C 1515:2004 Class 1 (IEC 60942:2003 class 1) specifications. While being compact, lightweight, and easy to use, the unit meets the performance requirements for calibrating precision sound level meters.

A reference microphone is integrated in the unit, which eliminates the need to compensate for differences in calibration sound pressure level caused by differences in the equivalent volume of various microphones. 1-inch, 1/2-inch, and 1/4-inch microphones made by Rion as well as microphones made by other manufacturers that meet the IEC 61094-4 size specifications are supported for calibration.

JCSS calibration

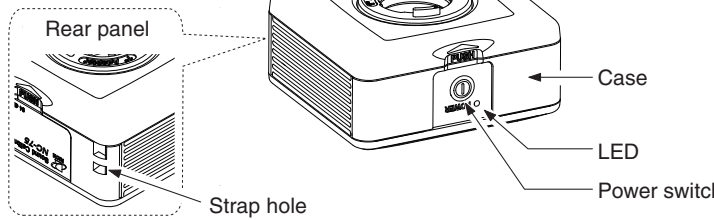
The sound calibrator NC-75 has undergone full JCSS calibration and provides traceability according to the requirements of the Japan Measurement Act, Article 134 for Specified Standard Instruments (National Measurement Standard). This means that calibration results obtained with this sound calibrator have credibility on the national level. The JCSS Calibration Certificate supplied with this product is proof of this fact. JCSS is operated by an accreditation body (IA Japan) which is a signatory to the Asia Pacific Laboratory Accreditation Cooperation (APLAC) as well as the International Laboratory Accreditation Cooperation (ILAC) in an MRA (Mutual Recognition Arrangement). Calibration certificates bearing the ILAC MRA compliant JCSS symbol are recognized by countries throughout the world that are APLAC or ILAC signatories.

Controls and features

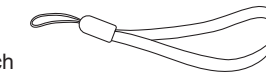


1/2-inch microphone adapter
NC-75-022

1/4-inch microphone adapter
NC-75-S11(option)



Hand strap VM-63-017



Coupler

The microphone to be calibrated is inserted here.

Battery cover

Separate from the case by simultaneously pressing the two sections marked PUSH. (See illustration on page 6.)

Case

Two batteries (Alkaline batteries LR6 or Ni-MH secondary batteries) are inserted here.

LED

Lights up when the power switch is set to ON.

Power switch

Serves to turn the unit on and off.

1/2-inch microphone adapter NC-75-022

Use this adapter when the outer diameter of the microphone is 1/2 inch.

1/4-inch microphone adapter NC-75-S11(option)

Use this adapter together with the 1/2-inch microphone adapter NC-75-022 for microphones with an outer diameter of 1/4 inch.

Hand strap VM-63-017

Attaching this strap to the strap hole and wrapping the strap around the wrist when carrying the NC-75 reduces the risk of dropping the unit.

Strap hole

Use this hole to install the supplied strap VM-63-017.

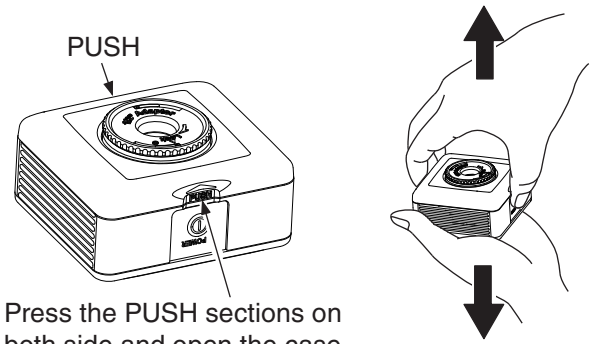
Soft case NC-75-011

This case is designed to protect the unit and reduce the risk of damage from water, dust, vibrations, shocks etc.

