



user **documentation**

noise excitation **equipment**

Nor250

Hemi-dodecahedron Loudspeaker

Nor270

Dodecahedron Loudspeaker

Nor280

Power Amplifier

Im280_1Ed1ROEn

CE

Ni Norsonic



Noise Excitation Equipment – December 2005 Edition

Nor250/Nor270/Nor280 User Guide
Im280_1Ed1R0En

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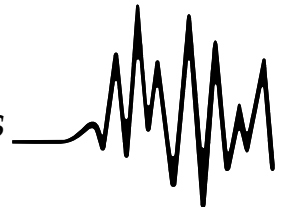
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Noise Excitation Systems



Dodecahedron Loudspeakers Nor-270 & Nor-270H

A multitude of applications within the field of building acoustics requires the use of isotropic sound sources. The loudspeakers Nor-270/270H have been designed to comply with these requirements and satisfies the ISO 140-3 Annex C (Laboratory measurements) and ISO 140-4 Annex A (Field measurements). The difference between the two lies in the sound power output level which is 120dB for Nor270 and 123dB for Nor270H.

The speakers 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.

Connecting to a Power Amplifier

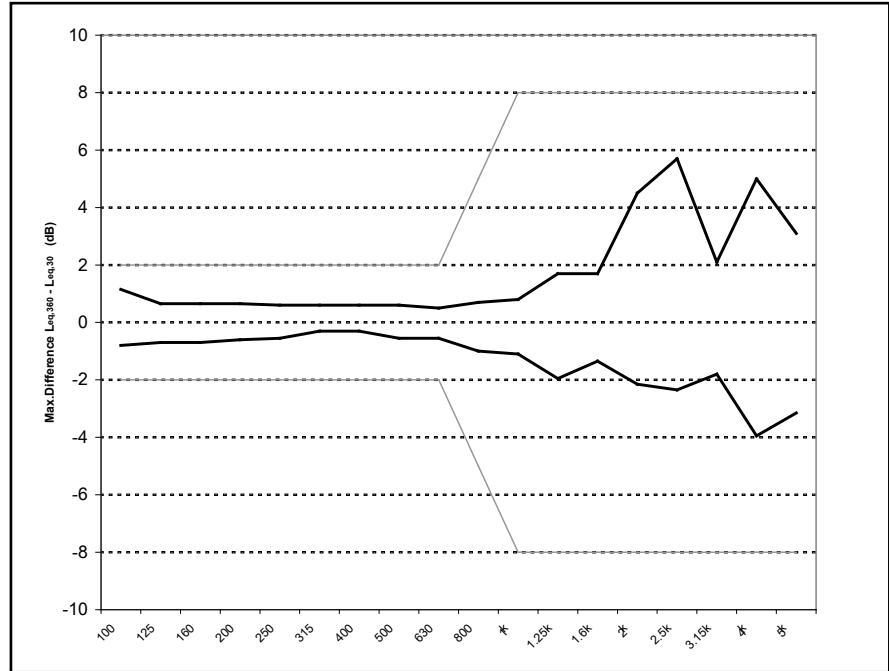
Verify that your amplifier has been designed to match the speaker. The Nor-270/270H are available in several impedance flavours – the impedance applicable to yours is stated on the speaker cabinet unless they are of the standard version

Both the Nor270 and 270H have been designed for continuous operation for more than one 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.

Directivity of the Nor-270 according to ISO 140: maximum deviation from mean for gliding 30° arc. Upper and lower curves are the ISO 140 tolerances.



