



user documentation

noise excitation equipment

Nor275

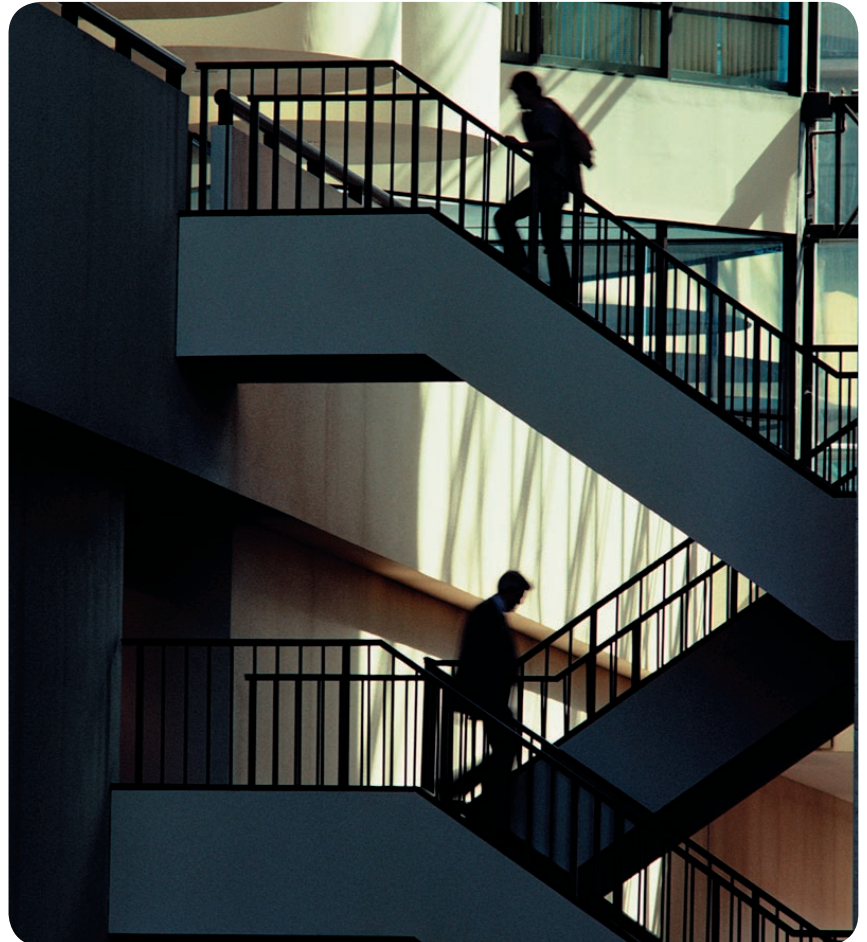
Hemi-dodecahedron Loudspeaker

Nor276

Dodecahedron Loudspeaker

Nor280

Power Amplifier



Noise Excitation Systems

Noise Excitation Equipment – August 2009 Edition

Nor275/Nor276/Nor280 User documentation

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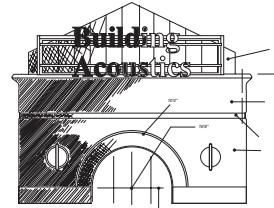
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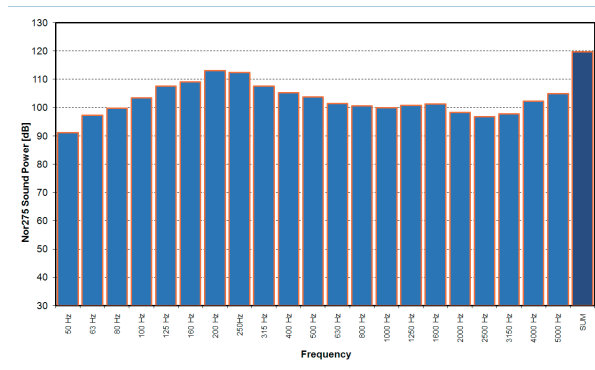


Hemi-dodecahedron Loudspeaker Nor275

A powerful sound source designed for building acoustics measurements per ISO 140-4 Annex A (Field measurements), ISO 354, ASTM E-90, E-336. The source provides uniform sound radiation. When used with the power amplifier Nor280 the high sound power level ensures accurate descriptors in measurement conditions that include high background levels, high sound insulation properties and large room volumes.