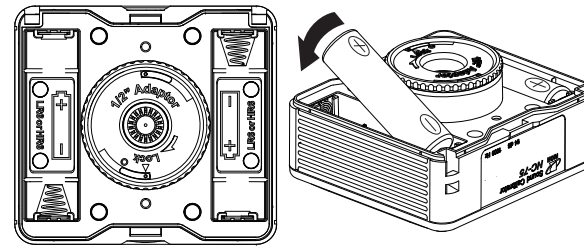
Preparations

Inserting the batteries

1. Open the case by pressing the sections marked PUSH and pulling the battery cover off the case.



2. Insert two batteries (Alkaline batteries LR6 or Ni-MH secondary batteries) with correct polarity.

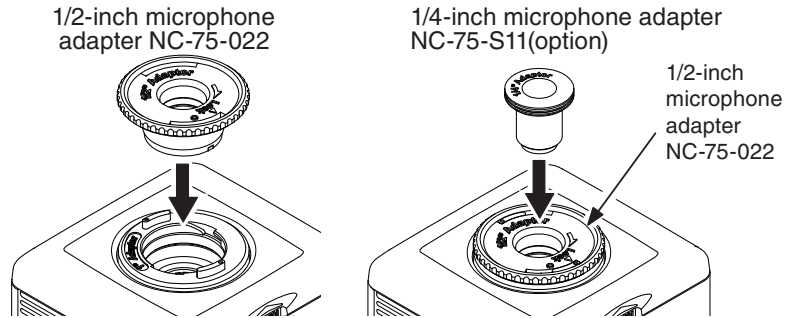


3. Snap the battery cover onto the case again.

Important

- Before inserting the batteries, check the correct + and – orientation as shown above. The polarity is also marked inside the battery wells.
- Do not mix old and new batteries.
- Do not mix different types of batteries.
- Always remove the batteries when not using the unit.
- Dispose of used batteries in accordance with local laws and regulations.

Using the 1/2-inch microphone adapter NC-75-022 and the 1/4-inch microphone adapter NC-75-S11



If the outer diameter of the microphone is 1 inch, remove the 1/2-inch microphone adapter and the 1/4-inch microphone adapter.

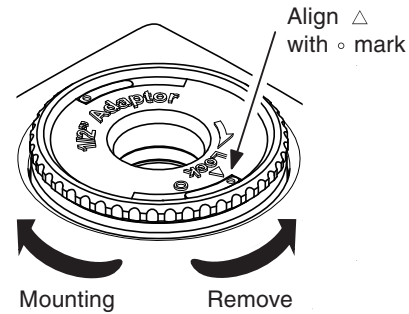
If the diameter is 1/2 inch, use the 1/2-inch microphone adapter NC-75-022.

If the diameter is 1/4 inch, use the 1/2-inch microphone adapter NC-75-022 and the 1/4-inch microphone adapter NC-75-S11 together.

Important

Insert the 1/2-inch microphone adapter NC-75-022 and the 1/4-inch microphone adapter NC-75-S11 fully into the coupler. Otherwise correct calibration is not possible.

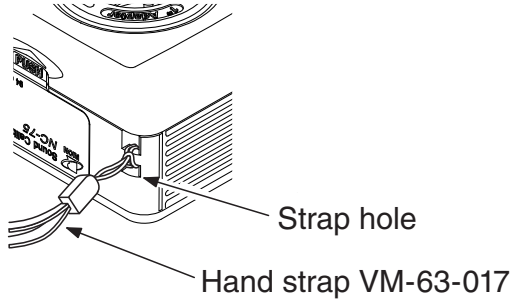
The 1/2-inch microphone adapter NC-75-022 is equipped with a lock function to ensure stable calibration. When mounting the adapter, push it down and then rotate it clockwise until the △ mark on the adapter matches the ◦ mark on the case. To remove the adapter, push down the adapter and rotate it counterclockwise.



Attaching the hand strap VM-63-017

To help prevent dropping of the unit, pass your wrist through this strap VM-63-017 when holding the unit for measuring.