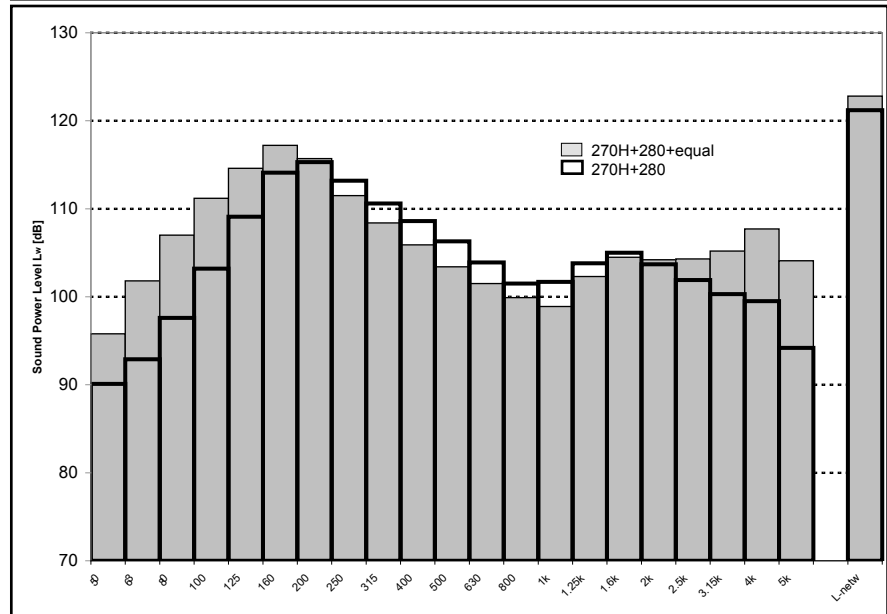
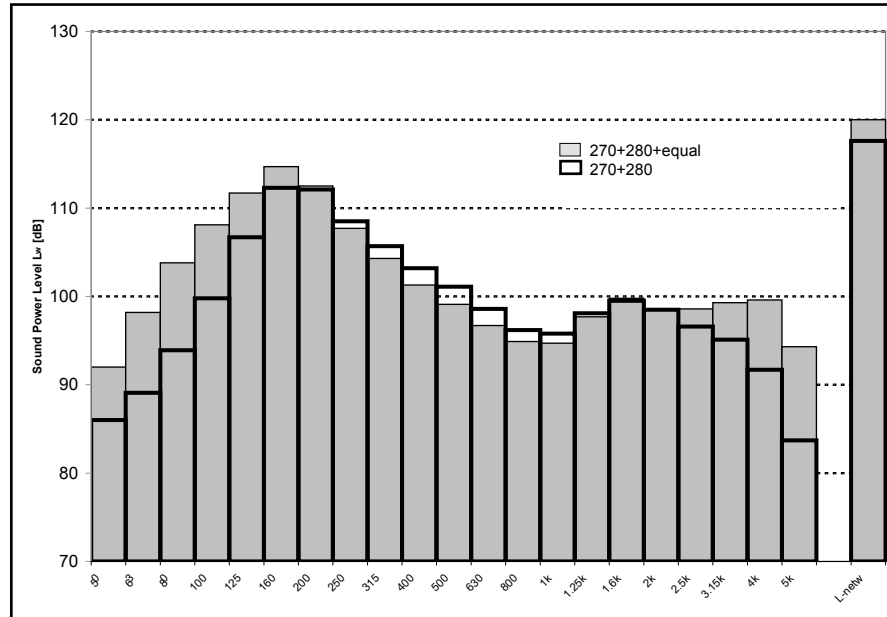
Specifications	Nor270	Nor270H
Sound power output (Lin.):	120 dB	123 dB
Speakers:	12x6.5"	12x6.5"
Power rating (max.):	250 W _{RMS}	400 W _{RMS}
Impedance:	6Ω	2.7Ω
Other impedance values also available, contact factory for details		
Diameter:	450mm	450mm
Weight:	12.5kg	20kg
Tripod mounting-rod diameter	1"	1"
Accessories included:	Speakon NL4FC plug; 5m assembled cable, if ordered with Nor-280	



The sound power level vs. frequency of the loudspeakers Nor270 (upper graph) and Nor270H (lower graph) when used with power amplifier Nor-280.

The amplifier has an equalisation circuitry designed to boost the high and low frequencies to improve the system performance when used for building acoustics. Both graphs include the sound power spectrum with and without the effects of the equalisation circuitry.

The loudspeaker Nor-270/270H



Hemi-dodecahedron Loudspeaker Nor250

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 Nor-250/260 system performance.

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



Specifications

Sound power output: Using the Nor-280 with pink noise, and equalisation: 120 dB (Lin)

Power rating: 250 W_{RMS} (maximum)

Impedance: 48 Ω, 12 Ω, 5.4 Ω (the latter matches Nor280), specify on order

Dimensions: 415 × 235 [mm] (d × h)

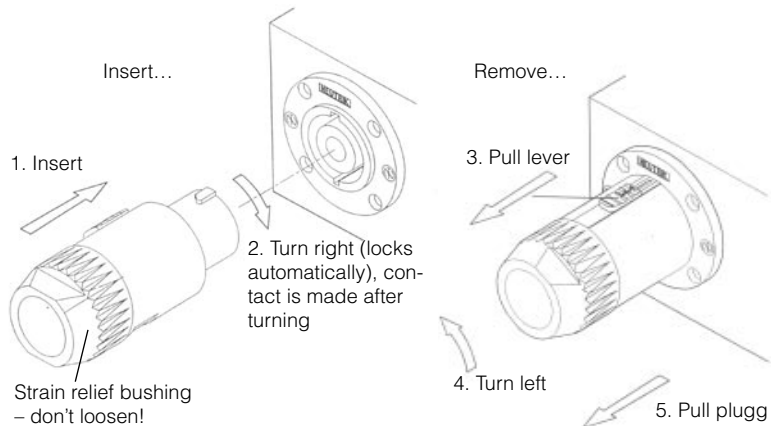
Speakers: 6 × 6.5"

Weight: 11.7 kg (26 lbs.)