The Nor280 power amplifier comes with an equalisation circuitry that can be switched on or off, designed to boost the high and low frequencies to improve the Nor275/280 system performance.

The loudspeaker is designed to operate at full power for more than one hour continuously.



Typical sound power level vs. frequency of the loudspeaker Nor275 when used with the pink noise source and equalizer included in the power amplifier Nor280.



NOTE: The Nor275 is designed to be used with Nor280 Power Amplifier only. Using other amplifiers may damage the speakers and will void the warranty.

Specifications Nor275

Physical design	Hemi-dodecahedron
Sound power output:	Using the Nor280 with pink noise, and equalisation: 120 dB (Lin)
Speakers:	6×6"
Power (broadband):	100 W _{RMS} (maximum) Peak 500 W
Impedance:	5.3 Ω
Diameter:	332 mm (13")
Height:	175 mm (6,9")
Weight:	6 kg (13,2 lb)
Accessories included:	Speakon NL4FC plug; 5m assembled cable, if ordered with Nor280

Dodecahedron Loudspeaker Nor276

A multitude of applications within the field of building acoustics requires the use of isotropic sound sources. The loudspeaker Nor276 has been designed to comply with these requirements and satisfies the ISO 140-3 Annex C (Laboratory measurements), ISO 140-4 Annex A (Field measurements) and ISO 3382-1.

The speaker come with a tripod ensuring correct placement so that unwanted reflections and structural transmissions are kept at a minimum.

The rugged speaker cabinets are made of fibre glass and the speaker elements themselves are protected by grids to further enhance the concept.



Specifications Nor276

Physical design	Dodecahedron
Sound power output:	Using the Nor280 with pink noise, and equalisation: 120 dB (Lin)
Speakers:	12×6"
Power (broadband):	200 WRMS Peak 1000 W
Impedance:	2,7Ω
Diameter:	332 mm (13")
Weight:	9 kg (19,8 lb)
Tripod mounting-rod:	1" diameter
Accessories included:	Speakon NL4FC plug; 5m assembled cable, if ordered with Nor280 Tripod

Connecting to a Power Amplifier

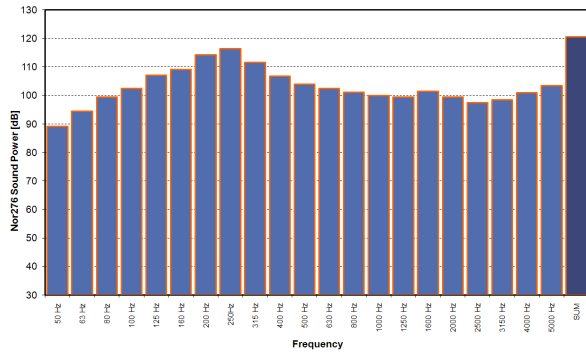
The Nor276 as been designed for continuous operation for more than on hour at full power.

The speaker input socket accepts Speakon NL4FC connectors – see overleaf for more on this.

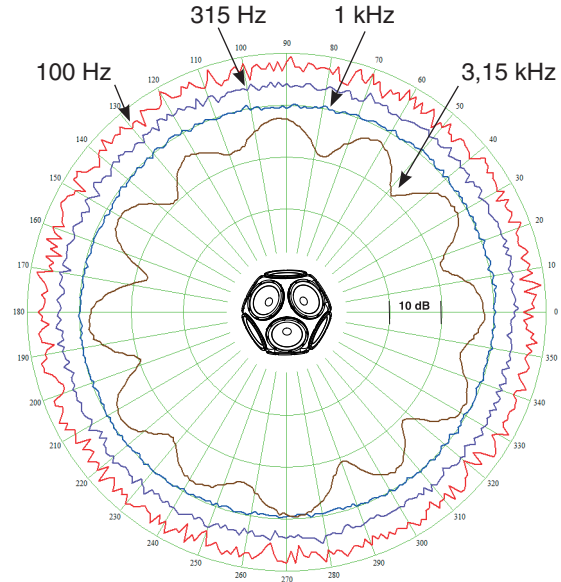
A mounting rod (Ø=1") makes tripod mounting easy and safe.