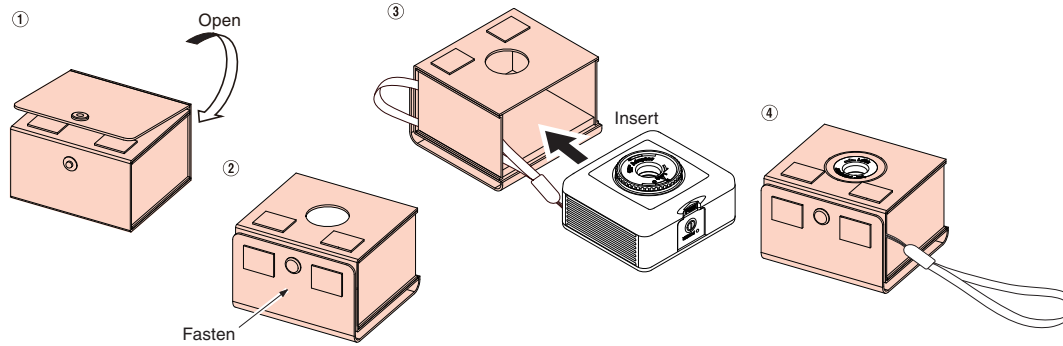
Attach the hand strap VM-63-017 as shown below.



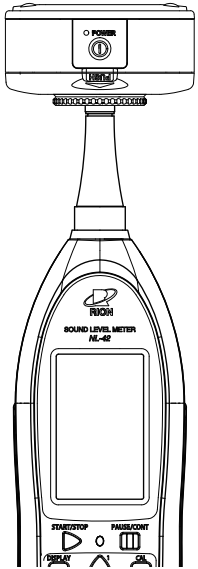
Using the soft case NC-75-011

To reduce the risk of inadvertent damage from water, dust, vibrations, shocks etc., it is recommended to perform calibration with the unit placed in its soft case NC-75-011. The lid of the case NC-75-011 can be fixed as shown below, so that it does not interfere with stable calibration. The unit can be inserted into the case NC-75-011 with the hand strap VM-63-017 attached.

When not using the unit, it is recommended to leave the unit in the soft case NC-75-011 and just close the lid.



Calibration



To make the calibration, place the units in a perpendicular position, as shown in the illustration at left.

1. Make sure that the power switch of the NC-75 is OFF.
2. Carefully insert the microphone of the sound level meter all the way into the coupler of the sound calibrator.

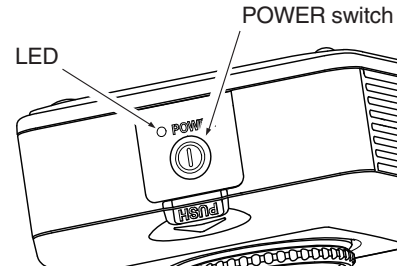
Important
The microphone of the sound level meter must always be inserted or removed slowly and carefully, to avoid the possibility of damage to the microphone diaphragm caused by abrupt changes in air pressure.
When mounting and dismounting the microphone and sound calibrator, do not rotate the sound level meter or sound calibrator. Otherwise the protective grid of the microphone may become loose or detached, causing damage to the microphone diaphragm.

3. After inserting the microphone, wait at least 30 seconds before reading the level indication on the sound level meter. Make a note of the reading, because this will be used in step 6.

Note
Immediately after inserting the microphone, the air pressure inside the sound calibrator will change, thereby preventing correct calibration. The time required until the air pressure inside the sound calibrator stabilizes is 30 seconds or less.
The time required until the air pressure inside the microphone itself stabilizes depends on the microphone type. Check the documentation of the microphone or the sound level meter.

4. Select the measurement range of the sound level meter so that 94 dB can be measured.

5. Set the power switch of the NC-75 to ON.
   - If the battery voltage of the NC-75 is normal, the LED lights up.
   - If the voltage is too low, the LED flashes. In such a case, replace both batteries with fresh ones.
   - If the batteries are totally exhausted, the LED will not light at all, power is automatically shut off. The batteries must be replaced immediately.