Accessories included: Speakon NL4FC plug; 5m assembled cable, if ordered with Nor280

Accessories available: Nor1327A carrying case for Nor250 speaker and Nor280 amplifier

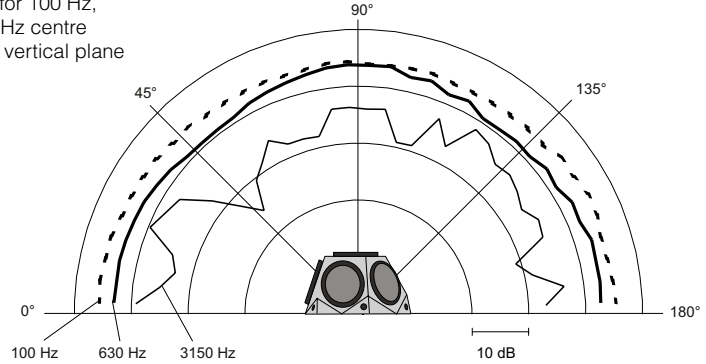
The Nor250 Quick Lock connector...



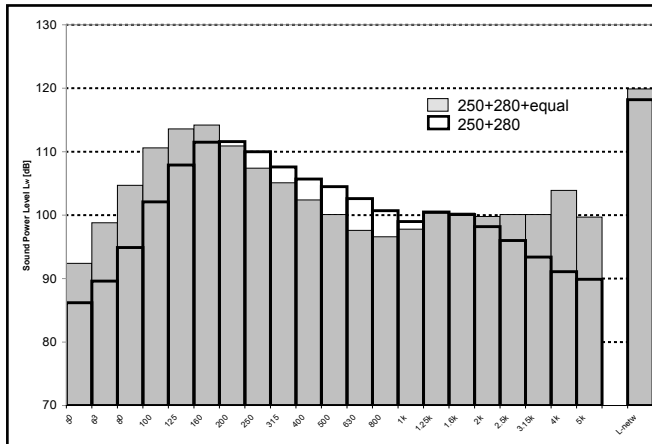


If you need to assemble cable and the Quick Lock connector, connect as follows:
 1+ and 2+ are to be connected together.
 1- and 2- are to be connected together.

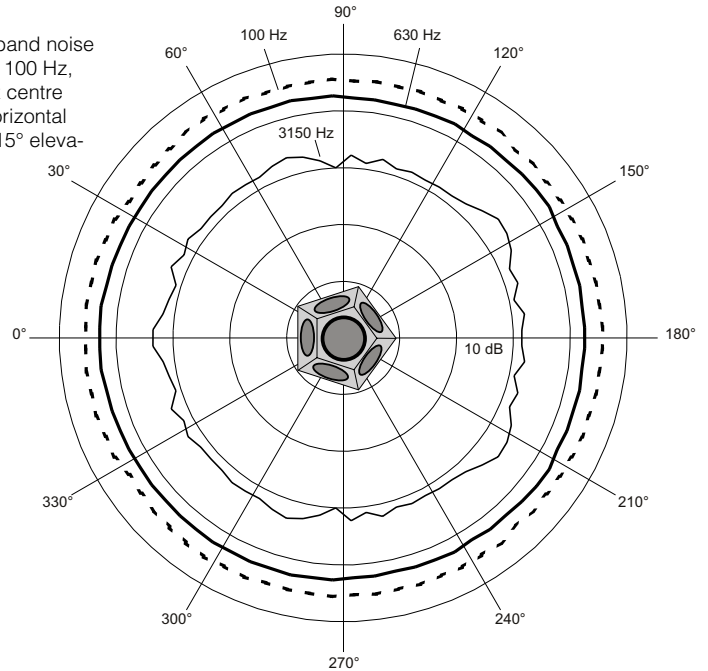
Typical third octave band noise directivity pattern for 100 Hz, 630 Hz and 3 150 Hz centre frequencies in the vertical plane



Typical Nor250 third octave band frequency response when fed with pink noise from the Nor280 power amplifier, with and without the equalisation circuitry activated. Equalisation is used to boost the spectrum extremes for better system performance when used for building acoustics



Typical third octave band noise directivity pattern for 100 Hz, 630 Hz and 3 150 Hz centre frequencies in the horizontal plane, measured at 15° elevation



The Nor280 Power Amplifier

The Nor280 is a rugged, lightweight and powerful class D amplifier. It is specially designed for building acoustics applications. Its output stage is designed to drive almost any type of load.

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. The equalisation network also ensures that it is less than 5 dB difference between two adjacent 1/3 octave bands. 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 1V_{rms} for full power output.
- 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.