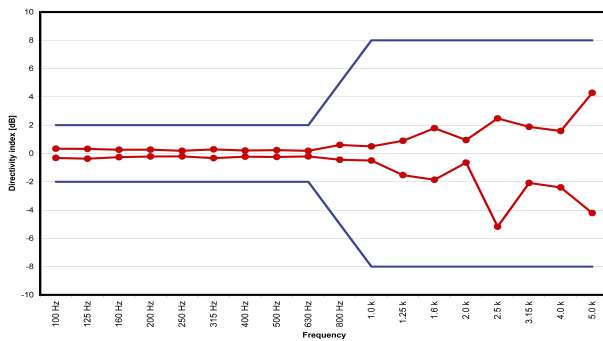
NOTE: The Nor276 is designed to be used with Nor280 Power Amplifier only. Using other amplifiers may damage the speakers and will void the warranty.



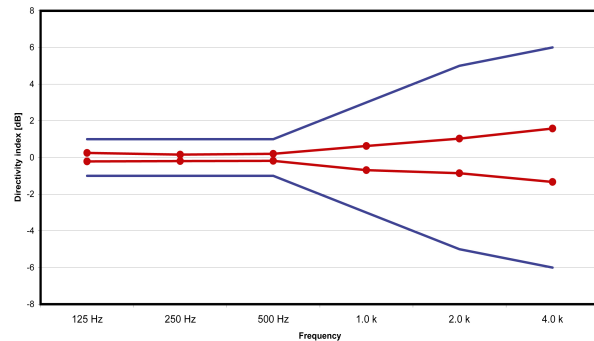
Typical sound power level vs. frequency of the loudspeaker Nor276 when used with the pink noise source and equalizer included in the power amplifier Nor280.



Sound power in different directions for Nor276. The measurement is done in a horizontal plane through the centre of the loudspeaker. The graph shows the respons for a sinusoidal signal at 100 Hz, 315 Hz, 1 kHz and 3,15 kHz.



Maximum and minimum directivity indices in different directions according to the requirements in ISO 140-3 and ISO 140-4 compared to the tolerance limits.



Maximum and minimum directivity indices in different directions according to the requirements in ISO 3382-1 compared to the tolerance limits.



Caution !

The loudspeaker unit **MUST** be placed on tripod before excited.



The speaker pointing to a flat surface /floor will be damaged if excited when placed directly on a floor or other flat surfaces.

Warranty of the loudspeaker is void if excited with other power amplifiers than Norsonic Nor280 and a Norsonic sound level meter.

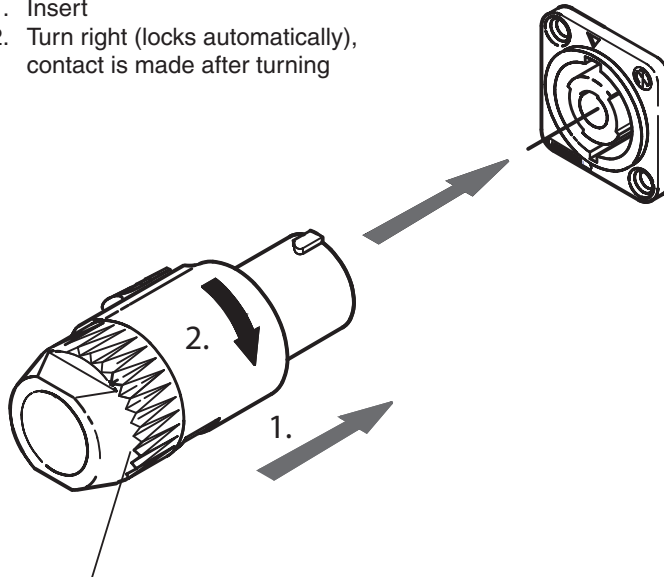
The Nor275/Nor276 Quick Lock connector...

If you need to assemble cable and the Quick Lock connector, connect as follows:

- 1+ and 2+ are to be connected together.
- 1- and 2- are to be connected together.

Insert...

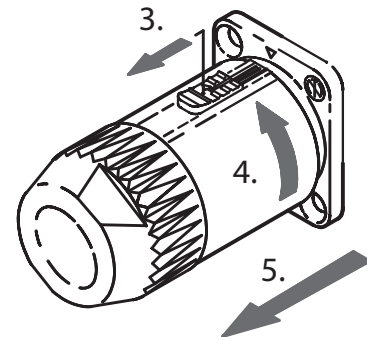
1. Insert
2. Turn right (locks automatically), contact is made after turning



Strain relief bushing
– don't loosen!

Remove...

3. Pull lever
4. Turn left
5. Pull plugg



Power Amplifier Nor280

The Nor280 is a rugged, lightweight and powerful class D amplifier. It is specially designed for building acoustics applications.