Important
While the LED is flashing, correct calibration may not be possible. There also is the possibility that the power may be shut off automatically during a calibration. Replacing the batteries as early as possible is therefore recommended.

6. Wait until the sound level meter reading has stabilized. Then read the indicated value. Verify that this reading is at least 20 dB higher than the reading obtained in step 3.

Important
If the difference is less than 20 dB, ambient noise has too much influence on the measurement, and correct calibration will not be possible.

7. Adjust the sound level meter so that its level reading is 94 dB (calibration value, see Note below).

Note
Depending on the sound level meter and microphone type, this calibration value may vary. For details on precise calibration values, please refer to the “Reference” section on page 17 or to the documentation of the sound level meter and microphone.

8. When level adjustment is completed, set the power switch of the NC-75 to OFF.
9. Carefully remove the microphone of the sound level meter from the NC-75 (see the “Important” on page 12).

Note
If the microphone is removed with the power switch in the ON position, power will go off automatically after about 5 seconds. However, if the 1/4-inch microphone adapter NC-75-S11 is mounted, the power may not go off automatically.

Reference

Sound level meter and analyzer calibration value

If the sound calibrator NC-75 is used for acoustic calibration of a sound level meter and an analyzer, adjust the respective equipment so that the sound pressure level indication matches the calibration value. When calibrating a sound level meter, use the values given in Table 1 as a reference. When calibrating a microphone connected via a cable to an analyzer, use the values of Table 2.

Example

When calibrating the sound level meter NL-42, the calibration value would be 93.9 dB from Table 1.

Attach this unit to the microphone (sound level meter) and adjust the level to indicate value of NL-42 will be 93.9 dB.

For the calibration procedure, refer to the sound level meter instruction manual.

Calibration values for sound level meters

Class 1 Sound level meter

Model	Microphone	Calibration value (dB)
NA-28	UC-59	94.0
NA-42S	UC-53A	94.0
NA-83	MS-11	94.0
NA-39A	MS-11A	94.0
NL-31	UC-53A	94.0
NL-32	UC-53A	94.0
NL-52	UC-59	94.0
NL-62	UC-59L	94.0

Class 2 Sound level meter

Model	Microphone	Calibration value (dB)
NL-20	UC-52	93.9
NL-21	UC-52	93.9
NL-22	UC-52	93.9
NL-27	UC-52	93.9
NL-42	UC-52	93.9

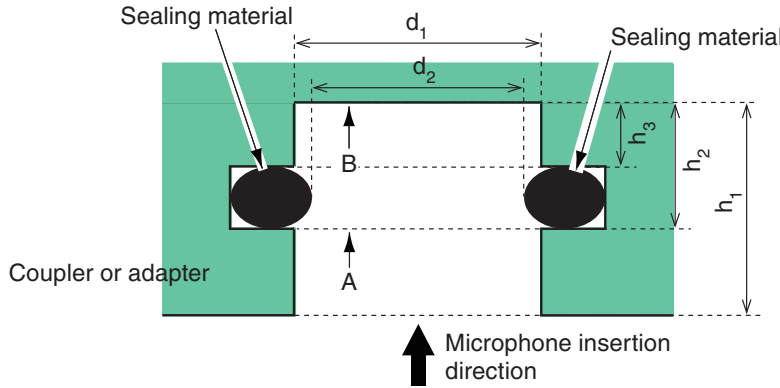
Table 1

Calibration values for microphones

Nominal outer diameter	Model	Calibration value (dB)
1 inch	UC-27	93.8
	UC-34	93.9
	UC-35	93.9
1/2 inch	UC-30	94.0
	UC-31	93.9
	UC-33P	94.0
	UC-52	93.9
	UC-53A	94.0
	UC-57	94.0
	UC-59	94.0
	UC-59L	94.0
	MS-11	94.0
	MS-11A	94.0
1/4 inch	UC-29	94.0
	UC-54	94.0

Table 2

Sealing mechanism



Upon inserting a microphone for calibration, the microphone begins to be gripped by the sealing material once it reaches point A in the above illustration. Upon full insertion, the microphone stops at point B and is held in place by the sealing material. Depending on the nominal outer diameter of the microphone, the sealing dimensions change as shown in Table 3.