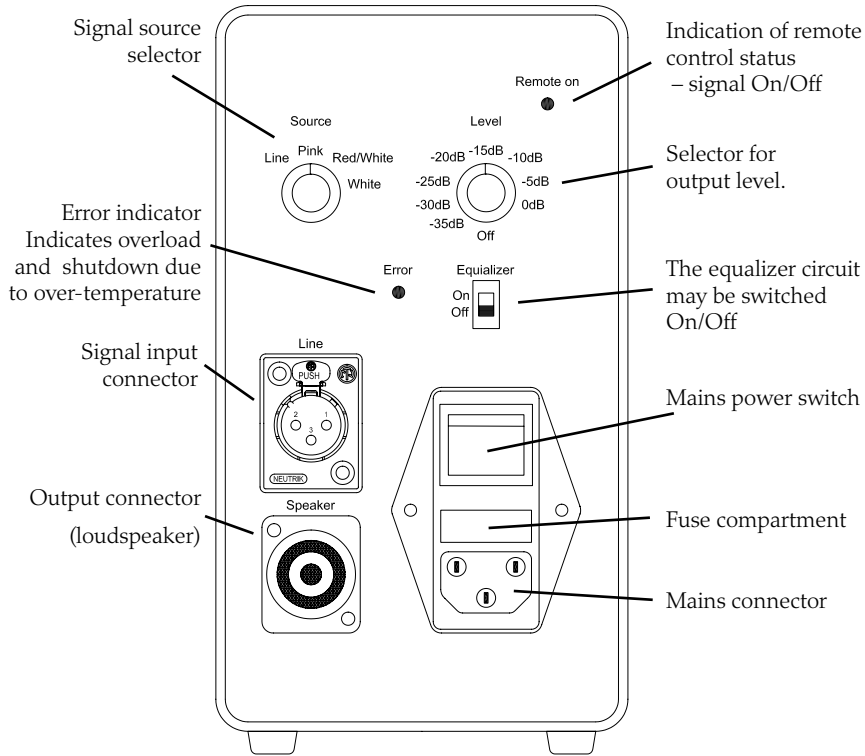
Level selector

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 or Nor270H 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 Nor250, Nor270 and Nor270H loudspeakers. When using other speakers, it is recommended to switch the equalizer off, or use the network with care in order not to damage



Front panel of Nor280

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

Switch on the amplifier and set the signal attenuator to off. Select the noise source or connect the signal input to the amplifier. Connect the amplifier to the speaker.

Caution ! Consult the table on this page 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.

Increase the signal to the desired level. Precaution should be taken against hearing loss – wear hearing protectors!

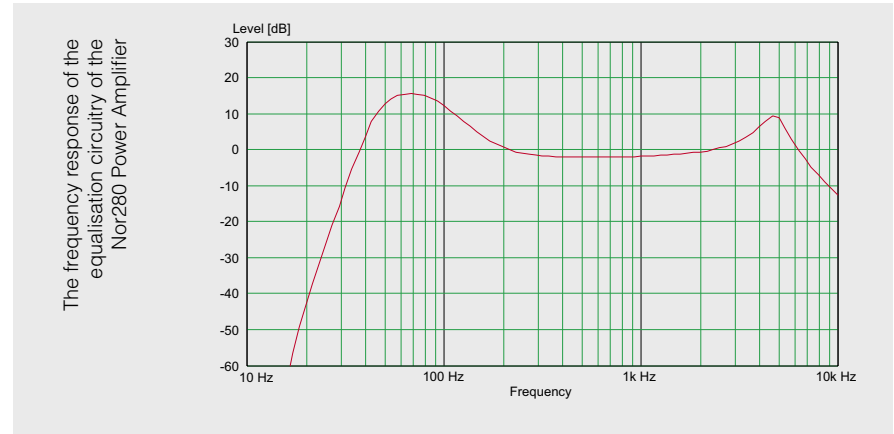
Noise Generator

The built in noise generator is a random type with a repetition rate of ??Hz. 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.

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.



Using Nor-280 with the speakers Nor223/229/250/270/270H

The power amplifier Nor-280 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.

The following settings should **not** be exceeded:

Signal type	Nor223 ¹	Nor229 ²	Nor250/270/270H
White/pink noise	0 dB	-3 dB	0 dB
Octave & third octave filtered pink noise, f < 200 Hz	-3 dB	-6 dB	-3 dB
Octave & third octave filtered pink noise, f > 200 Hz	0 dB	-3 dB	0 dB
Red/white noise with equalisation On/Off	-3 dB/0 dB	-6 dB/-3 dB	-3 dB/0 dB

All dB values are dB re. 1V_{RMS}

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 Nor250 and Nor270 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)
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 acceptably interface 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)

Declaration of Conformity

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

Nor250; Nor270/270H; 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, December 2005

A handwritten signature in black ink, appearing to read 'Dagfinn Jahr'.

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