The amplifier comes with a built in noise generator as standard and as an option it can be fitted with a wireless remote control for switching the signal on/off.

To optimise the power where it is needed a unique built in equalization network compensates for the falling frequency response of the speaker system in both the low and high frequency areas. A part of the amplifiers input stage is a high pass filter that removes low frequency signals that lie below the required frequency range for building acoustic measurements and a low pass filter that removes all frequencies above 12kHz. This feature protects the speakers from distortion and concentrates power into the frequency bands where it is needed.

The output of the amplifier is short circuit protected and an automatic system will guard against overheating and high signal voltages through the input. The built in cooling fan is normally not required but will run at high room temperatures or during prolonged use of the amplifier at full power. It will however, immediately switch off when the input signal goes off; this feature makes the unit well suited to reverberation measurements in areas of low background noise.



Front panel layout

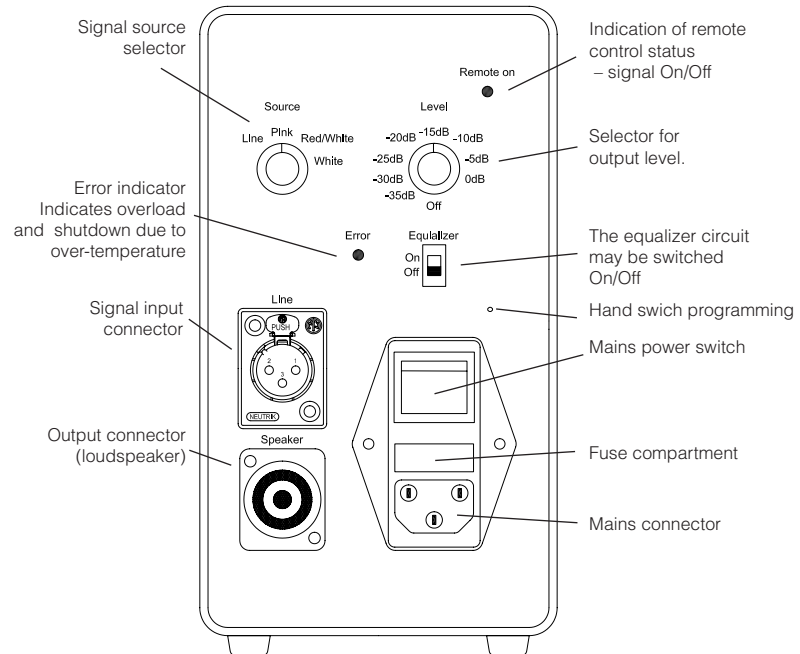
The front panel consist of a source selector, a level attenuator, a switch selecting the equaliser on/off, input and output connectors, mains connector, mains fuse and switch, an error indicator and a remote indicator.

Source selector

The Source selector has four positions:

- **Line.** Selects the input signal connector and disconnects the internal noise generator. This allows the use of an external signal source. Input sensitivity is 1 Vrms for full power output when using Norsonic speakers.
- **Pink.** Selects pink noise from the internal noise generator.
- **Red/White.** Selects Red/White noise from the internal noise generator.
- **White.** Selects White noise from the internal noise generator.

Front panel of Nor280



Level selector

The Level selector attenuates the output level in 5 dB steps from 0 dB (full power) to 35dB. The final position switches the signal off.

Equalizer switch

The equalizer switch selects the equalization network on/off. The switch should be left in the on position when using Nor250, Nor270, Nor270H, Nor275 or Nor276 loudspeakers for maximum power to the speaker system. It also ensures that there is less than 5 dB between each adjacent 1/3 octave band (free field conditions) when using any of the above mentioned speakers, as required by annex C in the ISO140/3 standard.

The equalization network is adapted to the Nor275, Nor276 loudspeakers. When using other speakers, it is recommended to switch the equalizer off, or use the network with care in order not to damage the speaker.

The high and low pass filter is always a part of the signal path regardless of the setting of the equalization switch.

Error indicator

The error indicator is illuminated and the output signal is turned off when one of the following error conditions occurs:

- Short circuit. If the output current exceeds 35Amp due to a short circuit of the output stage or a speaker system with a nominal impedance less than 2 ohm is connected.
- Over temperature. If the temperature exceeds the temperature limit, the amplifier is turned off and the cooling fan is turned on at full speed.

The signal is turned on again as soon as the error condition is removed.