Sealing material dimensions (representative)

Microphone Nominal outer diameter	d_1	d_2	h_1	h_2	h_3
1 inch	24.0	23.3	11.5	8.5	4.1
1/2 inch	13.4	13.3	11.1	7.1	4.1
1/4 inch	7.1	6.7	9.1	5.2	3.2

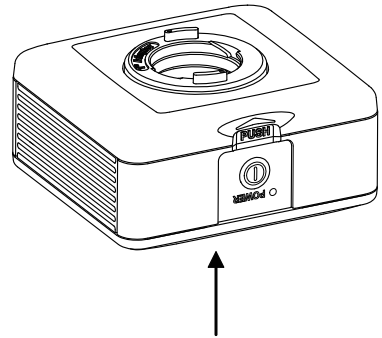
Unit: mm

Table 3

Electromagnetic compatibility

Reference orientation for testing effects of exposure to radiofrequency fields:

Opposite side of microphone insertion opening (see illustration below)



Reference orientation for testing effects of exposure

Radiofrequency emissions

Electromagnetic field strength of radiofrequency emissions produced by the unit (quasipeak value at a distance of 10 m)

Frequency range 30 MHz to 230 MHz: 30 dB (reference 1 µV/m) or less

Frequency range 230 MHz to 1 GHz: 37 dB (reference 1 µV/m) or less

The configuration for greatest radiofrequency emissions: power ON

Immunity to electrostatic discharges

No malfunction after the following electrostatic discharge tests

- Contact discharge: up to ±4 kV (versus ground potential)
- Non-contact discharge: up to ±8 kV (versus ground potential)

Immunity to power-frequency magnetic fields and radiofrequency electromagnetic fields

Sound pressure level deviation when placed under the influence of power-frequency magnetic fields and radiofrequency electromagnetic fields as specified below:

within ±0.25 dB (excluding maximum permitted uncertainties of measurement)

- Electromagnetic field strength up to 10 V/m rms (non-modulated), frequency range 26 MHz to 1000 MHz, 900 Hz sinusoidal wave, 80% amplitude modulation
- Electromagnetic field strength up to 3 V/m rms (non-modulated), frequency range 1400 MHz to 2000 MHz, 900 Hz sinusoidal wave, 80% amplitude modulation
- Electromagnetic field strength up to 1 V/m rms (non-modulated), frequency range 2000 MHz to 2700 MHz, 900 Hz sinusoidal wave, 80% amplitude modulation
- AC magnetic field strength up to 80 A/m rms, frequency 50 Hz and 60 Hz

The configuration that produce minimum immunity (maximum susceptibility) to power-frequency magnetic fields and radiofrequency electromagnetic fields:

power ON

Specifications

The tolerance values given in these specifications exclude the maximum permitted uncertainties of measurement.

Applicable standards	IEC 60942:2003 class 1
	ANSI/ASAS1.40-2006 class 1
	JIS C 1515:2004 class 1
	CE marking
	WEEE Directive
	Chinese RoHS
Specified microphones	
	Microphones made by RION as well as microphones made by other manufacturers that meet the IEC 61094-4 size specifications
	1-inch microphones

1/2-inch microphones (supplied adapter NC-75-022 is used)

1/4-inch microphones (optional adapter NC-75-S11 is used)

Reference environmental conditions

Static pressure: 101.325 kPa

Ambient temperature:

23ºC

Relative humidity: 50% RH

Ambient conditions for operation

Static pressure: 65 kPa to 108 kPa

Ambient temperature:

–10˚C to +50˚C

Relative humidity: 10% to 90% RH (no condensation)

Ambient environmental conditions for storage

Static pressure 65 kPa to 108 kPa

Ambient temperature

−10˚C to +50˚C (no condensation)