Please note that the fan is turned on if the temperature inside the amplifier exceeds 35 °C and the input signal exceeds 100mVrms. The amplifier however is still well suited for reverberation time measurements in areas of low background noise since the fan is turned off when the input signal drops below 100mVrms.

Remote on LED

The “remote on” LED indication is normally illuminated. If the wireless remote on/off control option is added, the output to the speaker can be switched on/off from the small remote hand switch. The remote on indicator is turned off if the output is switched off from the remote switch.

Input connector

The input connector is a 3 pin female XLR. The input stage is balanced in order to remove influence from external noise such as hum and crosstalk. A BNC to XLR adaptor is a part of the delivery schedule. It is recommended to use a XLR cable from the Nor280 to the external signal, and convert it to a BNC or other single ended cable system as close to the signal source as possible. This ensures a minimum influence from external hum and noise.

Output connector

The output connector is a 4 pole Speakon NL4MP type. 1+ and 2+ are connected together to form the + output, and 1- and 2- are connected together to form the – output.



Warning: The balanced speaker outputs are both “hot” with a common DC voltage separate from ground. Shorting one of the terminals to ground results in an over-current situation.

Connecting to a speaker

Connect the amplifier to the speaker. Connect the signal input to the amplifier or select the noise source. Set the signal attenuator to off. Switch on the amplifier and increase the signal to the desired level. Precaution should be taken against hearing loss – wear hearing protectors!

Power output vs input voltage

The input sensitivity when connected to a Norsonic speaker is 1.0 Vrms. This gives a power output to the speaker of about 100 Wrms for the Nor275 and 200 Wrms for the Nor276.

If higher power is required for other speakers than Norsonic, the input voltage to the amplifier may be increased. Max. output power is 500 Wrms/250 Wrms in 4/8 ohm. This corresponds to an input level of approx. 2 Vrms.

0 dB on the input attenuator/noise generator corresponds to 1 Vrms.



Caution ! Consult the table on page 15 for selecting the level of the noise. If your speaker is not listed, precaution must be taken in order not to damage the speaker system.

Noise Generator

The built in noise generator is a random type with a repetition period in excess of 4 hours. It features 3 different noise types; Pink, Red/White and White. The output can be attenuated in 5 dB steps by the level selector from 0 to -35dB in addition to signal off.

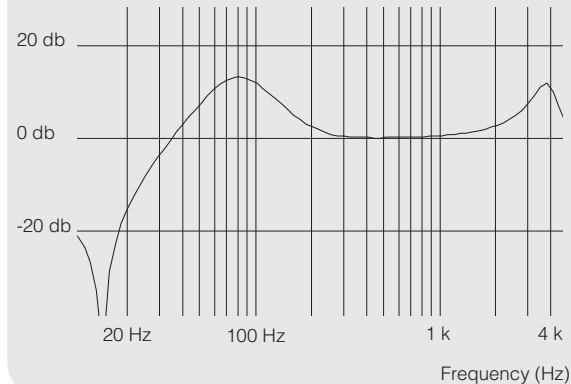
Connecting other noise generators than found in Norsonic sound level meters may damage the loudspeaker. If using other sources, make sure the maximum output voltage of the noise generator is 1,0 Vrms. Higher voltage will damage the speaker.

Wireless remote control

Option 1, wireless remote control of signal on/off, enables the user to control the on/off without being present in the source room. The output to the speaker can be switched on/off from the small remote hand switch. Typical range is 100m in free field but will also transmit

through a concrete wall/floor. The remote on LED indication is normally illuminated. The remote on indicator is turned off if the output is switched off from the remote switch.

The frequency response of the equalisation circuitry of the Nor280 Power Amplifier



Using Nor280 with the speakers Nor223/229/275/276

The power amplifier Nor280 is extremely powerful, so care must be taken not to destroy loudspeaker systems connected to it. The below table provides an indication of maximum permissible amplifier input signal. Max input signal to the amplifier is 1 Vrms. The following settings should NOT be exceeded:

Signal type	Nor223 ¹⁾	Nor229 ²⁾	Nor270/270H/250	Nor275/276
White/pink noise	0 dB	-3 dB	0 dB	0 dB
Octave & third octave filtered pink noise, f < 200Hz	-3 dB	-6 dB	-3 dB	0 dB
Octave & third octave filtered pink noise, f > 200Hz	0 dB	-3 dB	0 dB	0 dB
Red/white noise with equalisation On/Off	-3 dB/0 dB	-6 dB/-3 dB	-3 dB/0 dB	0 dB