Dimensions	approx. 42 mm (H) × 77 mm (W) × 70 mm (D)(maximum)
Weight	approx. 200g (including two alkaline batteries)
Power supply	Two batteries (Alkaline batteries LR6 or Ni-MH secondary batteries)

Battery life (at reference environmental conditions):

Alkaline batteries : 50 hours or higher

Ni-MH secondary batteries (eneloop pro) : 50 hours or higher

Power supply voltage

Nominal 3.0 V, Maximum 3.6 V, Minimum 2.1 V

Automatic power shutoff

Power will shut down after about 5 seconds if coupler is open (may not apply if 1/4-inch microphone adapter NC-75-S11 is mounted)

Nominal sound pressure level
94 dB

Specified sound pressure level
94.0 dB (at reference environmental conditions)

Specified sound pressure level tolerance
±0.25 dB (at reference environmental conditions)
(Average value for a 20-second period)

Nominal frequency 1000 Hz

Specified frequency 1000 Hz (at reference environmental conditions)

Specified frequency tolerance
±0.1% (at reference environmental conditions)
(Average value for a 20-second period)

Sound pressure level stabilization duration

After power-on: 5 seconds or less (at ambient conditions for operation)

After microphone insertion:
30 seconds or less (at ambient conditions for operation)

Sound pressure level stability (short-term fluctuations)

±0.05 dB (at reference environmental conditions)
[20 s, Time Weighting F (JIS C 1509-1, IEC 61672-1)]

Sound pressure level stability (Influence of power supply voltage)

±0.05 dB (at reference environmental conditions, within power supply voltage range)

Frequency stabilization duration

After power-on: 5 seconds or less (at ambient conditions for operation)

Frequency stability ±0.1% (within ambient conditions for operation)
(20 s, average time 1 s)

Total distortion of generated sound pressure

within 1.0% (within ambient conditions for operation, 20 Hz to 20 kHz)

Influence of static pressure, ambient temperature and humidity

Sound pressure level:

within ±0.25 dB (at ambient conditions for operation)

Frequency: within ±0.1% (at ambient conditions for operation)

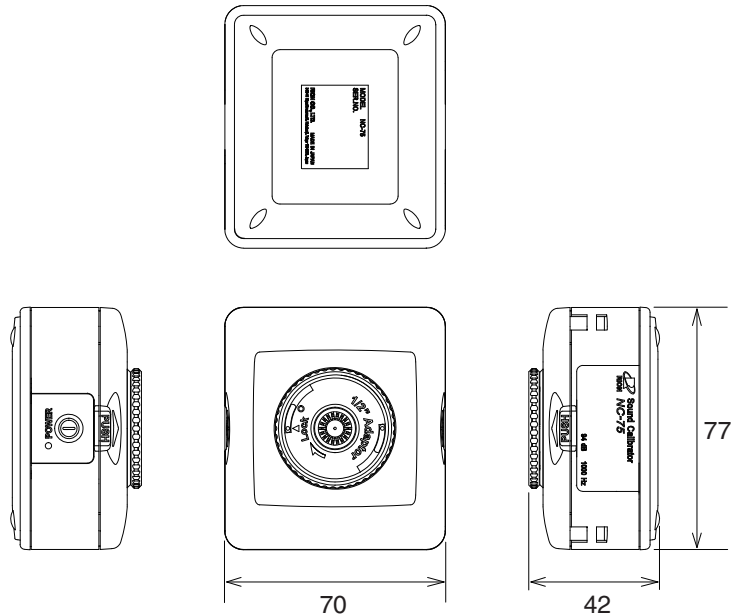
Permissible ambient sound level
84 dB max.

Supplied accessories

Soft case NC-75-011	1
(Calibration possible with unit inserted in soft case)	
1/2-inch microphone adapter NC-75-022	1
Alkaline batteries LR6	2
Hand strap VM-63-017	1
Instruction manual	1
Inspection certificate	1
JCSS calibration certificate	1

Optional accessories

1/4-inch microphone adapter NC-75-S11



Unit: mm

Dimensional Drawings