All dB values are dB re. 1Vrms

¹⁾ assuming an impedance of 5.4Ω

²⁾ assuming an impedance of 6Ω

Specifications

Output:	Short circuit and over temperature protected
Output connector:	Speakon NL4MP
Output power:	500Wrms (4ohm) and 250Wrms (8ohm) measured as THD+N<0.1%.The built-in LP and HP filters ensure that the output power matches the Norsonic Nor275 and Nor276 series of dodecahedron loudspeakers.
Peak power:	>1 kW
Output current:	Maximum 35 A
Input:	Balanced input to avoid ground loops and cross talk to signal cables
Input sensitivity:	1V (0dB) equals to 100w in 5Ω
Input impedance:	10k ohm//220pF
Input connector:	3 pin female XLR
Weight:	3,5Kg (7,7 lb)
Dimensions:	275 x 110 x 246 (mm) (D x W x H) 11 x 4,3 x 9,7 (inch)
Operating temperature:	-20 to + 35 °C
Operating humidity:	0-90 %RH
Enclosure class:	IP20
Mains voltage:	220Vac (190 - 265Vac, 45-55Hz) or 110Vac (90 - 132Vac, 55-65Hz).
Mains fuse:	T 3,15A for 220Vac and T 6A for 110Vac The unit is only safety approved using the following fuses, as appropriate: Wickman 181 1630 000 (1000pcs) or 002 (10 pcs) (110V) or Wickman 181 1315 000 (1000pcs) or 002 (10 pcs) (230V)

EMC and safety standards:

EN55103-1, EN55103-2, IEC61340-5 part 1&2, IEC61010, FCC part 15b class A

Licence Exemption:

Europe: The transmitter encoders use ECM compliant radio transmitter modules and complies with ETSI330-220 and ETSI300-683.

USA: The device complies with part 15 of the FCC Rules

Operation is subject to the following two conditions:

1. The device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Schedule of parts

Mains input lead, BNC to XLR female adapter, Output connector or a complete assembled cable 5m if ordered with a Norsonic Nor250, Nor270 or Nor270H dodecahedron speaker. User manual with conformance certification.

Programming the hand switch

The remote hand switch is pre-programmed for the supplied Nor280. Several hand switches can be programmed for one or more amplifiers or vice versa. The procedure is as follows:

- Switch on the amplifier.
- Push a small rod (paperclip) into the tiny hole located to the right above the mains switch. This activates a push button
- Press and release the button located on the remote hand switch
- Repeat the press and release
- Wait 20 seconds
- The hand switch is now programmed to the new Nor280

Ordering information

Option 1: Wireless remote on/off switch (must be specified when ordering)

NORSONIC WARRANTY STATEMENT

All Norsonic labeled products are, unless other stated, warranted against defects in material and or workmanship for 36 months from date of delivery.

Any equipment that may be defective should be returned to Norsonic AS carriage paid and Norsonic AS or their approved local agent who will at their discretion repair or replace equipment that proves to be defective during the warranty period. This warranty includes labour and parts only with any return carriage being for the customers account.

Repair due to misuse of the equipment, fair wear and tear and/or use of non approved third party hardware, software or interfacing is not covered by this warranty, Batteries (dry cells or rechargeable) or other consumable items are not covered by this warranty.

No other warranty is expressed or implied, including but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

Norsonic AS shall not be liable for consequential damages arising from either the use or the interpretation of the results from the equipment.

Declaration of Conformity

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

Nor275; Nor276; Nor280

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

Performance complying with:

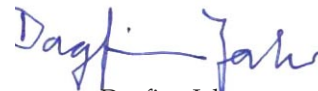
EMC and safety standards: EN55103-1, EN55103-2, IEC61340-5 part 1&2, IEC61010, FCC part 15b class A (Nor280 is only safety approved using the specified fuses)

The optional remote control transmitter use ECM compliant radio transmitter modules complies with ETSI330-220 and ETSI300-683 and part 15 of the FCC Rules, as applicable (see Specifications)

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, May 2009

A handwritten signature in blue ink that reads 'Dagfinn Jahr'.

Dagfinn Jahr
Quality Manager

The declaration of conformity is given according to EN 45014 and ISO/IEC Guide 22.
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Norsonic AS supplies a complete range of instrumentation for acoustics – from sound calibrators, microphones & preamplifiers; 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.